

SPECIAL ISSUE

Adapting to the challenges of the global pandemic on genetic counselor education: Evaluating students' satisfaction with virtual clinical experiences

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Abstract

Travel restrictions, physical distancing, and limits to clinical placements due to the global pandemic raised enormous challenges for genetic counseling education in 2020. In response, we created authentic virtual clinical experiences in our Master of Genetic Counseling program, mimicking clinical practice: virtual simulation with standardized clients, and virtual clinical placements, including intake calls, triage, consultations, teamwork and time management, and genetic counseling with standardized clients. The virtual clinical experiences involved online pre-brief, simulation, and debrief. We aimed to evaluate students' satisfaction with this learning method. Between April and November 2020, we distributed an anonymous online survey to all participating students using a modified version of a validated satisfaction with simulation scale. We analyzed the combined responses from first- and second-year virtual clinical experiences using descriptive statistics and content analysis. The total number of possible responses was 120. The mean response rate was 68.36% ($n = 82.03$), with a mean of 16.41 participants responding to each survey from each year group. Of the first-year participants, 53% ($n = 10$) had not observed a genetic counseling consultation before attending the virtual clinical placement. Overall, 92.5% of responses indicated that students were satisfied with the virtual clinical experiences ($SD = 0.05$). 100% ($n = 82$) of responses indicated that working with standardized clients was beneficial to learning, encouraged reflection on clinical ability and was a valuable learning experience overall. However, 37.78% ($n = 17$) of those who participated in the virtual simulation found that the use of Zoom detracted from their clinical learning. The virtual clinical experiences increased first-year students' confidence about clinical placement and prepared second-year students for telehealth. In conclusion, the adaptation to virtual clinical experiences enhanced learning for most students, prepared them for practice, met the requirements of the accreditation body and enabled all of our final year students to graduate on time.

KEYWORDS

education, genetic counseling, standardized clients, telemedicine, virtual clinical placement, virtual simulation

1 | INTRODUCTION

The University of Technology Sydney (UTS) Master of Genetic Counseling program involves a blend of synchronous and asynchronous online and face-to-face learning with students located across Australia and New Zealand. Students study at home online, attending clinical placements and on-campus blocks in person (McEwen & Jacobs, 2020).

Master of Genetic Counseling programs in Australasia are accredited by the Human Genetics Society of Australasia (HGSA) Accreditation Committee which requires students to undertake a minimum of 74 days of clinical placement over the two-year program, including 48 days of clinical placement in Year 2 (Human Genetics Society of Australasia, 2019). Clinical placement is defined as an arrangement in which a genetic counseling student is in an environment that provides genetic counseling-related services to real clients. Students can be actively involved in an aspect of genetic counseling practice or they can be observing activities related to genetic counseling (adapted from the UK General Medical Council definition, 2011). Most genetic counseling clinical placements occur at publicly funded clinical genetic services, located in tertiary hospitals across Australia and Aotearoa, New Zealand. Currently in these two countries, there are approximately 300 genetic counselors in clinical practice serving a population of approximately 30 million people (Abacan et al., 2018). This relatively small genetic counseling workforce means that opportunities for clinical placements can be limited by the availability of suitably qualified supervisors.

Simulation with standardized clients has been used to enhance or even in some cases to replace clinical placements, effectively preparing nursing, medical, physiotherapy, occupational therapy, and speech pathology students for practice (Blackstock et al., 2013; Cook et al., 2011; Hayden et al., 2014; Hill et al., 2020; Ward et al., 2014). However, there is little evidence of simulation being used in genetic counseling education (Holt et al., 2013). Simulation involves students working with standardized clients who are actors trained to simulate the psychological, emotional, historical, and physical manifestations of a client (Barrows, 1971). Working with standardized clients encourages learning by watching, thinking, doing, and feeling (Kolb, 1984) and helps to prepare students for clinical placement.

Prior to 2020, counseling and communication learning within the UTS Master of Genetic Counseling program was enhanced by face-to-face simulation in the classroom during the on-campus blocks provided for first- and second-year students in each of the four university sessions in the program (each university year consists of two sessions). In the simulations, students worked with standardized clients and experienced genetic counselors (facilitators) to pre-brief, role play, and de-brief (McEwen & Jacobs, 2020). There was no formal, graded evaluation, or assessment of students' performance in these activities; however, in-depth feedback was provided. Using Pendleton's 'ask then tell' feedback model (Pendleton et al., 1984), facilitators, fellow students and actors provided individual positive feedback and facilitators provided constructive critical feedback to the group.

