



Simulated Based Dementia Training: Impact on Empathic Understanding and Behaviour Among Professionals and Carers

Slater, P. F., Hasson, F., Moore, K., & Sharkey, F. (2021). Simulated Based Dementia Training: Impact on Empathic Understanding and Behaviour Among Professionals and Carers. *Clinical Simulation in Nursing*, 55, 43-51. Article 1. Advance online publication. <https://doi.org/10.1016/j.ecns.2021.04.004>

[Link to publication record in Ulster University Research Portal](#)

Published in:
Clinical Simulation in Nursing

Publication Status:
Published (in print/issue): 01/06/2021

DOI:
[10.1016/j.ecns.2021.04.004](https://doi.org/10.1016/j.ecns.2021.04.004)

Document Version
Author Accepted version

General rights
Copyright for the publications made accessible via Ulster University's Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The Research Portal is Ulster University's institutional repository that provides access to Ulster's research outputs. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact pure-support@ulster.ac.uk.

1 **Simulation Based dementia training: impact on empathic understanding and**
2 **behaviour among professionals and carers.**

3
4
5 **ABSTRACT**

6 *Background:* Simulation-based experiences provide learning opportunities into the world of
7 people living with dementia, however limited research into its effectiveness exists.

8
9 *Methods:* A quasi-experimental design was used to examine the impact of the virtual dementia
10 tour on empathetic thinking, understanding and person care. Study participants included carers
11 and multi-health professionals (n=223).

12
13 *Results:* Empathetic understanding of symptoms, its impact on the provision of person-centred
14 practice were all scored as neutral. Significant positive changes were reported on all measures
15 post intervention, across all demographics.

16
17 *Discussion:* Virtual reality offers an opportunity to understand the isolated, fragmented and
18 confusing world of the person with dementia.

22 **KEY POINTS**

- 23 1. Stimulated based experience provides a new and innovative method to provide
24 experiential learning opportunities into the **hard-to-reach** world of people living with
25 dementia.
- 26 2. Findings suggest that participants roles in simulation-based experience led to a
27 significant positive change in empathetic understanding and the behavioural impact of
28 the condition on the person.
- 29 3. Virtual reality training programmes offer **nurses and all health professionals** an
30 opportunity to understand the often isolated, fragmented and confusing world of the
31 person with dementia.

32

33

34 **KEYWORDS**

35 Dementia, health professionals, empathy, virtual reality, simulation, quasi-experimental
36 research

37

38 **INTRODUCTION**

39 The use of virtual reality technologies in health professionals training continues to increase as
40 new technological advances continue to evolve, and new conceptualised uses emerge (Hattlink
41 et al 2015). This is particularly so in the field of Alzheimer’s Disease and related Dementia’s
42 (ADRD). There has been a rise of virtual reality programmes as effective modes of dementia
43 training including the Virtual Dementia Experience TM, (VDE) (Doube & McGuire, 2016;
44 Gilmartin-Thomas, et al., 2018; 2020), Dementia Live TM (Han, Kim, & Hong, 2019), myShoes
45 project (Adefila et al., 2016) Through d’mentia lens (Wijma et al., 2018) and Virtua Dementia
46 Tour (VDT®) (Beville, 2002; Slater et al., 2019). To date, the evidence regarding this new
47 and developing field of research reflects its relative novelty – encouraging but limited by the
48 lack of strong research design (Hirt & Beer, 2020).

49

50 There is an onus on health professionals to be fully aware of the theoretical knowledge of
51 dementia and its progression, including how the condition impact on the person living with
52 dementia. With advances in new virtual reality (VR) technologies it has become possible to
53 mimic the lived experience of dementia (Hattlink et al., 2015), albeit in a controlled and
54 temporal manner, in order to provide a better understanding of the world of the person living
55 with dementia (Sulzer, Feinstein, Wendland, 2016; Fagiano, 2019). VR is deemed better than
56 traditional learning modes as it promotes experiential learning (Wijma et al., 2018, Gilmartin-
57 Thomas et al., 2018, Kyaw et al., 2019); promotion of a deeper empathetic understanding of
58 dementia, awareness of its impact on emotions and subsequent behaviours (Jütten et al., 2017),
59 and the promotion of person-centred care for people with dementia by formal (Slater et al.,
60 2019) and informal carers (Wijma et al., 2018).

61

62

63 Different VR simulation programmes for dementia have been researched, for example in the
64 US, Beville (2002) was the first to address the use of VR technologies in understanding of
65 dementia among health professionals. Using a one sample pre-post-test design with a sample
66 of 146 health professionals, Beville (2002) reported a heightened awareness of the emotional
67 needs of people with dementia and how these emotions manifest as inappropriate behaviour;
68 and a corresponding reduction in agreement that people with dementia receive the care they
69 need. Later Doube and McGuire (2016) tested the virtual dementia experience (VDE) and
70 reported significant increases in empathetic understanding and knowledge of dementia,
71 compared to traditional classroom training among health students.

