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## REVIEW ARTICLE



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# The use of simulation in occupational therapy education: A scoping review

Terri Grant<sup>1</sup>  | Yvonne Thomas<sup>1</sup> | Peter Gossman<sup>1</sup> | Liz Berragan<sup>2</sup><sup>1</sup>University of Worcester, Worcester, UK<sup>2</sup>University of Gloucestershire, Gloucestershire, UK**Correspondence**

Terri Grant, University of Worcester, Henwick Grove, St Johns, Worcester WR2 6AJ, UK.

Email: [t.grant@worc.ac.uk](mailto:t.grant@worc.ac.uk)**Abstract**

**Introduction:** Simulated learning experiences are a common feature of many health professions' pre-registration curricula. However, the use of simulation within occupational therapy is still largely undefined. This scoping review seeks to identify and summarise the available evidence exploring the use of simulation within occupational therapy pre-registration education.

**Methods:** A search was conducted in four databases for articles published between 2009 and 2020 to identify international literature relevant to the use of simulation within occupational therapy education. Articles were evaluated using the appropriate Critical Appraisal Skills Programme (CASP) tool and key features and benefits of current simulation education were identified using thematic analysis.

**Results:** A total of 32 papers were included within the review. Four themes were identified and explored: simulation methods, authenticity, global approaches to simulation, and relationship to practice education.

**Conclusion:** Simulation is taking place in many different forms within occupational therapy internationally. It is positively received by students and may provide an effective replacement for practice education if focussed on professional standards and competencies. Further research into the potential effectiveness of simulation in relation to practice learning is indicated.

## 1 | INTRODUCTION

The importance, effectiveness, and satisfaction of using simulation as an adjunct to teaching across the medical and allied health professions have been widely discussed (Hellaby, 2013). A variety of literature supports the benefits of simulation to undergraduate education in nursing, medicine, and physiotherapy, among other professions (Buckley et al., 2012). The links to social transaction in the formation of professional identity and situated learning, and the importance of contextual information in student learning has led nursing to consider simulation as a pedagogy in its own right

(Berragan, 2011). However, it is important to recognise that different health professions require different skill sets, as evidenced by variations in the standards of proficiency set forth by professional and regulatory bodies.

Occupational therapists whose only experience of simulation is the use of mannequins for the practice of cardiopulmonary resuscitation may question relevance to the profession. Defined as a hypothetical opportunity that incorporates an authentic representation of reality, facilitates active student engagement, and integrates the complexities of practical and theoretical learning with opportunity for repetition, feedback, evaluation, and reflection (Bland et al., 2011) simulated

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learning has much greater potential than mannequin use would suggest. However, the occupational therapy profession has not been forthcoming in integrating such methods into regular practice (Bennett et al., 2017).

The substitution of simulated learning for practice education in occupational therapy is also comparatively new, with Australian students permitted to undertake up to 20% of the required 1,000 hours of practice education with a “well-designed simulation experience” (OTC, 2013, p. 13) and British pre-registration education programmes able to replace up to 40 of their 1,000 hours (4%) with simulated practice. Although the precise design and delivery of simulated practice is not defined, Imms et al. (2017) suggest an experience offering high levels of authenticity and complexity which should directly replicate real placement interactions, and should be assessed in a similar manner.

Noting the absence of systematic reviews and the limited previous literature reviews (Bennett et al., 2017; Yeung et al., 2013), this scoping review seeks to explore the evidence base for simulated learning currently being used within the occupational therapy profession.

## 2 | METHODS

The scoping review was undertaken following the six-step methodological framework identified by Levac et al. (2010) as follows:

1. Identify the research question
2. Identify relevant studies
3. Select studies
4. Chart data
5. Collect, review, & summarise results
6. Consultation

In order to develop a clear picture of the current use of simulation within occupational therapy education, this review sought to include both an understanding of the types of simulation currently used in occupational therapy education and an exploration of the evidence base to support its use. The research question identified to guide the review was “What is the evidence that simulation is being used as an educational approach within pre-registration occupational therapy education?”

