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RESEARCH ARTICLE

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"Walking in Their Shoes": The effects of an immersive digital story intervention on empathy in nursing students

Juping Yu | Gareth S Parsons | Deborah Lancastle | Emma T Tonkin | Siva Ganesh

Faculty of Life Sciences and Education, University of South Wales, Pontypridd, UK

Correspondence
Juping Yu, Faculty of Life Sciences and Education, University of South Wales, Pontypridd, Mid Glamorgan, CF37 1DL, UK.
Email: juping.yu@southwales.ac.uk

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Abstract

Aim: To evaluate the effects of a novel, immersive digital story intervention on empathy.

Design: A randomized trial with three phases.

Results: A total of 238 2nd year nursing students were recruited between May 2018 and December 2019. At baseline, no significant differences in empathy between the groups were found ($p = .760$). However, at post-test, empathy was significantly higher in the intervention group (M: 118.76, *SD*: 10.65) than it was in the control group (M: 114.60, *SD*: 15.40) ($p = .012$). At follow-up, there were no significant differences in empathy between the groups ($p = .364$).

Conclusion: The intervention resulted in an immediate increase in empathy in nursing students. However, further development of effective intervention delivery modes and fundamental redesign of the intervention itself would be needed to sustain this improvement over the long term.

KEYWORDS

"Walking in Their Shoes", digital stories, empathy, nursing education, nursing students, patient stories, simulation

1 | INTRODUCTION

Empathy is a specific concept acknowledged in undergraduate nursing curriculum in many countries, such as the United Kingdom (UK), and helping behaviors driven by empathy are enshrined in The Code (NMC 2018). Despite the recognition of its importance, serious failings in patient care in the last decade were reported in countries, such as the UK and Australia, where care was found to be delivered with a lack of empathy, compassion, and dignity, and an increase in abuse and neglect (Andrews & Butler, 2014; Beattie, 2015; Francis, 2013).

Health and care policies in many countries have called for the establishment of a culture of compassionate care, highlighting the importance of nurturing qualities such as empathy and compassion among health and care staff to promote dignified, safe, person-centered and compassionate care (Francis, 2013; Welsh Government, 2013a,2013b, 2015). Health professional education has a significant role to play in ensuring that students are trained in ways that maximizes the likelihood that this vision is delivered. The aim of this study was to determine the effects of the "Walking in Their Shoes," immersive digital story intervention on empathy in nursing students. The intervention was based on the principles of the Theory of Mind model. According to this model, being able to infer what somebody else is thinking or feeling is critically important in helping one to predict that person's response (e.g. Baron-Cohen et al., 1985). The lack of an empathic response to another person may be due to problems with imagining and valuing another person's thoughts and feelings (Dvash & Shamay-Tsoory, 2014). In a medical

context, being able to imagine and appreciate what a patient may be thinking and feeling and hence how they might respond to a health challenge can therefore be an important factor affecting the likelihood that a health professional will act in a responsive way to the patient's needs.

Empathy is a complex psychological construct that is seen as both a process and a concept (Alligood, 2005; Morse et al., 1992). There is an ongoing debate in the literature about its definition and precise meaning, which adds to the problem of studying this phenomenon (Cuff et al., 2016).

In the context of counseling psychology, the concept was defined by Rogers (1957, p. 99) as an ability "to sense the client's private world as if it were your own, but without ever losing the 'as if' quality." In psychological therapies and psychotherapy, empathy is regarded as one of the "common factors" (Wampold, 2015). Such factors, to some extent, rely on therapists' intuition and are important therapeutic elements in contrast to therapy distinct "specific factors" and extra-therapeutic "contextual factors" (Nienhuis et al. 2018). In a meta-analytic review, Nienhuis et al. (2018) found a moderate relationship between therapeutic alliance and perceptions of therapist empathy. The Improving Access to Psychological Therapies (IAPT) program began in 2008 in England, UK, providing evidence-based psychological therapies to people with mental ill-health such as anxiety and depression (NHS England, 2020). It is recommended that IAPT training should focus on therapeutic principles of common factors such as warmth, empathy, hope and alliance rather than on specific techniques (Wampold, 2015). In a qualitative study, Omylinska-Thurston et al., (2019) found that negative perception of therapists, including limited empathy, might have contributed to the high dropout rate in IAPT in England, highlighting the need for increased empathy training in therapy courses to help therapists to better understand and respond to clients' needs. Although this evidence relates to training and practice in mental health practitioners, ensuring that nursing students cross all fields are similarly trained to recognize, understand, and respond to their patients' needs and concerns appropriately is important to their current education and future practice. Caring as a concept is extensively cited in the literature as a core value in nursing education and nursing practice, while the attitude and action of "empathy" are an important means by which this caring is expressed (Brown, 2011; Doyle et al., 2014).

