The aim of the *Irish Journal of Occupational Therapy* (IJOT) is to contribute and stimulate critical debate and evidence-based practice by disseminating research findings, expert opinion, theoretical arguments and developments within clinical practice and professional education in Ireland and internationally.

The journal will publish original articles that will add to the knowledge base within occupational therapy and further evidence-based practice and critical debate within the profession.

Research papers accepted for publication in IJOT are double blind refereed to ensure academic rigour and integrity.

EDITOR-IN-CHIEF
Niall Turner
TILDA, School of Medicine, Trinity College Dublin, Lincoln Gate, Dublin 2, Ireland
Email: jot@aot.ie
Homepage: http://www.emeraldgrouppublishing.com/services/publishing/ijot/index.htm

ASSOCIATE EDITORS
Bethan Collins
University of Liverpool, UK
Caroline Hills
University of Galway, Ireland
Mary Tinnelly
Health Services Executive of Ireland
Rosaleen Kiely
Health Services Executive of Ireland
Sherrie Buckley
St Patrick’s Mental Health Services, Ireland
Edel O’Neill
Central Remedial Clinic, Clontarf, Ireland

ISSN 2398-8819
© 2019 Association of Occupational Therapists of Ireland

Emerald Publishing Limited
Howard House, Wagon Lane, Bingley BD16 1WA, United Kingdom
Tel +44 (0) 1274 777700; Fax +44 (0) 1274 785201
E-mail emerald@emeraldinsight.com

For more information about Emerald’s regional offices please go to http://www.emeraldgrouppublishing.com/offices

Customer helpdesk: Tel +44 (0) 1274 785278; Fax +44 (0) 1274 785201
E-mail support@emeraldinsight.com

The Publisher and Editors cannot be held responsible for errors or any consequences arising from the use of information contained in this journal; the views and opinions expressed do not necessarily reflect those of the Publisher and Editors, neither does the publication of advertisements constitute any endorsement by the Publisher and Editors of the products advertised.

Emerald is a trading name of Emerald Publishing Limited

Printed by CPI Group (UK) Ltd, Croydon, CR0 4YY

Guidelines for authors can be found at:
http://www.emeraldgrouppublishing.com/services/publishing/ijot/authors.htm

Irish Journal of Occupational Therapy
Indexed and abstracted by:
The British Library
An evaluation of sensory processing training on the competence, confidence and practice of teachers working with children with autism

Aideen Ruttledge
Middletown Centre for Autism, Middletown, UK, and

John Cathcart
Ulster University, Newtownabbey, UK

Abstract

Purpose – At present, there is no research to support teachers’ use of sensory interventions in the classroom. This study aims to investigate the extent to how participation in a sensory processing training session would improve teachers’ competence, confidence and practice towards supporting children with autism.

Design/methodology/approach – A pilot study design with mixed qualitative and quantitative methods was used to evaluate the impact of sensory processing training on six teachers who taught at least one child with autism in a mainstream school. The Autism Education Trust Competency Framework and face-to-face semi-structured interviews were completed with participants both pre (Time 1) and post (Time 2) training session.

Findings – Quantitative findings presented statistically significant differences (p < 0.05) in results with large effect sizes in the areas of confidence, knowledge, implementing sensory strategies, adjusting sensory environments, reviewing and reflecting. Qualitative data provided by participants corroborated this and indicated a need for further and more detailed training in the area. There was no change in the practice of teachers consulting with pupils about their sensory needs.

Practical implications – This study found that the attendance of teachers at sensory processing training is justified and the promotion of sensory processing training is therefore warranted.

Originality/value – Findings of this pilot study indicate that sensory processing training for teachers does improve competence, confidence and practice towards supporting children with autism. Review of the session to allow more detail, including consulting with the children themselves, is recommended.

Keywords Autism, Sensory processing, Teacher training

Paper type Research paper

Introduction

Latest reports state that 1.5 per cent of the school population in Ireland has a diagnosis of autism (National Council for Special Education, 2016a). Many children with autism require...
additional support and accommodations to facilitate their successful participation in the school setting. In the Republic of Ireland, the range of placements include mainstream classes with and without support, autism-specific special classes and special schools (Health Service Executive, 2012). Schools should be adapted to meet the needs of children with autism, and this includes the need for teacher training programmes (Department of Education and Skills, 2006).

Sensory processing differences are now recognised as a core feature of autism with their inclusion in the *Diagnostic and Statistical Manual of Mental Disorders – 5th Edition* (American Psychiatric Association, 2013). Estimates on the prevalence of sensory features in autism vary from 80-95 per cent (Tomcheck and Dunn, 2007; Ben-Sasson *et al.*, 2009). Sensory processing difficulties limit a child’s ability to achieve and maintain an optimal range of performance for adaptation and learning (Tomcheck *et al.*, 2014).

The *Education for People with Special Educational Needs Act* (Government of Ireland, 2004) ensures all children with special educational needs receive a full learning experience in an inclusive school environment. Classrooms are typically challenging sensory settings. The nature of being seated in small groups leads to the likelihood of unpredictable tactile input. Furthermore, modern classrooms with interactive whiteboards and various wall displays can provide highly stimulating visual feedback. Concerns have been highlighted in relation to the presentation of academic material through verbal instruction and the effect of excessive noise on learning and attention (Ashburner *et al.*, 2008).

Occupational therapists traditionally address sensory processing differences through therapy sessions and/or support and recommendations across home and school settings. Access to occupational therapy services in the Republic of Ireland involves extensive waiting lists. Reports show 3,611 children and young people under the age of 18 in Ireland are waiting for their first occupational therapy assessment (Murphy O’Mahony, 2016). Capacity to provide advice and support to teachers who are responsible for educating children with autism and sensory processing differences for approximately five hours each day, five days per week is extremely limited. This results in provision of an inclusive learning environment being compromised.

Continuous professional development for teachers in Ireland is essential to meet Teaching Council requirements for registration. At present there is no research to support teachers’ use of sensory interventions in the classroom. The National Council for Special Education (2016b) recommended that appropriate training programmes should be funded and available to ensure that all teachers can acquire the requisite knowledge and skills to educate students with autism, whether in mainstream or special settings. The importance of educating and training teachers as to how to choose and implement evidence based therapeutic interventions within the context of their classroom is therefore necessary (Reinson, 2012).

The training at the focal point of this study is on the topic of sensory processing and is provided on average twenty-seven times per year throughout Ireland for parents and educational professionals by Middletown Centre for Autism. The centre is a cross-border government-funded organisation which provides learning support, assessment and training to parents and professionals of children and young people who have autism throughout the island of Ireland. According to the Department of Education and Skills’ key statistics 2015/2016, there are 34,576 primary school teachers in Ireland. In 2016, 757 primary school teachers received sensory processing training by Middletown Centre for Autism (Middletown Centre for Autism, 2017). The session lasts for 2 hours and examines how the sensory processing differences associated with autism, impact on learning, play, social interactions and behaviour in the school environment. It aims to facilitate the development
of simple strategies to alleviate sensory differences and customise the environment to accommodate sensory needs. In-depth evaluation of the impact such training has on teaching students with autism has not been undertaken to date.

Modification of the school environment has been increasingly recognised in the scientific literature to support the effective inclusion of children with autism and sensory processing differences. Research has demonstrated that sensory stimulation, in particular visual (Kanakri et al., 2017) and auditory (Miller-Kuhaneck and Kelleher, 2015), has a significant impact on the arousal of children with autism in the classroom. This in turn has been found to negatively affect performance on classroom tasks. Piller and Pfeiffer (2016) examined the perspective of 13 teachers and therapists on sensory related environmental impediments to participation within the preschool setting. The study was solely qualitative in nature and relied on participants’ verbal descriptions of perceived experiences. It also focussed on environmental components of sensory functioning within the classroom and did not consider other aspects such as use of sensory strategies. Themes which emerged were that sensory aspects of the environment played a significant role in children avoiding a task. Participants in the study identified environmental modifications as essential to promote participation for the child with autism in the classroom. This finding supports a previous study by Kinnealey et al. (2012) which examined the effects of environmental adaptations on the attention and engagement of four students with autism. The environmental adaptations in this study were restricted to lighting and sound modifications (halogen lighting and sound absorbing walls). It was found that these adaptations increased the frequency and stability of attending and engagement for these students.

Howe and Stagg (2016) used a qualitative research study to investigate the experiences of sixteen children with autism while they are in the classroom at school. They found that sensory sensitivity effected participants learning, and that the sensory experiences of children in school were largely negative. The study was carried out with adolescents who completed a questionnaire without the researcher present which resulted in very little detail being obtained about the classroom experience. Fernandez-Andre et al. (2015) found that in a group of children with autism, teachers reported greater dysfunction in the classroom environment than parents in the home environment. Reasons suggested for this included the presence of certain environmental factors in the classroom such as stimulation overload produced by excessive noise or unpredictable physical contact from peers. This is in keeping with a study by Ashburner et al. (2008) which was cited in 237 subsequent articles and recommended that classroom acoustics and tactile input within school environments need to be addressed. These studies recommend that schools need to create sensory profiles for each student with autism. It is suggested that increasing the understanding of school staff in this area will further enhance the quality and appropriateness of interventions, thus enabling these students to access the curriculum and realise their own potential in the classroom.

Worthen (2010) critically appraised 13 studies examining sensory-based interventions in the general education classroom. It was concluded that school staff should be required to increase their understanding of research in this area and how it can be applied in the classroom environment. Implications for future research included the need to determine the extent to which sensory-based techniques are being implemented in the general education classroom and to establish the most effective ways of increasing teacher knowledge of sensory processing. Some sensory approaches used in school settings, such as strategies to increase attention and the use of dynamic seating (Bagatell et al., 2010), have shown encouraging results. Oriel et al. (2011) and Nicholson et al. (2011) demonstrated the positive effects of physical exercise on academic engagement for children with autism. Following on from this, Ashburner et al. (2014) also highlighted the effectiveness of movement breaks as a
sensory strategy in schools. Mills et al. (2016) examined the effectiveness of a sensory activity schedule in supporting participation and increasing classroom task performance in four students with autism. This study concentrated on sensory strategies only and did not consider the impact of the environment on performance. It was found that targeted sensory activities may have a positive effect on classroom task mastery and that there is little guidance about how to instruct school staff as to how to best to utilise sensory-based activities in the classroom.

Method
This research project was carried out as a pilot study using mixed qualitative and quantitative methods. Purposive sampling was used to identify teachers to participate in this study and all teachers received the training. The following criteria was applied to ensure teachers with rich information on the topic were included:

- Be a full-time primary school teacher in a mainstream school.
- Have a minimum of one child with autism and sensory processing differences in their class.
- No previous sensory processing training.

The independent variable in this study was:
- The training session attended by teachers.

The dependent variables in this study were:
- Measuring changes in the confidence of teachers in identifying sensory processing differences in the pupils they work with.
- Measuring changes in teachers’ competency in making environmental adaptations to suit the needs of pupils with sensory processing differences.
- Measuring changes in teachers’ competency to practice basic sensory strategies to meet the sensory processing differences of pupils in their class.

The hypothesis being tested was that participation in a two hour sensory processing training would improve teachers’ self-reported competence, confidence and practice towards identifying and supporting children with autism. If the hypotheses are confirmed, this study will further develop the evidence base for teachers to engage in continuous professional development in sensory processing.

The training was carried out by a member of staff from Middletown Centre for Autism who has completed post graduate training in sensory integration and was not involved in this study.

The Autism Education Trust (AET) developed a set of competencies to describe the knowledge, understanding and skills required for staff to work effectively with children with autism aged between 5 and 16 years. The AET Competency Framework (Wittemeyer et al., 2015) details 57 competencies, 5 of which are specific to sensory processing and were used in this particular study. These competencies were rated as either Not yet developed/Developing/Established. The participant (i.e. the teacher) was also required to rate the priority level of each competency based on the current population of children with autism in their class. Priority levels were further rated as High/Medium/Low. If a competency was rated as Established, the teacher was required to provide evidence in the form of documentation (D) (policy document, accounts from pupils, staff or parents, records on
training events), for relevant practice to be observable (O) within the school setting and for colleagues, parents/carers or pupils to be able to voice (V) their views on the competency if asked. The five sensory processing specific competencies were used as a baseline measure prior to the sensory training session (Time 1) and as a post measure eight weeks following the session (Time 2). The AET framework was used to collate both qualitative and quantitative data.

As no research was currently available on this topic, this study also aimed to explore the experiences and views of teachers on supporting children with autism and sensory processing differences in the school environment. A pre-training face to face semi-structured interview collected general demographic data using questions such as how many children with autism were in the class and how many years teaching experience participants had. The pre-training interview content also collected data to inform confidence and current practice regarding how the needs of children with sensory processing were met prior to attending training. A mix of closed- and open-ended questions in a Likert scale were used to allow the interviewee flexibility to facilitate the collection of exploratory data. This interview was completed along with the AET Competency Framework nine weeks before the training (Time 1). Eight weeks post training (Time 2), the AET Competency Framework and face-to-face interviews were repeated. A dictaphone was used to record the face to face semi-structured interviews. Content of the interviews were then transcribed verbatim.

**Ethical considerations**

Ethical approval to undertake this study was granted by Ulster University Ethics Committee.

**Participants**

Eleven teachers participated at Time 1 of the study, which commenced in January 2018. The sensory processing training then took place in March 2018. After the training, at Time 2, a full data set was obtained for 54.5 per cent of the original sample set, with six female teachers returning to participate in April 2018. The reason for dropout was severe weather conditions at the time of the training; this resulted in five teachers being unable to attend the training and therefore unable to participate at Time 2. The teachers came from a mainstream mixed gender school in Dublin, Ireland. The school had a total of 410 children enrolled, 26 of which had a diagnosis of autism. None of the teachers had experience in liaising with a professional regarding sensory processing in the past. Each participant was identified A-F. The number of children with autism taught by each of the teachers was between one and two, and the age range was from 4 to 10 years. The number of years of teaching experience of each of the teachers ranged from 1 to 10 years.

**Data analysis**

Dependent sample t-tests were used to analyse quantitative data gathered from participants using the AET Competency Framework, Likert scale and closed questions. Differences between mean scores from participants before (Time 1) and after (Time 2) receiving the training were analysed using IBM SPSS version 24 for Windows (2016) software. The guidelines proposed by Cohen (1988) were used to interpret the eta squared effect size values (0.01 = small effect size, 0.06 = moderate effect size, 0.14 = large effect size).

To analyse the qualitative data, repeated readings of interview transcripts took place to search for meanings and patterns. Recurring items of interest were highlighted and coded as they related to one another. The QSR International’s NVivo 11 Qualitative Data Analysis Software (2015) was then used to collate and organise all relevant data extracts into themes.
Thematic analysis was used as it can produce trustworthy and insightful findings (Braun and Clarke, 2013).

Results

Quantitative results
Quantitative results were derived from semi-structured interviews which used both open- and close-ended questions on a Likert scale at Times 1 and 2. Table I demonstrates the questions which yielded the quantitative data. No significant change occurred in participant’s ability to identify sensory processing concerns between Time 1 and Time 2, ($p > 0.05$). A significant increase in the use of sensory strategies was found when mean scores for all participants were compared between Time 1 and Time 2 ($p = 0.025$) with a large effect size (0.6 eta squared). Furthermore, participant’s knowledge and confidence in the area of sensory processing significantly improved between both time points ($p < 0.05$) with large effect sizes (0.91 and 0.74 eta squared respectively).

In addition to the semi-structured interviews, participants also provided ratings to the AET Competency Framework’s five sensory processing specific competency questions at Time 1 and Time 2. As shown in Table II, significant increases in ratings were obtained for three of the five questions ($p < 0.05$) between Time 1 and Time 2. Two of these questions related to environments: AET Question 50 Creating Suitable Learning Environments and AET Question 52 Enabling Sensory Friendly Environments; with large effect sizes (0.83 and 0.6 eta squared, respectively). The third question (AET Question 53) related to reflecting and reviewing practices to address sensory processing needs. Question 53’s eta squared statistic (0.59) indicated a large effect size.

Each of the AET competency questions also came with a priority rating. There were no significant changes in how participants rated the importance of each of the five sensory processing specific competencies between Time 1 and Time 2. No significant changes were found for AET question 55 ($p > 0.05$), which related to consulting with children about their needs within their learning environment. This indicates that participants had not yet implemented any changes in this competency area between Time 1 and Time 2.

Qualitative results
Two overarching themes were derived from the qualitative data using thematic analysis: training and development (Theme 1) and sensory strategies (Theme 2). Table III details participant responses within the training and development theme, which was further developed into subthemes.

Theme 1: Training and development
Identifying sensory processing differences. Participants were asked at Time 1 and Time 2 about their ability to recognise sensory processing concerns in the children they worked with. Descriptions given by participants about the presenting sensory concerns indicated an increase in competence as shown in Table III. At Time 1, some descriptions given by participants did not refer to sensory processing. In contrast, each participant gave a more detailed response that was related specifically to sensory processing at Time 2. Additionally, three participants gave detailed information on sensory concerns at Time 2, which were not reported at Time 1.

Reviewing and reflecting on the sensory approach taken. At Time 1 and Time 2, participants described their current use of reflection and review in relation to their practice. Whilst at Time 1, this practice was already in place, by Time 2, participants were more explicit in how this was carried out. They referred to an expansion of their practice within
| Variable                                | Time 1 Mean (SD) | Time 2 Mean (SD) | T     | df   | Sig (2 tailed) | Mean decrease | Confidence interval | Eta squared |
|-----------------------------------------|------------------|------------------|-------|------|----------------|----------------|---------------------|-------------|
| Identifying sensory processing concerns | 0.83 (0.40)      | 1.00 (0.00)      | -1.0  | 5    | 0.363          | -0.17          | From -0.60 to 0.26  | N/A         |
| Use of sensory strategies               | 0.33 (0.52)      | 1.00 (0.00)      | -3.16 | 5    | 0.025          | -0.67          | From -1.21 to -0.12 | 0.6 (Large) |
| Knowledge                               | 2.33 (0.52)      | 3.5 (0.55)       | -7.0  | 5    | 0.001          | -1.17          | From -1.60 to -0.74 | 0.91 (Large) |
| Confidence                              | 2.33 (0.52)      | 3.5 (0.55)       | -3.80 | 5    | 0.013          | -1.17          | From -1.96 to -0.38 | 0.74 (Large) |
| Variable                                      | Time 1 Mean (SD) | Time 2 Mean (SD) | $t$  | $df$ | Sig (2 tailed) | Mean decrease | Confidence interval | Eta squared |
|-----------------------------------------------|------------------|------------------|------|------|----------------|-----------------|-------------------|-------------|
| Question 1: Identifying Strengths and Challenges in Sensory Processing | 0.83 (0.41)      | 1.17 (0.41)      | -1.56 | 5    | 0.175          | -0.33          | From -0.86 to 0.21 | N/A         |
| Question 1: Priority Rating                   | 2.0 (0.00)       | 2.0 (0.00)       | N/A  | N/A  | N/A            | N/A            | N/A               | N/A         |
| Question 50: Creating Suitable Learning Environments | 1.00 (0.00)      | 1.83 (0.41)      | -5.00 | 5    | 0.004          | -0.83          | From -1.26 to -0.40 | 0.83 (Large) |
| Question 50: Priority Rating                   | 1.83 (0.41)      | 2.0 (0.00)       | -1.00 | 5    | 0.363          | -0.17          | From -0.60 to 0.26 | N/A         |
| Question 52: Enabling Sensory Friendly Environments | 1.00 (0.00)      | 1.67 (5.16)      | -3.16 | 5    | 0.025          | -0.67          | From -1.21 to -0.12 | 0.6 (Large) |
| Question 52: Priority Rating                   | 1.83 (0.41)      | 2.0 (0.00)       | -1.00 | 5    | 0.363          | -0.17          | From -0.60 to 0.26 | N/A         |
| Question 53: Reflecting and Reviewing Practices | 0.83 (0.41)      | 1.67 (0.52)      | -2.71 | 5    | 0.042          | -0.83          | From -1.62 to -0.04 | 0.59 (Large) |
| Question 53: Priority Rating                   | 1.83 (0.41)      | 2.0 (0.00)       | -1.00 | 5    | 0.363          | -0.17          | From -0.60 to 0.26 | N/A         |
| Question 55: Consulting with Children          | 1.17 (0.41)      | 1.33 (0.52)      | -1.0  | 5    | 0.363          | -0.17          | From -0.60 to 0.26 | N/A         |
| Question 55: Priority Rating                   | 2.00 (0.00)      | 2.00 (0.00)      | N/A  | N/A  | N/A            | N/A            | N/A               | N/A         |
### Table III.
Participant quotes within training and development theme

| Theme                                | Time Point                                                                 |
|--------------------------------------|---------------------------------------------------------------------------|
| Theme Time Point                     |                                                                           |
| Training and development             |                                                                           |
| Theme 1:                             |                                                                           |
| Time 1                               |                                                                           |
| Identifying sensory processing       | “With him it’s more muscular, it’s not really sensory processing” – Teacher A |
| differences                          |                                                                           |
| Reviewing and reflecting on sensory  | “Big reviews happen at the end of the year” – Teacher B                    |
| approach taken                       | “I would review with SNA, now obviously because she is spending a lot of time one on one with this child and you know when they are out of the classroom together” – Teacher C |
| Current training needs               | “If I was to be critical of myself and ask do I have a list of strategies that I currently employ? I probably need more knowledge to be honest with you if that’s what the training might give me... do you know what I mean?” – Teacher B |
| Feedback                             | “Em I think what I found really helpful in the training were some of the things that you could use within the class, I know they were talking about the band that goes around the chair- the theraband. I think things like that are really helpful to know they are out there” – Teacher D |
|                                    | “Em, getting actual first-hand information from someone with autism. Em, the little boy I teach hates going to the canteen then it showed what it was like going into a supermarket you know that completely made me not understand but I could totally see where he was coming from then if the canteen sounds like that to me what does it sound like to him? Probably ten times worse now I feel bad bringing him there” – Teacher F |
this area due to the new information they received at the training and a desire to now discuss and reflect on which sensory approaches were helpful or effective.

Current training needs. At Time 1, participants emphasised the significance of attending the training session and indicated their motivation to learn more about sensory processing. At Time 2, they continued to highlight how further training was necessary in this area, specifying their need for additional sessions and more detailed knowledge and information on how to support the children they work with. Reference was also made to the length of the session, it was only one afternoon, and the limitations this had on the impact of their learning.