72

73 Adefila et al. (2016) employed a quasi-experimental design and assessed changes in
74 participants' attitudes using the Interpersonal Reactivity Index (IRI) (Davis, 1980) to measure
75 taking the perspective of and have empathetic concerns for others, reported that the VR
76 programme (myShoes project) increased awareness of dementia, empathy and compassion
77 among social care professionals. Later, Wijma and colleagues (2018) looked at the impact of
78 VR on informal caregivers using a small scale (n=35) pre-post intervention research design.
79 Standardised scales were used to measure perspective taking, resilience, competency and
80 positive dyadic interactions and all were found to be change positively and at a statistically
81 significant level albeit with a small sample. However, Jütten et al. (2017) failed to report
82 significant changes in the short-term (1-week post programme) and long-term (15 months) on
83 IRI measures, anxiety and depression among carers. It was the first study to look at the
84 sustained impact of the intervention. However, they did conclude significant positive impact
85 on the quality of relationship between carers and people with dementia. Gilmartin-Thomas and
86 colleagues (2018) in Australia conducted a quasi-experimental controlled study with medical
87 and pharmacy students (n=278), looking at VR teaching compared to standard curriculum.

88 They reported that the intervention produced statistically significant improvements in scores
89 beyond that of the standard curriculum on a standardised scale measuring knowledge and
90 attitudes towards people with dementia.

91

92 Building on this previous work, Slater and colleagues (2017; 2019) provided a qualitative
93 context to the impact of the intervention, reporting on small sample of formal and informal
94 carer's (n=18). Participants perceived the VDT programme as useful, and it provided an
95 opportunity to understand what it is like to think, feel and live with dementia and that it enabled
96 a behavioural and cognitive reaction to this 'lived experience'; producing an eventual moral
97 reaction regarding what constitutes effective and appropriate care for people with dementia.
98 Such findings were confirmed by Han and colleagues (2019) study that explored 28 caregivers
99 (formal and informal) using semi-structured interviews, two weeks after participation in a VR
100 training intervention. They found an increased empathy, the promotion of positive care
101 strategies leading to emotional and social benefits; and an increased awareness of aging and
102 risk of dementia.

103

104 Whilst these studies provide a framework upon which to understand the usability of virtual
105 reality for people with dementia there is a lack of research focusing on the learning outcomes
106 (Radianti et al., 2020), underpinned by a strong methodological design (Hirt & Beer, 2020). In
107 response this study aims to examine how a virtual reality programme for health professionals
108 and carers impact on understanding of the condition and in particular the empathetic
109 understanding of its impact on cognitions, emotions and behaviours.

110

111 **MATERIAL AND METHODS**

112 **Research Design**

113 A quasi-experimental one-group pre-test - post-test research design was used to measure
114 change across time (3-months). A questionnaire was developed to measure empathy and
115 understanding of the impact of dementia on thinking, emotions and behaviour (Slater, Hasson,
116 Moore, Sharkey, 2020). A Questionnaire pack containing participant information sheet,
117 questionnaire and support information were administered to all participants prior to the
118 intervention and again upon completion.

119

120 **Sample**

121 Participants were drawn from across a Health and Social Care Trust in Northern Ireland that
122 have been using the VDT ® as a training tool for people working with people living with
123 dementia. Participation was voluntary and open to health professionals, voluntary groups and
124 members of the community. Recruitment was via awareness posters and advertising campaign
125 via email and social media. Clusters of 12 people per grouping participated in the training and
126 there were two sessions per day. Over the period of two weeks, there were potentially a total
127 of 240 participants. A response rate of 223 completed questionnaires for both time points
128 representing a response rate of 93%. The remaining 7% (n=17) were accounted for as 4
129 participants completed pre-intervention questionnaires and 1 completed post intervention
130 questionnaire were removed. The remaining participants (2.5%, n=12) either did not turn up
131 for training or did not wish to participate in the study. Participants were emailed the
132 questionnaire pack 3-months post intervention and asked to complete and return it. A response
133 rate of 37% (n=82) was achieved.

134

135 **Intervention**

136 The VDT® programme claims to be a replication of stage four-five (moderate) dementia. The
137 programme lasts 2-hours and involves 10-minutes of sensory (visual, auditory and tactile)

138 distortion using apparatus, and cognitive confusion by requiring participants to complete
139 simple tasks, such as folding clothes. This is to mimic distortion produced by the deterioration
140 of the Parietal, temporal, occipital and frontal lobe as well as the limbic system and cerebral
141 cortex. This is followed by an opportunity to watch the behaviour of another group participate
142 in distortion session. A 30-minute debriefing programme completes the training. The VDT®
143 programme uses transformative learning technique to place the participant in the realm of
144 dementia and provides participants with an imagined '*insider's view*' of the condition and an
145 opportunity to self-reflect on the experience to help better understand what it is like living with
146 the condition (Beville, 2014).