What is known about this topic

Genetic counseling students require practical clinical experience during their training. Effective simulation-based education has been reported among allied health students; however, little is known about satisfaction with virtual simulation or the use of simulation for educating genetic counseling students.

What this paper adds to the topic

During the pandemic, we developed authentic virtual clinical experiences that mimicked clinical practice and surveyed two cohorts of Master of Genetic Counseling students following these experiences. We found that student genetic counselors were mostly satisfied with learning via virtual clinical experiences.

Travel restrictions and physical distancing as a result of the global pandemic in 2020 severely restricted access to clinical placements for all health professional students and required much post-graduate education to be delivered online across the world. This situation threatened the timely graduation of student genetic counselors. In response, we created authentic virtual clinical experiences that mimicked clinical practice, enabling students to work with standardized clients. The HGSA Accreditation Committee agreed that these virtual clinical experiences, in addition to other activities such as role playing with a genetic counselor in practice, met the HGSA criteria for clinical placement days.

The aim of this study was to evaluate students' satisfaction with virtual clinical experiences informing future genetic counseling education, both during and beyond the global pandemic.

2 | METHOD

2.1 | Procedure for conducting the virtual clinical experiences

We developed two types of virtual clinical experiences: virtual simulations which were adapted from the previously conducted face-to-face simulations (differences between face-to-face and virtual simulations are shown in Figure 1) and virtual clinical placements which were developed specifically to be experienced online. We developed standardized clients for the virtual clinical experiences from real cases with names and identifying details changed to preserve confidentiality. Each virtual clinical experience involved pre-brief, simulated activity and de-brief.

Three virtual simulations were conducted between April and November 2020, one for first-year students (in session 2) and two for second-year students (in sessions 3 and 4, see Table 3). Learning outcomes for first and second-year students in sessions 2 and 3 were

Activity	Face-to face	Virtual	Comments
Whole group pre-brief	In classroom	In Zoom room	Use of the chat function and/ or raise virtual hands to ask questions
Pre-brief in small groups	Pre-brief and pre-simulation activity in the classroom.	Pre-brief in Zoom room, pre-simulation activity in breakout rooms	Each facilitator sets up their own Zoom link enabling breakout rooms to be managed and simulation to be recorded
Simulation	Students welcome client at the door	Students welcome client into the Zoom room	Facilitator manages entry to the Zoom room, turning off their own camera when clients enter and managing the Zoom room in case of internet problems
	Participants are anonymous	Participants names are visible	Facilitator renames actor with client's name before entry to Zoom room
	Observers sit in a semi-circle around role play	Observers turn off cameras and microphones	Turning off cameras and muting observers' microphones helps create the 'fourth wall' effect.
	Simulations are not recorded	Facilitator records each simulation	Recording provides students with the opportunity for further reflection
	Facilitator verbally interrupts when time is up	Facilitator turns on their camera when time is up	By quietly entering the Zoom room the facilitator allows the students to end the session.
	Clients leave the classroom	Clients exit to breakout room	Minimal delay for the next pair (5 minutes allowed for reflection between role plays)
	Reflection in the classroom	Reflection with camera off	Turning off cameras allows students time for quiet reflection
De-brief	Reflection in the classroom	Reflection in the Zoom room	Facilitator reminds everyone to mute their microphones when not speaking to ensure everyone can be heard.

FIGURE 1 Differences between conducting simulation-based education face-to-face and virtually

to (a) establish an effective counseling relationship, (b) elicit personal and sensitive information, and (c) modify communication according to clients' needs. Additional learning outcomes for second-year students in session 4 were to (d) demonstrate advanced communication skills and (e) facilitate understanding, adjustment and adaptation in response to genetic counseling. Whole group orientation was followed by a pre-brief in groups of eight supervised by two facilitators. Students worked in pairs to counsel standardized clients in consultations of 15 min (first and second years) or 30 min (session 4 for second years). Standardized clients were played by professional actors who each received one hour of training and orientation by CJ prior to the virtual simulations. The professional actors in these roles had previously worked in our face-to-face simulations so had experience with playing genetic counseling clients. The de-brief involved each student reflecting on the consultation with positive feedback provided by observing students, actors, and facilitators. Facilitators also provided constructive critical feedback to the whole group.