Morse et al. (1992) identified four key dimensions of empathy: emotive (the ability to subjectively experience and share in another's psychological states or intrinsic feelings), moral (an internal altruistic drive that motivates the practice of empathy), cognitive (the intellectual ability to identify and understand others' perspectives and predict their thoughts) and behavioral (the ability to communicate empathetic understanding and concerns) components. Although others agree with some of these perceptions, it has been argued that empathy does not necessarily lead to behavioral outcomes (Cuff et al., 2016). Instead, it has been suggested that empathy is a motivator for helping behaviors, but that any such behaviors may be mediated by competing situational or other factors, such as threats to self or distractions to attention or ongoing stress (Cuff et al., 2016; Duarte et al., 2016).

In the context of patient care, empathy is often regarded as a multi-dimensional cycle, involving health professionals' ability to understand the patient, to convey their empathetic understanding, to check the patient's awareness of such understanding and to act on that understanding with the patient (Barrett-Lennard, 1981; Mercer et al., 2004). Thus, in the context of nurse–patient relationships, empathic behavior is equated to good nursing practice that produces beneficial outcomes for patients (Teófilo et al., 2019). Empathy is also considered as an underpinning condition for compassion and patient-centered care to take place (Teófilo et al., 2019). Higher empathy in health professionals has been found to be associated with improved patient satisfaction, patient compliance, and physiological and psychological indicators of health (Del Canale et al., 2012; Hojat et al., 2011; Olson & Hanchett, 1997). Ward et al., (2012) also highlight the importance of an empathic relationship between health professionals and patients in patient experience and patient outcomes.

There is mixed evidence about whether empathy increases (Sheehan et al., 2013) or declines (Nunes et al., 2011; Ward , 2012) in undergraduate students from nursing and other health disciplines over the course of their studies. Although this inconsistency may reflect the difficulty and inherent complexity in measuring this subjective, multi-dimensional, and intangible construct, the development of effective interventions to foster empathy in nursing students is an important matter (Yu & Kirk, 2008, 2009). As empathy is an elusive phenomenon, it is difficult and challenging to find ways to teach it effectively. A number of training programs are available to enhance empathy in nursing students, some of which were delivered as an integrated part of nursing curricula (Briggs et al., 2012; Chaffin & Adams, 2013; Chen et al., 2015; Lobchuk et al., 2018; Richardson et al., 2015). However, the evidence for the benefits of these programs is equivocal. Whereas some evidence demonstrates their effectiveness (Kazanowski et al., 2007; Ozcan et al., 2011), other studies shed doubt on their benefits (e.g. Beddoe & Murphy, 2004; Mete, 2007; Webster, 2010). The lack of consistent evidence demonstrating that empathy is being taught and measured effectively in nursing and other health students is concerning, given the undoubted importance of empathy in their ongoing practice.

Simulation is becoming increasingly popular in healthcare training to help students develop various competencies and skills essential in clinical care (Chaffin & Adams, 2013; Teherani & O'Sullivan, 2008; Williams et al., 2013). For example, in a US study of 58 nursing students, Chen et al. (2015) found a positive impact of a 3-hr ageing simulation game on empathy of participants, but as a control group was not used in the study, it cannot be determined whether changes in empathy were due to the intervention rather than extraneous factors such as the passage of time. Similarly, in a US study of 67 mental health nursing students, Chaffin and Adams (2013) evaluated the use of a hearing voices simulation to increase students' empathy towards patients with

auditory hallucinations. Participants' empathy sores were significantly improved following the simulation. Participants valued the experience highly and reported more understanding, empathy and patience with patients. However, there was neither a control group, nor information about the scale used to measure empathy, so it is not known whether empathy was assessed using a reliable and valid measure. In another US study of nursing students, Ward (2016) explored the effects of a simulation on empathy using actors to play a mother/grandmother of a sick child. An increase in empathy was found in participants in one nursing program, but not the other. None of these studies assessed whether the increases post-intervention were sustained over time, which is important given that greater empathy in future nursing practice should be the purpose of empathy interventions involving nursing students.

The current study aimed to extend the knowledge base about the short- and long-term benefits of an immersive digital story intervention on empathy in a clinical simulation setting. If simulation is to be incorporated in nursing education as an effective adjunct to clinical experience, it must contribute to the development of essential nursing attributes, such as empathy. To our knowledge, this is the first UK-based experiment assessing the effects of an immersive clinical simulation intervention on empathy among nursing students.