Searches for full-text articles using the terms Occupational Therap\* AND simulation AND education were carried out using the Cumulative Index for Nursing and Allied Health Literature (CINAHL), MEDLINE, PsycINFO®, and Academic Search Complete for the period 2009–2019 yielding a total of 112 results, with a further five papers identified from reference searches. The 10-year search period was selected to ensure that current practice was being reviewed,

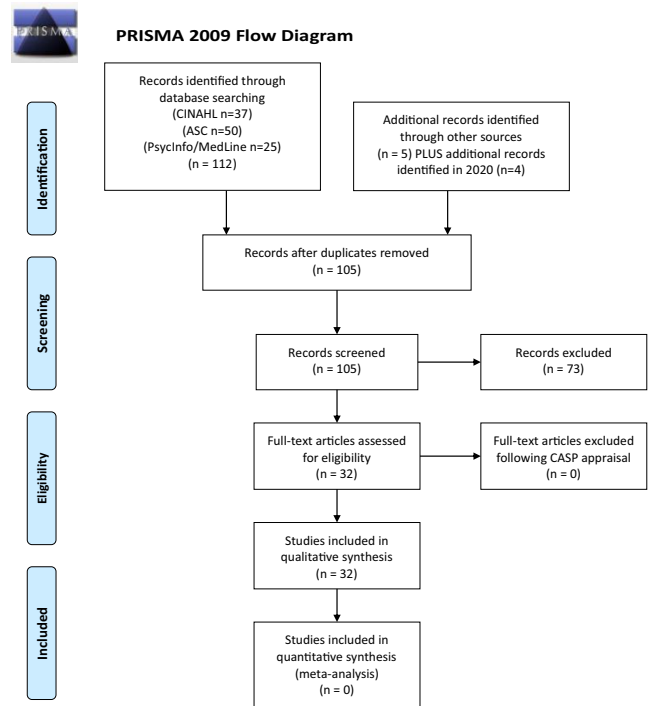


FIGURE 1 Search process

in recognition of this rapidly developing area of practice. A pre-publication update to include papers published in 2020 identified four additional papers bringing the total to 121.

Study titles and abstracts were reviewed by one author using the PICOT model (Aveyard & Sharp, 2013) to ensure relevance, leading to the removal of duplicates ( $n = 16$ ), conference abstract ( $n = 1$ ), and the elimination of a further 72 papers where the focus of study was not the pre-registration education of Occupational Therapy students. Excluded results included papers focussed on other allied health professions where Occupational Therapy students did not participate, studies in which the simulation was used as a client intervention, and studies where simulation was used to train qualified health professionals. The remaining papers ( $n = 32$ ) stood up to scrutiny using the appropriate CASP checklist (CASP Checklists, 2019), although variation in relation to rigour was noted and reported on where appropriate. This meant that no further selection process was required (Figure 1).

Data charting took place in line with Arksey and O'Malley's (2005) narrative review. Key information regarding author geography, type of simulation, type of study, and results was extracted via an iterative process; re-reading papers on multiple occasions to ensure that all the relevant data were extracted. Use of CASP identified the methodology used by each study, evaluated its appropriateness for the topic, and ensured that analysis was sufficiently rigorous to warrant inclusion. Studies from a wide range of sources, including Occupational Therapy-specific journals, inter-professional education journals teaching publications, and health condition-specific publications, were included. An

inclusive approach was taken with respect to study methods, which are identified below.

The collation and summarising of results was completed by the primary author. Results are reported following Levac et al.'s (2010) recommendations of numerical summary, thematic analysis, and implications of findings.

Consultation took place with the additional authors throughout the process of reviewing literature, primarily during stages 4 and 5. All authors were instrumental in supporting the verification of the appropriateness of themes and findings in the context of the current simulation discussion within other health-care professions.

### 3 | STUDY METHODS

Of the 32 studies identified, 26 reported primary research, with seven using a solely quantitative methodology, including one randomised controlled trial, nine using a combination of quantitative and qualitative measures in various forms, and ten approaching the subject from a qualitative perspective only (see Table 1). A total of 24 studies carried out post-simulation evaluations, of which four also incorporated pre-test findings. Most studies were carried out with students immediately following the simulation experience, although one assessed students' views post-qualification. Twenty two of these studies focussed on student perceptions with ten attempting to quantify these perceptions and six also measuring outcomes using a variety of methods. One comparative cohort study did not include student evaluations and one study reported on the opinions of faculty members on the use of simulation.

Remaining literature included two literature reviews (Bennett et al., 2017; Yeung et al., 2013) and two descriptions or recommendations of simulation methods and processes without analysis (Shea, 2015; Treadwell & Havenga, 2013). One national survey of the use of simulation in practice (Bethua et al., 2014) and one protocol paper for a randomised controlled trial (Imms et al., 2017) were included.

Of the literature identified, 20 papers reported on simulation for occupational therapy students alone, whereas the remaining 10 included occupational therapy students as part of an inter-professional group with other students from medical, nursing, pharmacy, physiotherapy, speech and language therapy, dietetics or architecture courses.