Two virtual clinical placements were conducted between April and November 2020, one for each year group. The virtual clinical placements took place at the start of session 2 for first years and in the final week of session 4 at the end of the program for second years (see Table 3). Learning outcomes were closely aligned with the clinical placement outcomes and included engaging in the delivery of client-centered genetic counseling. Students worked in teams of six with a supervising genetic counselor for approximately 21 hr over a five-day period to replace three days of clinical placement. Pre-brief involved an introduction to the virtual clinical placement and overview of the week. Simulated consultations (30 min except for the second-year session 4 which was 45 min) were conducted in pairs

with standardized clients played by students from a different cohort or professional staff. 'Actors' were provided with detailed back stories and offered 30 min of online training. Other activities included participating in team meetings, managing organizational tasks, simulated 'on call' queries, triage activities (second-year session 4 only), preparation of a case presentation, participation and reflection on a continuing professional development activity and documentation in a workbook of draft clinic letters, a logbook, and a final reflection. The de-brief involved case presentations, a whole class reflective activity and individual written feedback on the workbook.

This study was approved by UTS Human Research Ethics Committee (ETH19-4023 and ETH2020-5115).

2.2 | Sample and recruitment

Forty-eight students from two cohorts ($n = 24$ per cohort) participated in five virtual clinical experiences between April and November 2020. Students were invited to participate in the evaluation after each virtual clinical experience via an online anonymous survey link.

2.3 | Instrumentation

We used a modified version of the Satisfaction with Simulated Experience Scale (Levett-Jones et al., 2011) consisting of 32 statements, requiring participants to state their level of agreement or disagreement on a 5-point scale (ranging from 1=strongly disagree,

2=disagree, 3=unsure, 4=agree to 5=strongly agree). Statements were grouped into pre-brief, simulated activity, de-brief, and clinical learning (see Table 1). The survey also included five statements designed to evaluate the use of Zoom for the virtual simulation (see Table 4). Clarification questions were asked if participants indicated that the experience was too challenging or the timing of the experience was inadequate. In the evaluation, participants were asked whether or not they had attended a face-to-face clinical placement prior to the virtual clinical placement. Participants were invited to comment on the most important lesson learned, the aspects they found most and least beneficial, and the use of Zoom to work with standardized clients.

2.4 | Data analysis

First, the proportion (n) of statements about which participants strongly disagreed, disagreed or were unsure (not satisfied) and strongly agreed or agreed (satisfied) were calculated for each statement on the Satisfaction with Simulation Scale (Levett-Jones et al., 2011). These calculations were used to determine the mean (SD) proportion for the pre-brief, simulated activity, de-brief and clinical learning and the whole experience overall for the combined virtual clinical experiences, the virtual simulations only, the virtual clinical placements only and for each experience individually.

The statements about Zoom were analyzed separately as these only related to the virtual simulations and were not validated. For these five statements, the proportion (n) of statements about which participants strongly disagreed, disagreed or were unsure (disagreed) and strongly agreed or agreed (agreed) were calculated for each statement and used to determine the mean (SD) for each statement. The mean percentages were calculated for the pre-brief, simulated activity, de-brief and clinical learning to equally weigh satisfaction across all five virtual clinical experiences.

Participants' comments about the most important lesson learned were counted using content analysis (Silverman, 2006). Free text comments were used to elucidate the survey findings.