2 | METHODS

2.1 | Design and setting

The aim of this study was to explore the effects of the "Walking in Their Shoes" (WITS), immersive digital story intervention in a clinical simulation setting on empathy in nursing students. The CONSORT-SPI guidelines for reporting randomized trials of social and psychological interventions in line with the recommendations of (Montgomery et al., 2018) were adopted. A cluster randomized controlled trial was conducted with three phases. The intervention cluster received the WITS intervention as described below, after the usual lecture about empathy provided on this module. The control cluster received the same lecture (only). Both the intervention and control clusters received the lecture at the same time to avoid differences in lecture presentation affecting the control clusters' experience.

- Phase 1: baseline assessment 1–2 weeks prior to the intervention and randomization to the intervention or control arm of the study.
- Phase 2: implementation of the WITS intervention and the lecture about empathy followed by post-test assessment immediately after the intervention
- Phase 3: follow-up assessment 8–12 weeks post-intervention

The study took place at the University of South Wales in the UK between May 2018 and December 2019.

2.2 | Participants and recruitment

A convenience sample of second-year Bachelor of Nursing (Adult) students attending the "Acute and continuing care needs of adult clients and their families" module was recruited. All students attending the module were eligible. Students not in the second-year of the university's adult nursing program were excluded from the study. Three cohorts of full-time students and two cohorts of part-time students were recruited. The study information sheet was distributed to potential participants in advance via the university's virtual learning environment. Hard copies of the information pack consisting of an information sheet, consent form, and pre-test questionnaires were provided in the classroom on the day for pre-test data collection.

All students who turned up were invited to participate. 4.8% (n = 12) declined to participate but still completed the lecture and the intervention. The module leader randomly assigned students' usual study skills groups (22 study skills groups in total) into intervention or control clusters by flipping a coin. An equal number of intervention and control clusters were created, and students remained in the same cluster for the whole study. Allocation concealment was not possible.

2.3 | Intervention

The WITS intervention is an immersive digital story intervention we developed for a teaching and learning environment in simulation, using a story from a real patient with bowel cancer. The intervention offers a compelling immersive experience of being in a simulated hospital environment to enable people to discover and explore the patient's experience themselves and to imagine what the patient thought and how she might be feeling during that experience. An immersive experience is an illusory environment that surrounds a person such that the person feels that he or she is inside it and part of it. The term is associated with technology environments that command the senses such as virtual reality and mixed/augmented reality. The basic principles of storytelling (enhancing understanding and connecting to audience), digital and other advanced technologies were used together to enhance the immersive experience.

In the story, the patient recounted her journey and experiences of being in hospital for cancer treatments, her feelings about the hospital surroundings and her interactions with health professionals. The story was audio recorded. Nine digital clips (some with still images) were generated from the story. Each clip has a unique web address (URL) that is linked to a unique Quick Response (QR) code, a type of bar-code that can be read using smartphone technology. Clips were organized to follow the patient's journey in a chronological order as she recounted it. Each clip with a brief description and its corresponding QR code was displayed on an A4 board in one of nine locations around the university's Clinical Simulation Suite. The clips were displayed in locations, which best