### 4 | THEMATIC ANALYSIS

Thematic analysis of results followed Braun and Clarke's (2006) steps. Initial codes were collated and grouped into potential themes and further reviewed and refined

until the final themes of types of simulation, authenticity, global approaches, and relationship to practice education were defined to allow for synthesis of findings of student perception.

#### 4.1 | THEME 1: SIMULATION METHODS

The review found that various methods of simulation have been used in pre-registration education, and an overview of different methods is provided in Table 2. Simulation methods were divided into interactive simulation, in which students engaged with simulated patients, mannequins, or virtual reality systems, and non-interactive simulation, where the student receives a video- or text-based case study.

##### 4.1.1 | Interactive simulation

The most frequently reported method was that of standardised or simulated patients. This simulation modality takes the form of a patient or client being portrayed by an appropriately trained individual (Velde et al., 2009), often following a standardised script or protocol. Although these are frequently played by medical actors, there is some reference to lecturers (Bradley et al., 2013; Sabus et al., 2011) taking on these roles in order to reduce cost. Role play, in which the role of the patient is played by a classmate or staff member, was considered less authentic by students (Vuuren, 2016). The authenticity of interactive methods using standardised or simulated patients was identified as a key factor in the success of simulation (Cahill, 2015; Gibbs et al., 2017; Giles et al., 2014; Haracz et al., 2015; Vuuren, 2016).

One study explored the use of people with stable chronic medical conditions, known as expert patients, concluding that students' ability to practice in a client-centred way was enhanced following this activity (Cameron & McColl, 2015). However, the lack of structured learning strategies during the interactions with expert patients suggests they may not be characterised as simulated learning.

The use of mannequins, discussed in five papers, appears more common in North America, with no studies from other countries involving this form of simulation (Gibbs et al., 2017; Ozelie et al., 2016; Reichl et al., 2019; Thomas et al., 2017; Zamjahn et al., 2018). Mannequin simulation appears to be common practice within other healthcare professions (Evans et al., 2019) and comprises a range of equipment from, at its most basic, part-task models which allow students to practice one specific task, through to human simulators which take the form of full-body human mannequins equipped with sensors to simulate changes in homeostatic functions.

TABLE 1 Origin and type of study

| Year | Country of publication | Author                | Study design                   | Focus                                |
|------|------------------------|-----------------------|--------------------------------|--------------------------------------|
| 2009 | USA                    | Velde et al.          | Post-sim evaluation            | Student perception                   |
| 2011 | USA                    | Sabus et al.          | Post-sim evaluation            | Student perception                   |
| 2011 | USA                    | Shoemaker et al.      | Post-sim evaluation            | Student perception                   |
| 2013 | UK                     | Bradley et al.        | Post-sim evaluation            | Student perception                   |
| 2013 | Africa                 | Treadwell and Havenga | Recommendations for practice   | N/A                                  |
| 2013 | Aus                    | Watchorn et al.       | Pre-post test                  | Student perception                   |
| 2013 | Canada                 | Yeung et al.          | Literature review              | N/A                                  |
| 2014 | USA                    | Bethea et al.         | National survey                | Sim types used by HEIs               |
| 2014 | USA                    | Giles et al.          | Post-sim evaluation            | Student perception                   |
| 2014 | USA                    | Shoemaker et al.      | Post-sim evaluation            | Student perception                   |
| 2015 | USA                    | Cahill                | Post-sim evaluation            | Student perception                   |
| 2015 | Aus                    | Haracz et al.         | Post-sim evaluation            | Student perception                   |
| 2015 | USA                    | Shea                  | Recommendations for practice   | N/A                                  |
| 2016 | USA                    | Ozelie et al.         | Comparative cohort study       | Measure of effectiveness             |
| 2016 | Africa                 | Pitout et al.         | Post-sim evaluation            | Student perception                   |
| 2016 | Africa                 | Vuuren                | Post-sim evaluation            | Student perception                   |
| 2017 | Aus                    | Bennett et al.        | Literature review              | N/A                                  |
| 2017 | Canada                 | Gee et al.            | Post-sim evaluation            | Student perception                   |
| 2017 | USA                    | Gibbs et al.          | Post-sim evaluation            | Student perception                   |
| 2017 | Aus                    | Imms et al.           | Proposal                       | N/A                                  |
| 2017 | Canada                 | MacKenzie et al.      | Post-sim evaluation            | Student perception AND effectiveness |
| 2017 | USA                    | Thomas et al.         | Pre-post test                  | Student perception AND effectiveness |
| 2018 | Aus                    | Imms et al.           | RCT                            | Measure of effectiveness             |
| 2018 | Aus                    | Lewis et al.          | Post-sim evaluation            | Student perception AND effectiveness |
| 2018 | Canada                 | Mackenzie et al.      | Post-sim evaluation            | Student perception                   |
| 2018 | Aus                    | Springfield et al.    | Pre-post test                  | Student perception                   |
| 2018 | USA                    | Zamjahnet al.         | Pre-post test                  | Student perception                   |
| 2019 | Aus                    | Mills et al.          | Post-sim evaluation            | Student perception AND effectiveness |
| 2019 | USA                    | Reichl et al.         | Post qualification reflection  | Student perception                   |
| 2019 | USA                    | Walls et al.          | Post-sim evaluation            | Student perception AND effectiveness |
| 2020 | South Africa           | Van Wyk et al.        | Quantitative descriptive study | Faculty perception                   |
| 2020 | USA                    | Wu and Shea           | Post-sim evaluation            | Student perception                   |