Feedback from training session. An additional theme to qualitative data at Time 2 was feedback from participants regarding the training session. Participants highlighted the benefits and value of attending the training to improve their awareness of sensory processing differences experienced by people who have autism. The demonstration of how various resources can be used to help children in the classroom was also noted by participants as being helpful.

Theme 2: Sensory strategies
Table IV details participant responses within the sensory strategies theme, which was further developed into subthemes:

Tactile. Four of the participants referred to an increase in the use of tactile strategies, these included specifics such as feely boxes, fidget toys and messy play materials. Resources demonstrated at the training had been sourced by the teachers and were in use by Time 2: I had a fidget box now that I didn’t have before.

Visual. Three participants had introduced visual strategies at Time 2. No reference had been made to the use of visual strategies at Time 1 by any of the participants. Strategies included environmental adaptation such as reducing visual stimuli within the class and positioning the child directly in front of the white board.

Calm area. One participant detailed their successful use of a calm area at Time 1 as a break from sensory stimuli. By Time 2, three additional participants had implemented the use of calm areas for the children they worked with and described the strategy as being helpful and a preventative classroom management strategy.

Movement. Two participants had been using movement strategies at Time 1. This included the use of a wiggle cushion and movement breaks on the trampoline. At Time 2, these participants detailed new movement strategies they had used, such as the use of a TheraBand. Two additional participants had implemented movement breaks by Time 2, these included going on short messages around the school for the purpose of movement and the use of a trampoline. Positive observations on using movement break strategies were also reported by participants: She’s reacting well to having those things.

Discussion
This pilot study set out to investigate the extent to how participating in a two hour sensory processing training for teachers would improve their competence, confidence and practice in working with children with autism. Quantitative findings presented statistically significant differences in results from a semi-structured interview and the AET Competency Framework which were used before (Time 1) and after (Time 2) attending the training. Although this was a pilot study with a small sample size, the inclusion of quantitative results was intended to add scientific rigour to the study design. Qualitative findings also showed a contrast between responses at Time 1 and Time 2.

There was disparity between quantitative and qualitative results on participant’s ability to recognise sensory processing concerns in children they worked with. Quantitative results were
not statistically significant; however, teachers gave more detailed interpretations at Time 2 of sensory processing concerns compared to Time 1. Teacher A did not recognise any sensory concerns at Time 1 however at Time 2 she gave a comprehensive account of sensory concerns noted in one child. Most of the teachers were aware of sensory processing concerns at Time 1, which may explain why there was only a modest increase by Time 2 in quantitative data. In contrast, the qualitative information provided was much more detailed by Time 2, indicating teachers were more competent at recognising sensory processing concerns at Time 2.

There was a statistically significant increase in the use of sensory strategies by the teachers between Time 1 and Time 2. These findings were corroborated by qualitative data provided by the participants. At Time 1, five of the teachers referred to sensory strategies they had in place prior to the training. At Time 2, all six teachers had used new sensory strategies. Teacher C introduced sensory strategies for the first time in her class following the

| Theme | Time Point |
|-------|------------|
| Tactile | “We let him bring a soft toy to resource teaching and then if he goes to the sensory room or ball pool as well we let him bring a soft toy. So that he can feel it on the way” – Teacher F |
| Visual | No reference by any participants |
| Calm Area | “If there was an area in the class that he could go to it would mean he wouldn’t have to step out, he could go there and calm himself down for a while . . . that would be nice” – Teacher A No reference made by Teacher E |
| Movement | No reference made by Teacher C or E |

| Theme | Time Point |
|-------|------------|
| Tactile | “I had a fidget box now that I didn’t have before and I got those beads and the theraputty which I wouldn’t have had before. Even the theraputty I would give out to him if he was unsettled or upset and he would use it” – Teacher F |
| Visual | “Since the training I’ve tried to reduce the amount of visual displays cause suppose I’m conscious that it can be overwhelming for the little boy” – Teacher B |
| Calm Area | “He is sitting up against a wall so there’s just a wall in front of him and he has his words on the wall so that they are directly in front of him whereas before I would have been putting them on the table. Em, so that’s one way I’ve altered it that I wouldn’t do for other children” – Teacher F |
| Movement | “Yeah well since doing the course I’ve made sure to have like things like the theraband on the chair which seems to be quite good, she seems to like it cause she would have been a bit of a tapper do ya know things like that so there’s less of that which is brilliant. So yeah no, she’s reacting well to having those things so she needs them” – Teacher C |
| Movement | “Em yeah providing more opportunities I suppose for movement breaks and for sensory needs as well throughout the day” – Teacher E |

Table IV. Participant quotes within sensory strategies theme
training. The strategies used by teachers included tactile, movement and visual. Visual strategies specifically had not been referenced by any of the teachers at Time 1, which would indicate they had been introduced to the concept during the training. This study responds to the work of Mills et al. (2016) which had concluded that there is little guidance about how to instruct school staff as to how best to utilise sensory based activities in the classroom.

Self-reported ratings of knowledge and confidence on the topic of sensory processing yielded statistically significant increases between Time 1 and Time 2. Qualitative feedback however indicated that teachers still felt they required additional training in sensory processing. Teachers A, B, C and F stated that they required further education and development in this area. A review on the length of the training session to accommodate additional content or consideration of a more detailed follow up training session may therefore be necessary.

The AET Competency Framework generated both quantitative and qualitative data. Three out of the five questions produced statistically significant results. Two of these questions relating to sensory friendly environments (Questions 50 and 52) also delivered qualitative information detailing approaches introduced by the participants. These included the setup of calm areas and other environmental strategies such as adjusting visual stimuli within the classroom. This supports previous recommendations by Smith-Roley et al. (2015), who posited that part of the occupational therapist’s role in providing intervention for students with sensory difficulties should involve the delivery of professional development programmes based on sensory integration theory and methods to teachers. They suggested training should include input on sensory processing patterns and ways to adapt the classroom or playground environment to enhance student engagement. This also reflects the proposal by Ashburner et al. (2014) for the development of a clinical reasoning framework which involves strategies to optimise participation of students with autism experiencing sensory challenges. It was also proposed that it may be worthwhile for occupational therapists to invest time in educating teachers about the need to improve the sensory characteristics of school environments. This study has aimed to evaluate the effectiveness of such education.

Another statistically significant outcome in this study was demonstrated by AET Question 53 which showed an increase in reviewing and reflecting on the practice used within the area of sensory processing. Teachers further endorsed this finding by describing an increase in meetings with colleagues to review and reflect on new strategies they had implemented following the training. AET Question 55, which was related to consulting with children themselves about their sensory needs within the class setting, did not result in significant change between Time 1 and Time 2. Furthermore, qualitative data did not show any evidence of change in this area. As teachers did not refer to any attempts to initiate collaboration following the training, this may indicate that the training content did not address this competency area. Explicit advice and support in how to initiate collaboration between teachers and pupils in addressing sensory needs may be necessary as part of training content.

At Time 2, all teachers referred to aspects of the training they found helpful and which broadened their understanding of the subject. Similar feedback was given by several teachers, including the impact of the video footage in helping comprehend the experiences of having sensory processing needs. Seeing resources in person and learning what specifically they can be used for within the classroom was also highlighted.

Priority ratings did not change between Time 1 and Time 2. Both before and after the training participants rated all sensory processing areas of the AET Competency Framework as high priority. This would suggest that the teachers in this study were motivated and valued sensory processing as an important factor to consider within their roles.
This study departed from previous studies in so far as it acted on recommendations that training on sensory processing was necessary and set out to evaluate the impact of such training on the performance of teachers. As the dependent variables were observed, the attendance of teachers at sensory processing training is justified and the promotion of sensory processing training is warranted. This may facilitate the implementation of evidence-based sensory strategies within the classroom routine to improve outcomes for children with autism (Prizant et al., 2003).

This has implications for occupational therapy practice. Occupational therapists traditionally address sensory processing differences through therapy sessions and/or support with recommendations across home and school settings. The provision of such training to teachers may impact on immediate caseload management. However, one could argue in the longer term that the impact of raising awareness and competence of teachers in this area will reduce referral numbers as sensory processing needs will be accommodated within the classroom. This may allow greater capacity for occupational therapists to allocate time to address complex sensory processing concerns in children with autism and also reduce waiting lists.

Confounding variables of this study include the possibility that teachers accessed other sources of information to develop their knowledge on sensory processing such as relevant literature. A bias which may have influenced the internal validity of this study is the fact that participants enrolled on the training of their own volition and were therefore likely to be motivated to learn and acquire new skills in the area of sensory processing. It is therefore not possible to say definitively that changes in practice are due solely to teachers having attended the training. Teachers were aware that they would return to complete interviews at Time 2 and may have furthered their knowledge independently to prepare.

Future research may involve examining the impact sensory processing teacher training has on the presentation of children with sensory processing differences in the classroom. Consideration of the influence that teacher sensory processing training has on the performance of children with autism in class may yield powerful findings. As this was a relatively short time frame (eight weeks between the training and Time 2 data collection), it would be beneficial to know if changes in teacher practice within this area were sustained over a longer time frame. A larger sample and consideration of the inclusion of a control group may also be beneficial. Comparisons could be drawn from outcomes of interviews between participants who had attended the training and those who had not. The control group could then attend the training following the Time 2 data collection.

Limitations
This study was limited in that there was one main researcher. Rigour in qualitative and quantitative data analysis is therefore compromised as it was completed solely by the researcher. The sample dataset was small due to the non-attendance at the training by a number of the original sample of teachers. Having a small, non-randomised sample size and no control group has implications for the generalisability of the results obtained. The purposive sample was quite homogeneous with regard to age, gender and number of children being taught with autism and sensory processing needs. Therefore, caution should be exercised if generalising these findings to a larger population. Another factor to consider is that teachers knew they were participating in an evaluative study and may have felt that some responses were more desirable.

Conclusion
To conclude, the significant findings of this pilot study indicate that sensory processing training for teachers can improve competence, confidence, and practice towards identifying
and supporting children with autism who have sensory processing differences. Review of the length of the training session to allow more detail or a follow up session is recommended. Revision of the content to include support on how to involve the children themselves in meeting their sensory needs is also indicated. The results of this study should however be treated with caution given the small sample size and absence of a control group. Further research is also warranted to determine sustainability of change in practice and the impact of training teachers in this area has on the functioning of children with autism.

**Key findings**

- Sensory processing training for teachers improves competence, confidence, and practice.
- Further improvements on training content are warranted to include greater detail and how to consult with children on their sensory processing needs.

**What the study has added**

This is the first study, to the authors’ knowledge, to evaluate the impact of sensory processing training on the competence, confidence and practice of teachers of children with autism.

**References**

American Psychiatric Association (2013), *Diagnostic and Statistical Manual of Mental Disorders, DSM-5*, American Psychiatric Association, Washington, DC.

Ashburner, J., Rodger, S., Ziviani, J. and Hinder, E.A. (2014), “Optimizing participation of children with autism spectrum disorder experiencing sensory challenges: a clinical reasoning framework”, *Canadian Journal of Occupational Therapy*, Vol. 81 No. 1, pp. 29-38.

Ashburner, J., Ziviani, J. and Rodger, S. (2008), “Sensory processing and classroom emotional, behavioural, and educational outcomes in children with autism spectrum disorder”, *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, Vol. 62 No. 5, pp. 564-573.

Bagatell, N., Mirigliani, G., Patterson, C., Reyes, Y. and Test, L. (2010), “Effectiveness of therapy ball chairs on classroom participation in children with autism spectrum disorders”, *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, Vol. 64 No. 6, pp. 895-903.

Ben-Sasson, A., Hen, L., Fluss, R., Cermak, S.A., Engel-Yeger, B. and Gal, E. (2009), “A meta-analysis of sensory modulation symptoms in individuals with autism spectrum disorders”, *Journal of Autism and Developmental Disorders*, Vol. 39 No. 1, pp. 1-11.

Braun, V. and Clarke, V. (2013), *Successful Qualitative Research: A Practical Guide for Beginners*, Sage, London.

Cohen, J.W. (1988), *Statistical Power Analysis for the Behavioural Sciences*, 2nd ed., Lawrence Erlbaum Associates, Hillsdale, NJ.

Department of Education and Skills (2006), *Evaluation of Educational Provision for Students with Autistic Spectrum Disorders*, The Stationery Office, Dublin.

Fernandez-Andre, M.I., Pastor-Cerezuela, G., Sanz-Cervera, P. and Tarraga-Minguez, R. (2015), “A comparative study of sensory processing in children with and without autism spectrum disorder in the home and classroom environments”, *Research in Developmental Disabilities*, Vol. 38, pp. 202-212.
Government of Ireland (2004), *Education for Persons with Special Educational Needs Act*, The Stationery Office, Dublin.

Health Service Executive (2012), “National review of autism services past, present and way forward”, available at: www.hse.ie/eng/services/Publications/services/Disability/Autismreview2012.pdf (accessed 1 March 2017).

Howe, F.E.J. and Stagg, S.D. (2016), “How sensory experiences affect adolescents with an autistic spectrum condition within the classroom”, *Journal of Autism and Developmental Disorders*, Vol. 46 No. 5, pp. 1656-1668.

Kanakri, S.M., Shepley, M., Tassinary, L.G., Varni, J.W. and Fawaz, H.M. (2017), “An observational study of classroom acoustical design and repetitive behaviours in children with autism”, *Environment and Behaviour*, Vol. 49 No. 8, pp. 847-873.

Kinnealey, M., Pfeiffer, B., Miller, J., Roan, C., Shoener, R. and Ellner, M.L. (2012), “Effect of classroom modification on attention and engagement of students with autism or dyspraxia”, *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, Vol. 66 No. 5, pp. 511-519.

Middletown Centre for Autism (2017), *Attendance Figures for Teacher Professional Development in Sensory Processing*, MCA, Middletown.

Miller-Kuhaneck, H. and Kelleher, J. (2015), “Development of the classroom sensory environment assessment (CSEA)”, *American Journal of Occupational Therapy*, Vol. 69 No. 6, pp. 1-9.

Mills, C., Chapparo, C. and Hintitt, J. (2016), “The impact of an in-class sensory activity schedule on task performance of children with autism and intellectual disability: a pilot study”, *British Journal of Occupational Therapy*, Vol. 79 No. 9, pp. 530-539.

Murphy O’Mahony, M. (2016), “Budget must address rising waiting lists for occupational therapy”, available at: www.fiannafail.ie/budget-must-address-rising-waiting-lists-for-occupational-therapy-omahony/ (accessed 11 July 2017).

National Council for Special Education (2016a), “NCSE press release 15 july 2016 major education report finds 14,000 students have autism diagnosis”, available at: http://ncse.ie/wp-content/uploads/2016/07/Press_release_ASD.pdf (accessed 21 February 2019)

National Council for Special Education Policy Advice (2016b), “Supporting students with autism spectrum disorder in schools: a guide for parents/guardians and students”, available at: www.ncse.ie/policy-advice-on-supporting-students-with-Autism-spectrum-disorder-in-schools (accessed 14 March 2017).

Nicholson, H., Kehle, T.J., Bray, M.A. and Van Heest, J. (2011), “The effects of antecedent physical activity on the academic engagement of children with autism spectrum disorder”, *Psychology in the Schools*, Vol. 48 No. 2, pp. 198-213.

Oriel, K.N., George, C.L., Peckus, R. and Semon, A. (2011), “The effects of aerobic exercise on academic engagement in young children with autism spectrum disorder”, *Pediatric Physical Therapy: The Official Publication of the Section on Pediatrics of the American Physical Therapy Association*, Vol. 23 No. 2, pp. 187-193.

Piller, A. and Pfeiffer, B. (2016), “The sensory environment and participation of preschool children with autism spectrum disorder”, *Otjr: Occupation, Participation and Health*, Vol. 36 No. 3, pp. 103-111.

Prizant, B.M., Wetherby, A.M., Rubin, E. and Laurent, A. (2003), “The SCERTS model: a transactional, family-centred approach to enhancing communication and socioemotional abilities of children with autism spectrum disorder”, *Infants and Young Children*, Vol. 16 No. 4, pp. 296-316.

QSR International (2015), “NVivo qualitative data analysis software, version 11”, Reinson, C. (2012), “A collaborative decision tree system for designing a sensory diet curriculum for children with autism in the classroom setting”, *Journal of Occupational Therapy, Schools, and Early Intervention*, Vol. 5 No. 1, pp. 61-72.
Smith-Roley, S., Bissell, J. and Frolek Clark, G.J. (2015), “Occupational therapy for children and youth using sensory integration theory and methods in school-based practice”, American Journal of Occupational Therapy, Vol. 69 No. 1, pp. 1-20.

Tomcheck, S.D. and Dunn, W. (2007), “Sensory processing in children with and without autism: a comparative study using the short sensory profile”, The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association, Vol. 61 No. 2, pp. 190-200.

Tomcheck, S.D., Huebner, R.A. and Dunn, W. (2014), “Patterns of sensory processing in children with an autism spectrum disorder”, Research in Autism Spectrum Disorders, Vol. 8, pp. 1214-1224.

Wittemeyer, K., English, A., Jones, G., Lyn-Cook, L. and Milton, D. (2015), Schools Autism Competency Framework, AET, London.

Worthen, E. (2010), “Sensory-Based interventions in the general education classroom: a critical appraisal of the topic”, Journal of Occupational Therapy, Schools, and Early Intervention, Vol. 3 No. 1, pp. 76-94.

Further reading
Department of Education and Skills (2017), “Key statistics 2015/2016”, available at: www.education.ie/en/Publications/Statistics/Key-Statistics/Key-Statistics-2015-2016.pdf (accessed 12 March 2017).

IBM Corporation (2016), SPSS for Windows, Version 24, IBM Corp, Armonk, New York, NY.

Corresponding author
Aideen Ruttledge can be contacted at: aideenmcm anus@hotmail.co.uk

For instructions on how to order reprints of this article, please visit our website:
www.emeraldgrouppublishing.com/licensing/reprints.htm
Or contact us for further details: permissions@emeraldinsight.com
Predictors of academic honesty and success in domestic and international occupational therapy students

Ted Brown
Department of Occupational Therapy, Monash University – Peninsula Campus, Frankston, Australia

Stephen Isbel
Occupational Therapy, Faculty of Health, The University of Canberra, Canberra, Australia

Alexandra Logan
School of Allied Health, Faculty of Health Sciences, Australian Catholic University, Melbourne, Australia, and

Jamie Etherington
Department of Occupational Therapy, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Australia

Abstract

Purpose – Academic integrity is the application of honest, ethical and responsible behaviours to all facets of students’ scholarly endeavours and is the moral code of academia. The international literature reports the prevalence of academic dishonesty in higher education across many disciplines (including the health sciences), and there is evidence linking academic dishonesty in health professional students with future
unprofessional behaviour in the workplace. International students are reported to be a particularly vulnerable group. This paper aims to investigate the factors that may be predictive of academic honesty and performance in domestic and international occupational therapy students.

**Design/methodology/approach** – In total, 701 participants (603 domestic students; 98 international students) were recruited from five Australian universities, and data were collected via a two-part self-report questionnaire. ANOVA and multi-linear regression analyses with bootstrapping were completed.

**Findings** – Tendency towards cheating and self-perception tendency towards dishonesty in research, gender, age and hours spent in indirect study were found to be statistically significant predictors of academic integrity and performance.

**Research limitations/implications** – Limitations of this study were the use of convenience sampling and self-report scales which can be prone to social desirability bias. Further studies are recommended to explore other potential predictors of academic honesty and performance in occupational therapy students.

**Originality/value** – A range of predictors of academic honesty and success were found that will assist educators to target vulnerable domestic and international occupational therapy students as well as address deficiencies in academic integrity through proactive strategies.

**Keyword** Occupational therapy

**Paper type** Research paper

---

**Introduction**

Within teaching, learning and the wider higher education environment, honesty and integrity are key principles that guide and inform the academic work of all students and faculty (International Education Advisory Council (IEAC), 2013; Watson, 2013). Academic integrity is the moral code of academia whereby students and staff conduct themselves in an ethical and honest manner, value the dissemination of existing and new knowledge, and promote the teaching and acquisition of knowledge and skills in fair, equitable and responsible ways (Turner and Beemsterboer, 2003). Examples of academic integrity include the citation and accreditation of original sources of information and others’ research findings in assignments, the accurate reporting of research findings and acknowledging collaboration on assignments or respecting requirements to complete assessment tasks independently (Krueger, 2014).

Since the publication of McCabe’s seminal research on cheating among American high school and university students three decades ago, evidence suggests a widespread prevalence of dishonest behaviours exists within higher education, internationally and across many disciplines (McCabe and Trevino, 1997). Research has spanned cohorts of students from a variety of subjects including business, education and the health sciences (Okoroafor et al., 2016; Tsui and Ngo, 2016; Yenilyurt, 2014). The literature also reports the difficulties encountered by institutions in their attempts to redress poor levels of academic integrity in student cohorts, including an apparent lack of knowledge about how to instil and apply the accepted conventions of academic integrity (Bretag et al., 2014), confusion about how academic integrity should be taught in course syllabi, whether it can be taught, whose responsibility it is and how misconduct cases should be handled (Löfström et al., 2015).

This bleak picture is compounded by claims that many students view their actions as acceptable standard academic practice and fail to recognise their behaviours as morally or ethically wrong (Josien and Broderick, 2013). The implications of such a mindset for students graduating in the health professions are serious with studies reporting that students who engage in academically dishonest practices are more likely to exhibit inappropriate professional behaviours later on in their career (Jiang et al., 2013; Johnson, 2013). This has a direct impact on service recipients where, for example, failure to report
fraudulent activity and tendencies for poor ethical decision-making (Krueger, 2014; Medina, 2013) can result in reduced and potentially unsafe quality of patient care (Ryan et al., 2009).

As a result, the past decade has witnessed a perceptible shift in the way higher education authorities advocate for and promote academic integrity among students. Rather than presenting academic integrity as an amorphous concept that all students are expected to adhere to, students are guided to regard the process as being as important as the end-product; that “Integrity is as important as knowledge itself” (Medina, 2013). The holistic approach adopted by many institutions in Australia and elsewhere is reflected in institutions’ internal policies and procedures for dealing with breaches of academic integrity standards. Rather than the imposition of draconian measures in response to misconduct cases, such incidences are used as learning opportunities, to offer feedback, champion academic integrity policies and instil in students the need to take responsibility for their own behaviours (Lofstrom et al., 2015). This is academic integrity as a co-responsibility at the individual and institutional levels and also encompassing institutions’ duty to improve students’ perceptions and understanding of what it means to apply the principles of academic integrity (Bretag et al., 2014).