147

148 **Instrumentation**

149 Examination of the literature failed to identify a psychometrically sound tool that addresses
150 health professionals empathetic understanding of living with dementia, its impact the
151 behavioural and psychological symptoms of dementia and care provided. An assessment tool
152 was designed and psychometrically tested to measure these aspects (Slater, Hasson, Moore,
153 Sharkey, 2020). The tool development was based on previous qualitative findings (Slater
154 Hasson, Gillen, 2017) and further qualitative and quantitative research work into the effect of
155 VR on participants empathetic understanding of living with dementia and reported strong
156 psychometric properties (Slater, Hasson, Moore, Sharkey, 2020). It consisted of 15 items, rated
157 on a 5-point Likert scale ranging from strongly disagree to strongly agree, measuring 3
158 constructs - empathy, understand of behaviours and role of the person in care decisions. Four
159 additional items measured a fourth construct - experience of previous training. Additional
160 demographic details were collected and experience/importance of knowledge of dementia. All
161 four constructs had acceptable Cronbach alpha scores above the threshold of 0.7 and therefore
162 considered stable.

163

164 **Procedure**

165 An open invitation was sent via the web and email to all participants in the study in a Health
166 and Social Care Trust. Participants self-nominated to be involved in the VDT training and
167 allocated to a session on a first come-first serve basis. Participants were in group of 12 per
168 session and 20 sessions were held in total (n=240). The participants were informed about the
169 study and provided with an invitation pack. One hour prior to the intervention participants
170 were provided with the questionnaire pack and, if willing to participate, completed the
171 questionnaire. Participants engaged in the VDT training and then all were invited to complete
172 the questionnaire after the intervention. Participants provided email addresses and were send
173 an electronic version of the questionnaire three months after participation.

174

175 **Statistical Analysis**

176 Demographic details of the sample were examined to identify the characteristics of the sample.
177 Descriptive statistics were generated for each of the items across both time points, including
178 frequency scores and measures of distribution. Cronbach alphas were calculated for each
179 construct and items were summated. Paired t-tests were calculated between pre and post
180 scores. Repeated measures analysis of variance scores was calculated across the three time
181 points to show changes on items and constructs. Analysis of Covariance was used to examine
182 changes across time according to each of the demographic details, controlling for variability in
183 pre-test scores.

184

185 **Ethical Issues**

186 The study was performed in accordance with the Declaration of Helsinki Full (World Medical
187 Association, 2001). Ethical approval was sought from a University ethics committee prior to

188 commencement of the study. A completed questionnaire was indicative of implied consent to
189 use in the study. Anonymity and confidentiality were assured for all participants. A unique
190 four-digit self-completed coding system was used to ensure the anonymity of participants
191 whilst allowing questionnaires to be pair-matched for analysis. Support services were offered
192 to all participants on completion of the intervention.

193

194 **RESULTS**

195 **Demographic Details**

196 A total of 223 (93%) completed the programme. This represented a representative spread
197 across gender, settings and education levels (see table 1). More than two thirds of the
198 participants had not received training in dementia awareness.

199

200 *Insert Table 1 Here*

201

202 There was a good spread across health and social care professionals and informal carers (7%,
203 n=15). The major group of participants were ‘Others’ including psychiatrists, psychologists,
204 student nurses and student social workers (26%, n=56). The second largest group was from
205 medical or allied health professional backgrounds (23%, n=49) including occupational
206 therapists and physiotherapists. 12% were nurses (n=26), 15% (n=33) social workers and
207 fifteen participants (7%) were carers.

208

209 **The Need for Dementia Training**

210 **Prior experience of dementia training and its necessity was investigated using 4 statements.**

211 More than half of the participants spent at least a moderate amount of time caring for people
212 with dementia (see figure 1) and for the majority of participants required a high level of

213 dementia knowledge to allow them to do their jobs well (see figure 2). There was a moderate
214 positive relationship between working with people with dementia and the importance of
215 knowledge relating to dementia ($r=.51$, $P<0.01$).

216 *Insert Figure 1 and Figure 2 here*

217

218 **Assessment of Prior Training**

219 Participants were asked to rate how well their previous training equipped them to understand
220 the emotional, physical and cognitive aspects of dementia. Respondents were generally happy
221 with their knowledge levels with a score ranging between ‘Neutral’ and ‘Somewhat Agree’
222 (See table 2).

223

224 *Insert Table 2 here*

225

226 The items were summed to provide a factor score ‘**Assessment of Prior Training**’ that looks at
227 how well previous training has provided participants with a strong evidence base of the
228 physical, emotional wellbeing impacts on the mind-set and thinking of the person with
229 dementia. The mean scores ($\bar{x}=3.47$) for the construct shows that participants felt a slight sense
230 of agreement. Multiple regression analysis (12.7% of the variance) showed that experience
231 with working with people with dementia has an impact on training, as does the age of the
232 participant. Further examination of the linear regression shows there to be a small, positive,
233 relationship between both perceptions of prior training and frequency of working with people
234 with dementia ($r=.278$, $p<0.01$) and importance of dementia knowledge in their job ($r=.20$,
235 $P,0.01$).