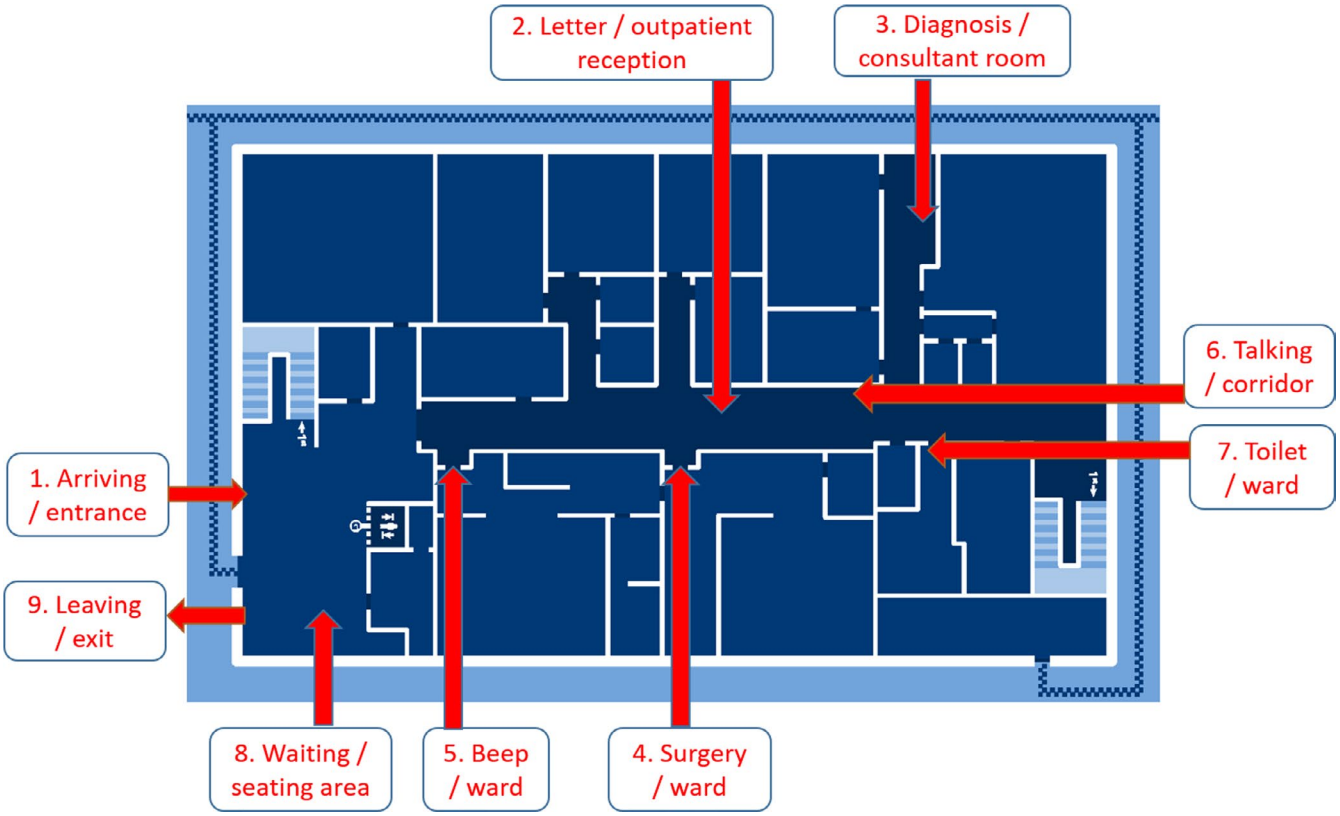

FIGURE 1 The "Story Walk" map

represented the story in that clip. A map (Figure 1) for a physical "Story Walk" was created for participants to immerse themselves in the patient's stories while "Walking in Their Shoes" around the physical environment. The walk was completed in about 30 min in this suite.

Students commenced the intervention in small groups of 5–6 at 10-min intervals to avoid congestion in the suite. A student in each group volunteered to lead the group and received a copy of the map and instructions. Participants followed a designated route accessing the story clips by scanning QR codes using their smart phones and listening on headphones. Two team members were available to direct participants and to answer any queries.

2.4 | Data collection

Data were collected three times: pre-test (T_0), post-test (T_1) and follow-up (T_2). An overview of the data collection process is presented in Figure 2.

The primary outcome was participants' empathy scores. Empathy was measured using the Jefferson Scale of Empathy (JSE)—Health Professional version. This is a validated instrument to measure the cognitive attribute of empathy in the context of patient care. The scale was originally developed based on an extensive literature review on empathy to measure medical students' attitudes towards empathy (Hojat et al., 2001). There are 20 items, 10 of which are phrased negatively and then reverse scored. Each item is answered on a 7-point Likert-type scale (strongly agree = 7, strongly disagree = 1). The total score ranges from 20 to 140, with a higher score indicating a higher level of empathy.

Additional demographic and background information (age, gender, ethnicity and clinical experience) was collected. Participants completed the questionnaires in their usual classroom or in the Clinical Simulation Suite.

2.5 | Statistical analysis

R software version 3.6.3 (R Core Team, 2020) was used for data analysis. Descriptive statistics including means, frequencies and percentages were calculated to show the distribution of demographic information, care experience and empathy levels. Inferential statistics were carried out as follows.

2.5.1 | Mixed between-within units analysis of variance (ANOVA) on empathy scores

This analysis was used to establish whether receiving the WITS immersive digital story intervention combined with the empathy lecture had a significant impact on empathy over time, compared to receiving the lecture alone. There was one repeated-measure or within-participants factor (Time: T_0, T_1 and T_2) and one between-participants factor (Group: Intervention and control).

