



West
Northamptonshire
Council



Enhancing Wellbeing in Care Home Settings Through Technology-Based Activities

Research Report Submitted to West Northants Council

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Executive Summary

This report evaluates the impact of three technology-based interventions, Virtual Reality (VR), Hydra Smart Cups, and RoboPets, on the wellbeing of care home residents across physical, emotional, mental, and social domains. Drawing on interviews, pre- and post-intervention surveys, and case studies, the evaluation found that these tools contributed to notable improvements in mood, hydration, engagement, and social interaction.

Among the technologies, VR emerged as particularly effective in facilitating reminiscence, emotional regulation, and personalised therapeutic experiences. RoboPets offered comfort and companionship, especially for residents with dementia, while Hydra Smart Cups promoted autonomy and improved fluid intake.

The findings highlight strong potential for wider implementation, especially when supported by adequate training, simplified interfaces, and the ability to tailor interventions to individual

needs. These technologies can offer scalable and person-centred enhancements to the quality of care provided that staff capacity, training and infrastructure support are in place.

Background and Rationale

The wellbeing of older adults in residential care is widely recognised as a multifaceted issue, encompassing physical, cognitive, emotional, and social dimensions. Residents often face complex challenges such as dementia, depression, loneliness, reduced mobility, and limited opportunities for meaningful engagement. In response, the role of digital technologies in enhancing care has gained increasing attention, with evidence pointing to the therapeutic potential of Virtual Reality (VR), assistive smart tools, and robotic companions.



VR has shown promise in dementia care, offering immersive, person-centred experiences that support reminiscence, emotional regulation, and cognitive stimulation. Studies by Appel et al. (2020) and Ng et al. (2024) report significant reductions in loneliness and improvements in emotional wellbeing among older adults using VR. Brimelow et al. (2022) further found that such interventions remain effective even in the later stages of dementia. However, as Mao et al. (2024) caution in their systematic review, the evidence base remains emergent, and deeper understanding of both benefits and limitations is needed.

Robotic companions, such as RoboPets, have also been shown to improve mood and reduce anxiety in care settings, particularly among residents living with dementia (Bemelmans et al., 2012; Wu et al., 2025). Meanwhile, hydration, a frequently overlooked aspect of wellbeing, plays a critical role in both physical and cognitive health. Smart hydration tools such as Hydra Smart Cups have been found to reduce the risks of confusion, fatigue, and falls (Gazza et al., 2024), while subtly promoting autonomy and self-care.

Despite the promise of these technologies, the post-COVID landscape has revealed persistent barriers to adoption in many care homes. Digital exclusion, infrastructure limitations, and workforce training gaps continue to hinder implementation (Seifert & Cotton, 2023). Many settings lack not only the devices themselves, but also the content, confidence, and capacity to deploy them effectively.

This study was therefore designed to explore the real-world feasibility and impact of three specific technologies, VR, RoboPets, and Smart Cups, within care home environments. The study seeks to generate practical insights into scalable, person-centred technology use in later-life care by embedding these tools into daily routines and evaluating their effects through a mixed-methods approach.

In doing so, it responds to a growing policy imperative: to embed digital innovation into long-term care models in ways that are evidence-based, inclusive, and tailored to the needs of diverse resident populations. The findings aim to inform strategic investment, workforce development, and policy guidance for technology-enabled care across the sector.

Aim, objectives and research questions

Aim

To evaluate the impact of technology-based interventions, Virtual Reality (VR), Hydra Smart Cups, and RoboPets, on the wellbeing of care home residents across physical, emotional, mental, and social domains.

Objectives

- To assess the overall influence of technology-enabled activities on residents' quality of life and mental wellbeing.
- To evaluate the specific contribution of VR therapy to emotional regulation, reminiscence, and cognitive engagement.
- To determine the effectiveness of Hydra Smart Cups in supporting hydration, autonomy, and physical wellbeing.
- To explore how RoboPets promote emotional comfort, reduce anxiety, and encourage social interaction among residents.

Research Questions

1. What is the overall impact of technology-based activities on the wellbeing of care home residents?
2. In what ways does VR therapy affect residents' mental and emotional states?
3. How do Hydra Smart Cups influence hydration levels and support independence?
4. What role do RoboPets play in providing emotional support and enhancing social engagement?

Methodology

A mixed-methods approach was employed to evaluate the impact of three technology-based interventions, Virtual Reality (VR), Hydra Smart Cups, and RoboPets, on the wellbeing of care home residents. The study combined qualitative and quantitative data collection to capture both measurable outcomes and lived experiences.