The empirical literature on academic integrity in occupational therapy students and those from other health-care disciplines cites a range of factors relevant to self-reported dishonest academic behaviours at the undergraduate and graduate levels. These include maturity level, gender, grade point average (GPA), workload, competition with peers, levels of social media use and ignorance of academic integrity policies (Bertram Gallant et al., 2015; Bonsaksen, 2016; Bonsaksen et al., 2017; Mitchell, 2015). Additional factors which have been reported are students’ fear of failure, Web-based study frameworks, low satisfaction levels with the teaching and learning environment, ease of cheating on assessments and cost-cutting and credentialism in higher education (Bretag and Harper, 2017; Korn and Davidovitch, 2016). A common research finding is that many breaches are committed unintentionally, often resulting from gaps in students’ knowledge about, naivety towards and/or different interpretations of, academic integrity.

Bertram Gallant et al. (2015) and Beasley (2016) research on the characteristics and demographics of American undergraduate students reported that being classified as an international student was a primary risk factor for cheating. They found that international students are five times more likely to be reported for cheating and engage in a wider range of dishonest behaviours than their domestic student counterparts. Further studies provide the context for these claims in suggesting that international students enrolling in institutions based on the Western educational model are subject to a unique set of conditions. For example, international students’ lack of proficiency in English language skills may lead to them experiencing difficulties in communicating successfully with classmates and academic staff (Lim et al., 2016); culture shock may result in students struggling to adapt to and meet social and academic expectations (Contreras-Aguirre and Gonzalez, 2017); financial and cultural factors can place significant family pressure on students to succeed academically (Edgecombe et al., 2013).

Lim et al. (2016) refer to this as “cultural dissonance” which afflicts students transferring from Asian countries with teacher-centred education systems, in which students are not encouraged to voice their own opinions, engage in critical debate, question educators’ ideas or challenge accepted knowledge. This leads to difficulties adjusting to Western pedagogical systems that require students to contribute to group discussions, think critically, learn independently and actively engage with supervisors (Wang et al., 2015). The impact of culture and language as determining factors in the academic pathways of overseas health professional students, where difficulties adapting to unfamiliar academic, clinical and social environments are encountered, is reflected in the medical and nursing literature (Crawford and Candlin, 2013; Gilligan and Outram, 2012; Jeong et al., 2011).
The unique challenges faced by international students are especially relevant in the context of the Australian university system which is likely to see a 30 per cent increase in the intake of international students by 2020, and a forecast growth of 75 per cent per annum (International Education Advisory Council (IEAC), 2013). Occupational therapy programmes are one of the health-related courses that fall in the top ten higher education fields that attract overseas students to study in Australia. The demand for places is driven by a shortage of available places in students’ home countries; for example, in mainland China, only three Bachelor of Occupational Therapy programmes are currently offered to address the need for 300,000 allied health professionals to serve an ageing population (Yu et al., 2017). In 2016, it was estimated that 5-20 per cent of all students enrolled in Australian occupational therapy education programmes were international students, originating from China, Hong Kong, Taiwan, Vietnam, South Korea, Malaysia, India and Saudi Arabia (International Education Advisory Council (IEAC), 2013).

The findings from the current study will add to the evidence base on the predictors of academic honesty and success in occupational therapy students (Bonsaksen, 2016; Bonsaksen et al., 2017; Shanahan, 2004; Watson, 2013). This is the first study to investigate such predictors in a cohort of domestic and international occupational therapy students. Identifying the potential factors that usefully predict students’ academic honesty and success, and determining how much variability they account for, will facilitate a commitment to informed curriculum design and implementation. The findings will enable academic and fieldwork educators to better identify vulnerable students before breaches are committed and bridge gaps in students’ academic skill sets by offering remedial strategies and programmes that support and foster academic integrity.

Improved understanding of the predictors of academic integrity and performance in students will mean that universities are better placed to actively promote academic honesty as a core competence for all students, irrespective of origin. Therefore, this study set out to answer two research questions:

- **RQ1.** What independent factors predict overall classroom and fieldwork academic integrity in domestic and international occupational therapy students?
- **RQ2.** What factors predict academic success in domestic and international occupational therapy students?

**Methods**

**Participants**

Domestic and international occupational therapy students enrolled in undergraduate and graduate-entry masters programmes at Monash University, Australian Catholic University, La Trobe University, University of Canberra and the University of Queensland were recruited using a convenience sampling method. In total, 701 participants were recruited of whom 603 (86.02 per cent) were domestic students and 98 (13.98 per cent) were international students. In the context of this study, **domestic students** refer to students who have Australian citizenship or Australian permanent residency, pay domestic university tuition fees and are enrolled in an occupational therapy course in Australia. **International students** in the current study denote students who do not have Australian citizenship, but are from another country, are attending university on a student visa, pay international university tuition fees and are enrolled in an Australian occupational therapy course.
Students completed either an online or paper-based self-report questionnaire comprising two sections to elicit information about their academic integrity and academic performance. The first section contained demographic questions in which students reported their year level, gender, age, student status (domestic/international; full-time/part-time), academic GPA and number of hours per week spent in direct and indirect academic study, and paid work. GPA refers to the cumulative average or mean grade that a student has earned while enrolled in a specific academic course. It is calculated by adding up all the accumulated final grades for courses/units the student has completed and then dividing the total by the number of grades received. GPA is often used as a summary indicator of a student’s level of academic achievement. The second section consisted of five standardised scales that used a Likert scoring system to measure students’ general academic integrity, tendencies to engage in dishonest behaviours in the classroom and fieldwork settings, moral development and perceived sources of academic stress.

In the Academic Dishonesty Scale (ADS) participants rate 14 academic behaviours and their responses generate a total academic dishonesty cheat score. The scale has reported reliability and validity with evidence of good internal consistency (Cronbach’s alpha coefficient of 0.83) (McCabe and Trevino, 1997; McCabe et al., 2001).

The Academic Dishonesty in the Classroom Setting (ADCS) and Academic Dishonesty in the Clinical/Practice Education Setting scales (ADCPES) (Krueger, 2014) investigate academic behaviours that students may or may not engage in in classroom and field settings. Respondents rate 20 (ADCS) and 9 (ADCPES) behaviours, respectively, in relation to the frequency they have engaged in it and how seriously they regard the behaviour. Responses generate total, seriousness and frequency mean scores. Both instruments have reported reliability and validity (Krueger, 2014).

The Moral Development Scale for Professionals (MDSP) measures students’ moral development in professions with a high level of responsibility for other people where decision-making has ethical implications. Responses to 12 statements load to four subscales: authoritative standards; public meaning; moral practice; and common values. The MDSP has established validity and internal consistency with a reported Cronbach’s alpha coefficient of 0.67 (Skisland et al., 2012).

The Academic Dishonesty Tendency Scale (ADTC) examines tendencies to engage in academically dishonest behaviours. Responses load onto four subscales: tendency towards cheating; tendency towards dishonesty in assignments, essays and studies; tendency towards dishonesty in the process of doing and reporting research; and tendency towards dishonesty in providing appropriate references and acknowledgements. Scores of 1.00-1.79 equate to very low tendency and scores of 4.20-5.00 represent very high tendency. The scale has proven reliability and construct validity with Cronbach’s alpha coefficients ranging from 0.71 to 0.90 (Eminoglu and Nartgun, 2009).

The Perceived Academic Sources of Stress (PASS) scale measures levels of academic stress in university students and responses to the 18 statements load to four subscales: pressures to perform; workload and examinations; self-perceptions; and time restraints. The instrument has established validity and reliability with reported Cronbach’s alpha coefficients ranging from 0.50 to 0.60 (Bedewy and Gabriel, 2015).

Data entry, management and analysis
The Statistical Package for the Social Sciences (SPSS), version 22 (IBM Corporation, 2013), was used for data entry, storage and analysis. Results were processed using ANOVA analysis and multi-linear regressions determined if there were any significant predictors of academic honesty and performance in the sample population.
A resampling technique, bootstrapping, a type of robust statistic that infers a population from sample data, was used (Chernick, 2007). Sample size is an important consideration when completing ANOVA analysis with comparison of multiple variables because it affects the statistical power and generalisability of the findings. By taking, with replacement, the values from the original sample to obtain 2,000 student bootstrapped samples, the accuracy of the confidence interval (CI) estimation can be improved. For analyses, \( p < 0.05 \) was considered statistically significant.

Procedures
Ethics committee approval for this project was obtained from the participating universities. Students were asked to complete the self-report questionnaire at the end of a lecture by a non-teaching member of staff. Students were informed that participation was voluntary, and consent was inferred by students completing and submitting the questionnaire. The anonymity of participants was guaranteed, as there was no identifiable information on the questionnaires, and data were analysed on a group basis.

Results
Demographic and academic results
The sample included undergraduate (\( n = 609 \)) and graduate-entry masters (also referred to as pre-registration masters) (\( n = 92 \)) occupational therapy students. The sample was dominated by female students below the age of 25 in their first, second and third years of undergraduate study (Table I). The results show that 69.4 per cent of domestic students had a self-reported GPA in the 60-79 per cent range, while 77.6 per cent of international students recorded self-reported GPAs in the 50-69 per cent band. International students spent more hours per week engaged in direct and indirect academic study than their domestic counterparts, while domestic students recorded more hours in paid work per week.

Instrument scores
On measures of academic honesty, domestic and international students recorded similar scores across the subscales including self-reported frequency and seriousness ratings of engaging in dishonest behaviours in class and field settings (Table II). Domestic students scored higher on three of the scales that measured tendencies to engage in dishonest behaviours: general tendency towards cheating, and tendencies towards dishonesty in the preparation of assignments and projects and the process of doing and reporting research. International students recorded a higher score on the tendency towards dishonesty in providing appropriate references and acknowledgements. Both sets of students recorded similar scores on two measures of moral development – authoritative standards and public meaning – and international students performed better than their domestic counterparts on the moral practice and common values subscales. The scores on the perceived stresses scale indicated that international students felt under greater pressure to perform, exhibited lower levels of self-perception and experienced higher stress levels as a result of workload and time restraints (Table II).

Regression analysis
Regression analysis concentrated on four dependent variables: academic integrity; academic integrity in the classroom setting; academic integrity in the fieldwork setting; and self-reported academic GPA. The results identified a number of statistically significant factors that were predictive of academic honesty and success in the sample group.
Predictors of general academic honesty

**Domestic.** Six independent variables were included in the regression equation. The model accounted for 4.3 per cent of total variance of the dependent variable ($R^2 = 0.043, F(6, 596) = 4.42, p = 0.001$) (Table III). Three independent variables made a unique contribution to the model: age (1.6 per cent, $p = 0.020$), GPA (0.94 per cent, $p = 0.009$) and tendency towards cheating (0.83 per cent; $p = 0.033$).

**International.** The regression equation included nine independent variables. The model accounted for 29.5 per cent of total variance of the dependent variable ($R^2 = 0.295, F(9, 88) = 4.09, p = 0.001$). One independent variable made a unique contribution to the regression model: gender (11.63 per cent; $p = 0.001$) (Table IV).

Predictors of academic honesty in the classroom setting

**Domestic.** Eight independent variables were included in the regression equation. The model accounted for 12.3 per cent of total variance of the dependent variable ($R^2 = 0.123, F(8, 594) = 10.38, p = 0.001$) (Table V). Tendency towards dishonesty in the process of doing and reporting research (3.13 per cent; $p = 0.003$) and tendency towards cheating (3.17 per cent; $p = 0.006$) made unique contributions to the regression model.

### Table I.
Demographic data, self-reported GPA and time spent in direct education, indirect study and paid work (domestic $n = 603$; international $n = 98$)

|                      | D frequency | D (%) | I frequency | I (%) |
|----------------------|-------------|-------|-------------|-------|
| **Year of enrolment**|             |       |             |       |
| 1st year undergraduate| 144         | 23.9  | 28          | 28.6  |
| 2nd year undergraduate| 141         | 23.4  | 23          | 23.5  |
| 3rd year undergraduate| 149         | 24.7  | 18          | 18.4  |
| 4th year undergraduate| 92          | 15.3  | 14          | 14.3  |
| 1st year graduate entry| 39          | 6.5   | 8           | 8.2   |
| 2nd year graduate entry| 38          | 6.3   | 7           | 7.1   |
| **Age range**        |             |       |             |       |
| 17-19 years          | 148         | 24.6  | 25          | 25.5  |
| 20-24 years          | 338         | 56.1  | 60          | 61.2  |
| 25-29 years          | 61          | 10.1  | 10          | 10.2  |
| 30-34 years          | 21          | 3.5   | 3           | 3.1   |
| 35-39 years          | 10          | 1.7   | 0           | 0     |
| 40 years or older    | 25          | 4.1   | 0           | 0     |
| **Gender**           |             |       |             |       |
| Male                 | 165         | 27.4  | 28          | 28.6  |
| Female               | 438         | 72.6  | 70          | 71.4  |
| **Self-reported GPA**|             |       |             |       |
| <49%                 | 7           | 1.2   | 0           | 0     |
| 50-52%               | 31          | 5.1   | 33          | 33.7  |
| 60-69%               | 192         | 31.8  | 43          | 43.9  |
| 70-79%               | 227         | 37.6  | 8           | 8.2   |
| 80-89%               | 129         | 21.4  | 1           | 1.0   |
| >90%                 | 17          | 2.8   | 13          | 13.3  |
|                      | D Mean      | SD    | I Mean      | SD    |
| Hrs/week in face-to-face education | 14.64         | ±5.60 | 15.64       | ±6.08 |
| Hrs/week dedicated to independent study | 15.49         | ±9.37 | 16.89       | ±10.61 |
| Hrs/week of paid work                     | 11.43         | ±8.11 | 3.34        | ±6.28 |

**Notes:** GPA: Grade point average; D: domestic; I: international; SD: standard deviation
International. The regression equation included six independent variables. The model accounted for 25.4 per cent of total variance of the dependent variable ($R^2 = 0.254, F (6, 91) = 5.17, p = 0.001$). Two independent variables made a unique contribution to the regression model: public meaning (3.28 per cent; $p = 0.044$) and tendency towards cheating (9.92 per cent; $p = 0.033$) (Table VI).

**Predictors of academic honesty in the fieldwork setting**

**Domestic.** The regression equation included five independent variables. The model accounted for 6.0 per cent of total variance of the dependent variable ($R^2 = 0.060, F (5, 597) = 7.68, p = 0.001$) (Table VII). One independent variable accounted for unique variance: gender (2.92 per cent; $p = 0.008$).

**International.** Three independent variables were included in the regression model. The model accounted for 11.7 per cent of total variance of the dependent variable ($R^2 = 0.117, F (3, 94) = 4.17, p = 0.008$). One independent variable contributed to unique variance: pressures to perform (6.60 per cent; $p = 0.017$) (Table VIII).

**Predictors of self-reported academic performance**

**Domestic.** Six independent variables were included in the regression model. The model accounted for 11.5 per cent of total variance of the dependent variable ($R^2 = 0.115, F (6, 596) = 12.90, p = 0.001$) (Table IX). Five items contributed to the unique variance of the dependent variable: number of hours per week dedicated to indirect work related to education (2.6 per cent;
### Table III.
Predictors of academic honesty of domestic occupational therapy students (n = 603) based on bootstrapped linear regression analysis

| Predictors | Before bootstrapping | After bootstrapping<sup>b</sup> |
|------------|----------------------|-------------------------------|
|            | B<sup>a</sup>  | SE B  | β  | t  | p  | PC  | PC<sup>2</sup>  | SE B  | p  | BCa 95% CI lower  | BCa 95% CI upper |
| (Constant) | 25.49  | 3.236  | 7.876  | 0.001  | 3.729  | 0.001  | 17.828  | 32.966  |
| Age        | 0.721  | 0.235  | 0.127  | 3.067  | 0.002*  | 0.125  | 0.0156  | 0.301  | 0.020*  | 0.197  | 1.301  |
| Grade point average | −0.667  | 0.280  | −0.099  | −2.377  | 0.018*  | −0.097  | 0.0094  | 0.260  | 0.009*  | −1.154  | −0.176  |
| MDSP Factor 2: Public meaning | −0.154  | 0.188  | −0.034  | −0.820  | 0.413  | −0.034  | 0.0011  | 0.215  | 0.466  | −0.556  | 0.237  |
| ADTC Scale 1: Tendency towards cheating | −1.243  | 0.554  | −0.096  | −2.242  | 0.025*  | −0.091  | 0.0082  | 0.573  | 0.033*  | −2.488  | −0.092  |
| ADTC Scale 3: Tendency towards dishonesty in the process of doing and reporting research | −0.407  | 0.443  | −0.039  | −0.918  | 0.359  | −0.038  | 0.0014  | 0.476  | 0.386  | −1.380  | 0.463  |
| PASS Factor 3: Self-perceptions | −0.098  | 0.114  | −0.036  | −0.857  | 0.392  | −0.035  | 0.0012  | 0.120  | 0.405  | −0.358  | 0.146  |

**Notes:** <sup>a</sup> Represents statistically significant p-values (p < 0.05); Constant = y-intercepts of regression line; B = unstandardised beta coefficient; SE B = standard error for the unstandardised beta; β = standardised beta; t = the t test statistic; CI = confidence interval; PC = Part Correlation; PC<sup>2</sup> = Part Correlation Squared; BCa = bias-corrected and accelerated; MDSP = Moral Development Scale for Professionals; ADTC = Academic Dishonesty Tendency Scale; PASS = Perceived Academic Sources of Stress; <sup>b</sup>B remained unchanged after bootstrapping; <sup>b</sup>unless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
### Table IV.

**Predictors of general academic honesty of international occupational therapy students (n = 98)** based on bootstrapped linear regression analysis.

| Predictors                                                                 | Before bootstrapping | After bootstrapping$^b$ |
|--------------------------------------------------------------------------|----------------------|-------------------------|
|                                                                          | B$^a$ | SE B | β   | t     | p      | PC | PC$^2$ | SE B | p      | BCa 95% CI lower | BCa 95% CI upper |
| (Constant)                                                               | 48.35 | 7.01 | 6.90 | 0.001 | 9.861  | 0.001 | 9.861  | 0.001 | 27.160 | -7.015 | -1.371 |
| Gender                                                                   | -4.21 | 1.238 | -0.322 | -3.400 | 0.001* | -0.341 | 0.1163 | 1.504 | 0.008* | 7.015 | 0.080 |
| # of hours of direct time spent attending occupational therapy education programme each week | -0.092 | 0.091 | -0.095 | -1.012 | 0.314 | -0.107 | 0.0114 | 0.089 | 0.292 | -0.269 | 0.080 |
| Grade point average                                                      | -0.704 | 0.689 | -0.103 | -1.023 | 0.309 | -0.108 | 0.0117 | 0.744 | 0.358 | -2.238 | 0.653 |
| MDSP Factor 2: Public meaning                                           | -0.752 | 0.462 | -0.155 | -1.628 | 0.107 | -0.171 | 0.0292 | 0.644 | 0.259 | -1.996 | 0.474 |
| ADTC Scale 1: Tendency towards cheating                                 | -0.788 | 1.216 | -0.072 | -0.648 | 0.518 | -0.069 | 0.0048 | 1.483 | 0.594 | -3.800 | 2.590 |
| ADTC Scale 2: Tendency towards dishonesty in assignments, essays and studies such as projects | -0.809 | 0.987 | -0.087 | -0.820 | 0.415 | -0.807 | 0.0076 | 1.467 | 0.608 | -3.695 | 2.089 |
| ADTC Scale 3: Tendency towards dishonesty in the process of doing and reporting research | -1.266 | 1.016 | -0.150 | -1.246 | 0.216 | -0.132 | 0.0174 | 0.978 | 0.210 | -3.311 | 0.435 |
| PASS Factor 1: Pressures to perform                                     | 0.003 | 0.200 | 0.001 | 0.014 | 0.989 | 0.001 | 0.0000 | 0.181 | 0.994 | -0.353 | 0.333 |
| PASS Factor 2: Perceptions of workload and examinations                 | -0.244 | 0.191 | -0.135 | -1.276 | 0.205 | -0.135 | 0.0182 | 0.159 | 0.122 | -0.577 | 0.099 |

**Notes:** *Represents statistically significant p-values (p < 0.05); Constant = y-intercepts of regression line; B = unstandardised beta coefficient; SE B = standard error for the unstandardised beta; β = standardised beta; t = the t test statistic; CI = confidence interval; PC = Part Correlation; PC$^2$ = Part Correlation Squared; BCa = bias-corrected and accelerated; MDSP = Moral Development Scale for Professionals; ADTC = Academic Dishonesty Tendency Scale; PASS = Perceived Academic Sources of Stress; $^a$B remained unchanged after bootstrapping; $^b$unless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
### Table V. Predictors of academic honesty in the classroom setting of domestic occupational therapy students (n = 603) based on bootstrapped linear regression analysis

| Predictors                                                                 | B^a | SE B | \( \beta \) | t   | p    | PC     | \( PC^2 \) | SE B | \( p \) | CI lower | CI upper |
|---------------------------------------------------------------------------|-----|------|------------|-----|------|--------|-----------|------|--------|----------|----------|
| (Constant)                                                                | 2.538 | 0.160   | 15.855 | 0.001 | 0.346 | 0.001  | 0.001 | 1.982 | 3.179    |
| Gender                                                                   | -0.021 | 0.031  | -0.026 | -0.672 | 0.502 | -0.028 | 0.0008 | 0.036 | 0.561 | -0.099 | 0.057    |
| No. of hours of direct time spent attending occupational therapy programme each week | -0.004 | 0.002  | -0.063 | -1.613 | 0.107 | -0.066 | 0.002 | 0.063 | -0.008 | 0.000    |
| No. of indirect time spent attending occupational therapy programme each week | -0.002 | 0.001  | -0.057 | -1.440 | 0.150 | -0.059 | 0.0035 | 0.017 | -0.004 | 0.000    |
| ADTC Scale 1: Tendency towards cheating                                  | -0.129 | 0.029  | -0.183 | -4.416 | 0.001* | -0.178 | 0.0317 | 0.046 | 0.006* | -0.235 | -0.045   |
| ADTC Scale 3: Tendency towards dishonesty in the process of doing and reporting research | -0.104 | 0.024  | -0.184 | -4.395 | 0.001* | -0.177 | 0.0313 | 0.035 | 0.003* | -0.184 | -0.030   |
| ADTC Scale 4: Tendency towards dishonesty in providing appropriate references and acknowledgements | -0.012 | 0.026  | -0.019 | -0.458 | 0.647 | -0.019 | 0.0004 | 0.032 | 0.681 | -0.076 | 0.049    |
| PASS Factor 2: Perceptions of workload and examinations                   | -0.017 | 0.006  | -0.127 | -2.635 | 0.009* | -0.107 | 0.0114 | 0.009 | 0.000 | -0.037 | 0.001    |
| PASS Factor 4: Time restraints                                            | -0.002 | 0.006  | -0.018 | -0.371 | 0.711 | -0.015 | 0.0002 | 0.006 | 0.714 | -0.013 | 0.008    |