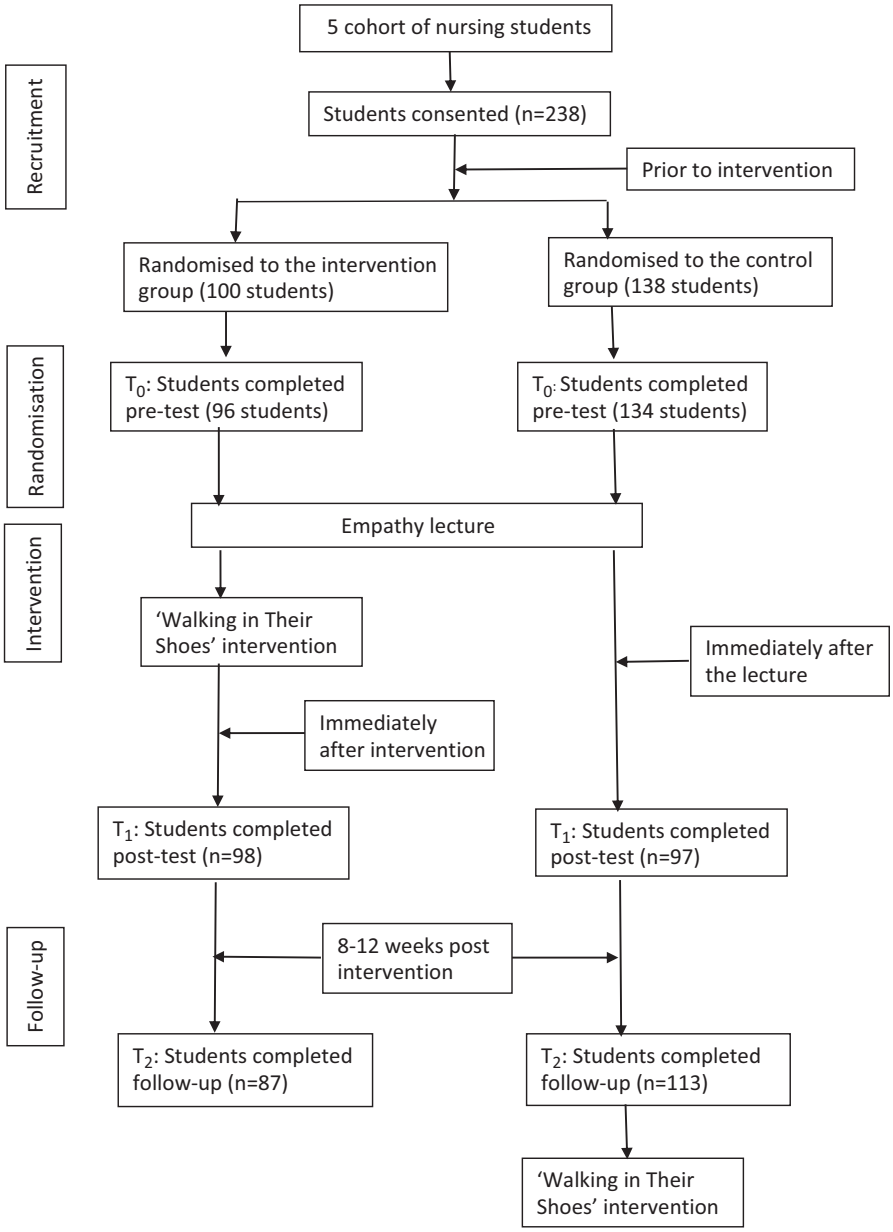

FIGURE 2 Flow chart of procedures and data collection

Participants (in cohorts) were treated as genuine replications, and "linear mixed effects models with REML framework" were used with participants' ID numbers (in cohorts) as random effects to capture appropriate structure for ANOVA.

2.5.2 | Transformations and permutation tests

When analyzing raw data, if "ANOVA assumptions" are not satisfactory, the alternative is to base the inference on the "transformed data" or use resampling methods such as the "permutation tests" (also known as "randomization tests").

In this study, the dependent variable (empathy scores) did not fully satisfy the basic assumptions for ANOVA, especially in terms of the normality of the data. Furthermore, the usual transformations (e.g. square root, log etc.) did not provide satisfactory improvement. As a result, permutation tests (with 5,000 randomizations) were performed. The resulting significance of the various effects was very similar to those of the ANOVA using the raw data, thus these later results were retained.

2.5.3 | Post hoc multiple comparison tests or "pairwise treatment comparisons"

When the interaction and/or main effects in the ANOVA were significant, the nature of this significance was explored using pairwise comparisons of the means of the repeated-measure factor and the experimental factor. As our data were "unbalanced" due to missing values (i.e. not all group and repeated-time combinations had the same number of observations), means and standard errors are presented using the well-known "least squares" estimated/predicted values (Lenth, 2016).