236 *Insert Table 3 here*

237

238 Pre-intervention Item Scores

239 Prior to the intervention, participants reported a general sense of ambivalence regarding the 4
240 items relating to empathetic understanding of dementia. Participants reported that they were
241 unable to think like a person with dementia $x = 2.63$ (see table 3) and the other 3 items were
242 similarly scored. The 7 items relating to ‘understanding of the behavioural impact of dementia’
243 were scored as ‘neither agree nor disagree’ to ‘slightly agree’. The four items relating to the
244 importance of involving or having the voice of the person with dementia in care decisions and
245 effective care was positively scored as slightly agree.

246

247 Post intervention (and 3-month follow-up)

248 There was a significant movement in opinions relating to understanding and knowledge of the
249 symptoms and behaviours of people with dementia. All scores moved to being positively
250 scored as ‘slightly agree’ to strongly agree’. Statistical examination show that all 15 items
251 increased as a statistically significant level ($p > 0.01$) post intervention. The items relating to
252 effective care also changed at a statistically significant level to an agreed level of strongly
253 agree. Examination of the 3-month follow up show that scores remained constant or improved
254 from the post intervention scores.

255

256 Summation of Items to Construct Scores

257 Further investigation of the construct scores **shows** there was a positive and statistically
258 significant relationship across all three constructs at pre-intervention. Correlation coefficient
259 scores show no issues of collinearity and sufficient variability in scoring to indicate that each
260 construct is measuring different aspects of care. Skewness and kurtosis were not significant
261 issues however there was a raise towards ceiling effect post intervention and follow-up.

262 **Definitions of the constructs are provided in Table 4.**

263 *Insert Table 4 Here*

264

265 Repeated measure analysis of variance was conducted across the three time points on all three
266 constructs. Examination of the Mauchly's test of Sphericity show epsilon scores of greater
267 than 0.75 (Huynh-Feldt construct 1=0.956; construct 2=0.970; construct 3=0.863) indicating a
268 violation of sphericity and therefore the Huynh-Feldt correction was used.

269

270 **Empathetic Understanding of Dementia**

271 Examination of the 'Empathetic Understanding of Dementia' mean scores across the three time
272 points show that there is a statistically significant increase in scores from pre and post scores,
273 and pre and follow-up but not between post and follow-up. Repeated measures analysis of
274 variance shows there to be a statistically significant difference in scores across time points
275 $F(1.91, 153.00)=59.42, p<0.001, \text{partial } \eta^2 .97$.

276

277 **Understanding of Behavioural impact of Dementia:**

278 Examination of the construct 'Understanding of behavioural impact of dementia' mean scores
279 across the three time points show that there is a statistically significant increase in scores from
280 pre and post scores, and pre and follow-up and between post and follow-up. Repeated measures
281 analysis of variance shows there to be a statistically significant difference in scores across time
282 points $F(1.94, 151.64)=36.65, p<0.001, \text{partial } \eta^2 .99$.

283

284 **The Role of the Person in Care Decisions**

285 Examination of the construct 'Role of the person in care decisions' mean scores across the
286 three time points show that there is a statistically significant increase in scores from pre and
287 post scores, and pre and follow-up but not between post and follow-up. Repeated measures

288 analysis of variance shows there to be a statistically significant difference in scores across time
289 points $F(1.73, 138.11)=36.65, p<0.001$, partial eta .96.

290

291 **Analysis of Covariance of impact of intervention across Demographics**

292 Examination of the effects of demographic details (Gender, age, Occupation, setting and
293 education) on the impact of the intervention using an Analysis of Covariance show that the
294 change was noted across all groups for both the constructs empathetic understanding and
295 understanding behaviour but not provision for person-centred care. Post intervention scores
296 were compared whilst controlling for pre-intervention scores in order to get a full account of
297 whether a particular group gained more from the intervention. Only gender was found of have
298 an effect on the role of the person in care decisions ($f=6.775, df=102,1, p=0.01$) and females
299 mean scores increased from 4.22 – 4.69; males increase slightly less 4.22 – 4.55).

300

301 Participants were asked to provide feedback on the impact of the intervention of their attitudes
302 and practice. The vast majority of participants supported the programmes and almost everyone
303 (97.3%) viewed it as having a significant impact on attitudes to people with dementia. Almost
304 all participants felt that the training would have an impact on their approach to practice
305 (98.7%). All participants (100%) stated they would recommend the programme to others.

306

307 **DISCUSSION**

308 The findings from this study show that the virtual reality programme offers an opportunity to
309 participants to ‘walk in the shoes’ of the person with dementia and create a sense of empathy
310 thereby promoting the role of the person living with dementia in care decisions. Previous
311 research into virtual reality simulations of dementia has found significant increases empathetic
312 understanding and knowledge (Doube & McGuire, 2016; Adelifa et al., 2016), symptoms

313 (Beville, 2002; Adelifa et al., 2016), inappropriate behaviour (Beville, 2002) and missed care
314 opportunities (Beville. 2002; Slater et al., 2019). The findings from this study show that
315 participation in the programme produced a significant improvement in understanding the
316 cognitive, emotional and behavioural aspects of dementia and how this translates into person-
317 centred care.