**Notes:**  
*Represents statistically significant p-values (*p* < 0.05); Constant = y-intercepts of regression line; B = unstandardised beta coefficient; SE B = standard error for the unstandardised beta; \( \beta \) = standardised beta; t = the t test statistic; CI = confidence interval; PC = Part Correlation; \( PC^2 \) = Part Correlation Squared; BCa = bias-corrected and accelerated; ADTC = Academic Dishonesty Tendency Scale; PASS = Perceived Academic Sources of Stress; ^aB remained unchanged after bootstrapping; ^bunless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
### Table VI

**Predictors of academic honesty in the classroom setting of international occupational therapy students (n = 98) based on bootstrapped linear regression analysis**

| Predictors                                                                 | Before bootstrapping |          |          |          |          |          |          |          |          |          |          |          |          |          |
|---------------------------------------------------------------------------|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| (Constant)                                                                | 36.081               | 5.986    | 6.027    | 0.001    | 4.976    | 0.001    | 27.930   | 47.647   |          |          |          |          |          |          |
| No. of hours of direct time spent attending occupational therapy education programme each week | -0.153               | 0.075    | -0.130   | -2.049   | 0.043*   | -0.210   | 0.0441   | 0.106    | 0.156    | -0.402   | 0.052    |          |          |          |
| MDSP Factor 2: Public meaning                                             | 0.757                | 0.370    | 0.190    | 2.046    | 0.044*   | 0.210    | 0.0441   | 0.334    | 0.044*   | 0.207    | 1.364    |          |          |          |
| ADTC Scale 1: Tendency towards cheating                                  | -3.047               | 0.964    | -0.341   | -3.162   | 0.002*   | -0.315   | 0.0992   | 1.187    | 0.033*   | -5.663   | -0.736   |          |          |          |
| ADTC Scale 3: Tendency towards dishonesty in the process of doing and reporting research | 0.120                | 0.768    | 0.017    | 0.156    | 0.876    | 0.016    | 0.0003   | 0.585    | 0.842    | -0.900   | 1.139    |          |          |          |
| PASS Factor 3: Self-perceptions                                          | -0.439               | 0.203    | -0.214   | -2.167   | 0.033*   | -0.222   | 0.0493   | 0.204    | 0.051    | -0.946   | -0.046   |          |          |          |
| PASS Factor 4: Time restraints                                            | -0.089               | 0.160    | -0.055   | -0.553   | 0.582    | -0.058   | 0.0034   | 0.131    | 0.500    | -0.330   | 0.166    |          |          |          |

**Notes:**
- *Represents statistically significant p-values (p < 0.05); Constant = y-intercepts of regression line; $B =$ unstandardised beta coefficient; $SE_B =$ standard error for the unstandardised beta; $\beta =$ standardised beta; $t =$ the $t$ test statistic; $CI =$ confidence interval; $PC =$ Part Correlation; $PC^2 =$ Part Correlation Squared; BCa = bias-corrected and accelerated; MDSP = Moral Development Scale for Professionals; ADTC = Academic Dishonesty Tendency Scale; PASS = Perceived Academic Sources of Stress; “$B$ remained unchanged after bootstrapping;” unless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
### Table VII.

Predictors of academic honesty in the fieldwork setting of domestic occupational therapy students ($n = 603$) based on bootstrapped linear regression analysis

| Predictors                                                                 | Before bootstrapping | After bootstrapping$^b$ |
|---------------------------------------------------------------------------|----------------------|-------------------------|
|                                                                           | B$^a$ SE B $\beta$   | t $p$ PC PC$^2$ SE B $p$ | BCa 95% CI lower | BCa 95% CI upper |
| (Constant)                                                                | 1.687 0.122          | 13.864 0.001            | 0.291 0.001      | 0.291 0.001      | 1.226 2.257     |
| Gender                                                                   | -0.114 0.027         | -0.171 -4.233 0.001* $^a$ | -0.171 0.0292 0.039 | 0.008* $^a$ | -0.207 -0.041  |
| Age                                                                      | 0.007 0.011          | 0.025 0.619 0.536       | 0.025 0.0006 0.008 | 0.007 0.024      | 0.007 0.024     |
| No. of hours of direct time spent attending occupational therapy education programme each week | 0.004 0.002         | 0.084 2.081 0.038* $^a$ | 0.085 0.0072 0.004 | 0.243 0.011      | -0.002 0.011    |
| ADTC Scale 1: Tendency towards cheating                                  | -0.091 0.024         | -0.152 -3.699 0.001* $^a$ | -0.150 0.0225 0.050 | 0.072 0.0215    | 0.005           |
| ADTC Scale 2: Tendency towards dishonesty in assignments, essays and studies such as projects | -0.035 0.022         | -0.066 -1.595 0.111      | -0.065 0.0042 0.031 | 0.262 -0.098  | 0.029           |

**Notes:**

$^a$Represents statistically significant $p$-values ($p < 0.05$); Constant = $y$-intercepts of regression line; B = unstandardised beta coefficient; SE B = standard error for the unstandardised beta; $\beta$ = standardised beta; $t$ = the $t$ test statistic; CI = confidence interval; PC = Part Correlation; PC$^2$ = Part Correlation Squared; BCa = bias-corrected and accelerated; ADTC = Academic Dishonesty Tendency Scale; $^b$B remained unchanged after bootstrapping; $^b$unless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
### Table VIII. Predictors of academic honesty in the fieldwork setting of international occupational therapy students (n = 98) based on bootstrapped linear regression analysis.

| Predictors                                           | Before bootstrapping | After bootstrapping<sup>b</sup> | B<sub>SE</sub> | SE<sub>B</sub> | β  | t    | p   | PC  | PC<sup>2</sup> | SE<sub>B</sub> | p   | BCa 95% CI lower | BCa 95% CI upper |
|------------------------------------------------------|----------------------|---------------------------------|----------------|----------------|----|------|-----|-----|--------------|----------------|-----|----------------|-----------------|
| (Constant)                                           |                      |                                 | 8.259          | 1.692          |     | 4.881| 0.000|     | 1.887        | 0.001          |     | 4.020          | 11.877          |
| Gender                                               |                      |                                 | -0.860         | 0.537          | -0.163| -1.602| 0.112| -0.163| 0.0266       | 0.635          | 0.192| -2.201         | 0.436           |
| PASS Factor 1: Pressures to perform                  |                      |                                 | 0.216          | 0.084          | 0.288| 2.574| 0.012*| 0.257| 0.0660       | 0.073          | 0.017*| 0.085          | 0.364           |
| PASS Factor 4: Time restraints                       |                      |                                 | 0.020          | 0.092          | 0.026| 0.222| 0.825| 0.023| 0.0005       | 0.104          | 0.848| -0.166         | 0.244           |

**Notes:** *Represents statistically significant p-values (p < 0.05); Constant = y-intercepts of regression line; B = unstandardised beta coefficient; SE B = standard error for the unstandardised beta; β = standardised beta; t = the t test statistic; CI = confidence interval; PC = Part Correlation; PC<sup>2</sup> = Part Correlation Squared; BCa = bias-corrected and accelerated; PASS = Perceived Academic Sources of Stress; B remained unchanged after bootstrapping; unless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
Table IX.
Predictors of academic performance based of domestic occupational therapy students (n = 603) on bootstrapped linear regression analysis

| Predictors                                                                 | Before bootstrapping | After bootstrapping<sup>b</sup> |
|----------------------------------------------------------------------------|----------------------|---------------------------------|
|                                                                            | B<sup>a</sup>        | SE B                            | β     | t    | p     | PC   | PC<sup>2</sup> | SE B | p     | CI lower | CI upper |
| (Constant)                                                                | 1.967                | 0.431                           | 4.560 | 0.001| 0.416 | 0.001|                | 1.094| 2.749 |
| Age                                                                       | 0.107                | 0.034                           | 0.126 | 3.163| 0.002*| 0.158| 0.0250          | 0.032| 0.002*| 0.043    | 0.173    |
| No. of hours of indirect time spent working on and studying material related to your occupational therapy education programme | 0.016                | 0.004                           | 0.159 | 3.85 | 0.001*| 0.161| 0.0259          | 0.005| 0.002*| 0.006    | 0.027    |
| MDSP Factor 3: Moral practice                                             | -0.033               | 0.016                           | -0.083| -2.133| 0.033*| -0.087| 0.0076          | 0.017| 0.041*| -0.066   | 0.000    |
| ADTC Scale 1: Tendency towards cheating                                  | 0.156                | 0.075                           | 0.081 | 2.079| 0.038*| 0.085| 0.0072          | 0.065| 0.016*| 0.030    | 0.281    |
| PASS Factor 1: Pressures to perform                                      | 0.020                | 0.013                           | 0.062 | 1.535| 0.125 | 0.063| 0.0040          | 0.013| 0.114 | -0.009   | 0.046    |
| PASS Factor 3: Self-perceptions                                          | 0.065                | 0.017                           | 0.159 | 3.908| 0.001*| 0.158| 0.0250          | 0.017| 0.001*| 0.028    | 0.097    |

Notes: "Represents statistically significant p-values (p < 0.05); Constant = y-intercepts of regression line; B = unstandardised beta coefficient; SE B = standard error for the unstandardised beta; β = standardised beta; t = the t test statistic; CI = confidence interval; PC = Part Correlation; PC<sup>2</sup> = Part Correlation Squared; BCa = bias-corrected and accelerated; MDSP = Moral Development Scale for Professionals; ADTC = Academic Dishonesty Tendency Scale; PASS = Perceived Academic Sources of Stress; "B remained unchanged after bootstrapping; "<sup>b</sup>Unless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
Discussion

This study explored the factors that predict academic honesty and performance in domestic and international occupational therapy students. Subjecting the data to regression analysis identified a range of statistically significant predictors of general, classroom and fieldwork academic honesty and success.

Predictors of general academic integrity

Regression analysis revealed a larger range of predictive factors for domestic students, including GPA, age and tendency towards cheating, compared to the single predictive factor identified for international students (gender). The finding that GPA positively predicted domestic students’ academic honesty ($p = 0.009$) should be viewed in context; with nearly 70 per cent of domestic students self-reporting a GPA in the 60-79 per cent range, one might reasonably expect such high-achieving students to apply academic rigour in their studies. The dominance of females across the sample contributes to the contextual setting and the findings mirror previous research associating female gender with high GPAs (Bonsaksen et al., 2017). Although GPA was not a predictor of international students’ academic integrity, their GPA scores (which were on average lower compared to domestic students) aligns with the finding that gender is a significant predictor of their general academic honesty ($p = 0.001$).

Across the sample, the data on GPA and gender offer a potential explanation for the low rates of self-reported dishonest behaviours in this cohort of students, compared to studies of other health professional students (Okoroafor et al., 2016). For example, higher incidences of academic dishonesty have been reported in nursing, physical therapy and pharmacy undergraduates (Balik et al., 2010; Montuno et al., 2012; Ryan et al., 2009). The findings from the current study are similar to previous studies of occupational therapy and nursing students in which female gender was found to be a reliable predictor of better academic outcomes, while male gender was associated with poorer academic performance and higher incidences of academic dishonesty (Korn and Davidovitch, 2016; Watson, 2013).

Studies of family medicine and public health students in the USA reveal the influence of age as a risk factor for engaging in dishonest academic behaviours, with rates of cheating aligned to maturity levels (Bertram Gallant et al., 2015). Beasley (2016) suggests that younger students are more likely to be unaware of the rules that constitute academic integrity and the consequences of breaches of expected academic conduct. When considering the demographic factors that predict academic honesty in domestic and international students, the results from this study and elsewhere demonstrate the need to consider the predictive value of variables such as GPA, gender and age in relation to one another and not in isolation (Brown and Murdolo, 2016).

Domestic and international groups recorded similar scores on the ADTC Tendency Towards Cheating subscale (Domestic students, 3.84, SD ± 0.50; International students, 3.73, SD ± 0.54) but only in domestic students was it found to be predictive of general academic honesty. This is an important finding as it suggests that asking students to rate
Table X. Predictors of academic performance based on international occupational therapy students (n = 98) on bootstrapped linear regression analysis

| Predictors                                      | Before bootstrapping | After bootstrapping\(^b\) |
|------------------------------------------------|----------------------|---------------------------|
| (Constant)                                      | 2.062 0.539 3.825 0.001 | 0.561 0.001 0.935 3.062   |
| Age                                             | 0.405 0.113 0.323 3.586 0.001* | 0.347 0.120 0.128 0.002* 0.165 0.663   |
| ADTC Scale 2: Tendency towards dishonesty in assignments, essays, and studies such as projects | -0.322 0.132 -0.237 -2.435 0.017* -0.244 0.0595 0.137 0.014* -0.615 -0.019 |
| ADTC Scale 3: Tendency towards dishonesty in the process of doing and reporting research | 0.443 0.119 0.359 3.711 0.001* | 0.357 0.127 0.123 0.001* 0.193 0.657 |

Notes: \(^*\)Represents statistically significant p-values (p < 0.05); Constant = y-intercepts of regression line; B = unstandardised beta coefficient; SE B = standard error for the unstandardised beta; \(\beta\) = standardised beta; \(t\) = the \(t\) test statistic; CI = confidence interval; PC = Part Correlation; PC\(^2\) = Part Correlation Squared; BCa = bias-corrected and accelerated; ADTC = Academic Dishonesty Tendency Scale; \(^b\)B remained unchanged after bootstrapping; \(^b\)unless otherwise noted, bootstrap results are based on 2,000 bootstrap samples.
statements such as “Using material from a published source in a paper without giving the author credit” and “Copying material and turning it in as your own work” as honest or dishonest behaviours, establishes their tendency to engage in such practices.

Predictors of academic honesty in classroom settings

Within the classroom setting, the measure of tendency towards cheating was a significant predictor of both domestic and international students’ academic integrity (Domestic students, $p = 0.006$; International students, $p = 0.033$). For international students, this finding should be considered in the context of the large number of international students enrolled in occupational therapy programmes in Australia. Overseas students increasingly represent a significant proportion of the student body and research indicates that international students from Confucian-based education systems can struggle to adapt to the requirements of Western pedagogy where students are expected to apply critical thinking, be active participants in classroom discussions and become independent learners (Lim et al., 2016). There is also widespread evidence that personal and situational factors are factors in the difficulties encountered by many international students when transitioning to higher education in Australia.

Martirosyan et al. (2015) cite poor language proficiency as a primary cause of concern for international students that adversely affects their academic performance inside and outside the classroom. Velliaris and Breen (2016) stress that overseas, students may struggle to conform to the discipline-specific language requirements in their chosen subject – this may be especially so in the health sciences which are laden with medical and anatomical terminology. One recommendation is to support international students from an early stage by offering pathways in academic language and learning preparation; these might include programmes designed to improve writing skills so students learn the importance of incorporating and acknowledging others’ ideas in their own assignments; activities to enhance reading comprehension; and initiatives that raise levels of understanding about the importance of following citation and referencing conventions (Velliaris and Breen, 2016).

Such measures will serve to establish culturally sensitive educational environments for international students that facilitate collaborative partnerships and learning. In clarifying the academic behaviour and conduct expected of students, be they preparing an assignment or preparing for an exam, academic integrity is instilled as a core component of learning where the means and processes of learning are as important as the final educational outcomes (Medina, 2013). It would also serve to address misunderstandings about what constitutes dishonest academic behaviour and potentially reduce breaches by vulnerable students.

Although domestic and international students recorded similar scores on the tendency towards dishonesty in the process of doing and reporting research scale, regression analysis found it to be a strong predictor of academic classroom integrity in domestic students only ($p = 0.003$). This suggests that students may be unfamiliar with the protocols regarding the appropriate acknowledgement of others’ research and the importance of generating original qualitative and quantitative data in their own research projects. This may reflect contemporary technology and a prevailing “cut and paste” mentality that precludes the application of academic rigour when preparing assignments. In conjunction with regression analysis demonstrating the tendency towards cheating scale’s value as a predictor of honest academic behaviours in the classroom, these findings represent useful “red flag” markers.

Deficiencies in academic integrity in the classroom context represent a challenge for educators as high standards in research protocol are essential within the health sciences. Within occupational therapy, Mitchell (2015) emphasises the importance of students’ spending time outside the classroom engaged in authentic fieldwork experiences where the adoption of
technical approaches and case-based methods develop students' knowledge of how to conduct and report their own research according to established and accepted protocols.

A positive finding was the high scores recorded by both groups on measures of moral development, although only one subscale – public meaning – was moderately predictive of international students' academic integrity in the classroom setting ($p = 0.044$). It is interesting to note that the items loading to the public meaning factor relate to the importance of meeting others' expectations, paying attention to what people are saying and listening to what people mean by right and wrong – qualities it could be argued that are inherent in traditional Confucian education systems. The high levels of moral development offer encouragement for occupational therapy educators as they provide evidence of a positive moral compass within this cohort of students, irrespective of origin.

Predictors of academic honesty in fieldwork settings
In the practice education setting, regression analysis revealed only one factor, gender ($p = 0.008$), to be predictive of domestic students' academic honesty. This finding is consistent with previous research by Seah et al. (2011) that suggests female students are more highly motivated and confident in their academic endeavours. They contend that females are more adept at meeting personal challenges and aware of opportunities to develop their clinical reasoning and relational skills, particularly within female-dominated disciplines such as occupational therapy where educational programmes typically involve concentrated periods of professional practice placements.

Domestic and international students recorded near-identical scores on the pressures to perform scale, but only in international students was it predictive of academic honesty in the field arena ($p = 0.017$). The inference is that while both groups experience the same levels of stress generated by peer and parental pressure, domestic students have a higher coping threshold that allow them to maintain academic standards. It also casts light on the unique challenges faced by overseas students on professional practice placements. Outside the relative “safety” of the lecture theatre or tutorial, the workplace represents a challenging and difficult work environment for students who may lack proficiency in written and spoken English. This can lead to feelings of isolation and alienation (Bertram Gallant et al., 2015) in the practice education setting, often compounded by stress from perceived peer competition and the unrealistic expectations of, and criticism from, academic and/or practice staff and parents.

While the literature reports the academic resilience of Asian students as a result of their experiences of striving to succeed and get ahead within highly competitive Confucian education systems, it is recognised that this can act as a barrier to engaging in the collegiate working practices expected within Western pedagogies (Li, 2017). Lim et al.'s (2016) study of students from Hong Kong, Malaysia and Singapore enrolled in an Australian occupational therapy programme describes how international students on placement often felt less competent than domestic students in terms of language proficiency, confidence and ability to express themselves. Expectations to be more assertive, show initiative and participate in activities were particularly stressful for students who were acutely aware that failure to demonstrate these behaviours could result in placement failure (Lim et al., 2016).

Predictors of academic performance
This section of the study revealed some of the strongest predictors and adds to our understanding of the factors that may influence and contribute to the academic success of domestic and international occupational therapy students in Australia. Self-perceptions ($p = 0.001$); number of hours per week spent in indirect education activities ($p = 0.002$); age ($p = 0.002$); tendency towards cheating ($p = 0.016$); and moral practice ($p = 0.041$) were strong to moderate predictors of academic performance in domestic students. For international
students, age \((p = 0.002)\), tendency towards dishonesty in process of doing and reporting research \((p = 0.001)\) and tendency towards dishonesty in process of preparing assignments \((p = 0.014)\) were predictive of academic success.

Domestic students’ higher score on measures of self-perception suggests that their familiarity with Western pedagogies facilitates easier navigation through the higher education system compared to their international counterparts. Whereas domestic students are more likely to have experience of teaching formats that emphasise the need to learn independently, contribute to group discussions and apply critical and reflective learning (Wang et al., 2015), international students may initially struggle to meet these requirements. Lim et al. (2016) stress the importance of creating culturally sensitive programmes that assist international students to overcome educational and social barriers and ease the transition from their home cultures. Strategic measures at the institutional level targeting English language proficiency and communication with fellow students and university staff have been shown to improve international students’ adaptation, resulting in higher self-esteem, better social and academic relationships and enriched personal and educational learning (Contreras-Aguirre and Gonzalez, 2017).

The aim for all students, irrespective of point of origin, should be to demonstrate an in-depth understanding of how to apply theory in multi-disciplinary field contexts that facilitates motivation and self-confidence in their academic endeavours, including an awareness of the importance of academic integrity. In particular, having a good understanding of academic integrity principles before heading out to complete fieldwork placements is essential for domestic and international students.

Regression analysis revealed that age was a significant predictor of academic performance in domestic \((p = 0.002)\) and international \((p = 0.002)\) students. Previous research that has investigated the influence of age in relation to academic integrity is inconclusive. Seah et al. (2011), for example, report that students prefer direct structured supervision in the early years of study in contrast to students in their final years of study who are comfortable with hands-off forms of supervision, particularly during field placements. This suggests that students’ prior experiences in classroom and practice settings equip them with the necessary skills in independent learning, reflective practice and group work that facilitate self-regulated and specialised academic learning processes. In contrast, other research contends that age is neither a proven predictor of academic performance nor associated with academic success, in occupational therapy students (Shanahan, 2004; Watson, 2013).

The finding that time spent in independent learning – be that reading, researching, completing assignments or preparing for group presentations – was strongly predictive \((p = 0.002)\) of domestic students’ academic performance was not unexpected. Previous research has provided evidence that time engaged in self-study activities is related to higher GPAs, improved satisfaction levels and better rates of academic achievement (Bonsaksen et al., 2017). Studies have also determined a positive correlation between year level of academic study and academic performance (Brown and Murdolo, 2016; Richardson, 2010).

At the institutional level, this emphasises the importance of addressing and mitigating the effects of cultural and social barriers that may impact international students’ attendance at lectures and active participation in small group work. This is especially pertinent to occupational therapy programmes where the teaching of foundational knowledge such as occupational science, psychology and physiology is emphasised in the early years of study. In the context of the Monash University occupational therapy programme, a range of didactic and assessment methods are used in the first years of study including scenario-based learning in which students develop their own learning and research objectives based on authentic case studies.