TABLE 1 Characteristics of the participants at baseline

Variables	Grouping	Control group *n* (%)	Intervention group *n* (%)	Total *n* (/%)
Age (years)	<21	21 (15.2)	12 (12.0)	33 (14.2)
	21–30	65 (47.1)	42 (42.0)	107 (45.9)
	31–40	28 (20.3)	30 (30.0)	58 (24.9)
	41–60	22 (15.9)	13 (13.0)	35 (15.0)
Gender	Male	14 (10.1)	5 (5.0)	19 (8.0)
	Female	124 (89.9)	95 (95.0)	219 (92.0)
Ethnicity	White*	125 (92.6)	88 (92.6)	213 (92.6)
	Other	10 (7.4)	7 (7.4)	17 (7.4)
Previous care experience	Yes	88 (65.2)	74 (77.9)	162 (70.4)
	No	47 (34.8)	21 (22.1)	68 (29.6)
Current care experience	Yes	101 (74.8)	75 (78.9)	176 (76.5)
	No	34 (25.2)	20 (21.1)	54 (23.5)

*White Welsh/English/Scottish/Northern Irish/British.

2.6 | Ethical considerations

The study was reviewed and approved by the Faculty of Life Sciences and Education Research Ethics Committee at the University of South Wales, UK (Reference number: 18JY0401LR). General ethical principles as set in the UK policy framework for health and social care research were followed (Health Research Authority, 2018).

An information sheet with detailed information about the project and the nature of participation was distributed to potential participants. Participants had the opportunity to raise any question about the study and were informed of their right to withdraw from the study, without consequence to their studies. Written informed consent was sought from students who were willing to participate in the study.

The intervention was part of a scheduled teaching and learning activity, but participation was voluntary. Students who chose not to participate in the study still received the lecture and the intervention, and therefore, they were not disadvantaged. Participants in the control group undertook the intervention once the follow-up data collection was completed to ensure that all students had the same learning experience.

Participants were assured that any data they provided would not become part of their academic record, and their academic grades were not affected by their participation. Participants were informed that all data would remain unidentifiable and confidential, and reported in aggregated group statistics.

2.7 | Validity and reliability

The JSE used in this study had acceptable validity and reliability as reported in its original study, which were demonstrated by construct validity (factor analysis and gender comparison), convergent and discriminant validity, and internal consistency with Cronbach's alpha coefficient of 0.81 (Hojat et al., 2001). Since its original development, evidence of the psychometrics of JSE has been reported in nursing students worldwide, including the USA (Ward et al., 2009), Italy (Montanari et al., 2015), Spain (Diaz et al., 2019) and Taiwan (Hsiao et al., 2013), and in medical students or physicians in the USA (Hojat et al., 2018), Malaysia (Spasenoska et al., 2016), China (Wen et al., 2013), Iran (Shanriat et al., 2010), and Italy (Di Lillo et al., 2009). In a recent systematic review of psychometric assessment of the scale, Williams and Beovich (2019) conclude that the scale has demonstrated robust structural validity, convergent validity, and internal consistency.

3 | RESULTS

3.1 | Baseline characteristics of participants

As illustrated in Figure 2, 238 students took part and these 238 cases were used in all data analysis. Of these, 230 (96.6%) completed the pre-test (T_0) questionnaires, 195 (81.9%) completed the post-test (T_1) questionnaires; 200 (84.3%) completed the follow-up (T_2) questionnaires; and 171 participants completed all three administrations of the questionnaires. The baseline characteristics of the participants are presented in Table 1. The largest proportion of consented participants were aged between 21 and 30 (n = 107, 45.0%); 219 participants (92.0%) were female; 213 participants (89.5%) were White Welsh/English/Scottish/Northern Irish/British.

Of the consented participants, 162 (70.4%) had had previous experience of providing care in health and/or social care sectors before beginning their nursing training, and 176 76.5%) currently had such experience in addition to the clinical placements provided by the course.

At baseline, the mean empathy score was 111.97 (SD = 13.45) for participants in the control group, and 112.13 (SD = 11.33) for participants in the intervention group (Table 2). There was no significant difference in empathy between the intervention group and

TABLE 2 Participants' empathy scores by group

Group	Test	Mean	*SD*	Min	Max	Number
Control group	T_0	111.97	13.45	39	140	134
	T_1	114.60	15.40	42	137	97
	T_2	113.66	13.82	65	140	113
Intervention group	T_0	112.13	11.33	87	137	96
	T_1	118.76	10.65	83	140	98
	T_2	114.83	13.79	76	140	87

T_0: pre-test; T_1: post-test; T_1: follow-up.