Qualitative Data Collection

Semi-structured interviews were conducted to explore perceptions of resident engagement, emotional responses, and implementation challenges. Interview transcripts were analysed thematically using Braun and Clarke's (2006) six-phase framework. A sentiment analysis was also carried out to assess the emotional tone of staff observations.

Quantitative Data Collection

Pre- and post-intervention surveys were completed by residents or their proxies, using validated items covering four domains of wellbeing: Physical Health, Mental Health, Environmental Satisfaction, and Social Relationships. A total of 6 residents completed the pre-survey, with the same 6 completing the post-survey. Whilst the sample sizes are small, these data provided a directional view of the interventions' impact over time.

Setting and Sample

The research was conducted in a single care home, selected as a convenience sample for this pilot study. The home was supported in setting up the technological infrastructure and identifying suitable participants.

VR Therapy Delivery

A total of 20 VR sessions were delivered by a trained expert over the course of the pilot. Each 90-minute session included a combination of group activities and one-to-one engagements, allowing for both social interaction and individualised therapeutic use. A dedicated VR space was created within the care home to offer a calm and immersive environment. Two types of

headsets, Meta Quest and Pico were used to ensure accessibility and flexibility across residents with differing needs.

Residents were encouraged to provide feedback throughout the intervention period, and session content was adapted in real time to accommodate preferences, emotional states, and cognitive abilities. This person-centred approach ensured a high degree of personalisation and inclusivity.



A diverse range of immersive experiences was curated to support emotional, cognitive, physical, and sensory wellbeing. These experiences were tailored to residents' personal interests, histories, and therapeutic needs, fostering engagement, reminiscence, and relaxation.

Examples of experiences offered

Nature and Wildlife

Residents engaged with calming natural environments, including swimming with dolphins, forest walks, and guided meditations featuring birdsong, rivers, and expansive landscapes. These sessions promoted relaxation, sensory stimulation, and emotional grounding.

Memory and Reminiscence Therapy

Residents virtually revisited childhood homes, favourite holiday destinations, and other personally meaningful locations. One participant, for example, relived his time working on the railways, vividly recalling passing locomotives and sharing memories of his role—highlighting the power of VR in triggering autobiographical recall and narrative sharing.

Cultural and Heritage Exploration

Virtual tours of iconic landmarks such as Buckingham Palace, Welsh castles, and National Trust sites enabled residents to connect with their cultural heritage. These experiences encouraged storytelling, shared conversation, and a renewed sense of identity.

Music and Performing Arts Therapy

Residents attended immersive performances including classical concerts, jazz ensembles, and ballet productions like *The Nutcracker*. Some residents sang along to familiar songs from their youth, creating uplifting moments of joy and social connection.

Physical and Motor Skills Engagement

VR activities such as adaptive cycling and kayaking enabled gentle physical engagement for residents who often declined traditional movement-based activities. These experiences supported mobility, coordination, and confidence in a safe and supported environment.

Mindfulness and Pain Management

Residents accessed calming experiences such as *David Attenborough's Forest of Serenity*, developed with St Giles Hospice for palliative care. These sessions supported emotional regulation, pain distraction, and mindfulness, particularly for residents experiencing anxiety or discomfort.

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Questionnaire Data

Quantitative data were collected through pre- and post-intervention surveys administered to care home residents. All residents were invited to complete a baseline (pre-test) survey, and those who participated in one or more of the technology-based activities, Virtual Reality (VR), Hydra Smart Cups, or RoboPets, were subsequently invited to complete an endpoint (post-test) survey.

The surveys (see Appendix B) were adapted from the World Health Organization Quality of Life (WHOQOL) instrument and focused on four key domains of wellbeing: Physical Health, Mental Health, Environmental Satisfaction, and Social Relationships. Questionnaires were administered by care home shift leaders at the baseline and endpoint stages of the project.

In total, 6 matched pre- and post-test responses were analysed to assess the impact of the interventions on residents' wellbeing.

Interview Data

Qualitative data were collected through two semi-structured interviews with the care home manager and VR facilitator directly involved in implementing the interventions (see Appendix A for interview guide). These interviews explored perspectives on resident engagement, emotional responses, and practical considerations for delivery. The VR facilitator collected mini-case studies of residents' engagement with her sessions.