In this context, the finding that tendency towards dishonesty in the process of doing and reporting research \((p = 0.001)\) and in the preparation of assignments \((p = 0.014)\) are predictive of
international students’ academic performance is a significant outcome. Overseas’ students vulnerability in these areas is of concern for health science educators as following correct research procedures, acquiring proficiency in compiling reports and accrediting the work of others are fundamental requisites in the academic and professional arenas. This highlights the value of assessing students’ problem-solving, leadership, practical and presentation skills across years of study to ensure that all students – domestic and international – actively model and promote academic integrity during the course of their studies. Evidence from the occupational therapy literature suggests that programmes in which students are encouraged to be reflective and draw upon their field and class experiences act as a catalyst for the development of sophisticated cognitive skills that allow students to apply their knowledge at a deeper level (Mitchell, 2015). It is therefore recommended that academic programmes incorporate personalised teaching and learning relationships and design assessments as part of a multi-pronged, holistic approach. Allied with culturally sensitive education that recognises the challenges faced by international students, the aim should be to strengthen academic rigour within the class and practice education environment (Bretag and Harper, 2017; Lim et al., 2016).

More specifically, it is suggested that this can be achieved by course content that advocates “best practice” in the application of academic integrity standards, and a culture that rewards good research practice. Löfström et al. (2015) recommend that where breaches occur, these should be treated as learning opportunities where the episode is acknowledged, feedback provided to the student and the clear message imparted that students must take responsibility for their own behaviour. Research has also shown the benefits of educational bundles in improving confidence and self-efficacy in areas such as evidence-based practice which provide students with a solid grounding in research and appraisal skills and the appropriate use of citation managers (Bissett et al., 2016).

Prior research indicates that educating students about the academic requirements, standards and tasks expected of them improves overall satisfaction rates with course content (Bonsaksen, 2016). Programmes that place an emphasis on promoting motivation, resilience and resourcefulness facilitate students to meet personal challenges, make the most of opportunities to develop their learning, make the right academic decisions and feel confidence as a student and in their future careers.

Future research
This study identified a range of factors that usefully predict academic honesty and success in domestic and international occupational therapy students. The findings on the influence of age, gender and GPA, allied with new evidence from the tools measuring tendencies to engage in dishonest behaviours and perceived stresses, support and add to the knowledge base on academic integrity and performance. Identifying a range of predictors should assist health science educators in earlier identification of at-risk students and improve their understanding of the strengths and weaknesses inherent in student cohorts. Future research should focus on generating longitudinal and qualitative data to further explore the predictors of academic honesty and performance and establish whether the challenges faced by particular groups, such as overseas students, change as they progress across year levels. A comparison of domestic and international students enrolled in more subject-based courses (i.e. chemistry, biology, physiology, history, geography, linguistics, etc.) in relation to academic integrity issues would be informative.

Limitations
Finally, there are several limitations to this research: the convenience sampling approach to the recruitment of participants and the use of self-report scales which can be prone to social desirability bias. It is possible that students may not have reported all instances of dishonest
academic behaviours they may have engaged in and participants may not have been completely honest in self-reporting their GPAs. However, for ethical reasons it was not possible to retrieve this information from the student records. It is also acknowledged that other factors on which data were not collected may also predict academic integrity and success in students (e.g. living circumstances and socio-economic status).

**Conclusion**

This study examined a range of demographic and self-measured factors that were predictive of academic honesty and success in domestic and international occupational therapy students. The findings will assist practice educators in offering learning environments that enhance students’ educational experiences and self-esteem. The self-reported incidence of cheating behaviours was low in this sample of students compared to studies of other health science students. Educators should nevertheless be aware of the factors that influence students’ ability to understand, demonstrate and uphold academic integrity as a routine and essential component of their scholarly endeavours.

International students are a particularly vulnerable group as they are confronted with unique cultural challenges that may compromise their full educational and social integration. Proactive educational and cultural initiatives, including mentoring, language and transitioning programmes, should facilitate the likelihood of positive academic and social outcomes for overseas students and improved understanding of, and commitment to, academic integrity. Further investigation in this area is recommended in this important area of teaching and learning research.

**References**

Balik, C., Sharon, D., Kelishek, S. and Tabak, N. (2010), “Attitudes towards academic cheating during nursing studies”, *Medicine and Law*, Vol. 29 No. 4, pp. 547-563.

Beasley, E.M. (2016), “Comparing the demographics of students reported for academic dishonesty to those of the overall student population”, *Ethics and Behavior*, Vol. 26 No. 1, pp. 45-62.

Bedewy, D. and Gabriel, A. (2015), “Examining perceptions of academic stress and its sources among university students: the perception of academic stress scale”, *Health Psychology Open*, Vol. 2 No. 2, pp. 1-9.

Bertram Gallant, T., Binkin, N. and Donohue, M. (2015), “Students at risk for being reported for cheating”, *Journal of Academic Ethics*, Vol. 13 No. 3, pp. 217-228.

Bissett, K.M., Cvach, M. and White, K.M. (2016), “Improving competence and confidence with evidence-based practice among nurses”, *Journal for Nurses in Professional Development*, Vol. 32 No. 5, pp. 248-255.

Bonsaksen, T. (2016), “Predictors of academic performance and education programme satisfaction in occupational therapy students”, *British Journal of Occupational Therapy*, Vol. 79 No. 6, pp. 361-367.

Bonsaksen, T., Brown, T., Lim, H.B. and Fong, K. (2017), “Approaches to studying predict academic performance in undergraduate occupational therapy students: a cross-cultural study”, *BMC Medical Education*, Vol. 17, p. 76.

Bretag, T. and Harper, R. (2017), “Assessment design won’t stop cheating, but our relationships with students might”, available at: https://theconversation.com/assessment-design-wont-stop-cheating-but-our-relationships-with-students-might-76394

Bretag, T., Mahmud, S., Wallace, M., Walker, R., McGowan, U., East, J., Green, M., Partridge, L. and James, C. (2014), “‘Teach us how to do it properly!’ an Australian academic integrity student survey”, *Studies in Higher Education*, Vol. 39 No. 7, pp. 1150-1169.
Brown, T. and Murdolo, Y. (2016), “The relationship between approaches to study and academic performance among Australian undergraduate occupational therapy students”, *Australian Occupational Therapy Journal*, Vol. 64 No. 3, pp. 218-225.

Chernick, M. (2007), *Bootstrap Methods: A Guide for Practitioners and Researchers*, Wiley, New York, NY.

Contreras-Aguirre, H.C. and Gonzalez, E.G.Y. (2017), “Experiences of international female students in US graduate programs”, *College Student Journal*, Vol. 51 No. 1, pp. 33-46.

Crawford, T. and Candlin, S. (2013), “A literature review of the language needs of nursing students who have english as a second/other language and the effectiveness of english language support programmes”, *Nurse Education in Practice*, Vol. 13 No. 3, p. 181.

Edgecombe, K., Jennings, M. and Bowden, M. (2013), “International nursing students and what impacts their clinical learning: literature review”, *Nurse Education Today*, Vol. 33 No. 2, pp. 138-142.

Eminoglu, E. and Nartgun, Z. (2009), “A scale development study to measure academic dishonesty tendency of university students”, *International Journal of Human Sciences*, Vol. 6 No. 1, pp. 215-240.

Gilligan, C. and Outram, S. (2012), “Culturally and linguistically diverse students in health professional programs: an exploration of concerns and needs”, *Health Education*, Vol. 23 No. 1, pp. 40-47.

IBM Corporation (2013), *IBM SPSS Statistics for Windows, Version 22.0*, IBM Corporation, Armonk, New York, NY.

International Education Advisory Council (IEAC). (2013), *Australia – Educating Globally, Commonwealth of Australia*, Canberra, ACT, Australia.

Jeong, S.Y., Hickey, N., Levet-Jones, T., Pitt, V., Hoffman, K., Norton, C.A. and Ohr, S.O. (2011), “Understanding and enhancing the learning experiences of culturally and linguistically diverse nursing students in an Australian bachelor of nursing program”, *Nurse Education Today*, Vol. 31 No. 3, pp. 238-244.

Jiang, H., Emmerton, L. and McKauge, L. (2013), “Academic integrity and plagiarism: a review of the influences and risk situations for health students”, *Higher Education Research and Development*, Vol. 32 No. 3, pp. 369-380.

Johnson, J.A. (2013), “Does academic dishonesty result in unethical professional practice?”, *Journal for Nurses in Professional*, Vol. 29 No. 5, pp. 271-273.

Josien, L. and Broderick, B. (2013), “Cheating in higher education: the case of multi-methods cheaters”, *Academy of Educational Leadership Journal*, Vol. 17 No. 2, pp. 93-105.

Korn, L. and Davidovitch, N. (2016), “The profile of academic offenders: features of students who admit to academic dishonesty”, *Medical Science Monitor*, Vol. 22, pp. 3043-3055.

Krueger, L. (2014), “Academic dishonesty among nursing students”, *Journal of Nursing Education*, Vol. 53 No. 2, pp. 77-87.

Li, H. (2017), “The ‘secrets’ of Chinese students’ academic success: academic resilience among students from highly competitive academic environments”, *Educational Psychology*, Vol. 37 No. 8, pp. 1001-1014.

Lim, J.W., Honey, A., Du Toit, S., Chen, Y.-W. and Mackenzie, L. (2016), “Experiences of international students from Asian backgrounds studying occupational therapy in Australia”, *Australian Occupational Therapy Journal*, Vol. 63 No. 5, pp. 303-311.

Löfström, T.E., Trotman, T., Furnari, M. and Shephard, K. (2015), “Who teaches academic integrity and how do they teach it?”, *Higher Education*, Vol. 69 No. 3, pp. 415-428.

McCabe, D.L. and Trevino, L.K. (1997), “Individual and contextual influences on academic dishonesty: a multicampus investigation”, *Research in Higher Education*, Vol. 38 No. 3, pp. 379-397.

McCabe, D.L., Trevino, L.K. and Butterfield, K.D. (2001), “Cheating in academic institutions: a decade of research”, *Ethics and Behavior*, Vol. 11 No. 3, pp. 219-232.

Martirosyan, N.M., Hwang, E. and Wanjohi, R. (2015), “Impact of english proficiency on academic performance of international students”, *Journal of International Students*, Vol. 5 No. 1, pp. 60-71.
Medina, M.S. (2013), “Promoting academic integrity among health care students”, American Journal of Health-System Pharmacy, Vol. 70 No. 9, pp. 754-757.

Mitchell, A.W. (2015), “Longitudinal study of occupational therapy students’ beliefs about knowledge and knowing”, American Journal of Occupational Therapy, Vol. 69 No. 2, p. 690223010.

Montuno, E., Davidson, A., Iwasaki, K., Jones, S., Martin, J., Brooks, D., Gibson, B.E. and Mori, B. (2012), “Academic dishonesty among physical therapy students: a descriptive study”, Physiotherapy Canada, Vol. 64 No. 3, pp. 245-254.

Okoroafor, A.U., Henning, M.A., Chibuike, O.M. and Rajput, V. (2016), “Disclosing academic dishonesty: perspectives from Nigerian and New Zealand health professional students”, Ethics and Behavior, Vol. 26 No. 5, pp. 431-447.

Richardson, J.T.E. (2010), “Perceived academic quality and approaches to studying in higher education: evidence from Danish students of occupational therapy”, Scandinavian Journal of Educational Research, Vol. 54 No. 2, pp. 189-203.

Ryan, G., Bonanno, H., Krass, I., Scouller, K. and Smith, L. (2009), “Undergraduate and postgraduate pharmacy students’ perceptions of plagiarism and academic honesty”, American Journal of Pharmaceutical Education, Vol. 73 No. 6, pp. 1-8.

Seah, C.H., Mackenzie, L. and Gamble, J. (2011), “Transition of graduates of the master of occupational therapy to practice”, Australian Occupational Therapy Journal, Vol. 58 No. 2, pp. 103-110.

Shanahan, M.M. (2004), “Does age at entry have an impact on academic performance in occupational therapy education?”, British Journal of Occupational Therapy, Vol. 67 No. 10, pp. 436-439.

Skisland, A., Bjørnestad, J.O. and Söderhamn, O. (2012), “Construction and testing of the moral development scale for professionals (MDSP)”, Nurse Education Today, Vol. 32 No. 3, pp. 255-260.

Tsui, A.P.Y. and Ngo, H.Y. (2016), “Social predictors of business student cheating behaviour in Chinese societies”, Journal of Academic Ethics, Vol. 14 No. 4, pp. 281-296.

Turner, S.P. and Beemsterboer, P.L. (2003), “Enhancing academic integrity: formulating effective honor codes”, Journal of Dental Education, Vol. 67 No. 10, pp. 1122-1129.

Velliaris, D.M. and Breen, P. (2016), “An institutional three-stage framework: elevating academic writing and integrity standards of international pathway students”, Journal of International Students, Vol. 6 No. 2, pp. 565-587.

Wang, C., Andre, K. and Greenwood, K.M. (2015), “Chinese students studying at Australian universities with specific reference to nursing students: a narrative literature review”, Nurse Education Today, Vol. 35 No. 4, pp. 609-619.

Watson, J. (2013), “Progression routes and attainment in occupational therapy education: the impact of background characteristics”, British Journal of Occupational Therapy, Vol. 76 No. 12, pp. 520-527.

Yesilyurt, E. (2014), “Academic locus of control, tendencies towards academic dishonesty and test anxiety levels as the predictors of academic self-efficacy”, Educational Sciences: Theory and Practice, Vol. 14 No. 5, pp. 1945-1956.

Yu, M.L., Brown, T. and Farnworth, L. (2017), “Embracing international students in occupational therapy higher education in Australia: challenge or asset?”, Australian Occupational Therapy Journal, Vol. 64 No. 6, pp. 501-504.

**Corresponding author**
Ted Brown can be contacted at: ted.brown@monash.edu

For instructions on how to order reprints of this article, please visit our website: [www.emeraldgrouppublishing.com/licensing/reprints.htm](http://www.emeraldgrouppublishing.com/licensing/reprints.htm)
Or contact us for further details: permissions@emeraldinsight.com
A qualitative study of Irish parents’ views on hippotherapy, including its influence on their children’s home-based occupations

Rachel O'Mahony, Emma Connolly and Patrick Hynes

Occupational Science and Occupational Therapy, University College Cork, Cork, Ireland

Abstract

Purpose – Hippotherapy is an emerging area of paediatric occupational therapy practice in Ireland. It is a treatment strategy used by specially trained occupational therapy practitioners, physical therapists and speech language pathologists as part of the intervention programme to facilitate functional gains. This paper aims to explore parents’ perspectives on children’s participation in home-based occupations following hippotherapy treatment.

Design/methodology/approach – Qualitative, semi-structured interviews were conducted with eight participants. Interviews were audio-recorded and transcribed verbatim. In accordance with thematic analysis, line-by-line coding was completed to identify codes. Codes were organised into categories, which were grouped to develop themes.

Findings – Three core themes were identified: lack of knowledge regarding hippotherapy as an occupational therapy intervention; children's increased participation in home-based occupations secondary to improved physical, psychological, communication and social skills; and the unique hippotherapy environment as a motivating factor for children to engage in occupational therapy intervention.

Originality/value – Findings from this study support the growing body of evidence that hippotherapy is an effective means of intervention for increasing physical, psychological, social and communication skills. The participants report positive effects following hippotherapy on their children’s participation in home-based occupations. It highlights a link between the unique hippotherapy environment and children’s increased engagement in occupational therapy. Given that no published hippotherapy-specific literature related to occupational therapy exists in the Irish context, and given that hippotherapy is an emerging area of practice in Ireland, this paper contributes to the knowledge base.

Keywords Hippotherapy, Home-base occupation, Children with disabilities, Occupational therapy

Paper type Research paper

© Rachel O'Mahony, Emma Connolly and Patrick Hynes. Published in Irish Journal of Occupational Therapy. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at http://creativecommons.org/licences/by/4.0/legalcode

This research project was part of the Department of Occupational Science and Occupational Therapy, University College Cork programme of Community-Academic Research Collaboration. The authors wish to thank staff members at the Hippotherapy Clinic who facilitated access to participants, and the participants who took part in this research.
Introduction

Hippotherapy is an emerging area of practice in paediatric occupational therapy in Ireland. With the movement of a horse being used as part of an intervention plan (Govender et al., 2016; Neill, 2018), hippotherapy is used by specially trained occupational therapy practitioners, physical therapists and speech language pathologists [American Hippotherapy Association (AHA), 2016]. Hippotherapy is used to facilitate functional gains for the purposeful manipulation of equine movement to engage neuromotor, sensory and cognitive systems to achieve functional outcomes for individuals with physical, cognitive and neuro-motor deficits (AHA, 2016).

It is useful to distinguish between the different types of therapies that currently exist with the use of the horse to clarify what hippotherapy is and what it is not. Neill (2018) differentiates between hippotherapy and other equine activities including developmental riding therapy, equine-facilitated therapy, psycho-educational vaulting and riding and riding as a sport and skill. Frequently, therapeutic horseback riding (THR) and riding for the disabled are commonly mistaken for hippotherapy. THR requires a certified riding instructor with training in equine management, disabilities and riding instruction. It concentrates on teaching specific riding skills for recreational purposes. In contrast, hippotherapy requires a licensed occupational therapist, physical therapist or a speech language pathologist with specialised training and qualifications (AHA, 2016). In hippotherapy, the child is encouraged to interact and respond to the three-dimensional movement of the horse. In contrast to THR, in hippotherapy, the therapist analyses the movements of the individual on the horse and directs and adjusts the horse’s movements according to the individual’s needs and abilities (North American Riding for the Handicapped Association, 1998, cited in Sterba, 2007). By incorporating hippotherapy into occupational therapy practice, the ultimate goals are to address the underlying skills required to enhance occupational participation in all areas of an individual’s life including work, play, leisure, self-care and social participation (Latella and Langford, 2008).

There is an onus on occupational therapists to research the effectiveness of interventions that they use. Occupational therapists are obligated to prioritise and implement evidence-based practice (Lin et al., 2010; AOTI, 2013; CORU, 2014). In doing so, occupational therapists ensure better outcomes for clients (Shin et al., 2010) and “remain at the cutting edge of practice and education” (Warren et al., 2010, p. 2). However, what is lacking in the published literature is the link between the skills attained in hippotherapy and their transfer to an individual’s natural environment following intervention. The challenge of delivering an effective intervention that transfers to the everyday life of children on a long-term basis is a concept highlighted by Heffernan (2017). Furthermore, Cerquozzi et al. (2007) highlight the need for further investigation into the use of hippotherapy and its efficacy in meeting occupational therapy-specific goals. In their statements of best practice, the AHA (2017) advocates that therapy professionals should strive to engage in rigorous research projects to promote the development of an evidence base for the use of hippotherapy. Hills (2018) highlights the need to evidence the effectiveness of the occupational therapy role by being research-informed practitioners. It is incumbent within the profession to research the efficacy of interventions used, such as hippotherapy, and to date, there are no studies on hippotherapy and occupational therapy in the Irish context.

Accordingly, this paper explores the link between Irish children who have attended hippotherapy and their participation in home-based occupations from the parents’ perspective. Home-based occupations refer to occupations that children typically do in the home environment, including eating, sleeping, playing and self-care activities such as washing and dressing [World Federation of Occupational Therapists (WFOT), 2010].
Literature review

The effects of hippotherapy on children with disabilities including Autism Spectrum Disorder (ASD), Cerebral Palsy (CP), Down Syndrome (DS) and learning disabilities formed the majority of findings from the literature, in conjunction with some literature on its use in occupational therapy, and service users and parents’ perspectives.

Physical effects

A growing body of evidence exists to support hippotherapy for children who have been diagnosed with ASD, CP and DS (Shurtleff et al., 2009; Taylor et al., 2009; Champagne and Dugas, 2010). Much of the research on hippotherapy indicates positive outcomes in children with these disabilities (Hamill et al., 2007; Shurtleff et al., 2009; Shurtleff and Engsberg, 2010; Park et al., 2014). A meta-analysis undertaken by Zadnikar and Kastrin (2011) indicates that hippotherapy improves postural control and balance in children with CP. Of the 84 children with CP included across ten studies, therapy was effective with 76, leading the authors to conclude that hippotherapy can be recommended to improve posture and balance. This is further supported by a systematic review of nine articles by Whalen and Case-Smith (2012), who suggest that hippotherapy had a positive effect on gross motor function in children with CP.

Silkwood-Sherer et al. (2012) conducted research with the aim of assessing the effects of hippotherapy on balance and coordination in children with mild-to-moderate balance issues. Furthermore, they aimed to determine if a correlation exists between changes in balance and functional changes. Findings suggested that hippotherapy was a viable intervention for reducing balance deficits and improving a child’s performance of daily life skills where the child experiences mild-to-moderate balance difficulties. So far, studies focusing on the physical benefits of hippotherapy are reported from a physiotherapist perspective. However, it would appear that further research is required to examine the impact of hippotherapy on specific functional gains for children, and not just the physical improvements.

Psychological effects

Psychological benefits have been recorded in hippotherapy literature with improvements seen in children with a wide range of disabilities including ASD, CP and learning disabilities. Psychological benefits include increased confidence and self-competence (Debuse et al., 2009; Frank et al., 2011; Laiou et al., 2015), motivation (Macauley and Gutierrez, 2004; Llambias et al., 2016; Taylor et al., 2009), participation (Granados and Agis, 2011), increased social interaction and improved mood (Sams et al., 2006; Nimer and Lundahl, 2007) and participation (Granados and Agis, 2011). Similar to studies on the physical benefits of hippotherapy, studies focusing on psychological improvements fail to associate improvements with occupational participation. Furthermore, many of the studies rely on self-reports and observations with limited descriptions of research procedures.

Occupational therapy and hippotherapy

An individual participates in society through participation in meaningful daily occupations (Law, 2002; Wilcock, 2006; Hocking, 2014), with many of these occupations happening in the home environment. Within paediatric settings, many occupational therapists specialise in facilitating children with special needs to successfully participate in occupations by overcoming deficits or through environmental alterations (Dunn, 2007), and hippotherapy is one of the methods used by occupational therapists.

An exploratory study of the role of occupational therapists in hippotherapy was conducted by Cerquozi et al. (2007), with results indicating the profession’s unique focus
and goals. Additionally, Cerquozzi et al. (2007) conveyed that occupational therapists reported using hippotherapy to attain typical occupational therapy-specific functional outcomes, including dressing, feeding and engaging in play activities. Furthermore, their study highlights the active role played by occupational therapists in hippotherapy, thus indicating that the profession’s expertise and knowledge is valued and beneficial.