318

319 The impact of the intervention was reported across all participants irrespective of demographic
320 details, whether acute or community settings, age, educational background, whether had
321 previous training or not, and occupation. The findings also confirm the sustainability of change
322 in attitudes and beliefs 3-months after the intervention. Few studies into the impact of VR
323 provide quantitative evidence to show the sustainability of change over time.

324

325 A better understanding of the world of the person with dementia has a significant impact on
326 the care provided by **nurses and all health care professionals** (Jütten et al., 2017) and it is
327 essential, given the increase in the number of people living with dementia, that we look at new
328 and innovative methods to get a glimpse of this world. Cunningham (2006) described the world
329 of the person living with dementia as fragmented, confusing, challenging, unpredictable and
330 sometimes frightening and gaining access to this world that moves our understanding beyond
331 the physical deterioration of the body/brain is not addressed in many traditional methods of
332 education (Jütten et al., 2017). Jeffery (2016) reported that current traditional training methods
333 and subsequent practice fail to promote or display empathy; yet Ahrweiler et al (2014) reported
334 that individuals who are more empathetic were found to provide better care and increased
335 patient satisfaction and clinical outcomes. The rise in the use of VR technologies to allow
336 access into the ‘hidden world’ of people living with dementia and provides participants with a

337 safe and managed albeit brief exposure to their world – to walk in their shoes (Beville, 2002;
338 Adefilifa et al., 2016; Slater et al., 2019).

339

340 Limitations

341 The challenge to future research into the use of VR technologies is to provide demonstrative
342 evidence of tangible and longer-term impact of the intervention on care for the person with
343 dementia. To date the evidence on VR interventions have focused on attitudinal change
344 towards people with dementia (Beville, 2002; Adelifa et al., 2016; Doube & McGuire, 2016).
345 This is an encouraging starting position but, Slater et al. (2019) highlight that care occurs with
346 many competing demands (inadequate staff or time, resources etc) that may interfere with or
347 eventually diminish the translation of new attitudes into practice. Further research is required
348 to look at the facilitation and implementation of VR change in practice, embedded within a
349 structured programme in dementia care and not be seen as a standalone package (Egan and Pot
350 2016).

351

352 CONCLUSIONS

353 There is a clear need for new and innovative methods of training health professionals in
354 dementia awareness that moves beyond the physiological changes to include a better
355 empathetic understanding of the condition. Virtual reality technologies provide a temporary
356 and conditional insight into the world of dementia, but the insight can have a significant impact
357 on the individual's attitudes and beliefs for the better. This can impact on empathy for the
358 person with dementia and improve understanding of symptoms and behaviours.

359

360

361

362 **ACKNOWLEDGEMENTS**

363 We wish to acknowledge all health care professionals and carers who took part in this research.

364

365 **DECLARATIONS OF INTEREST**

366 The authors declared they have no competing interests.

367

368

369 **REFERENCE**

370 Adefila, A., Graham, S., Clouder, L., Bluteau, P., Ball, S. (2016). myShoes—the future of
371 experiential dementia training? *The Journal of Mental Health Training, Education and*
372 *Practice, 11(2)*, 91-101. doi.org/10.1108/JMHTEP-10-2015-0048.

373

374 Ahrweiler, F., Neumann, M., Goldblatt, H., Hahn, E. G., Scheffer, C. (2014). Determinants of
375 physician empathy during medical education: hypothetical conclusions from an exploratory
376 qualitative survey of practicing physicians. *BMC Medical Education, 14(1)*, 122.
377 doi.org/10.1186/1472-6920-14-122.

378

379 Beville, P. K. (2002). Virtual Dementia Tour© helps senditiz health care providers. *American*
380 *Journal of Alzheimer's Disease & Other Dementias®*, 17(3), 183-190.
381 doi.org/10.1177/153331750201700301.

382

383 Beville P.K. (2014). *Dementia Simulation: Methods and Systems for simulation of cognitive*
384 *decline*. National Nursing Home, Quality Improvement Campaign.
385 <https://www.nhqualitycampaign.org/files/DementiaSimulation.pdf> (Accessed 17th September
386 2020).

387

388 Cunningham, D.L. (2006). *Capturing candor: Accessing teachers' thinking about the*
389 *cultivation of historical empathy*. In *Research methods in social studies education:*
390 *Contemporary issues and perspectives*. Edited by Keith C. Barton, 183-206, Greenwich
391 Connecticut, Information Age.