TABLE 3 Pairwise comparisons (associated with the interaction effect between Test and Group)

Test	Difference	Estimate	SE	*df*	*t* ratio	*p* value	95% CI
T_1	Control -Intervention	−4.68	1.85	232	−2.5263	.0122	−8.33, −1.03
T_2	Control -Intervention	−1.68	1.85	232	−.9096	.3640	−5.32, 1.96

T_0: pre-test; T_1: post-test; T_1: follow-up.

the control group. The estimated mean difference between the two groups was 0.54 (95% CI: −2.94–4.02, $p = .760$).

About the reliability of JSE for this study, the Cronbach's alpha coefficients were good: 0.802 for pre-test, 0.838 for post-test and 0.845 for follow-up.

3.2 | The effects of the intervention on empathy

A repeated measures analysis via mixed ANOVA model was carried out to examine the significance of the overall effects of Group and Time, and the interaction between Group and Time, on the empathy scores.

There was weak evidence for a significant **interaction** between Groups and Time [$F(2, 383) = 2.603$, $p = .075$], and also weak evidence for a significant overall effect of **Groups** [$F(1, 236) = 3.067$, $p = .081$]. However, the analysis showed that there was strong evidence for a significant effect of **Time** on empathy [$F(2, 383) = 11.504$, $p < .001$].

Next, we considered the post hoc multiple comparison tests, associated with the repeated measures analysis via the mixed ANOVA. Table 2 shows the means and standard deviations of participants' empathy scores at each test. Results from pairwise comparisons are shown in Table 3.

3.3 | Post-test results

At post-test, the mean empathy score was 114.60 (*SD* = 15.40) for participants in the control group and 118.76 (*SD* = 10.65) for participants in the intervention group. Empathy was significantly higher in the intervention group than it was in the control group. The estimated difference between the two groups was 4.68 (95% CI: 1.03–8.33, $p = .012$).

3.4 | Follow-up results

At follow-up, the mean empathy score was 113.66 (*SD* = 13.82) for participants in the control group, and 114.83 (*SD* = 13.79) for participants in the intervention group, and no significant difference was found between the intervention and control groups (1.68, 95% CI: −1.96–5.32, $p = .364$).

4 | DISCUSSION

To our knowledge, this was the first study that used a randomized trial design to test the effects of an immersive digital story intervention on empathy in a simulated clinical environment. The lecture plus immersive intervention produced an immediate increase in empathy compared to a lecture alone, although this increase was not sustained.

As expected, at post-test, empathy was significantly higher in the intervention group than it was in the control group. These findings are consistent with what are reported in previous studies showing the improvement in empathy of nursing students post-interventions using simulation (Chaffin & Adams, 2013; Chen et al., 2015; Haley et al., 2017). However, we found that the increased empathy scores of participants in the intervention group returned to the original level, with a reduction of 5.29 scale points from post-test to follow-up. These findings are similar to those reported in some previous studies, where healthcare students' empathy returned to the pre-test level when participants were followed up from a week to a year later (Daniels et al., 1988; Evans et al., 1998; Van Winkle et al., 2012). As the intervention had additional immediate benefits over a lecture about empathy alone, it indicates that our "Walking in Their Shoes" immersive intervention could be used by nurse educators to contribute to the impact of existing methods of educating nursing students about empathy. However, as these benefits were

not sustained over time, further design and development of our intervention are required to sustain improvements over time and into future nursing practice.

Our findings contribute to the literature demonstrating equivocal effects of empathy training on empathy. Some researchers demonstrate immediate and un-sustained impacts of empathy interventions, some shed doubt on the effects of empathy training programs (Beddoe & Murphy, 2004; Palsson et al., 1996; Webster, 2010), whereas others demonstrate sustained effects of training on empathy (Briggs et al., 2012; Haley et al., 2017; Hojat et al., 2013). However, it is difficult to make direct comparison across studies due to differences in samples, research designs, measurement tools used to assess empathy, and the content and length of training. Moreover, the quality of studies in this area is generally questionable. Whereas our study included a relatively large sample size ($N = 238$), a validated measure and an appropriate control group, other studies used a sample size from as small as 16 (Beddoe & Murphy, 2004), used unvalidated scales to assess empathy, or applied a pre–post-test design without a control group (e.g. Beddoe & Murphy, 2004; Chaffin & Adams, 2013; Chen et al., 2015). Overall, the equivocal evidence around the value of interventions to increase empathy suggests that more endeavor is required to develop interventions in a way that means an initial improvement in empathy following an intervention could be sustained over the longer term.