There are many gaps to explore in future studies. While it is evident that there is much literature pertaining to the psychological and physical effects of hippotherapy on children with ASD, CP, DS and learning disabilities, so far, studies have used small sample sizes. Many authors advise of the need for large-scale randomised control trials to either refute or confirm current findings of its efficacy as an intervention for children with disabilities (Zadnikar and Kastrin, 2011; Silkwood-Sherer et al., 2012; Whalen and Case-Smith, 2012). In addition, some studies (Sterba, 2007; Zadnikar and Kastrin, 2011; Whalen and Case-Smith, 2012) do not focus on hippotherapy alone and include therapeutic riding techniques, thus limiting a true representation of the effectiveness of hippotherapy. However, given its relatively new introduction to Ireland, conducting a randomised control trial of such a large size was deemed beyond the scope of the current research. Furthermore, what is striking from the literature is the large volume of studies by physical therapists. By contrast, occupational therapy-specific research is limited. As stated earlier, central to occupational therapy is the goal to increase occupational participation for individuals by improving everyday function, but what is lacking in the literature is the link between the skills attained in hippotherapy and their transfer to a child’s natural environment. Similar to Laiou et al. (2015), the researchers acknowledge the important role parents play in a child’s life, and therefore, it was deemed appropriate to ascertain their perceptive.

Method
This qualitative study was informed by the theoretical approach of phenomenology. Drawing from a phenomenological approach enabled the researchers to explore the lived experience (Carpenter and Suto, 2008) of parents whose children attended hippotherapy. Semi-structured in-depth interviews were used in this study. Qualitative interviews are recognised as a primary method of data collection in studies where the aim is to explore the lived experience (Carpenter and Suto, 2008). Fontana and Frey (2000) describe the importance of in-depth interviews because they highlight the hows and whats of people’s lives.

Participants
Convenience sampling was used to recruit eight participants through an Irish hippotherapy clinic. Purposive sampling facilitated the recruitment of a small number of participants who would yield the most relevant information about the particular phenomena being studied (Teddie and Yu, 2007). A staff member at the clinic agreed to act as a gatekeeper. The gatekeeper sent text messages to potential participants detailing the study and inviting them to participate. All participants, who consented to participate in the study, had at least one child who attended hippotherapy. One participant had two children. A second participant had three children. All children were less than 10 years old. The mean age of children was 5.5 years. A wide range of disabilities was represented, including ASD, CP, DS, genetic conditions and developmental coordination disorder (DCD). The male:female ratio of children who attended hippotherapy in this study was 9:2, representing the higher prevalence of disability amongst boys in Ireland (CSO, 2016). Duration of intervention ranged from 3 to 12 months. All participants were fluent English speakers. The children of
participants completed a minimum of eight weekly hippotherapy sessions, with many completing more sessions. Demographic details of the 11 children are listed in Table I.

Data collection
Semi-structured qualitative interviews were conducted by the first and second authors. A list of sample questions is provided in Appendix 1. The questions provided the researchers with a focus while still allowing a degree of freedom and adaptability to glean information from participants during interviews. Open-ended questions were used to allow participants the opportunity to contribute data uncontaminated by the researchers’ interpretations and/or bias. As each interview progressed, the researchers used more specific probing questions to verify participants’ answers and to seek clarification on topics of discussion. Throughout the interview process, participants were encouraged to express opinions honestly and were reassured that there were no right or wrong answers. For participants with more than one child who attended hippotherapy, the researchers conducted separate interviews, i.e. one mother was interviewed first about one child, and then interviewed about her second child who attended hippotherapy. Interviews ranged in length from 30 to 45 min. As per Merleau-Ponty (1964), cited in Quinny et al. (2016), participants were encouraged to choose interview locations to ensure comfort and convenience and to maximise opportunity for rich data collection. Interviews were voice recorded using digital recorders and transcribed verbatim by the researchers.

Data analysis
Thematic analysis enabled the researchers to systematically analyse and organise data and identify relevant patterns and themes relating to the research question (Braun and Clarke, 2006). To ensure thorough examination and familiarity of content, the researchers read and re-read the interview transcripts. In accordance with thematic analysis, line-by-line coding was completed to identify codes. Codes were organised into categories, which were then grouped to develop themes. Detailed field notes were kept. As advised by Carpenter and Suto (2008), the researchers discussed and analysed findings.

Rigour and trustworthiness
The following steps were taken to ensure credibility, transferability, dependability and confirmability. A peer review was conducted with a lecturer at the Department of Occupational Science and Occupational Therapy in University College Cork (UCC). The peer

| Interview | Interviewee | Age of child (years) | Diagnosis       | Duration of intervention (months) | Gender |
|-----------|-------------|----------------------|-----------------|----------------------------------|--------|
| 1         | Mother      | 9                    | DCD             | 10                               | M      |
| 2         | Mother      | 3                    | ASD             | 5                                | M      |
| 3         | Mother      | 4.5                  | CP              | 3                                | M      |
| 4         | Mother      | 5.5                  | ASD             | 12                               | M      |
| 5         | Mother      | 4.5                  | ASD             | 4                                | M      |
| 6         | Mother      | 5.5                  | DS              | 3                                | M      |
| 7         | Mother      | 8                    | Genetic condition | 11                              | M      |
| 8         | Mother      | 8                    | Genetic condition | 11                              | M      |
| 9         | Mother      | 4                    | ASD             | 4                                | M      |
| 10        | Mother      | 3                    | ASD             | 8                                | F      |
| 11        | Mother      | 7                    | ASD             | 8                                | F      |

Table I.
Demographic details of children
reviewer was not involved in the research process but reviewed field notes and transcripts analytically to validate or query links established between the data and identified themes, thus contributing towards deeper reflexive analysis and ensuring honesty (Lincoln and Guba, 1985). A thorough account of the research design, with clear and distinct descriptions of context, criteria for participant recruitment, data collection and the process of data analysis is provided to ensure transferability. To ensure dependability, the researchers swapped coded data for re-coding to ensure similar findings. Member checking enabled the researchers to validate interpretations of data and served to strengthen the link between original data and the researcher’s interpretations of it (Carpenter and Hammell, 2000; Carpenter and Suto, 2008). Reflective diaries served to determine the researcher’s judgements or biases during the research process. The researchers reflected on their own backgrounds and positions to see how they influenced the research process. Being able to explain their decisions helped provide valuable insight as to how the themes were identified (Carpenter and Suto, 2008).

Ethical considerations
This study received ethical approval from the Social Research Ethics Committee at UCC, Cork, Ireland. Participants were reassured that there were no right or wrong answers and were encouraged to express opinions honestly. Confidentiality and anonymity were assured, and pseudonyms were used in interview transcripts and field notes. All identifiable information was removed. Data storage was considered. All data were password protected on laptops, and data were discussed amongst the researchers and their supervisor only. Informed consent was adhered to. Consent forms were signed by participants who were willing to participate, with the option of withdrawing up to one month following the interview.

Findings
Following analysis of the data, three themes were identified. These were:

1. Lack of knowledge regarding hippotherapy;
2. Increased participation in home-based occupations secondary to physical and psychological improvements and enhanced social and communication skills; and
3. The unique hippotherapy environment.

Lack of knowledge about hippotherapy as an occupational therapy intervention
All participants in this study reported a lack of knowledge about hippotherapy and its use as an occupational therapy intervention. Through the following quotes, participants described their confusion about hippotherapy and their drive to search for information on hippotherapy, thus demonstrating their willingness to try different therapies to enhance their children’s functional development:

[...] we were looking for an activity for Eamon*, because he is not into group or team sport, he is not a sporty kid, and we were looking for an activity for him to do, but at the same time, something that would benefit him, you know, for his balance and his core strength basically (Interview 1).

I read up her site [...] I never actually heard anything about hippotherapy. I thought it was the funniest name. I thought it was fake, so yeah I just read her site, and looked up the photos, and all that kind of jazz but yeah, I didn’t know what hippotherapy was really (Interview 2).
He’d [referring to husband] heard another man at work had a son who was also autistic as well. So Jordan* has very much OT issues and social issues as well so we were just wondering, we’d try anything. So we read about [hippotherapy] and we rang them and [. . .] she said just come and see (Interview 5).

Increased participation in home-based occupations secondary to physical and psychological improvements and enhanced social and communication skills

All participants in this study highlighted their children’s increased participation in occupations in the home environment following hippotherapy. According to the participants, children were increasingly able to participate in occupations of their choice secondary to the following improvements:

- physical improvements;
- psychological improvements; and
- improvements in social and communication skills.

Physical improvements. All participants reported that hippotherapy resulted in positive physical changes in their children. They reported the beneficial physical impacts of hippotherapy on muscle control, coordination, core strength, and balance. Of importance to this study, all participants highlighted how significant physical improvements impacted on their child’s ability to participate in occupations typical of the home environment:

[. . .] within two or three weeks he was a different child, completely different child. He started getting up on all fours to try and crawl around which I never thought he’d do (Interview 7).

Increased physical strength was reported to contribute towards one child’s ability to participate for longer in table top activities at home (e.g. colouring):

[. . .] his core strength really like, it really helped him sit up straight and he was less tired, and I would say that’s definitely what happened to Joseph*. Like that’s why he used to spend so much time on the floor because it was easier for him to lie on the floor and play rather than try and hold himself up and do bits like this [colouring] at the table (Interview 8).

Participants highlighted their child’s ability to mobilise in the home environment, thus facilitating participation:

His core strengthened, he started to get muscles [. . .] and he isn’t bumping into the kitchen counter anymore. He became more spatially aware (Interview 4).

He uses a kind of a walking frame and he’s doing an awful lot more of that now and it’s great because he can get around faster and he follows us around the house now (Interview 7).

Psychological improvements. All participants commented on the psychological benefits of hippotherapy on their child’s emotional sense of well-being. No participant reported negative impacts. Participants highlighted increases in their child’s motivation, self-confidence and self-competence. Engaging in activities that were seen as mainstream in the home were prominent throughout the data, with participants commenting on the range of new meaningful occupations their children could enjoy both alone and as a family. One participant described how her son’s confidence grew, thus enabling him to participate with family:

He wanted to play with his brother. He was doing his usual and was coming back to myself and my husband, and I told him it’s ok if he wants to play with him, and he kept getting closer and closer, and eventually he went over and played with him in the sitting room. He never did that before (Interview 2).
Another participant commented on the changes she observed in her son’s level of motivation and interest in occupations at home before and after engaging in hippotherapy:

He wanted to go on the swing [at home] whereas prior to that he’d no interest in the swing so we kind of worked on it bit by bit and then we got a slide. [. . .] it opened him up to so many activities like the swings and slides (Interview 5).

Participants highlighted the psychological changes hippotherapy brought about in their children’s ability to participate in what they considered typical play activities:

She’s like a different child. She’s into toys, she’s into princesses, she has a much bigger variety of interests now (Interview 11).

Jordans* things were cars. Rolling, rolling with cars or spinning a seat and to be honest with you that stopped [after hippotherapy]. Now he likes reading [. . .]. Reading to himself or I read to him. He makes a lot of puzzles. He’ll do building blocks. He’ll do colouring. Before he was like cars, cars, cars [. . .] whereas now he actually takes the cars and plays with his garage (Interview 5).

Social and communication skills. All participants highlighted the social benefits of hippotherapy for their children and its impact on their ability to engage socially and communicate with family members and friends in the home environment:

[. . .] he started to make eye contact and then he was starting to use request words because he was talking to the animals in therapy and he kind of brought that home I suppose. He was requesting more at home and looking at us more (Interview 10).

It was a big thing for him to do, because he went from not wanting to do any activities, which engaged other people, you know, ammm, to having to interact with the neighbours every week (Interview 1).

[. . .] now she’s like a different child. She has more interests. Back then it would have been very one-to-one stuff [games], you know, where she wouldn’t have to engage other people with stuff [games] but now she’s more open to playing with her brother and sister (Interview 11).

The following participant commented on the impact hippotherapy had on her child’s ability to vocalise and its impact on his ability to communicate and interact with her:

We used [to] come home in the car [after hippotherapy] and it’d be all jibber jabber. He’d talk all day as if he’s trying to tell you what he’s doing (Interview 5).

[. . .] even to be able to do jobs [around the house] like [. . .] he was pretty much ‘you’ll do it for me’. But then like after that [hippotherapy] ‘get your coat, get your boots, get your hat’. He’d look at you then and then he’d get them (Interview 5).

The unique hippotherapy environment
All participants discussed the unique setting in which hippotherapy occurs. Participants commented on how the environment differed from a traditional occupational therapy setting. Participants reported their children were more willing to engage in occupational therapy through hippotherapy than they were in a traditional occupational therapy setting. Participants also highlighted that because their children were more willing to engage in therapy in a hippotherapy setting, it resulted in better physical, psychological and social outcomes for their children:
I thought it was beneficial. I think it’s just, you know, you can do physio and you can do OT and they’re all one-on-one and they’re quite boring for a child, particularly for a child who gets a bit of intervention anyway. Whereas horse riding [hippotherapy] it kind of normalises it I think, you know, he was looking forward to his horse riding lesson as opposed to it being an OT session (Interview 6).

He absolutely loved it. [mimics child] When are we going to horses mam? How many more minutes till we go? (Interview 4).

[. . .] because it is a little alternative as well, the fact that it is not clinical, it’s not somewhere where he is in a room, or stuck in a room, and there is animals involved, it’s magical and I just love that there is animals involved (Interview 2).

Discussion
This study reveals that from the participants’ perspective, there were improvements in their children’s communication and social skills, as well as an improvement in their physical and psychological being following hippotherapy, which had a positive impact on their participation in home-based occupations. An increase in their children’s occupational participation was observed by all participants within the home environment. Improvements in postural control, balance and coordination may provide children more opportunities to participate in self-care activities and social interactions (Ajzenman et al., 2013). Increased motor abilities in children afford more opportunities to participate in self-care activities such as shoe tying or dressing, leisure activities including cutting or colouring and social interactions with other children (Hilton et al., 2011). Debuse et al. (2009) highlight the link between improved physical function, enhancement in self-esteem and the resulting increase in motivation to attempt new activities. This is further supported by Brown and Dunn (2010), who suggest that active engagement in therapy activities leads to improvements in adaptation and increased willingness to participate in everyday activities. This study supports the theory that hippotherapy is an effective means of intervention for increasing occupational participation through physical changes in muscle strength, coordination and balance. Participants described how increased trunk stability improved a child’s ability to sit independently for longer periods, thus allowing him to participate in table-top activities. Furthermore, where balance developed, a child was reported to be able to enjoy using a swing effectively.

Participants also commented on the psychological improvements observed in their children, including increased confidence, self-esteem, motivation and self-competence. These results augment claims that hippotherapy is an effective intervention strategy for emotional and cognitive improvements (Debuse et al., 2009). Meregillano (2004) highlights hippotherapy’s multifaceted nature through its impact on all of the body’s systems.

A difference was observed by participants in their child’s social interaction and communication skills. The hippotherapy centre frequented by participants provided social opportunities to help children enhance social and communication skills. Interaction and engagement with the horse, the occupational therapist and the horse handlers throughout hippotherapy sessions provide opportunities to practice these skills (Hilton et al., 2011). Beck and Meyers (1996) highlight animals as being an important factor for developing social skills in children. Social and verbal interaction in children, they claim, improves as a result of interaction with animals.

All participants reported their lack of knowledge on hippotherapy as an intervention strategy for children with disabilities. Following the literature review conducted by the
researchers, hippotherapy does not appear to have a consistent definition and is sometimes described in a variety of ways. Owing to hippotherapy being relatively new to Ireland, this lack of clarity requires addressing for the benefit of parents of children with disabilities and health-care professionals. In contrast, in South Africa, Govender et al. (2016) report that awareness amongst occupational therapists of hippotherapy as an intervention is high, with many occupational therapists exposed to it during their studies, outlining that 42 respondents out of 47 indicated that they would consider the use of hippotherapy in the future. This suggests evidence of the profession’s belief in its effectiveness as an intervention strategy.

In this study, participants highlighted how the unique hippotherapy environment afforded their children the opportunity to engage in an activity that was perceived as fun and recreational. Environments are the external, physical and social aspects that surround clients while they engage in an occupation (AOTA, 2014). Research indicates that intervention strategies that occur in realistic settings contribute towards increased developmental change in comparison with interventions that occur in contrived, clinic-based settings (Humphrey, 2002; Humphrey and Wakeford, 2006). Participants reported that the fact that therapy sessions were not in “a typical clinical setting” (Interview 1) resulted in their children not associating hippotherapy with any kind of intervention. This is supported by Bachi et al. (2011, p. 302), who state that a “client approaching the stable can hide the fact that he or she is attending therapy”. It was also highlighted that the setting in which hippotherapy took place was an integral part of their child’s therapeutic experience. Participants expressed how important it was for their child to be having fun, and not resisting therapy. Hippotherapy, as reported by participants, was seen in the eyes of the child as “horse riding” and “an activity for them to have fun”. Leisure activities are used in occupational therapy as intervention modalities and as an intervention goal (Tanta and Knox, 2015).

Being in an environment close to nature has its own benefits to therapy, in particular, benefiting human health and well-being (Frumkin, 2001). Participants reported that being in fresh air, having animals around and the rich sensory environment added to the positive impact hippotherapy had on their child. Environmental psychologists have supported this and have shown that exposure to the natural world decreases negative behaviours and states and increases positive ones (Mayer et al., 2009).

The use of an animal in hippotherapy was highlighted as a motivating factor for participants to attend occupational therapy. The use of an animal in therapy offers beneficial and positive impacts as the animal appears to have a natural tendency to create a bond with people (Nimer and Lundahl, 2007). The presence of horses in a therapeutic setting contributes to increased self-confidence and the development of trust (Brandt, 2003). The horse, being a large and powerful animal and being controlled by the rider, contributes to the development of a positive self-image and self-confidence (Atwood Lawrence, 2000). Having a horse involved in therapy sessions added positively to the therapy atmosphere and resulted, as expressed by participants, in the child having trust in the horse and therapist and better engagement in intervention.

Limitations
Recognising limitations strengthens the validity of research (Carpenter and Suto, 2008). Generalisability of this study’s findings to a broader population is limited because of the small sample size used. This is especially true as diagnoses and functional ability of all the children varied considerably.
In addition, Siebes et al. (2002) reported that over half of the studies examining the impact of hippotherapy on children prior to 2001 were of duration shorter than six months. With this in mind, Siebes et al. (2002) deduced that future research should focus on interventions of longer duration. Intervention in research studies from the previous 10 years varies in length from 6 to 16 weeks. Given the participants’ perspective on the positive impact of hippotherapy on their children, and that all children were in receipt of intervention for more than three months, the researchers concur with Siebes et al. (2002) that future research should focus on studies with longer duration of intervention, which is likely to supply greater and richer data.

As this was a qualitative piece of research, parents’ perspectives were sought. Participants were asked about their children’s participation in home occupations as this was the focus of the research. In terms of occupational performance, some interpretation resulted from the themes. Participants were particularly positive in their opinions of hippotherapy; however, to reduce bias, the researchers asked participants if there were any negative aspects to hippotherapy. Participants may not have been fully able to differentiate whether hippotherapy or another therapy was responsible for improvements in their children’s participation. However, parents felt it was hippotherapy intervention that caused improvements in participation in home occupations, and for the purpose of this qualitative research, it was valuable to get parents’ perspectives.

Finally, children of participants in this study varied in age from three to nine years. During those years, children typically meet a variety of important developmental milestones in social and emotional development, language and communication, cognitive ability and physical development (Case-Smith, 2015). Subsequently, typical developmental changes in the children of the participants who acquired new functional skills that facilitated occupational participation may have occurred in conjunction with the hippotherapy intervention. Also, it is not clear from this study how much prior occupational therapy or other therapeutic intervention that the participants’ children had received and whether this may have also had a positive impact on the child’s development regarding participation in home-based occupations.

**Conclusion**

The aim of this study was to explore parents’ perspectives of their children attending hippotherapy intervention and the impact on their children’s participation in home-based occupations following the hippotherapy intervention. The findings are positive, in that they indicate that there was improvement in the participation of children in home-based occupations following hippotherapy intervention. However, it may not be surprising that there was a lack of knowledge on what hippotherapy actually was reported by participants. Given that no published hippotherapy-specific literature related to occupational therapy exists in the Irish context, and that it is a new emerging area of occupational therapy practice in Ireland, awareness and knowledge is lacking amongst parents and professionals. Participants’ lack of knowledge may stem from the fact that hippotherapy is an emerging area of practice in Ireland. Furthermore, no hippotherapy-specific literature exists to support its use as an intervention in an Irish context. Consequently, further research is needed to raise awareness for parents and children of its use in occupational therapy. In addition, it is recommended that awareness of hippotherapy amongst health-care professionals in Ireland should be investigated to encourage its use as an intervention for children with disabilities. There are many exciting emerging areas of occupational therapy practice on the horizon (Pettigrew, 2010), with hippotherapy potentially being one of them in the Irish context.
This research focused on self-reports and observations from the parents’ perspective. While functional gains were reported, it is important to note that functional abilities of all children in this study varied considerably. Therefore, more rigorous studies are required to examine functional outcomes. A large-scale randomised control trial using pre- and post-outcome measures would strengthen the evidence for hippotherapy’s use in children with physical, cognitive and neurological impairments. Finally, the United Nations Convention on the Rights of the Child emphasises the right of children to voice their opinion in matters affecting their own lives (UNCRC, 1992). Given the child’s active involvement in hippotherapy, further research is recommended to examine the child’s experience. The child’s perspective, coupled with the perspective of the parent, could serve to strengthen its use as an intervention in Ireland. Additionally, exploring occupational therapists’ perspectives on hippotherapy would add to the knowledge base.

*Pseudonym Used

References

Ajzenman, H.F., Standeven, J.W. and Shurtleff, T.L. (2013), “Effect of hippotherapy on motor control, adaptive behaviour, and participation in children with autism spectrum disorder. A pilot study”, American Journal of Occupational Therapy, Vol. 67 No. 6, pp. 653-663, available at: http://dx.doi.org/10.5014/ajot.2013.008383.

American Hippotherapy Association (AHA) (2016), Hippotherapy as a Treatment Tool, available at: www.americanhippotherapyassociation.org/ (accessed 17 September 2017).