392

393 Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAS*
394 *Catalog of Selected Documents in Psychology*, 10: 85.
395 https://www.uv.es/~friasnav/Davis_1980.pdf (accessed 16th September 2020).
396
397 Doube W., McGuire L. (2016). *Evaluating a Virtual Experience for Training Carers: Can*
398 *virtual reality technology engender empathetic understanding of the experience of dementia in*
399 *carers*. Swinburne University of Technology Conference Paper, Swinburne.
400
401 Egan, K.J., Pot, A.M. (2016). Encouraging innovation for assistive health technologies in
402 dementia: barriers, enablers and next steps to be taken. *Journal of the American Medical*
403 *Directors Association*, 17(4), pp.357-363.
404
405 Fagiano, M. (2019). Relational Empathy. *International Journal of Philosophical Studies*, 1-18.
406 doi: [10.1080/09672559.2019.1598086](https://doi.org/10.1080/09672559.2019.1598086)
407
408 Gilmartin-Thomas, J.F.M., McNeil, J., Powell, A., Malone, D.T., Wolfe, R., Larson, I.C.,
409 O'Reilly, C.L., Kirkpatrick, C.M., Kipen, E., Petrovich, T., Bell, J.S. (2018). Impact of a virtual
410 dementia experience on medical and pharmacy students' knowledge and attitudes toward
411 people with dementia: a controlled study. *Journal of Alzheimer's Disease*, 62(2), 867-876.
412
413 Gilmartin-Thomas, J.F, McNeil, J., Powell, A., Malone, D.T., Larson, I.C., O'Reilly, C.L.,
414 Kirkpatrick, C.M., Kipen, E., Petrovich, T., Ryan-Atwood, T.E., Bell J.S. (2020). Qualitative
415 evaluation of how a virtual dementia experience impacts medical and pharmacy students' self-
416 reported knowledge and attitudes towards people with dementia. *Dementia (London)*, 19(2),
417 205-220. doi: 10.1177/1471301218770270.

418 Han, A., Kim, T.H., Hong, H. (2019). Experiences of caregivers of people with dementia in a
419 Korean dementia simulation program. *Dementia (London)*, 9,1471301218823453. doi:
420 10.1177/1471301218823453.

421

422 Hattink, B.J., Meiland, F.J., Campman, C.A., Rietsema, J., Sitskoorn, M., Dröes, R.M. (2015).
423 Zelf dementie ervaren: Ontwikkeling en evaluatie van de Into D'mentia simulator
424 [Experiencing dementia: evaluation of Into D'mentia]. *Tijdschr Gerontol Geriatr*, 46(5), 262-
425 81.doi: 10.1007/s12439-015-0130-8. PMID: 25968906.

426

427 Hirt J., Beer, T. (2020). Use and impact of virtual reality simulation in dementia care education:
428 A scoping review. *Nurse Educ Today*, 84, 104207. doi: 10.1016/j.nedt.2019.104207.

429

430 Jeffery, D. (2016). Clarifying empathy: the first step to more humane clinical care. *Br J Gen*
431 *Pracy*, 66 (643), e143-e145.

432

433 Jütten, L. H., Mark, R. E., Janssen, B. W. J. M., Rietsema, J., Dröes, R. M., Sitskoorn, M. M.
434 (2017). Testing the effectivity of the mixed virtual reality training Into D'mentia for informal
435 caregivers of people with dementia: protocol for a longitudinal, quasi-experimental study. *BMJ*
436 *Open*, 7(8), e015702.

437

438 Kyaw, B.M., Saxena, N., Posadzki, P., Vseteckova, J., Nikolaou, C.K., George, P.P., Divakar,
439 U., Masiello, I., Kononowicz, A.A., Zary, N., Tudor Car L. (2019). Virtual Reality for Health
440 Professions Education: Systematic Review and Meta-Analysis by the Digital Health Education
441 Collaboration. *J Med Internet Res*, 22;21(1),e12959. doi: 10.2196/12959.

442

443 Radianti, J., Majchrzak, T.A., Fromm, J., Wohlgenannt, I. (2020). A systematic review of
444 immersive virtual reality applications for higher education: design elements, lessons learned
445 and research agenda. *Computers & Education*, 147, 103778.
446 doi.org/10.1016/j.compedu.2019.103778
447

448 Slater, P., Hasson, F., Gillen, P. (2017). *A research evaluation of an interactive training*
449 *experience: The virtual Dementia Tour (VDT)*. Nursing & Midwifery Planning &
450 Development, Ireland.
451

452 Slater, P., Hasson, F., Gillen, P., Gallen, A., Parlour, R. (2019). Virtual simulation training:
453 Imaged experience of dementia. *Int J of Older People Nurs*, 14(3), e12243. doi:
454 10.1111/opn.12243.
455

456 Slater, P.F., Hasson, F., Moore, K., Sharkey, F. (2020). The development of a tool to measure
457 empathetic understand, cognitions and behaviours of people living with dementia.
458 *International Journal of Older People Nursing*, in press.
459