Virtual reality (VR) in which an entire virtual environment is created was also evaluated positively though less frequently used (Sabus et al., 2011; Watchorn et al., 2013). Sabus et al. (2011) built a training environment within the SecondLife® platform to enable students to carry out a virtual home assessment for a simulated patient who was played

by a staff member. Watchorn et al., (2013) utilised the same platform to enable students to practice principles of inclusive design. Both studies found that using the platform was not entirely intuitive and students needed time to learn to use it effectively before participating in the simulation. In addition, the single virtual environment described by Sabus

**TABLE 2** Interactive and non-interactive simulation techniques

| Type of Simulation                   | Characteristics  | Author(s)   | Benefits  | Limitations  |
|--------------------------------------|--|---|---|--|
| Interactive simulation               |  |   |   |  |
| Standardised patients (SP)           | Students interview "patients" who are NOT played by students or staff<br>Scenario set by educators<br>Patients trained in scenario<br>Patients give feedback | Velde et al. (2009)<br>Shoemaker et al. (2011)<br>Treadwell and Havenga (2013)<br>Giles et al. (2014)<br>Cahill (2015)<br>Haracz et al. (2015)<br>Pitout et al. (2016)<br>Thomas et al. (2017)<br>Springfield et al. (2018)<br>Imms et al. (2018)<br>Walls, Fletcher and Brown (2019) | Good mimic of "real" situation<br>Fidelity can be enhanced by careful planning of the environment, use of appropriate moulage and dress (Treadwell & Havenga, 2013)<br>Interaction can be recorded for self-analysis by student<br>Low technology, high fidelity (Shoemaker 2011)<br>Additional feedback route (SP can provide feedback on student performance)   | Patients require training (although medical schools may already use SPs)<br>Ongoing cost to pay SPs<br>SPs need to be appropriately skilled to demonstrate real emotions, and express the needs, expectations and fears of a patient.  |
| Mannequins and/or part-task trainers | Use of computer aided mannequins that mimic physiological responses  | Gibbs et al. (2017)<br>Ozelle et al. (2016)<br>Thomas et al. (2017)<br>Zamjahn et al. (2018)<br>Reichl et al. (2019)  | Reduced risk to people<br>Opportunities to develop awareness of other professions skill set   | Availability and cost of mannequins<br>Relevance to Occupational Therapy   |
| Virtual environment                  | SecondLife®<br>Users interact (through computer hardware and software) in an environment without physically being in it                                      | Sabus et al. (2011); Watchorn et al. (2013)   | Students can practice risky tasks without putting an actual patient's well-being in jeopardy.<br>Fully customisable<br>Temporal control (can recreate past and future)<br>SecondLife® is free<br>Allows for low-risk but sensitive activities such as end of life conversations<br>All students can access the same environment (or not)<br>Areas can be set to restricted view so only students can access | Land has a cost implication in SecondLife® (although not expensive)<br>Time to build appropriate resource(s)<br>Requires a staff member to role-play the client<br>Not as useful as real-life simulations (Watchorn et al., 2013)<br>Steep learning curve in achieving basic proficiency in SecondLife® - high levels of attrition |
| Expert patients                      | People with real but stable conditions interact with students  | Cameron and McColl (2015)   | Minimal cost<br>Students gain exposure to individuals who have not been trained in how to interact with them<br>Puts the client at the centre of the experience<br>Students experience people with real health conditions   | This particular study does not constitute simulation as no attempt was made to replicate a "real-life" therapy situation (no part of the OT process was replicated)  |

(Continues)