American Hippotherapy Association (AHA) (2017), Statements of Best Practice for the Use of Hippotherapy by Occupational Therapy, Physical Therapy, and Speech-Language Pathology Professionals, American Hippotherapy Association, available at: www.americanhippotherapyassociation.org/wp-content/uploads/2015/02/Final-2017-Best-Practice.pdf (accessed 13 July 2018).

American Occupational Therapy Association (AOTA) (2014), “Occupational therapy practice framework: domain and process (3rd ed.)”, American Journal of Occupational Therapy, Vol. 68 No. 1, pp. S1-S48, available at: http://dx.doi.org/10.5014/ajot.2014.682006

Association of Occupational Therapists Ireland (AOTI) (2013), “Code of ethics and professional conduct”, available at: www.aoti.ie/attachments/a4e97af7-3a2a-48dd-b3df-c63e1bca6e9.PDF (accessed 18 June 2018).

Atwood Lawrence, E. (2000), “The human-horse bond”, in Engel, B.T. (Ed.), Therapeutic Riding 2: Strategies for Rehabilitation, Barbara Engel Therapy Services, Durango.

Bachi, K., Terkel, J. and Teichman, M. (2011), “Equine-facilitated psychotherapy for at-risk adolescents: the influence on self-image, self-control and trust”, Clinical Child Psychology and Psychiatry, Vol. 17 No. 2, pp. 298-312.

Beck, A.M. and Meyers, N.M. (1996), “Health enhancement and companion animal ownership”, Annual Review of Public Health, Vol. 17 No. 1, pp. 247-257.

Braun, V. and Clarke, V. (2006), “Using thematic analysis in psychology”, Qualitative Research in Psychology, Vol. 3 No. 2, pp. 77-101.

Brandt, K. (2003), “A language of their own: human-horse communication”, Society and Animals, Vol. 12 No. 4, pp. 299-316.

Brown, N.B. and Dunn, W. (2010), “Relationship between context and sensory processing in children with autism”, American Journal of Occupational Therapy, Vol. 64 No. 3, pp. 474-483, doi: 10.5014/ajot.2010.09077.

Carpenter, C. and Hammell, K.W. (2000), “Evaluating qualitative research”, in Hammell, K.W., Carpenter, C. and Dyck, I. (Eds), Using Qualitative Research: A Practical Introduction for Occupational and Physical Therapists, Churchill Livingstone, Edinburgh, pp. 107-119.
Humphrey, R. (2002), “Young children’s occupations: explicating the dynamics of developmental processes”, *American Journal of Occupational Therapy*, Vol. 56, pp. 171-179.

Humphrey, R. and Wakeford, L. (2006), “An occupation-centred discussion of development and implications for practice”, *American Journal of Occupational Therapy*, Vol. 60, pp. 258-267.

Laiou, A., Christakou, A. and Kaminiotis, V. (2015), “Impacts of hippotherapy on children with cerebral palsy from the parents’ perspective: a qualitative research”, *International Journal of Physical Therapy*, Vol. 2 No. 6, pp. 947-957.

Latella, D. and Langford, S. (2008), “Hippotherapy: an effective approach to occupational therapy intervention”, *Occupational Therapy Practice*, Vol. 13 No. 2, pp. 16-20.

Law, M. (2002), “Participation in the occupations of everyday life”, *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, Vol. 56 No. 6, pp. 640-649.

Lin, S.H., Murphy, S.L. and Robinson, J.C. (2010), “Facilitating evidence-based practice: process, strategies and resources”, *American Journal of Occupational Therapy*, Vol. 64 No. 1, pp. 164-171.

Lincoln, Y.S. and Guba, E. (1985), *Naturalistic Inquiry*, Sage, Beverly Hills CA.

Llambias, C., Magill-Evans, J., Smith, V. and Warren, S. (2016), “Equine-assisted occupational therapy: increasing engagement for children with autism spectrum disorder”, *American Journal of Occupational Therapy*, Vol. 70 No. 6, pp. 653-663.

Macauley, B. and Gutierrez, K. (2004), “The effectiveness of hippotherapy for children with language-learning disabilities”, *Communication Disorders Quarterly*, Vol. 25 No. 4, pp. 205-228, doi: org/10.1177/15257401040250040501.

Mayer, F., Frantz, S., McPherson, C., Bruchman-Senecal, E. and Dolliver, K. (2009), “Why is nature beneficial? The role of connectedness to nature”, *Environment and Behaviour*, Vol. 41 No. 5, pp. 607-643.

Meregillano, G. (2004), “Hippotherapy”, *Physical Medicine and Rehabilitation Clinics of North America*, Vol. 15 No. 4, pp. 843-854.

Merceru-Ponty, M. (1964), *The Primacy of Perception*, Northwestern University Press, Chicago, IL.

Neill, S. (2018), “To those who have seen their child healed almost subliminally, the science of therapeutic riding rings true”, Horse Healing. Child magazine (undated), available at: www.childmag.co.za/content/horse-healing#.V2qTvvn171V (accessed 13 July 2018).

Nimer, J. and Lundahl, B. (2007), “Animal-assisted therapy: a meta-analysis”, *Anthrozoos*, Vol. 20 No. 3, pp. 225-238.

Park, E.S., Rha, D.W., Shin, J.S., Kim, S. and Jung, S. (2014), “Effects of hippotherapy on gross motor function and functional performance of children with cerebral palsy”, *Yonsei Medical Journal*, Vol. 55 No. 6, pp. 1736-1742.

Pettigrew, J. (2010), “Editorial”, *Irish Journal of Occupational Therapy*, Vol. 38 No. 2, pp. 2-3.

Quinny, L., Dwyer, T. and Chapman, Y. (2016), “Who, where, and how of interviewing peers: implications for a phenomenological study”, *SAGE Open*, pp. 1-10.

Sams, M.J., Fortney, E.V. and Willenbring, S. (2006), “Occupational therapy incorporating animals for children with autism: a pilot investigation”, *American Journal of Occupational Therapy*, Vol. 60 No. 3, pp. 268-274.

Shin, J., Randolph, G.W. and Rauch, S.D. (2010), “Evidence-based medicine in otolaryngology, part 1: the multiple faces of evidence-based medicine”, *Otolaryngology - Head and Neck Surgery*, Vol. 142 No. 5, pp. 627-646, doi: 10.1016/j.otohns.2010.01.018.

Shurtleff, T. and Engsberg, J. (2010), “Changes in trunk and head stability in children with cerebral palsy after hippotherapy: a pilot study”, *Physical and Occupational Therapy in Paediatrics*, Vol. 30 No. 2, pp. 150-163, doi: 10.3109/01942630903517223.
Shurtleff, T., Standeven, J. and Engsberg, J. (2009), “Changes in dynamic trunk/head stability and functional reach after hippotherapy”, *Archives of Physical Medicine and Rehabilitation*, Vol. 90 No. 7, pp. 1185-1195, doi: 10.1016/j.apmr.2009.01.026.

Siebes, R.C., Wijnroks, L. and Vermeer, A. (2002), “Qualitative analysis of therapeutic motor intervention programs for children with cerebral palsy: an update”, *Developmental Medicine and Child Neurology*, Vol. 44 No. 9, pp. 593-603.

Silkwood-Sherer, D.J., Killian, C.B., Long, T.M. and Martin, K.S. (2012), “Hippotherapy – an intervention to habilitate balance deficits in children with movement disorders: a clinical trial”, *Physical Therapy*, Vol.92 No. 5, pp. 707-719, doi: 10.2522/ptj.20110081.

Sterba, J.A. (2007), “Does horseback riding therapy or therapist-directed hippotherapy rehabilitate children with cerebral palsy?”, *Developmental Medicine and Child Neurology*, Vol. 49 No. 1, pp. 68-73, doi: 10.1017/S0012162207000175.x/pdf.

Tanta, K.J. and Knox, S.H. (2015), “Play”, in Case-Smith, J. and Clifford O’Brien, J. (Eds), *Occupational Therapy for Children and Adolescents*, 7th ed., Mosby/Elsevier, MD Heights, MO, pp. 483-497.

Taylor, R.R., Kielhofner, G., Smith, C., Butler, S., Cahill, S.M., Ciukaj, M.D. and Gehman, M. (2009), “Volitional change in children with autism: a single-case design study of the impact of hippotherapy on motivation”, *Occupational Therapy in Mental Health*, Vol. 25 No. 2, pp. 192-200.

Teddie, C. and Yu, F. (2007), “Mixed method sampling: a typology with examples”, *Journal of Mixed Methods Research*, Vol. 1 No. 1, pp. 77-100.

United Nations Convention on the Rights of the Child (UNCRC) (1992), “United nations convention on the rights of the child”, available at: www.childrensrights.ie/childrens-rights-ireland/un-convention-rights-child (accessed 16 April 2018).

Warren, A., McGowan, P. and Hynes, P. (2010), “Building on our research ethos”, *Irish Journal of Occupational Therapy*, Vol. 38 No. 1, p. 2.

Whalen, C. and Case-Smith, J. (2012), “Therapeutic effects of horseback riding therapy on gross motor function in children with cerebral palsy: a systematic review”, *Physical and Occupational Therapy in Paediatrics*, Vol. 32 No. 3, pp. 229-242, doi: 10.3109/01942638.2011.619251.

Wilcock, A.A. (2006), *An Occupational Perspective of Health*, 2nd ed., SLACK Incorporated.

World Federation of Occupational Therapists (WFOT) (2010), “Statement on occupational therapy”, available at: www.wfot.org/Portals/0/PDF/STATEMENT%20ON%20OCCUPATIONAL%20THERAPY%20V300811.pdf (accessed 2 April 2018).

Zadnikar, M. and Kastrin, A.J. (2011), “Effects of hippotherapy and therapeutic horseback riding on postural control or balance in children with cerebral palsy: a Meta-analysis”, *Developmental Medicine and Child Neurology*, Vol. 53 No. 8, pp. 684-691, doi: 10.1111/j.1469-8749.2011.03951.

**Appendix. Sample interview questions**

Semi-Structured Question Guide for interviews with parents whose children completed hippotherapy intervention.

**Hippotherapy**

- Tell me about how you came to know about hippotherapy
- What encouraged you to try it as a method of intervention?
- How many sessions of hippotherapy did your child attend?
- Tell me about how s/he felt before/during/after the hippotherapy sessions
- Tell me what the experience of your child attending hippotherapy was like for you
Other therapy/intervention

- What other services/interventions was your child involved in at the same time?
- How often did your child receive other services/intervention?
- Did you follow a home programme as outlined by another service/therapist at the same time?
- What was different about hippotherapy for your child?

Hippotherapy intervention

- What difficulties/challenges was your child experiencing prior to hippotherapy and did these change following hippotherapy intervention? If yes, can you describe those changes?
- Describe your child’s response to hippotherapy
- Do you think the changes were linked to hippotherapy? If yes, describe how you know.
- Were there any negative aspects to hippotherapy intervention?

Corresponding author
Rachel O’Mahony can be contacted at: rachelsarahmahony@gmail.com
Is there a correlation between cognition and the ability to remember how to use assistive devices?

Gerard Mc Carroll

Occupational Therapy Department, Sligo University Hospital, Sligo, Ireland, and

Mary Cooke

Department of Nursing, Health Sciences and Disability Studies, St Angelas’s College, Sligo, Ireland

Abstract

Purpose – This study aims to establish a correlation between a patient’s mini mental state examination (MMSE) score and their ability to remember how to use common assistive dressing devices.

Design/methodology/approach – The study was a prospective, cross-sectional and correlational study. A final sample of 63 patients formed the study. Patients’ cognition was measured using the MMSE, and a new assessment tool was developed to assess patients’ ability to use three assistive devices and piloted on 15 patients to address normality, reliability, validity and clinical usefulness. Pearson’s rank correlation coefficient was used to establish direct correlations between the MMSE score and the assessment tool score. Eta squared was used to calculate the effect size to achieve an indication of the difference between the groups. Ethical approval had been granted by the regional ethics committee. The null hypothesis states that patients with an MMSE score of 22 or less show no difference in their ability to safely and appropriately use assistive devices provided and demonstrated by an occupational therapist than patients with an MMSE score of 23 or higher.

Findings – The null hypothesis was rejected and patients with an MMSE score of 22 or less showed a significant difficulty in their ability to use the three devices. Correlation coefficients showed significant positive correlations between MMSE scores and assistive devices scoring tool results for all three devices: Helping hand ($r = 0.677$, $n = 60$, $p = 0.01$), shoe horn ($r = 0.649$, $n = 54$, $p = 0.01$) and sock aid ($r = 0.877$, $n = 54$, $p = 0.01$).

Originality/value – The study is in an Irish context and demonstrated primary, objective evidence of the impact of impaired cognition on functional ability. Patients with cognitive deficits pose a larger safety challenge but still should be afforded an opportunity to use and benefit from assistive devices. The assessment tool is a new and unique instrument and although requires further development, may conceivably act not just as an assessment instrument but also an effective treatment tool.

Keywords Assistive devices, Cognitive impairment, Mini mental state examination

Paper type Research paper

© Gerard Mc Carroll and Mary Cooke. Published in Irish Journal of Occupational Therapy. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this licence may be seen at http://creativecommons.org/licences/by/4.0/legalcode

The author would like to acknowledge the contribution of the occupational therapy department, Sligo University Hospital for assisting with this research and the patients of Sligo University Hospital who participated in the research. This research was funded by the primary author as part of a Master’s research programme.
Introduction
There is a significant research gap in the field of provision of assistive devices (AD) including a shoe horn, sock aid and helping hand by occupational therapists. Although patient safety, cognition and appropriateness of the intervention is at the heart of the study, there are also significant implications for cost effectiveness, compliance and training which the study also aimed to address.

In light of the growing concern about the future of occupational therapy research, the Department of Health and Children (DOHC) (2010) commissioned a project to identify research priorities for the six therapy professions in Ireland including occupational therapy and urged researchers to provide evidence of clinical and cost effectiveness of interventions.

ADs are provided in the acute and community setting although the provision of assistive dressing devices is primarily the work of the hospital occupational therapist in the traditional “dressing practice”. This practice is one such intervention where holism and quality care are being challenged, as many devices are prescribed without any evaluation of cognition. There is a growing concern that the cognitive ability of patients to learn and retain knowledge of ADs is not thoroughly evaluated.

There is a strong need to marry a cognitive score with a patient’s ability to safely and appropriately use ADs, based on objective data, to target patients who are more likely to benefit from ADs. Furthermore, this will also highlight patients’ with cognitive deficits who may require further demonstration and training with ADs before discharge from the hospital and continued care in the community.

The aim of the study was to ascertain whether patients in an acute regional hospital with a mini mental state examination (MMSE) score of 23 or better can effectively remember to use prescribed and demonstrated devices and if patients with an MMSE score 22 or less are unable to effectively use the devices.

Literature review
Introduction
Within occupational therapy, there is a significant emphasis on evidence-based practice; however, many practice areas are largely based on what has been done historically and what appears to work well. The practice of providing AD by occupational therapists in the acute setting is often conducted quickly and routinely without due consideration being given to the patient’s cognitive ability. AD devices are a financial strain on any department budget. The annual non pay budget for an occupational therapy department in an acute hospital has been reduced by as much as 61 per cent since 2006 [Health Service Executive (HSE), 2011]. Subsequently, it is pertinent to ensure adequate clinical reasoning when providing AD to effectively manage departmental budgets. An extensive literature search was carried out using the search strategy described by Polit et al. (2001). Databases searched were Cinalh Plus, Medline, Psychoinfo, Psychology and Soc Index. Occupational therapy specific databases searched included occupational therapy seeker, OTD base, occupational therapy education finder and the physiotherapy database Pedro.

The history of provision of assistive device
The provision of AD has a long association with occupational therapy and is rooted in its practice. According to Neville-Jan et al. (1993), the history is traced back to the mid 1940’s and the end of World War II when there was a strong move towards rehabilitation. Although occupational therapy literature is consistent in the endorsement of ADs to promote independence, there is a limited evidence base for the rationale for using AD beyond the realms of total hip replacement (THR) and biomechanical principles.
Smith (1995) describes a client centred model for equipment provision through a single case study design. Although this research is clearly dated and lacking in evidence base, it makes the important point that the focus must shift from devices as being the solution, to a more client centred approach, which includes cognitive evaluation. No further studies have attempted to build on this work.

**Usage rates and teaching**

Research into usage rates of AD is abundant in the literature. Two literature reviews, Kraskowsky and Finlayson (2001) and Wielandt and Strong (2000), feature the most extensive collective body of research and conclude that compliance and usage rates vary significantly from 46 to 86 per cent compliance with AD. The reviews concluded that equipment suitability, adequate assessment and effective teaching were paramount in the effective provision of AD. Both reviews also concluded that further research was crucial, especially around optimal device use. Despite this, there are few up to date studies, which is a concern, as ADs are constantly being redesigned and changed.

There is no universal consensus in the literature about the best way to demonstrate and teach the use of AD. Moreover, research in the literature is largely confined to teaching dressing skills, rather than teaching the use of AD. The few studies that target AD use patients who are cognitively intact which makes teaching and demonstration easier (Schemm and Gitlin, 1998), (Guidetti and Tham, 2002). Teaching the use of AD should not only include technical information but also consider psychological and cognitive factors such as trust and understanding. Furthermore, it needs to use a variety of communication and teaching methods, which incorporate the value of both holistic and client centred practice.

**The abandonment of assistive device and the role of occupational therapy**

Reasons for abandonment of AD feature prominently in the literature; however, contemporary evidence-based research is lacking. Thomas et al. (2010) have explored the reasons for noncompliance with AD, targeting patients following THR. There is general agreement that reasons for abandonment fall into four common themes: a non-collaborative approach in prescription, poor instruction from therapists, an improvement in physical ability and help from spouses (Gitlin and Burgh, 1995). Most abandonment studies are definitive in that they ascertain whether devices are used or not. It is of perhaps greater concern to establish whether AD are being used safely and appropriately according to their primary prescription.

The ability to dress and undress is one of the most fundamental aspects of human occupation and the activity of “dressing practice” is often reviewed as occupational therapy’s single largest contribution to the assessment and treatment of self-care tasks. Dressing is a complex activity and although McIntyre (2005) describes how physical difficulties are often easier to highlight and address, she describes the unravelling of cognitive, perceptual and executive functions in relation to dressing practice as much more difficult to address. Unfortunately, there is limited evidence in this area to guide occupational therapy practice, thus leaving practitioners largely to their own intuition, experience and knowledge.

There are up to 50 standardised activities of daily living (ADL) assessments available to occupational therapists (Boop, 2011). The difficulty however is that many of these assessments examine a range of tasks such as feeding, toileting and dressing rather than comprehensively targeting a single skill or task. The need to use valid and reliable
assessments is well documented to enhance evidence based practice and research; however, there are currently no available tests to target specific AD use and skills.

The relationship between cognition and assistive device
The relationship between cognition and AD use is not well interlinked in the literature. Indeed, only one retrieved study, Nochajski et al. (1996), can be found which targets the use and satisfaction with AD by older persons with cognitive impairment. The authors concluded that there is a need “for on-going therapist involvement to assess changes and provide devices and interventions appropriate to the status of the individual” (p. 29). No further studies have built on this research.

The under detection of cognitive impairment and its increasing prevalence has brought cognitive assessment and screening to the forefront. Despite the wide use of the MMSE, attempts to use its results when prescribing and utilising AD is not well researched. No known study has directly attempted to correlate an MMSE score with a patient’s ability to appropriately use AD. The MMSE is ideally placed to identify a level of cognition because of its frequent and popular usage by occupational therapists and its strong psychometric properties (Douglas et al., 2007).

Occupational therapists working in the acute setting need to re-examine their rationale for providing AD in relation to cost, but more importantly they have a duty to their patients to appropriately assess for and prescribe AD using a more patient centred approach, which targets the appropriateness and safety of future AD use. There was a strong rationale for this study based on the lack of research identified in the literature and the research priority to provide evidence of clinical and cost effectiveness for occupational therapy interventions.

Methodology
The fundamental aim of the study was to ascertain whether patients with an MMSE score of 23 or higher can remember how to use the AD and if patients with an MMSE score of 22 or less are unable to remember how to use the AD.

The most widely accepted and frequently used cut off score for the MMSE is 23 out of a total of 30 (Cullen et al., 2005; Koder and Klahr, 2010). Scores of 23 or lower indicate the presence of a cognitive impairment but should not be used to make a formal diagnosis, as warned by the authors. In this study, an MMSE score of 22 was used as the cut off, as several authors have challenged the use of 23 as being under representative of cognitive impairment (Lopez et al., 2005; Friedman et al., 2011) and to provide definitive quantitative correlation. The literature also stresses that raw MMSE scores should be adjusted for age and education and population norms developed by Crum et al. (1993) should always be used when necessary. This was done for this study.

The study objectives were as follows:

- to evaluate a patient’s ability to effectively use the AD directly after demonstration using a reliable and validated scoring tool developed by the researcher;
- to re-evaluate patients’ ability to effectively use the AD 48 hours later using the objective scoring tool; and
- to examine the relationship between MMSE scores and the AD scoring tool results using descriptive and inferential statistics.

In terms of the study process, all patients were in-patients of an acute regional hospital and the researcher was a senior occupational therapist.
All patients had been initially referred to the occupational therapy service for assessment and treatment and all patients had an MMSE score as part of their initial assessment. The three ADs used were a long handled shoe horn, a sock aid and a helping hand which are commercial devices and have CE marking.

Patients who were deemed suitable for the provision of AD by an occupational therapist were deemed suitable for the study and patients who were eligible and had consented to the study were brought to the occupational therapy assessment bedroom where the research took place. Patients were also asked to bring their own shoes and socks.

The researcher demonstrated the use of 1, 2 or 3 AD using a structured teaching protocol developed by the researcher and the researcher then repeated the demonstration procedure.

Patients were then asked to use the AD and were assessed on their ability based on the objective scoring tool. A total score out of 10 could be achieved. The patients were escorted back to the occupational therapy department 48 hours later and reassessed on their ability to remember how to use the AD based on the scoring tool.

The researcher did not provide any demonstration at this stage and the researcher was also blinded to the patients’ MMSE score when demonstrating and assessing the use of the AD.

A pilot study of 15 patients was conducted over a three-month period prior to the main study, and the specific design for the study was a prospective, cross-sectional and correlational study which is common in rehabilitation research.

In terms of sample size, an estimation of 60 participants was made based on referral numbers, a department log, use of statistical software and the pilot study to ensure that acute hospital attrition were factored into the final sample.

The \( p \)-value/significance level was set at 0.05 and statistical power set at an accepted level of 80 per cent and formal ethical approval for the study was granted by the research ethics committee.