3 | RESULTS

The mean response rate for the combined virtual clinical experiences was 68.36% ($n = 82.03$, range 80–84). The total number of possible responses was 120. The mean number of participants in each survey from each year group was 16.41 (range 14–21). A mean of 54.48% ($n = 44.8$) of responses were about the virtual simulations only, and 45.52% ($n = 37.2$) of responses were about the virtual clinical placements only. All second-year participants had experience of clinical placement prior to any of the virtual clinical experiences. Of the first-year participants, 53% ($n = 10$) had not observed a genetic counseling consultation before attending the virtual clinical placement due to clinical placements being canceled at short notice during the pandemic. Overall, a mean of 92.5% ($SD = 0.05$, $n = 75.88$), of

responses indicated satisfaction with the virtual clinical experiences. Mean satisfaction with the virtual simulations only was 92.04% ($SD = 0.06$, $n = 41.28$) and with the virtual clinical placements only was 93.05% ($SD = 0.07$, $n = 34.59$). See Table 1 for satisfaction with each statement, Table 2 for satisfaction with the combined virtual clinical experiences, virtual simulations only and virtual clinical placements only, and Table 3 for satisfaction with each individual virtual clinical experience.

3.1 | Pre-brief

On average, 92.25% (range 85.6% to 97.22%, $SD = 4.89$, $n = 76$) of responses indicated that participants were satisfied with the pre-brief for the combined virtual clinical experiences. Mean satisfaction with the pre-brief for the virtual simulations only was 90.21% ($SD = 7.48$, $n = 40.5$) and for the virtual clinical placements only was 94.68% ($SD = 4.67$, $n = 35.5$) (see Tables 1, 2, and 3).

3.2 | Simulated activity

On average, 95.10% (range 91.28% to 98.21%, $SD = 3.64$, $n = 77.8$) of responses indicated that participants were satisfied with the activities for the combined virtual clinical experiences. 100% ($n = 82$) of responses indicated that the activities were beneficial to participants' learning. Mean satisfaction with the activities for the virtual simulations only was 93.56% ($SD = 4.7$, $n = 41.86$) and for the virtual clinical placements only was 96.96% ($SD = 4.2$, $n = 35.88$) (see Tables 1, 2, and 3).

In the virtual simulations, 91.11% ($n = 41$) of responses indicated that students agreed that Zoom allowed students to develop the skills to work online (e.g., via telehealth) (see Table 4). Free text comments supported this finding, for example:

This worked well and was a good opportunity to practice in a telehealth like setting.

(Year 1, session 2, virtual simulation)

Given the current climate, learning to work with clients over telehealth is really important. There are definitely benefits of telehealth but there are also limitations of not having a client in the room in front of you - both of which need a bit of getting used to. I think it's great practice to continue building our skills.

(Year 2, session 4, virtual simulation)

100% ($n = 37$) of responses indicated that the virtual clinical placement helped participants to develop and demonstrate their clinical communication skills. Twenty-seven participants (9 first years and 18s years) had previously participated in a clinical placement. Of these, 100% ($n = 9$) of the first years and 67% ($n = 12$) of the second years commented that

TABLE 1 Participants' satisfaction with each statement on the modified Satisfaction with Simulation Scale: mean percentage (n)