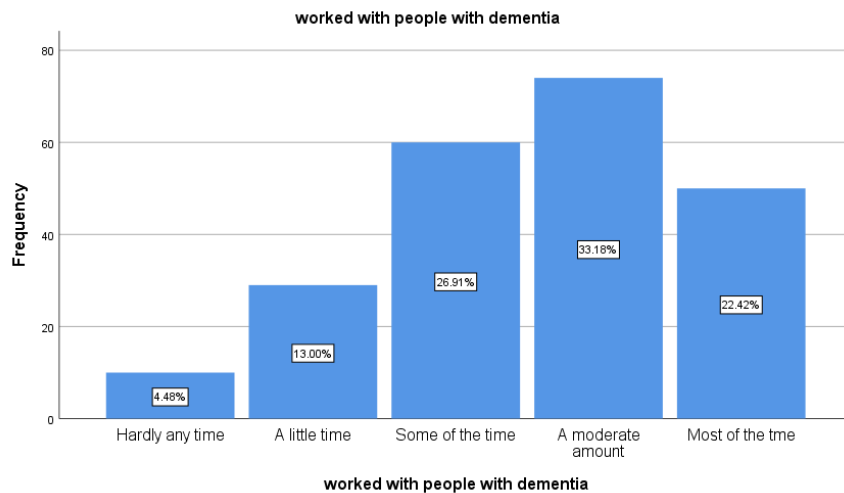
460 Sulzer, S. H., Feinstein, N. W., Wendland, C. L. (2016). Assessing empathy development in
461 medical education: a systematic review. *Medical Education*, 50(3), 300-310.
462

463 Wijma, E. M., Veerbeek, M. A., Prins, M., Pot, A. M., Willemse, B. M. (2018). A virtual reality
464 intervention to improve the understanding and empathy for people with dementia in informal
465 caregivers: results of a pilot study. *Aging & Mental Health*, 22(9), 1121-1129.
466

467 World Medical Association. (2001). World Medical Association Declaration of Helsinki.
468 Ethical principles for medical research involving human subjects. *Bulletin of the World Health*
469 *Organization*, 79(4), 373.
470

471 **Figure 1. Participants response to ‘How frequently do you work with people with**
472 **Dementia?’**

473



474

475

476

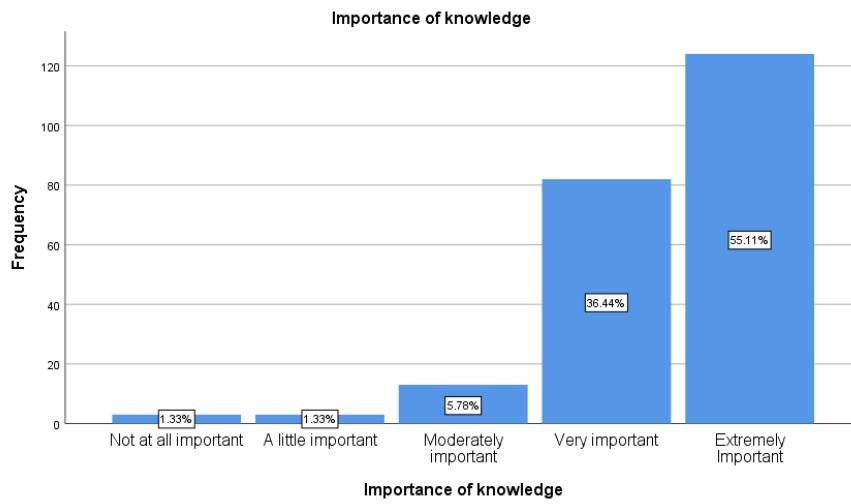
477

478

479

480 **Figure 2. Participants response to ‘How important is it for you to have a high level of**
481 **dementia knowledge to enable you to do your job well?’**

482



483

484

485

486

487

488

489

490

491 **Table 1. Demographic profile of attendees**

Gender		Age		Education	
Female	91.5 (205)	18-24	8.4 (19)	Degree	42.5 (88)
Male	8.5 (19)	25-34	20.0 (45)	Diploma	25.6 (53)
		35-44	21.8 (49)	Masters and higher	5.8 (12)
		45-54	27.6 (62)	Other	26.1 (54)
Setting		55-64	17.8 (40)	Previous Training	
Hospital	25.0 (53)	65+	4.4 (10)	Yes	31.0 (70)
Community	70.3 (149)			No	69.0 (156)
Voluntary	4.7 (10)				

492

493

494

495

496 **Table 2. Frequency scores of ‘Assessments of Prior Training’**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean (SD)
My previous training lets me know what the physical symptoms of dementia are.	3.9 (9)	10.2 (23)	23.0 (52)	52.2 (118)	10.6 (24)	3.55 (0.95)
My previous training lets me know what the emotional symptoms of dementia are.	3.1 (7)	11.6 (26)	26.2 (59)	50.7 (114)	8.4 (19)	3.50 (0.92)
My previous training lets me know how dementia effects the mind-set of the person.	3.1 (7)	12.9 (29)	25.9 (58)	49.1 (110)	8.9 (20)	3.48 (.94)
My previous training lets me know how dementia effects the thinking of the person.	3.6 (8)	17.0 (38)	29.0 (65)	42.4 (95)	8.0 (18)	3.34 (.97)

497

498

499

500

501

502

503

504 **Table 3. Measures of Distribution for 15 Items in the intervention Questionnaire (****
505 **indicates statistical significance P<0.01)**
506 **Comparison of Pre (T1) and post (T2) and 3-month (T3) intervention scores on items**