TABLE 2 (Continued)

| Type of Simulation              | Characteristics  | Author(s)  | Benefits   | Limitations  |
|---------------------------------|--|--|--|--|
| Team simulations                | Students use stimuli such as written case reports, client notes, video footage, virtual cases<br>The simulation occurs in the form of an interprofessional meeting | Shoemaker et al. (2014)<br>MacKenzie et al. (2017)<br>Mills et al. (2019)            | Minimal cost<br>Prepared materials can be re-used<br>No additional training required   | Could be argued that this is not simulation at all but simply IPL<br>Scheduling and curriculum alignment challenges                          |
| Role play                       | Students interview patients who are played by staff or other students  | Bradley et al. (2013)<br>Vuuren (2016)<br>Lewis et al. (2018)<br>Mills et al. (2019) | Minimal cost<br>Enhance fidelity by making environment as realistic as possible<br>Provides a role in the simulation experience for more students                            | Lack of fidelity/realism   |
| Non-interactive simulation      |  |  |  |  |
| Computer based virtual case     | Virtual patient based on case study information available electronically   | Shoemaker et al. (2014)  | Helps students from different programmes to collaborate<br>Commercially available<br>Similar findings to those of large IPE Sims<br>Less resource-intensive                  | Software needs to be edited to provide appropriate information for OT assessment<br>Reduced authenticity/fidelity                            |
| Video case studies or scenarios | Written or video resources are created to provide students with as much information as possible about the client   | Lewis et al. (2018)<br>Mills et al. (2019)   | Students are able to make observational assessments rather than relying on others' interpretation<br>Allows students to observe other professionals interacting with clients | Are case studies really simulation? What is being simulated here? There appears to be few or no links to simulation identity                 |
| Written case studies            | Written resources are created to provide students with as much information as possible about the client  | Identified in an extensive literature review by Bennett et al. (2017)                | Low cost   | Are case studies really simulation? What is being simulated here? There appears to be few or no links to simulation identity<br>Low fidelity |
| Real-life simulation            | Students simulate impairments in function on themselves (ie, wheelchair use, visual impairment, GERT suits)  | Watchorn et al. (2013)   | Students found helpful to make theoretical learning real<br>Provided a social and emotional element to student learning  | Unable to gain service user feedback or perception on activity   |

et al. (2011) took a team of staff approximately 50 hours to develop, suggesting that the time and effort required to develop and use SecondLife® may make such a system impractical. Although only two included studies used VR, it was noted that several excluded papers used this modality when working directly with clients.

Results from all studies suggest that students find the use of simulated patients, along with mannequin simulation, to be a valuable addition to their learning.

#### 4.1.2 | Non-interactive simulation

The review identified a number of common methods to convey information about a 'client' to students. Bennett et al.'s (2017) extensive literature review identified a number of papers using paper-based case studies, in which students read about a person's needs and challenges, and video-based case studies, in which students may observe the individual either talking about, or carrying out, occupations which they wish to develop. Case studies have been challenged as lacking the richness and challenges provided by interactive simulation (Bennett et al., 2017). Whether case studies in any format meet the definition of simulated learning is a debate that is wider than the scope of this report, and it is recognised that there exists a wide range of literature using these methods which is not identified as simulation and therefore not identified as part of this review. Nevertheless, studies defining case study methods as simulation were noted to provide valuable opportunities for inter-professional learning, enhanced communication, and team functioning (Gee et al., 2017; Lewis et al., 2018; Mackenzie et al., 2018; Mills et al., 2019).

#### 4.2 | THEME 2: AUTHENTICITY

There is consistent agreement within the literature that for simulation to be effective, a high level of authenticity, described as fidelity, is required (Shea, 2015). Discrepancies exist between authors about what constitutes a high-fidelity learning environment, with realism being described by varying authors as being achieved by the use of technological equipment and by the use of simulated patients, although not within the same studies.

Gibbs et al. (2017) utilise the terminology 'high-fidelity' to describe computerised human simulators. The mannequin studies identified in this review utilise sophisticated technology-enhanced mannequins that reproduce physiological responses such as changes in heart rate, pulse, and oxygen saturation to enhance the realism of the situation. Students stated that they preferred the mannequin simulation to that of a classmate because the mannequin is unable to

unintentionally help them out, although no comparisons are drawn between mannequins and actors (Gibbs et al., 2017).