Number	Statement	Satisfied	Not satisfied
Pre-brief			
1*	The facilitators provided adequate orientation to simulation	97.59 (81)	2.41 (2)
2*	The facilitators provided an overview of the scenario	96.39 (80)	3.61 (3)
3*	I had the opportunity to reflect on the given scenario and plan my encounter with the Simulated Client	92.77 (77)	7.23 (6)
4	I found the pre-simulation activity helpful in planning my encounter	81.71 (67)	18.29 (15)
5	I was able to identify what was required of me in simulation during the pre-briefing session	91.46 (75)	8.54 (7)
6	The session provided an opportunity to ask questions	91.46 (75)	8.54 (7)
7	The facilitators made me feel comfortable and at ease during the session	95.12 (78)	4.88 (4)
8	Timing for pre-briefing sessions was adequate	91.46 (75)	8.54 (7)
Simulated activity			
9	Working in the simulated activity created a sense of reality for me	95.12 (78)	4.88 (4)
10	Working in the simulated activity was beneficial to my learning	100.0 (82)	0 (0)
11	Working in the simulated activity enabled me to demonstrate my clinical communication skills	96.34 (79)	3.66 (3)
12	Working in the simulated activity developed my clinical communication skills	96.34 (79)	3.66 (3)
13	Working in the simulated activity developed my ability to work in a team	91.46 (75)	8.54 (7)
14	This was a valuable learning experience	98.78 (81)	1.22 (1)
15*	The facilitator made me feel comfortable and at ease during the session	93.75 (75)	6.25 (5)
16	Timing was adequate	89.02 (73)	10.98 (9)
De-brief			
17	The facilitator provided constructive criticism during the session	85.37 (70)	14.63 (12)
18	The facilitator summarised important issues during the session	91.46 (75)	8.54 (7)
19	Hearing feedback from the team was beneficial to my learning	86.59 (71)	13.41 (11)
20	I had the opportunity to reflect on and discuss my performance during the session	92.68 (76)	7.32 (6)
21	The session provided an opportunity to ask questions	85.37 (70)	14.63 (12)
22	The facilitator provided feedback that helped me to develop my clinical communication skills	84.15 (69)	15.85 (13)
23	Reflecting on and discussing the simulation enhanced my learning	97.56 (80)	2.44 (2)
24*	The facilitator's questions helped me learn	83.95 (68)	16.05 (13)
25	I received feedback during the debriefing that helped me to learn	89.02 (73)	10.98 (9)
26	The facilitator made me feel comfortable and at ease during the session	97.56 (80)	2.44 (2)
27	Timing was adequate	89.02 (73)	10.98 (9)
Clinical learning			
28	The simulated activity caused me to reflect on my clinical ability	100.0 (82)	0 (0)
29*	The simulated activity was not too challenging	84.52 (71)	15.48 (13)
30	Participating in the simulated activity helped me apply what I have already learned	97.56 (80)	2.44 (2)
31	The simulated activity helped me to recognise my clinical strengths and weaknesses	96.34 (79)	3.66 (3)
32*	Overall, this was a valuable experience	100.0 (81)	0 (0)

*The number of participants responding to marked statements was greater or less than 82 indicating that some participants selected not to respond to all statements

TABLE 2 Proportion of satisfied/not satisfied responses to the combined virtual clinical experiences, the virtual simulation and the virtual clinical placement: mean percentage (n)

Type of activity	Virtual clinical experiences combined mean n = 82.03		Virtual simulation mean n = 44.8		Virtual clinical placement mean n = 37.2	
	Satisfied	Not satisfied	Satisfied	Not satisfied	Satisfied mean	Not satisfied mean
Pre-brief	92.25 (76)	7.75 (6.38)	90.21 (40.5)	9.79 (4.38)	94.68 (35.5)	5.32 (2.0)
Simulated activity	95.1 (77.8)	4.9 (4.0)	93.56 (41.86)	6.44 (2.88)	96.96 (35.88)	3.04 (1.13)
De-brief	89.34 (73.2)	10.66 (8.73)	90.47 (40.66)	9.53 (4.27)	87.96 (32.55)	12.04 (4.45)
Clinical learning	95.69 (78.6)	4.31 (3.6)	96.0 (43.0)	4.0 (1.8)	95.36 (35.6)	3.62 (1.4)
Overall	92.5 (75.88)	7.5 (6.16)	92.04 (41.28)	7.96 (3.56)	93.05 (34.59)	6.95 (2.61)

TABLE 3 Proportion of participants satisfied/not satisfied with each virtual clinical experience per year group

Virtual clinical experience (session)	Year group	Date	Total students (n)	Activity	Responses		
					Mean response (n)	Satisfied Mean %	Not satisfied Mean %
Virtual clinical placement (session 2)	1	July 2020	24	Pre-brief	19.5	92.34	7.66
				Simulation	19	98.03	1.97
				De-brief	19	81.82	18.18
				Clinical learning	19.4	97.04	2.96
Virtual simulation (session 2)		Sept 2020		Pre-brief	14	96.43	3.57
				Simulation	14	98.21	1.79
				De-brief	14	95.45	4.55
				Clinical learning	14	98.57	1.43
Virtual simulation (session 3)	2	Apr 2020	24	Pre-brief	16	89.06	10.94
				Simulation	16	91.41	8.59
				De-brief	15.91	86.82	13.18
				Clinical learning	16	97.5	2.5
Virtual simulation (session 4)		Sept 2020		Pre-brief	14.88	85.6	14.4
				Simulation	14.75	91.28	8.72
				De-brief	15	89.7	10.3
				Clinical learning	14.8	92	8
Virtual clinical placement (session 4)		Nov 2020		Pre-brief	18	97.22	2.78
				Simulation	18	95.83	4.17
				De-brief	18	94.44	5.56
				Clinical learning	18	93.33	6.67

the virtual clinical placement provided greater opportunities for hands on practical experience or more autonomy than they had experienced on clinical placement. Comments supported this finding:

(It) was more hands on. While I saw a lot of the components from this week when I was on placement, I didn't understand what or why certain things occurred. Virtual clinical placement solidified my skills and knowledge from class and placement.