		Mean	SD	Skewness	Kurtosis
I am able see things through the eyes of the person with dementia	<i>T1</i>	2.70	1.07	-0.35	-0.42
	<i>T2</i>	4.29**	.86	-1.75	3.85
	<i>T3</i>	4.29	.87	-1.43	2.29
I am able to ‘stand in the shoes’ of the person with dementia.	<i>T1</i>	2.57	1.05	.47	.21
	<i>T2</i>	4.11**	.99	.16	1.26
	<i>T3</i>	4.15	.98	-1.66	3.20
I feel I can understand what it’s like to live with dementia.	<i>T1</i>	2.74	1.04	.18	-0.68
	<i>T2</i>	4.14**	.97	-1.33	1.69
	<i>T3</i>	4.27	.83	-1.73	4.59
I understand how dementia impacts on the person’s thinking.	<i>T1</i>	3.08	1.01	-0.33	-0.68
	<i>T2</i>	4.23**	0.87	-1.57	3.27
	<i>T3</i>	4.40	.87	-2.26	6.51
I understand how dementia impacts on the person’s emotions.	<i>T1</i>	3.17	.96	-0.37	-0.59
	<i>T2</i>	4.29**	0.84	-1.60	3.50
	<i>T3</i>	4.40	0.82	-1.98	5.70
I feel I can empathise with the emotional position of the person with dementia.	<i>T1</i>	3.39	.96	-0.67	.14
	<i>T2</i>	4.35**	.84	-1.82	4.46
	<i>T3</i>	4.50	.83	-2.35	6.70

I feel I understand what it's like to think like a person with dementia.	<i>T1</i>	2.63	1.0	.18	-.66
	<i>T2</i>	4.04**	0.97	-1.15	1.19
	<i>T3</i>	4.04	1.01	-1.32	1.94
I understand how dementia can lead to aggressive behaviour in people with dementia.	<i>T1</i>	3.66	.81	-1.22	1.68
	<i>T2</i>	4.57**	0.66	-2.21	7.80
	<i>T3</i>	4.77	.45	-1.68	1.84
I understand how dementia can lead to agitation in people with dementia	<i>T1</i>	3.78	.74	-1.10	1.92
	<i>T2</i>	4.68**	.53	-2.11	8.91
	<i>T3</i>	4.80	.40	-1.57	0.47
I understand the reasons people with dementia behave as they do.	<i>T1</i>	3.49	.85	-.73	-.01
	<i>T2</i>	4.48**	.72	-1.97	6.29
	<i>T3</i>	4.72	0.50	-1.58	1.63
I understand how dementia impacts on the person's physical behaviour.	<i>T1</i>	3.40	.92	-.56	-.19
	<i>T2</i>	4.45**	.69	-1.62	4.76
	<i>T3</i>	4.68	.50	-1.10	-0.7
Empathy is important for me to organise the effective care of a person with dementia.	<i>T1</i>	4.32	.79	-1.79	5.25
	<i>T2</i>	4.78**	.43	-1.55	.91
	<i>T3</i>	4.91	.32	-4.09	17.72
I need to consider the person's emotions in order to provide effective care for a person with dementia.	<i>T1</i>	4.31	.85	-1.83	4.57
	<i>T2</i>	4.78**	.50	-3.13	15.0
	<i>T3</i>	4.89	0.35	-3.38	11.83

In order to ensure effective care, I involve the person with dementia in care decisions.	<i>T1</i>	4.15	.87	-1.24	2.27
	<i>T2</i>	4.57**	.71	-2.05	5.57
	<i>T3</i>	4.67	.52	-1.24	0.57
I ask a significant other/family member about a person with dementia's emotional wellbeing in order to organise effective care.	<i>T1</i>	4.12	.94	-1.29	1.81
	<i>T2</i>	4.59**	.58	-1.28	1.37
	<i>T3</i>	4.67	.59	-1.63	1.64

507

508

509 **Table 4. Construct scores for the constructs across the various time points**

Construct Definition	Mean	SD	Skew	Kurtosis
Training in Dementia care: How well previous training has provided participants with a strong evidence base of the physical, emotional wellbeing impacts on the mind-set and thinking of the person with dementia.	3.47	.82	-.64	0.91
	---	---	---	---
Empathetic understanding of the impact of Dementia: The ability for participants to empathically understand and interpret the impact of changes caused by dementia on a person’s emotions and thinking patterns.	2.79	.73	.01	-.24
	4.19	.93	-1.52	3.57
	4.28	.77	-1.90	4.65
Understanding of Behavioural impact of Dementia: Understanding of the impact of emotional and cognitive changes caused by dementia translated into behaviours such as agitation, aggression etc.	3.65	.69	.85	1.12
	4.61	.56	-1.95	7.59
	4.74	.40	-1.30	0.7
The Role of the Person in Care Decisions: The role of taking a holistic perspective to people with dementia and empathetic understanding in the provision of effective care.	4.35	.76	-1.68	4.54
	4.74	.43	-1.31	0.91
	4.78	.32	-1.95	3.90

510