Interview transcripts were analysed using Braun and Clarke's (2006) six-phase thematic analysis framework, allowing for the identification of key themes and recurring patterns. A sentiment analysis was also conducted to assess the emotional tone associated with each theme, providing additional insight into staff perceptions and resident responses.

Ethics

This research was conducted in accordance with the University of Northampton's ethical standards and the British Educational Research Association (BERA) guidelines, upholding the principles of participant safety, dignity, and autonomy throughout.

Informed consent was obtained from all participating residents and staff, with information provided in accessible formats to ensure understanding. Residents were clearly informed of their right to withdraw at any time without consequence. Given the involvement of potentially vulnerable individuals, special attention was paid to emotional wellbeing, with staff trained to monitor and respond sensitively to any distress arising during technology-based activities.

All data were fully anonymised, securely stored, and handled in compliance with the General Data Protection Regulation (GDPR). Safeguarding procedures were in place, including support from familiar care staff during data collection, and emotional responses were documented and reviewed where appropriate.

Regular team reflections and monitoring ensured ongoing ethical oversight throughout the project, fostering a respectful and inclusive environment for all participants.

Findings

Interview and case study findings are presented below, followed by findings from the surveys.

Interview and case study findings

This section synthesises qualitative insights from two anonymised interviews assessing the impact of the three technology-based interventions (VR, RoboPets, Hydra Smart Cups) on wellbeing in care home settings. A thematic analysis of the interviews and surveys identified seven core themes aligned with the domains of resident wellbeing used for the survey.

Thematic analysis: key themes, codes, and illustrative quotes

Theme	Frequency	Representative Codes	Illustrative Quote
Emotional Uplift and Mental Wellbeing	High	joy, relaxation, reduced distress	'Seeing the difference... from a sad person to a massive smile on their face.' (VR) 'They absolutely love them. They they won't even let them go. I really find that it's a great involvement. It makes them feel valued.' (pets) 'For mental well-being these are absolutely incredible.' (pets) 'Encouraging residents to not walk around in the middle of the night.' (pets)
Reminiscence and Identity Reinforcement	High	visiting childhood home, Spitfire memory, cultural recall	'We travelled back to the house she grew up in... recounting happy memories.' (VR)
Physical Activation Through Engagement	Medium	movement, dancing, VR kayaking	'Her feet were tapping. It got them moving.' (VR) 'With the pets you get a brush, so it had the residents move their arms. More able residents put it down on the floor and go for a walk. So that's getting them out there moving and it's incredible for physical health.' (pets)
Social Bonding and Group Dynamics	High	group participation, shared experience, AVR corner	'People wanted to show each other where they'd been... built connections.' (VR)
Increased Autonomy and Motivation	Medium	independence, in charge, hydration reminders	'With the cups... it's like they're in control of something they weren't before.' (cups)

			'They've got the purpose of looking after this animal. It's her world by her side 24/7. It means so much to them.' (pets)
Personalisation vs Universality	Medium	tailored experience, universal pleasure, memory triggers	'There are universal pleasures... but the secret power is personalisation.' (VR)
Operational and Logistical Constraints	Medium	training gaps, funding needs, staff tech anxiety	'They ended up in the cupboard... people didn't know how to use them... so I definitely do think there's a benefit and a need for having a set time and someone external supporting it.' (VR)

Figure 1: Thematic Analysis

Sentiment Analysis by Theme

Theme	Overall Sentiment	Notes
Emotional Uplift and Mental Wellbeing	Strongly Positive	Joy, relaxation, and reduced distress frequently cited in response to tech interventions.
Reminiscence and Identity Reinforcement	Positive	Emotional resonance and engagement via memory recall.
Physical Activation Through Engagement	Moderately Positive	Encouraged movement and participation.
Social Bonding and Group Dynamics	Strongly Positive	Enhanced social interaction and connectedness.
Increased Autonomy and Motivation	Positive	Improved agency and independence noted especially with Hydra Smart Cups.
Personalisation vs Universality	Mixed/Reflective	Balance appreciated but surfaced as a complexity.
Operational and Logistical Constraints	Mildly Negative	Sentiment dipped here due to barriers like staff training and device misuse.