(Year 1, virtual clinical placement)

I got to experience very different cases compared to placement. I was also able to prepare more, which was great because it emphasised how much more you learn the deeper you prepare!

(Year 2, virtual clinical placement)

It was a chance to practice running a full consult autonomously in a realistic setup for a more challenging situation than I would tackle on placement

(Year 2, virtual clinical placement)

3.3 | De-brief

On average, 89.34% (range 81.82% to 95.45%, $SD = 4.96$, $n = 73.2$) of responses indicated that participants were satisfied with the de-brief for the combined virtual clinical experiences. Mean satisfaction with the virtual simulations only was 90.47% ($SD = 6.27$, $n = 40.66$) and with the virtual clinical placements only was 87.96% ($SD = 6.66$, $n = 32.55$) (see Tables 1, 2, and 3). For 16.05% ($n = 13$), there was dissatisfaction with the level of feedback with free text comments indicating that some participants wanted individualized critical feedback rather than group feedback, for example:

Some personalized constructive feedback would enable me to have something to work on prior to attending clinical placement.

(Year 1, virtual clinical placement)

When the facilitators gave positive feedback, they did that per pair but more negative (constructive) feedback was given to the whole group generally. I think it would've been more helpful to give this per pair as well, as for me I end up questioning, did I do that?

(Year 2, session 3, virtual simulation)

Following the session 4 virtual simulation, where second-year students were given more detailed feedback in pairs and without other students present, mean satisfaction was 89.7% ($n = 15$) (see Table 3). Several participants commented that the detailed feedback was useful and appreciated, although some wanted more, longer, or written feedback in addition.

3.4 | Clinical learning

On average, 95.69% (range 92.00% to 98.57%, $SD = 6.44$, $n = 78.6$) of responses indicated that participants were satisfied with the clinical learning for the combined virtual clinical experiences. 100% ($n = 82$) of responses agreed with statement 28: 'The simulated activity caused me to reflect on my clinical ability'. However, 15.48% ($n = 13$) of participants agreed with statement 29: 'the simulation was too challenging'. Mean satisfaction with the virtual simulations only was 96.0% ($SD = 4.55$, $n = 43$) and for the virtual clinical placements only was 95.36% ($SD = 8.95$, $n = 35.6$) (see Tables 1, 2, and 3). 100% ($n = 82$) of responses indicated that participating in the virtual clinical experiences facilitated the application of learning as supported by the free text comments, for example:

To not be afraid of asking questions that seem taboo. I've learned it's awkward wording and pre-warning that makes the question seem "taboo", not the question itself.

(Year 1, session 2, virtual simulation)

I think two virtual clinical placements should be done a year! First year and second year, even when Covid doesn't restrict placements. I learned so much from this that I would not have had the opportunity to at placement, and the feeling that it was a safe environment to make mistakes was really beneficial. I was able to give things a go that I would normally have asked for more help on.

(Year 2, virtual clinical placement)

In the virtual simulations, 37.78% ($n = 17$) of responses indicated that students agreed ($n = 5$) or were unsure ($n = 12$) that Zoom detracted from their clinical learning (see Table 4). Free text comments suggested that difficulties with co-counseling via Zoom, the challenges of counseling remotely and remaining engaged for a long period of time online may explain this dissatisfaction, for example:

I found it difficult to navigate working as co-counselors over Zoom. Although we had plenty of time to discuss and plan, it was more difficult to communicate with one another during the sim (not with the client), compared to co-counseling in person.

(Year 1, session 2, virtual simulation)

A tricky combination of seeing two people remotely over zoom and trying to engage them equally in the conversation.