4.1 | Strengths and limitations

Developing an empathy-focussed intervention and measuring the effects of such an intervention is challenging. One strength of our study is that we developed an innovative, immersive intervention using a digital patient story. Another strength is that the intervention was embedded in a clinical simulation suite. As it is challenging to incorporate the intervention in a real clinical environment, the use of our simulation suite overcame this issue and provided students with a safe environment to develop empathy from a patient's experience. The application of simulation technology in education to promote empathy tends to focus on the use of actors and actresses to create a simulated scenario to portray an encounter between patients and health professionals (Haley et al., 2017; Ward, 2016). Although some positive effects have been reported in such studies, the authenticity of the scenarios is questionable. Our study showed that the authentic story from a real patient produced an immediate increase in empathy of nursing students. In the future, gathering such stories might promote greater patient engagement in health services by giving them a voice to be heard and an opportunity to be involved in education initiatives, offering a platform for health professionals in-practice or in-training to "walk in their patients' shoes." Other strengths included the use of a randomized controlled design and the use of a valid instrument (JSE) to measure empathy.

There are three main limitations. We used a convenience sample with participants from adult field of nursing in a single university, limiting the generalizability of our findings to nursing students in other fields and in other universities in the UK or elsewhere. Male participants (5%) were under-represented, which reflects the demography of the nursing profession, but prevented us from exploring gender differences in empathy. Similar to other longitudinal studies, of participants who completed the baseline data, some did not complete the post-test or the follow-up. Despite these limitations, some implications can be drawn from our findings.

4.2 | Implications

In line with other studies, we only found immediate increases in nursing students' empathy by integrating our intervention to the nursing curriculum in our university (e.g. Evans et al., 1998; Van Winkle et al., 2012). Importantly, the fact that the study failed to demonstrate any long-term effect of the intervention indicates the need for develop or fundamentally redesign the intervention itself. In order that increased empathy would benefit patients in future nursing practice, it is important to consider ways that ensure a sustained benefit on nursing students' empathetic practice into the future. For example, our intervention was developed based on a single patient's experience of cancer treatment. A learning resource with stories from a range of patients with various conditions and more diversified experiences, which nurse educators could use in their teaching, would be helpful.

The deployment of reinforcement strategies such as those illustrated in Hojat et al. (2013) may help to make the effects last longer. In a two-phase study of medical students, Hojat et al. (2013) explored whether and how empathy could be sustained. In phase one, participants in the intervention group received 1-hr video clips from various films. In phase 2, 10 weeks after the phase 1, half of the participants in the intervention group were allocated to the reinforced group where they took part in activities including a lecture, a slide presentation about the importance of empathy in patient care and classroom discussions. It was found empathy improvement in the reinforced group was sustained successfully. As in phase 2, pre-test data were not collected and post-test data were collected immediately after the reinforced activities, it is not clear whether the effects observed were due to activities in phase 2 or the original intervention in phase 1. However, reinforcement strategies are worth considering in future interventions.

Our intervention was a one-off activity. Although an empathy lecture was delivered to all students before the intervention, classroom discussions were not undertaken following either the lecture or the intervention. An educational assessment or critical reflection could perhaps be added at a later point after the story walk, perhaps focussing on how nurses could be mindful of patients in similar circumstances to those described in each clip, and what they would say or do to help the patient. This could present a valuable opportunity to reflect on and express the thoughts and feelings the intervention had stimulated and may enhance and help to sustain intervention effects on empathy.

5 | CONCLUSION

This is the first empirical study of its kind, in which a validated empathy measure was used to evaluate the effect of an immersive digital story intervention in a clinical simulation environment to enhance empathy of nursing students. The results demonstrate that the intervention causes an immediate increase in empathy in nursing students, which is encouraging. Developing the intervention so that such an increase is sustained over time and into clinical practice is important. This study can serve as an initial step for researchers to restrengthen their empathy interventions and develop more effective intervention delivery modes to enhance and sustain empathy of health professionals in-training and in-practice over the long term.

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AUTHORS' CONTRIBUTIONS

Juping Yu, Gareth S Parsons, Deborah Lancastle and Emma T Tonkin involved in contributions to concept and design and data collection. Siva Ganesh, Juping Yu, Gareth S Parsons, Deborah Lancastle and Emma T Tonkin involved in revising the manuscript, final approval of the submitted version, agreeing to be accountable for all aspects of the work and agreeing on the order in which their names will be listed. Juping Yu drafted the manuscript. Siva Ganesh and Juping Yu analysed the data. Deborah Lancastle, Siva Ganesh and Juping Yu involved in interpretation of data.

DATA AVAILABILITY STATEMENT

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data are not available.

ORCID

Juping Yu https://orcid.org/0000-0002-7114-8622

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