Psychological fidelity, the degree to which the simulation mimics the real task, is considered of greater importance than engineering fidelity, the degree to which the equipment reproduces physiological changes, by Bradley et al. (2013). Development of communication skills and empathy, which students identified as beneficial within simulated patient studies (Bennett et al., 2017; Giles et al., 2014; Pitout et al., 2016; Shoemaker et al., 2011), has not been explored in relation to fidelity and may not be supported by mannequin-based learning. Bradley et al. (2013) suggest that the mannequin simulations often referred to as 'high fidelity simulation' may lack relevance to the occupational therapy profession, although there is evidence that they are used successfully within North America (Ozelie et al., 2016; Thomas et al., 2017; Zamjahn et al., 2018).

#### 4.3 | THEME 3: GLOBAL APPROACHES TO SIMULATION

North American authors were responsible for over half of the identified literature ( $n = 18$ ), of which 14 were based in the United States and four in Canada. Eight papers by Australian authors were included, and small numbers of papers were found by African ( $n = 3$ ) and British ( $n = 1$ ) authors. Differences are noted between locations in both the types and purpose of simulation experiences which may be reflective of the different health-care systems.

Despite a national study of Higher Education Institutions in the United States reporting that the most frequently used simulation methodology is the standardised patient – a person trained to play the role of a patient or carer – (Bethea et al., 2014), the literature suggests that occupational therapy education in America focusses on using simulation to expose students to medical emergencies and medically complex environments, using elements of mannequin simulation. Thomas et al. (2017) and Gibbs et al. (2017) simulated the intensive care unit experience with a combination of mannequin and human simulators, whereas Ozelie et al. (2016) included a mannequin-based medical emergency as one of four simulations. Results from Canadian authors identify only the use of a case-study approach to simulation (Gee et al., 2017; MacKenzie et al., 2017).

The African studies identified contribute to the evidence base from pre-post evaluative methodologies of simulated patient studies (Pitout et al., 2016; Vuuren, 2016) and considered faculty perceptions of similar simulations (Van Wyk et al., 2020), and the only British study included unitised a post-simulation evaluation of role play.

Australian literature spans a breadth of types of simulation ranging from non-interactive simulation using video

case studies (Lewis et al., 2018; Mills et al., 2019) through pre-post evaluation using both simulated patients and mannequins (Springfield, Honnery, & Bennett, 2018) to a simulated clinical placement (Imms et al., 2018). The most recent studies from Australia explore the relationship with practice learning (Chu et al., 2019; Imms et al., 2017, 2018), and include the only randomised controlled trial (Imms et al., 2018).

#### 4.4 | THEME 4: RELATIONSHIP TO PRACTICE EDUCATION

The relevance of simulation to practice learning appears inherent, given the intention to replicate practice in a safe and controlled environment to facilitate the application of learning (Cant & Cooper, 2010). Despite this, the relevance of simulation to students' placement experience is only discussed explicitly in three papers. Giles et al. (2014) identify simulation as a well-received assessment tool to ensure students' readiness for practice, in line with a national requirement in the United States for examination before the commencement of 'Fieldwork II', the placement which US students undertake at the end of their academic programme. This study identified a desire by students to increase the amount of simulation available throughout the curriculum but noted the relative resource intensiveness. Ozelie et al. (2016) explore the impact of simulation on practice placement grades, again focussing on Fieldwork II, finding no benefit to grades.

Only one study directly comparing simulated learning with practice-based learning was identified (Imms et al., 2018), with this group of authors contributing significantly to the evidence base (Chu et al., 2019; Imms et al., 2017, 2018). This study concludes that the use of a clearly defined simulated placement, designed with attention to authenticity and complexity, in comparison with a traditional placement of the same 40-hour duration within the early years of a pre-registration occupational therapy programme is equally effective in enabling students to meet their prescribed learning outcomes. Chu et al. (2019) recognise that design of the placement in line with nationally agreed standards could provide reassurance to students, clinicians, and educators that simulation is effective in replacing practice education.

### 5 | FINDINGS

#### 5.1 | Qualitative findings

The majority of identified papers ( $n = 25$ ) investigate students' perceptions of the simulation experience. Results from these studies all identify a positive perception of the simulation experience by students and provide good evidence to suggest that simulation is of value within the Occupational

Therapy pre-registration curriculum. No studies identified a negative perception, and although feedback was given by students on ways to improve the experience in all studies, this tended to relate to timing of feedback (Vuuren, 2016), whether the students felt that their classroom learning prepared them for the simulation (Mills et al., 2019) and other issues specific to the study environment.

The key findings of these studies can be synthesised to enhance understanding of the ways in which simulation is perceived as beneficial. Based on these studies, simulation has been demonstrated to enhance professional identity and develop inter-professional knowledge, improve communication skills, increase critical thinking and decision making, and develop confidence, autonomy, and self-efficacy.