(Year 2, session 4, virtual simulation)

3.5 | Key learning

There were 27 comments from the first years and 45 comments from the second years about the most important lessons learned. Of the first years' comments, 74.07% ($n = 20$) related to participation in the virtual clinical experiences developing confidence in ability, for example:

I learned that I am and will be capable of doing what is required of me in a clinical setting, it really helped to dispel some of my nerves about this.

(Year 1, session 2, virtual clinical placement)

25.93% ($n = 7$) of first years' comments related to the skills learned, such as taking a family history and structuring an intake call in the virtual clinical placement and co-counseling and allowing silence in the virtual simulation, for example:

I learned that silence is okay and its okay to push a bit harder with questions if the client looks uncomfortable try and get them to talk about it.

(Year 1, session 2, virtual simulation)

TABLE 4 Proportion of participants who agreed/disagreed with the additional Zoom statements about the virtual simulation: percentage (n)

Statement	Agreed % (n)	Disagreed % (n)
I felt comfortable with the pre-briefing sessions via Zoom	93.33 (42)	6.67 (3)
Working with the Simulated Clients via Zoom felt authentic	95.56 (43)	4.44 (2)
Working on Zoom enabled me to develop my skills to work online (e.g., via telehealth)	91.11 (41)	8.89 (4)
I felt comfortable with receiving feedback via Zoom	97.78 (44)	2.22 (1)
The simulation via Zoom detracted from my clinical learning	37.78 (17)	62.22 (28)

Of the second years' comments, 68.89% ($n = 31$) related to skills acquisition, such as managing a caseload, administrative tasks and being client-led, for example:

The most important thing I have learned is that counseling skills need to be adapted to suit the client's needs. We can go into the consultation with a plan but we need to be client led as the client's perceptions on results/risk may not always be what we are expecting.

(Year 2, session 3, virtual simulation)

31.11% ($n = 14$) of second years' comments related to raised awareness of their own strengths and weaknesses.

General comments indicated that the virtual clinical experiences were well received:

An interesting experience and one that we may be using more in the future. So, it's good to get used to it and try and adapt to not having the cues we might get from someone if we were sitting in the clinic with them

(Year 2, session 3, virtual simulation)

It would be amazing if virtual clinical placement was incorporated into the curriculum regardless of the circumstances. I think it provides an unbelievable and safe place to practise with clients before normal placement.

(Year 1, virtual clinical placement)

4 | DISCUSSION

Novel virtual clinical experiences developed in response to the global pandemic included virtual simulation and virtual clinical placement. Participants were mostly satisfied with the online pre-brief,

simulated activity, and debrief. However, for some the experience was too challenging, and some wanted individualized critical feedback. Most participants considered the virtual clinical experiences to be challenging and valuable, particularly in preparing for clinical placement or for telehealth; however, some found that the use of Zoom detracted from their clinical learning in the virtual simulation.

The novel virtual clinical experiences involved synchronous interactions with standardized clients without formal assessment, providing students with low stakes, hands on clinical experience in a safe environment. While randomized controlled trials have been conducted comparing traditional learning with virtual patients (Reger et al., 2020; Stevens et al., 2006), these virtual experiences have tended to focus on asynchronous, computerized simulation (Kleinheksel, 2017). The use of virtual clinical placement experience appears to be a novel concept in the education of health professional students. A nursing study described some similar concepts in the context of creation of a virtual health system for leadership clinical experiences, involving students working in teams on a virtual case within a virtual healthcare system (Ross & Crusoe, 2014). A virtual student placement model, also developed in response to COVID-19, has been described for physiotherapy students (Twogood et al., 2020). While several studies have evaluated the use of simulation with standardized clients on healthcare students' learning (Blackstock et al., 2013; Cook et al., 2011; Hill et al., 2020; Ward et al., 2014), there is little previous evidence of the use of simulation in the education of genetic counseling students (Holt et al., 2013) or of virtual simulation with standardized clients in the education of healthcare students generally (Twogood et al., 2020).