**Structured teaching protocol**

As part of the analysis process for the teaching protocol, a total of ten occupational therapists were sought to individually demonstrate the use of all three ADs. Permission and consent was requested from each individual occupational therapist. Demonstration was videoed and analysed for content, common themes and terminology. A tally table of findings was constructed for each AD for all 10 occupational therapists and totalled by the researcher. A non-clinical member of the occupational therapy staff was employed in the patient role for demonstration of the AD in this process and again consent, confidentiality and data protection applied.

Other important aspect of the demonstration process was the allowance of two practice attempts before testing and retesting in 48 hours in keeping with current clinical practice and to consolidate working memory and motor planning.

**Instrument development**

In the absence of specific ADL assessments which target dressing skills and the use of AD, a new instrument was developed which was specifically designed to assess the ability to use all three ADs. The following process guided the development:

- An occupational therapy focus group of ten occupational therapists, researcher experience and aspects of the Klien Bell ADL score, which has strong interrater reliability, were used as content analysis.
The focus group was conducted, audiotaped and analysed by the researcher.
Three versions of the instrument were compiled and given back to the ten occupational therapists for opinion and feedback.
The researcher collated the findings and decided which was the most appropriate and popular version.

The assessment was also reviewed for normality, reliability, validity and clinical usefulness using SPSS, and Pearson’s correlation was used and a correlation score greater than 0.7 was taken as an indicator of significance.
A Cronbach’s alpha value of 0.95 was used to determine the internal reliability of the instrument.

The predictor variable was the MMSE score and the criterion value was the demonstration and provision of the ADs, and Scatter plots were used to present data and establish the correlations.

All aspects of the study were undertaken and funded by the researcher.
It was decided to use one instrument as a generic tool for all three ADs, with a consistent scoring method with scores out of a possible 10 and 1 mark for each criterion achieved. Patients were seen as able to perform or unable to perform. Ten criteria were established in the final version of the tool. Criteria 1-4 targeted whether the patient could appropriately name, identify, select the garment, manipulate and demonstrate appropriate safety awareness with the AD. Criterion 5 targeted the correct sequence for the use of the device which was as per the standard demonstration procedure and provision was made in the assessment tool for the recording of this. The tool also recorded whether the patient was independent with the AD and independent as per the structured demonstration. One of the principal concerns from the occupational therapists’ qualitative review was the need to decipher between a patient using the AD independently and using the AD independently as initially demonstrated. Evidence shows that many patients manage AD independently but this is not consistent because they lack a structured, learned procedure (Griffin et al., 2007). The tool also caters for awareness of success and failure with the AD, and performing the task within an appropriate time frame. A period of 15 min was chosen for this tool both for practical and ethical reasons. The same tool was used in the subsequent evaluation 48 hours later. This timeline was chosen based on current practice, practical limitations of an acute hospital and to allow working memory to be evaluated.

A copy of the assessment tool is provided in Appendix 1, and a description of the assessment tool properties is provided in Appendix 2.

Particular emphasis was placed throughout the study on the retention of subjects, which is a concern in research involving older persons (Bowsher et al., 1993), and included positive communication and respect for patients’ time. The fact that all patients were acute hospital patients meant that the researcher’s primary concern was not to cause undue pain, discomfort or stress.

To increase the homogeneity of the study, a number of diagnoses were excluded from the study because of their direct influence on cognition, ability to physically use the AD or the patients’ knowledge and previous use of the AD.

The null hypothesis for the study states that:
Patients with an MMSE score of 22 or less show no difference in their ability to safely and appropriately remember how to use AD provided and demonstrated by an occupational therapist than patients with an MMSE score of 23 or higher.
Results

Demographics
Data were collected over a four-month period. The total number of valid participants was 63, which was the desired sample size. There was an almost equal split of males and females in the study with 33 female and 30 male participants. The mean age was 72.33 with a minimum age of 36 and a maximum age of 96. Although the age profile generally follows a normal distribution, there was a high frequency of participants in the 80 years age group which is above the mean score. There was a significant range and diversity of diagnoses. Chronic obstructive pulmonary disease was the most common diagnosis, while falls, chronic cardiac failure and fractured neck of femur also featured prominently in the study. The mean MMSE score was 22.76 and also followed a normal distribution. There were nine readmissions in the following six months post discharge, although specific data concerning their readmission are lacking and were not a primary aim of the research.

Correlations between mini mental state examination and helping hand. There was a large positive correlation between MMSE scores and times 1 helping hand, \((r = 0.598, n = 60, p = 0.01)\) and an even larger positive correlation \((r = 0.677, n = 60, p = 0.01)\) for MMSE scores and times 2 helping hand. This means that with decreasing MMSE score comes a decrease in the ability to remember to use the helping hand appropriately. This correlation gets even stronger with time. (See Figure 1 showing correlation of MMSE scores with times 2 helping hand).

Correlations between mini mental state examination and shoe horn. There was again a large positive correlation between MMSE scores and times 1 and 2 shoe horn. \((r = 0.646, n = 54, p = 0.01)\) \((R = 0.649, N = 54, P = 0.01)\) indicating that lower MMSE scores are associated with lower scores on the assessment tool. (See Figure 2 displaying MMSE and times 2 shoe horn).

Correlations between mini mental state examination and sock aid. The correlations obtained concerning MMSE and sock aids again displayed strong positive correlations. The most significant of all correlations was between MMSE and times 2 sock aids \((r = 0.877, n = 54, p = 0.01)\) as shown in Figure 3.

There was a statistically significant decrease in scores from times 1 to times 2 for all ADs and a large Eta Squared effect size: Helping hand 0.59, shoe horn 0.45 and sock aid 0.64. Clearly, the sock aid showed the largest effect size of all ADs. This means that the sock aid,

![Figure 1](image_url)
which was the most complex of all three ADs, was deemed the most difficult device to use particularly after 48 h had elapsed and particularly with patient’s with lower MMSE scores.

Results of the study obtained from the correlations indeed indicate significance and an unlikelihood that the results are because of chance. In this study, the null hypothesis can be rejected; however, literature warns that results are still based on probability and the importance of cautious interpretation must be stressed (Field, 2005).

Discussion
Despite cautious interpretation, a statistically significant relationship between variables is a pre-condition of causality, and therefore the results must be interpreted as positive. This study has provided primary, objective evidence of difficulties with decreased cognition and functional ability with AD. This is a potentially significant finding in the light of current occupational therapy practice.

Occupational therapists are at the very core of discharge planning in the acute hospital and are facing increasing pressure to safely facilitate a discharge and enable patients to
return home at the earliest possible time. Although the concept of decreased length of stay is important, it must not be abused in the pursuit of high-quality patient care as warned by Williams et al. (2010). The provision of AD is one area where time, patient centeredness and indeed accountability are required.

The study has also highlighted a clear shift in the provision of AD from traditional physical diagnoses such as THR to more medical, chronic based diagnoses. This provides an even greater rationale to use individual methods of assessment and treatment and avoid the “one size fits all” practice of AD provision.

The fact that scores have disimproved does not mean AD should be dismissed. Occupational therapists should trust their clinical reasoning about why they are required in the first instance and aside from cognitive issues, need to shift their focus to a more individualised training experience for their patients. Time and practice should remain the cornerstone of the intervention.

In addition, effective teaching of the use of AD often involved not just patients but caregivers, and this provides a further incentive and need to develop and implement effective teaching strategies for all persons involved in AD provision.

A concerning observation from the study was the amount of readmissions to hospital after several weeks, of patients who were discharged home with ADs. Although specific data is lacking, it is still an alarming reflection. The ability or inability to remember to use AD may not have caused their readmission, but a careful prescription and teaching of AD may well contribute to more independent living at home. The cost of a hospital admission is much more significant than the cost of AD and the level of intervention needed to make them successful (Deloitte and Touche, 2008). A true cost benefit analysis would ultimately show them to be a value for money intervention.

At the heart of this study was cognition. Occupational therapy plays a crucial role in the assessment of cognition and is considered expert in advanced cognitive assessments. It is imperative that all patients who receive AD also have some assessment of cognition to get a more holistic picture of their needs. This should be done as part of good practice.

Ineffective or inappropriate intervention is perhaps more problematic than no intervention at all and this may be particularly important for AD. AD used wrongly may be unsafe or even hazardous.

The study also calls into question the worthiness of prescribing AD to those who are unlikely to use them and with increased emphasis on quality and safety; this has never been more paramount. Although the study has opened up the debate on whether to provide or not provide AD based on levels of cognition, there are many ethical and practical considerations to consider before they are dismissed. There would need to be more substantial, objective evidence, beyond the realms of this study, before this could confidently infiltrate clinical practice, but this study has opened the debate to challenge therapists’ current practice on AD provision.

The wider implications of this are also very clear and the benefits of cognitive evaluation in areas such as wound care, medication management and dietary management are evident (Olsen-Keller and Strohschein, 2016). Indeed, effective cognitive evaluation and patient training should pre-dominate all health interventions, particularly in the light of home interventions and the increasing desire to keep patients at home for longer.

The assessment tool was designed with core values of holism, function and independence in mind and does appear to be suitable to measure competencies in AD use. It must be stressed, however, that it is based on limited psychometric data and a limited sample size. There would need to be more work done on making the tool more responsive to change and cater for varying levels of competence. Despite this, the tool has proved very valuable to establish correlations with cognitive scores, which was the aim of the research.
Conclusion

Occupational therapy is a traditional rehabilitation profession and prides itself on the achievement of maximum potential for all its patients. The challenge for occupational therapy is not just in the prescriptive stages of AD provision, but also in the demonstration, teaching and follow up stages to help all patients achieve their full potential and benefit from AD. Patients with cognitive impairment pose a larger safety challenge but still should be afforded an opportunity to use and benefit from AD. There may come a point, however, when AD provision is not appropriate or safe for patients with significant cognitive impairment and occupational therapy must also face this challenge while still allowing them to achieve their full potential.

This may involve not just new and innovative ways of teaching, but also calls on therapists to go back to basic skills such as problem solving, activity analysis and client centred practice and virtues such as trust, time, understanding and practice. Although in the short-term this may be more costly and time-consuming, it may ultimately be a more cost effective and efficient way of delivering care and maintaining independence. This would also contribute in a positive way to accountability, evidence-based practice and patient centred care.

The research and assessment tool is a new and unique way of looking at the provision of AD, particularly when cognitive impairment is a factor. Although results and correlations are significant, this only really highlights the need for much larger research to follow.

References

Boop, C. (2011), “Table of assessments: listed alphabetically by title”, in Crepeau, E., Cohn, E. and Boyt Schell, B. (2011), Willard and Spackman’s Occupational Therapy, 11th ed., Lippincott Williams and Wilkins, Philadelphia.

Bowsher, J., Bramlett, M., Burnsise, I. and Gueldner, S. (1993), “Methodological considerations in the study of the frail elderly”, Journal of Advanced Nursing, Vol. 18 No. 6, pp. 873-879.

Brentnall, J. and Bundy, A. (2009), “The concept of reliability in the context of observational assessments”, Occupational Therapy Journal of Research, Vol. 29 No. 2, pp. 63-71.

Cullen, B., Fahy, S., Cunningham, C.J., Coen, R., Bruce, I., Green, E., Coakley, D., Walsh, B. and Lawlor, B. (2005), “Screening for dementia in an Irish community sample using the MMSE: a comparison of norm adjusted versus fixed cut of points”, International Journal of Geriatric Psychiatry, Vol. 20 No. 4, pp. 371-376.

Deloitte and Touche (2008), “Value for money audit of the Irish healthcare system, Department of health and children”, Deloitte and Touche, Dublin.

Department of Health and Children (DOHC) (2010), “The identification of research priorities for therapy professions in Ireland”, Main report, available at: www.hrb.ie/uploads/tx_hrbpublications/physical_Therapies_Priorities_main_Report.pdf (accessed 21 October 2011).

Douglas, A., Liu, L., Warren, S. and Hopper, T. (2007), “Cognitive assessments for older adults: which ones are used by Canadian occupational therapists and why?”, Canadian Journal of Occupational Therapy, Vol. 5 No. 12, pp. 370-381.

Field, A. (2005), Discovering Statistics Using SPSS, 2nd ed., Sage Publications, London.

Finch, E., Brooks, D., Stratford, P. and Mayo, N. (2002), Physical Rehabilitation Outcome Measures: a Guide to Enhanced Clinical Decision Making, 2nd ed., Decker, Hamilton.

Friedman, T., Yelland, G. and Robinsin, S. (2011), “Subtle cognitive impairment with mini mental state examination scores within the ‘normal’ range”, International Journal of Geriatric Psychiatry, Vol. 27 No. 5, John Wiley and Sons Limited, Hoboken, NJ, pp. 463-471.

Gitlin, L. and Burgh, D. (1995), “Issuing assistive devices to older patients in rehabilitation: an exploratory study”, American Journal of Occupational Therapy, Vol. 49 No. 10, pp. 994-1000.

Griffin, J., Mc Kenna, K. and Tooth, L. (2007), “Discrepancy between older client’s ability to read and comprehend and the reading level of written educational materials used by occupational therapists”, American Journal of Occupational Therapy, Vol. 60 No. 1, pp. 70-80.
Guidetti, S. and Tham, K. (2002), “Therapeutic strategies used by occupational therapists in self care training: a qualitative study”, *Occupational Therapy International*, Vol. 9 No. 4, pp. 257-276.

Haley, S. and Fragala Pinkham, M. (2006), “Interpreting change scores of tests and measures used in physical therapy”, *Physical Therapy*, Vol. 86, pp. 735-743.

Health Service Executive (HSE) (2011), “Budget control reports per service cost Centre 2006-2011”, HSE West, Sligo.

Holli, A., Block, M., Moyle-Wright, P., Ernst, D., Hayden, S., Lazzara, D., Savoy, S. and Kostas-Polston, K. (2007), “A psychometric toolbox for testing validity and reliability”, *Journal of Nursing Scholarship*, Vol. 39 No. 2, pp. 155-164.

Klein, S., Barlow, I. and Hollis, V. (2008), “Evaluating ADL measures from an occupational therapy perspective”, *Canadian Journal of Occupational Therapy*, Vol. 75 No. 2, pp. 69-81.

Koder, D.A. and Klahr, A. (2010), “Training nurses in cognitive assessment: uses and misuses of the mini mental state examination”, *Educational Gerontology*, Vol. 36 Nos 10/11, pp. 827-833.

Kraskowsky, L.H. and Finlayson, M. (2001), “Factors affecting older adults use of adaptive equipment: review of the literature”, *American Journal of Occupational Therapy*, Vol. 55 No. 3, pp. 303-310.

Lopez, M., Charter, R., Mostafavi, B., Nibut, L. and Smith, W. (2005), “Psychometric properties of the Folstein mini mental state examination”, *Assessment*, Vol. 12 No. 2, pp. 137-144.

Mc Intyre, A. (2005), “Activity and participation: part 1”, in Mc Intyre, A. and Atwal, A., *Occupational Therapy and Older People*, Blackwell Publishing, Oxford.

Neville-Jan, A., Verner Pierso, C., Kielhofner, G. and Davis, K. (1993), “Adaptive equipment: A study of utilization after hospital discharge”, *Occupational Therapy in Health Care*, Vol. 8 No. 4, pp. 3-18.

Nochajski, S., Tomita, M. and Mann, W. (1996), “The use and satisfaction with assistive devices by older persons with cognitive impairments: a pilot intervention study”, *Topics in Geriatric Rehabilitation*, Vol. 12 No. 2, pp. 40-53.

Olsen-Keller, L. and Strohschein, S. (2016), “Population based public health nursing practice: The intervention wheel”, in Stranhope, M. and Lancaster, J. (Eds), *Public Health Nursing, population Centred Health Care in the Community*, 9th ed., Elsevier, Amsterdam.

Polit, D.F., Beck, C.T. and Hungler, B.P. (2001), *Essentials of Nursing Research: methods, appraisal and Utilisation*, 5th ed., Lippincott, Philadelphia.

Schemm, R. and Gitlin, L. (1998), “How occupational therapists teach older patients to use bathing and dressing devices in rehabilitation”, *The American Journal of Occupational Therapy*, Vol. 52 No. 4, pp. 276-282.

Smith, R. (1995), “A client centred model for equipment prescription (client’s values and roles, effective use of adaptive equipment)”, *Occupational Therapy in Health Care*, Vol. 9 No. 4, pp. 39-52.

Sonn, U., Törnquist, K. and Svensson, E. (1999), “The ADL taxonomy – from individual categorical data to ordinal categorical data”, *Scandinavian Journal of Occupational Therapy*, Vol. 6, pp. 11-20.

Thomas, W., Pinkelman, L. and Gardine, C. (2010), “The reasons for non compliance with adaptive equipment equipment in patients returning home after a total hip replacement”, *Physical and Occupational Therapy in Geriatrics*, Vol. 28 No. 2, pp. 170-180.

Williams, T., Hok, T., Dobb, G., Knuiman, M. and Webb, S. (2010), “Effect of length of stay in intensive care unit on hospital and long term mortality of critically ill adult patients”, *British Journal of Anaesthesia*, Vol. 104 No. 4, pp. 459-464.

**Further reading**

Wielandt, T., Mc Kenna, K., Tooth, L. and Strong, J. (2006), “Factors that predict the post discharge use of recommended technology”, *Disability and Rehabilitation. Assistive Technology*, Vol. 1 Nos 1/2, pp. 29-40.
Appendix 1. Final assessment tool

| 1. Patient identifies device by name and use | Yes | No |
|-------------------------------------------|-----|----|
| 2. Patient demonstrates adequate safety awareness throughout the process |     |    |
| 3. Patient selects appropriate garment for the device |     |    |
| 4. Patient manipulates the device appropriately |     |    |
| 5. Patient follows all of the correct sequence for the use of the device. |     |    |
| Refer to structured demonstration. |     |    |
| (a) Shoe Horn |     |    |
| 5 (b) Sock Aid |     |    |

(continued)
5. Patient successfully completes the task independently
6. Patient safely and appropriately tidies the device following use by returning it to its original position.
7. Patient demonstrates an adequate awareness of the process by verbal expression of the success/failure
8. Patient performs the task within 15 minutes

|       |       |
|-------|-------|
|       |       |

Signature of Researcher
Appendix 2: Assessment tool properties

Although the tool used in the study falls short of a complete standardised test defined by Finch et al. (2002) as a “published assessment tool that provides detailed instructions on administration and scoring and has published results of reliability and validity” (p. 78), the tool used has made a considerable contribution to such a test.

The reliability of the tool, both inter-rater and test re-test has been well proven with Cronbach’s alpha values of 0.927, 0.938 and 0.964, for all three ADs. This is above the value of 0.7, and indeed, 0.9 is used as a strong indicator of internal consistency in clinical studies (Holli et al., 2007).

Despite this, it is important to consider that these values are based on a pilot study of fifteen patients. To deem the test truly reliable an increased sample size would be desirable. Brentnall and Bundy (2009) state that a larger sample size is statistically more reliable, and there is a need to provide more reliable data if the tool is to be used going forward.

In terms of validity, the tool does measure what it claims to measure and has content, construct and face validity based on significant work at its development stage. The concept of safety, which is well represented, probably needs further definition and objectivity in its scoring to augment content validity. Holli et al. (2007) describe innovative methods of qualifying content validity such as a content validity ratio, which would require extensive research and development, and which is beyond the realms of this study.

Responsiveness to change

Re-evaluation and retesting of an instrument is an important factor to establish baseline performance and identify responses to therapy or intervention. Although the tool has proven useful and decisive in establishing statistically significant differences in scores, clinically significant changes remain unclear and would need further work such as the minimal clinical important difference described by Haley and Fragala Pinkham (2006).

Following feedback from the research assistants, question five in the tool, which requires the standardised sequence of use, does not cater for different levels of competence. Despite some patients getting only one step or all steps in the sequence wrong, they are still awarded a zero. This effectively means that this particular item can be failed quite easily. The tool needs to cater for varying levels of competence within this item and be rewarded accordingly. This would bring in a more complex marking system and may not have been practical for the study, but would ultimately be more responsive to change for future use.

Clinical utility

Although the tool was designed and developed for the purpose of the study and despite its shortcomings, it must also be considered useful from both a clinical and practical viewpoint to use within occupational therapy practice. There are low costs involved, ease of administration and little extensive training required to administer successfully. The tool is ideal to use in both an acute hospital and in the home setting, where it could potentially be used with greater effect.

The tool is unique and although designed with three specific ADs in mind, the template could be tailored to suit other AD. There would obviously need to be significant work in terms of standardisation and provision of a manual before it could be used in the open occupational therapy market. Klein et al. (2008) states that occupational therapy needs measures that are not just psychometrically sound, but are also fundamental to the profession’s values and beliefs, and the assessment tool was designed with core values of holism, function and independence in mind.
Direct observation
The importance of direct observation, as a data source, was well highlighted in the methodology as part of the development of the tool. Direct observation of every ADL has been criticised, (Sonn et al., 1999) because of all the time involved; however, the benefits in specific ADL tasks such as AD use are very clear. The assessment tool allows for accuracy, consistency, detection of unsafe methods, which was central to the study and specific areas which need further work.

The assessment tool does appear to be suitable to measure competencies in AD use; however, it must be stressed that it is based on limited psychometric data and a limited sample size. There would need to be further work in establishing subtle changes to make it more appealing clinically although from a study viewpoint has been more than adequate to establish correlations with cognitive scores, which was the fundamental aim of the research.

About the authors
Gerard Mc Carroll, senior occupational therapist, Sligo University Hospital. Gerard Mc Carroll is the corresponding author and can be contacted at: mccarrollgerard@gmail.com

Mary Cooke, senior lecturer, nursing, health sciences and disability studies, St Angelas’s College, Sligo.

For instructions on how to order reprints of this article, please visit our website: www.emeraldgrouppublishing.com/licensing/reprints.htm
Or contact us for further details: permissions@emeraldinsight.com
Irish Journal of Occupational Therapy

Number 1

2 An evaluation of sensory processing training on the competence, confidence and practice of teachers working with children with autism
Aideen Rutledge and John Cathcart

18 Predictors of academic honesty and success in domestic and international occupational therapy students
Ted Brown, Stephen Isbel, Alexandra Logan and Jamie Etherington

42 A qualitative study of Irish parents’ views on hippotherapy, including its influence on their children’s home-based occupations
Rachel O’Mahony, Emma Connolly and Patrick Hynes

58 Is there a correlation between cognition and the ability to remember how to use assistive devices?
Gerard Mc Carroll and Mary Cooke