There is good evidence to support the value of simulation to enhance inter-professional learning with eight studies investigating student perceptions of different simulation methods for developing inter-professional practice skills. Within these studies, outcomes were focussed on developing knowledge of other professions rather than considering the specific impact of the simulation itself (MacKenzie et al., 2017; Mills et al., 2019; Pitout et al., 2016; Shoemaker et al., 2014; Thomas et al., 2017; Treadwell & Havenga, 2013; Van Wyk et al., 2020; Zamjahn et al., 2018). However, simulation appears to be a common method for enhancing inter-professional learning, and Pitout et al. (2016) note that the skills developed by inter-professional simulation are client-centred care, knowledge of other professions, and social and communication skills, all of which are considered to be central to the occupational therapy profession (WFOT 2010, cited by College of Occupational Therapists, 2015).

Communication skills with other professionals, rather than with clients, are highlighted in mannequin-based studies, with Reichl et al. (2019) finding limited impact on communication and one participant in Thomas et al.'s (2017) study commenting that working with a mannequin did not encourage appropriate communication. Although Ozelie et al. (2016), Thomas et al. (2017), and Zamjahn et al. (2018) acknowledge the importance of developing empathy, none of the studies report directly on development of this skill.

#### 5.2 | Quantitative findings

Seven studies measure the effectiveness of simulation using quantitative methodologies, with five studies using post-simulation design to quantify the student experience. Findings reflect those of the qualitative studies, with all studies demonstrating positive changes in learning measured. The lack of control studies is identified by Bennett et al. (2017) with the recommendation that further studies of this nature are required, and this review found only two studies which measured the effectiveness of simulated learning against a



control group as described below (Imms et al., 2018; Ozelie et al., 2016).

Ozelie et al. (2016) retrospectively analysed the grades of students who received simulated learning prior to a placement experience and those who did not, finding no significant difference in the scores. In fact, in some areas of practice those who had participated in simulation achieved lower mean scores than those who had not. Results demonstrate a positive impact within the domain of communication for the students who had experienced simulation, although this did not reach the threshold for statistical significance.

Imms et al. (2018) carried out the largest trial to have taken place with regards to simulation within occupational therapy. They compared outcomes of a 40-hour simulated placement with those of a 40-hour traditional placement. This robust Australian multi-centre randomised controlled trial identified that students undertaking simulated placements achieved non-inferior outcomes to those undertaking traditional placements.

## 6 | DISCUSSION

This review of 32 publications on simulation in occupational therapy education demonstrates that despite differences with regards to the type of simulation studied, research design, and project aims, simulation is being used in a variety of ways within occupational therapy pre-registration education. Benefits to students appear to be demonstrated across all studies; however, there is a lack of rigorous studies and objective outcome measures for simulated learning in occupational therapy. The diversity of simulation methods and lack of objective outcome measures makes it difficult to draw any more specific conclusions, and the need for further research continues.

It is clear that within occupational therapy, the main type of simulation is the use of simulated patients rather than mannequins. The literature suggests that there may be a place for mannequin simulation to support practice of technical skills and inter-professional communication alongside the use of simulated patients (Gibbs et al., 2017; Thomas et al., 2017).

The preference towards the use of simulated patients may be indicative of the way in which the profession is practiced. To understand the central professional concept of a person's occupational identity, occupational therapists value the uniqueness of each individual, giving rise to the essential nature of person-centred practice (Sumsion, 2006). In direct contrast with professions which follow a process-driven approach, occupational therapists need to be able to access the clients' core beliefs, values, and wishes. To achieve this, interactive and conditional reasoning are used rather than formal strategies such as diagnostic or hypothetico-deductive reasoning that may be more common in other health professions (Sole et al., 2019). This leads therapists to use

techniques such as interviewing and observation as key assessment skills, which may present challenges to simulation by technology or mannequins but be more easily achieved by working with simulated patients.

Simulation designed to replicate human aspects of professional practice is considered valuable by students and educators. The ability to carry out skills such as taking an occupational history and interviewing to ascertain a person's valued occupations in a safe environment, combined with detailed debriefing, enables students to develop therapeutic communication skills which can be practiced and enhanced. The unique role of simulated patients can provide students with feedback from a client's perspective, enabling them the opportunity for reflection on and evaluation of these skills. Simulation can also provide a structured method for service user and carer involvement in all levels of education, as required by the regulator, by participating as simulated patients and carers (HCPC, 2017).