Participants were for the most part satisfied with the pre-brief, simulated activity, de-brief, and clinical learning from these virtual clinical experiences. A few participants documented that they found the simulated activity too challenging, although did not expand on the reasons for this when invited. It is possible that this response may have been due to the difficulty of the scenarios rather than the learning environment. Dissatisfaction with the debrief was most likely due to the desire among a number of participants for more critical individualized feedback which was not provided in sessions 2 and 3. Individualized feedback was provided to the second years in session 4 (for both the virtual simulation and the virtual clinical placement). However, the mean satisfaction with the debrief for this session was no higher than for the other virtual simulation. Our UTS Master of Genetic Counseling students complete a large number of counseling role play assessment tasks throughout the program for which we provide individualized written feedback. While students with high self-efficacy have a positive attitude to feedback and are highly motivated to learn and develop and respond well to constructive criticism (Clynes & Raftery, 2008; Rowbotham & Owen, 2015), those with low self-efficacy might find feedback challenging. There is therefore a fine balance between providing useful feedback and damaging the student's confidence and self-esteem. In addition, providing individualized feedback is time-consuming for facilitators.

Importantly, the students were comfortable with all aspects of the simulation via Zoom including the de-brief, suggesting that virtual clinical experiences may be a useful learning method even beyond the 2020 pandemic. This finding concurs with those of a systematic review of the effectiveness of digital education on medical students' communication skills compared with traditional learning which found that blended digital education was at least as effective as, and potentially more effective than, traditional learning for communication skills and knowledge (Kyaw et al., 2019).

The virtual clinical experiences increased first-year students' confidence about clinical placement and prepared second-year students for telehealth. However, Zoom detracted from clinical learning for some. Comments made by participants about the challenges of counseling via Zoom reflect the barriers identified by genetics health professionals to the use of telegenetics (genetic counseling via telehealth), including the inability to observe nonverbal communication, limitations to psychosocial counseling, difficulty with building rapport and lack of social interaction with colleagues (Zierhut et al., 2018; Zilliacus et al., 2010). Telehealth is frequently used in genetic counseling, especially in countries such as Australia where many clients live in remote areas without easy access to a clinical genetics service. Clients' experiences of telegenetics are largely positive (Orlando et al., 2019; Zilliacus et al., 2010), making it likely that genetic counselors' exposure to telegenetics will increase after the pandemic. Building the capacity of student genetic counselors to work with telehealth is therefore vital.

Randomized trials with other health professional groups have concluded that simulation in the classroom environment is not inferior to clinical placement and can effectively replace up to 25% of traditional clinical placement without loss of competency (Hill et al., 2020). Our findings suggest that genetic counseling students are satisfied that virtual clinical experiences help them to develop their clinical skills and that this learning method may continue to be of value beyond the pandemic. However, further research is needed to understand the impact of virtual clinical experiences on the confidence and competence of graduating students entering the workplace.

4.1 | Study Limitations

This small evaluation involved only one center and two cohorts of students at different stages in their education. It is important to note that all participants were familiar with Zoom prior to the pandemic, which may have influenced their satisfaction with learning via this medium.

5 | CONCLUSION

Incorporating innovative and authentic virtual clinical experiences into the curriculum during the pandemic enabled all of our final year students to graduate on time. Students were satisfied that the virtual

clinical experiences helped develop their clinical skills and prepared them for practice. We will continue to provide virtual clinical experiences to students undertaking the UTS Master of Genetic Counseling beyond COVID-19. Further research is needed to evaluate the impact of virtual clinical experiences on students' confidence and competency.

AUTHOR CONTRIBUTIONS

Author Jacobs conceived of and led the virtual simulation, and the evaluation study. Author McEwen conceived of and led the virtual clinical placements. Authors Jacobs and McEwen both meet the ICMJE criteria for authorship. Authors Jacobs and McEwen confirm that they had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All of the authors gave final approval of this version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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COMPLIANCE WITH ETHICAL STANDARDS

CONFLICT OF INTEREST

All Authors declare that they have no conflict of

HUMAN STUDIES AND INFORMED CONSENT

This study was approved by and conducted according to the ethical standards of University of Technology Sydney Human Research Ethics Committee (HREC). All applicable international, national, and/or institutional guidelines were followed. No informed consent was required from subjects as data were collected anonymously and completion of the online survey was accepted as consent to participate.

ANIMAL STUDIES

No non-human animal studies were carried out by the authors for this article.

DATA SHARING AND DATA ACCESSIBILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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