Using non-interactive simulation strategies for students to practice their skills has been taking place for some time within occupational therapy programmes without attracting the label of 'simulation'. Learning from case studies, practicing assessments on classmates and discussions with service users and expert patients are commonplace (Bennett et al., 2017; Bethea et al., 2014). Although it is possible that the lack of realism inherent in these activities causes programmes and individuals to refrain from calling such tasks simulation, their structured combination, together with attention to the details of the environment which enhance fidelity (Bennett et al., 2017; Bradley et al., 2013; Velde et al., 2009), may be key in their identification as simulation activities.

The identification of the benefits of simulation to enhance team skills such as communication and collaboration (MacKenzie et al., 2017; Shoemaker et al., 2014) bodes well for the future of simulation within occupational therapy, as these core skills underpin the ability to work in an occupation-focussed manner with clients. The interpretation of inter-professional simulation results could readily be applied to the profession to provide an appropriate evidence base to develop and identify the role of simulation within Occupational Therapy.

Enhancing fidelity, which may be achieved by addressing the environment in which the simulation takes place, should be easily achieved by occupational therapists who are experts in the impact of the environment on performance. Wearing uniform and carrying out activities with simulated clients within an authentic environment, such as a living room, bedroom, or simulated ward, may contribute to a high-fidelity occupational therapy simulation.

Literature included in this review which relates simulation directly to practice education is limited. However, the notion that simulation enables students to develop confidence, autonomy, and self-efficacy, as well as communication and professional skills, should be considered

in relation to practice performance. As the profession diversifies in relation to changes in health-care provision, placement experiences have become increasingly diverse (Glenn & Gilbert-Hunt, 2012) and student experiences can vary widely. In some settings, the student can be relegated to passive observer, unable to practice skills due to risk and regulatory restrictions and service user consent. It is possible that simulation could be used not only as preparation for practice but also to augment or replace placements in which students are unable to practice their skills. The purpose of undertaking placement learning in occupational therapy is widely understood to support integration of knowledge derived from formal education with practice in order to establish professional competence (Imms et al., 2018). Simulation provides a safe opportunity to practice these skills and to build confidence and could therefore enhance learning opportunities experienced in practice.

The literature suggests that occupational therapy educators should continue to seek to incorporate simulation activities within curricula, as these are well received as beneficial by students, who express a desire to undertake them both early on in their studies and frequently. However, the specific learning achieved remains poorly described and educators should take care to align the simulation constructively with intended learning outcomes (Boud & Falchikov, 2006) as they would with other learning activities.

## 6.1 | LIMITATIONS OF THE REVIEW

This scoping review highlights the current evidence for simulation in relation to occupational therapy education and may not be exhaustive. It is recognised that it is limited by one author reviewing all papers, which was nevertheless appropriate in the context of completing the review as part of PhD study. Reference searches may not be comprehensive as synonyms for the search terms “simulation” and “education” were absent. However, the 32 articles included represented a wide range of international simulation studies in occupational therapy education.

## 6.2 | FUTURE RESEARCH

The lack of studies measuring the outcomes of simulated learning as a replacement for practice education demonstrates a clear research gap, and the extrapolation of evidence gathered from inter-professional simulation experiences requires further attention. Although not identified as the specific intention of this review, it is also recognised that the effectiveness of simulation within occupational therapy education remains poorly evidenced, and there is an ongoing need for further control studies.

## 7 | CONCLUSION

The literature reviewed provides strong evidence that students find simulation to be a positive experience. Authors discuss simulation positively while recognising the need for further study and there is potential for simulation to be successfully used to replace a small number of practice learning hours. Occupational therapy educators are in an excellent position to develop the authentic environments required to create high fidelity simulations.

## KEY POINTS FOR OCCUPATIONAL THERAPY

- A wide variety of simulation methods are currently in use within pre-registration Occupational Therapy education
- Students report simulation to be of benefit to the development of communication skills
- Simulation may have a direct relevance to practice education if focussed on professional competencies congruent with practice learning outcomes.

## AUTHORSHIP STATEMENT

The first author named is lead and corresponding author. All other authors are listed according to contributions as defined using the CRediT taxonomy. Writing – Original Draft: TG. Writing – Review & Editing: TG, YT, PG.; Conceptualization: TG, YT, PG, LB.; Methodology: TG, YT, PG, LB; Formal Analysis: TG, YT

## CONFLICT OF INTEREST

The author(s) confirm that there is no conflict of interest.

## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

## ORCID

Terri Grant  <https://orcid.org/0000-0001-9600-8282>

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