Figure 2: Sentiment analysis

Sentiment by Theme in Technology-Based Care Interventions

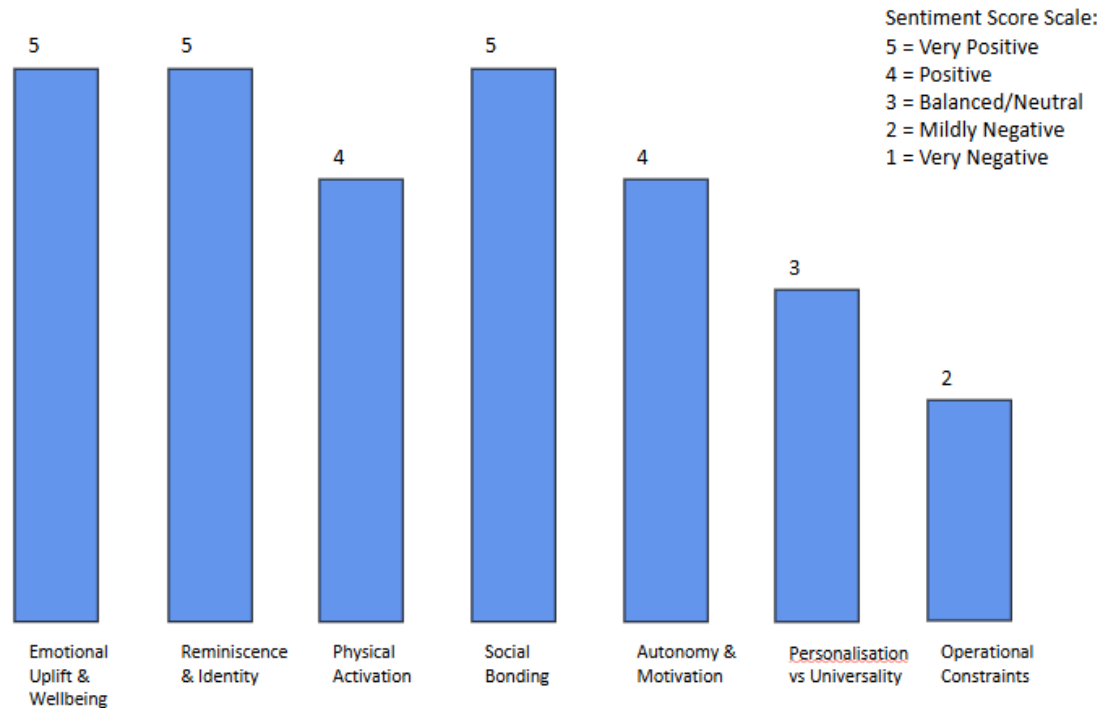


Figure 3: Sentiment by theme



Figure 4: Quote cloud from thematic data

Summary of themes

Emotional Uplift and Mental Wellbeing

Interviewees consistently described improved mood, joy, and calm in residents. These findings were reinforced by survey data showing increased satisfaction in mental wellbeing and reduced negative feelings.

'I forgot all my worries for a while - this was magic'
'I feel young again.'
'Seeing the difference in people as soon as they put the headset on and going from a very depressed hunched over sad person that was not interested or engaging in any of the world around them to then suddenly their body language changes, their shoulders are back, they're looking up and around them and they've got a massive smile on their face.'
'I think it was in the jungle, and you could hear the birds come in, the snakes, the elephants, and it actually sent him to sleep. He walks with purpose a lot and he doesn't really sleep. So, for that to send him to sleep is absolutely incredible.'

Reminiscence and Identity Reinforcement

VR's ability to trigger personal memories was a powerful theme. This corresponded with residents reporting more life enjoyment and meaningful engagement.

'I never thought I'd be able to travel again, but this has taken me places I never dreamed of.'
'I feel like I'm actually there. It's wonderful to see my hometown again.'
'This brought back so many wonderful memories.'
'With the lady that had lost her brother, we travelled back to the house that she grew up in with him and we went back to the streets that she lived on. And she was then able to start recounting happy memories, whereas everyone else was trying to dismiss it and change the topic. It actually allowed her to explore those memories in a safe space.'
'It can often be the initial universal experiences will be that trigger for opening up the conversations for their own memories and then you're able to use those to personalise it.'

Physical Activation Through Engagement

While not every technology targeted physical health directly, some residents became more mobile or physically responsive, as supported by stable-to-improved ratings in daily activities and mobility-related survey items.

'We had a lady listening to Doris Day. Her feet were tapping; it got them moving. It's an activity in itself, you know, it got them singing again. It was incredible.'
'They would never be interested in doing sports or fitness related activities, however, using virtual reality and being able to match it to their interests. For example, doing painting and creative activities but getting them up on their feet and painting it in an immersive environment. Being able to go and do the biking and the kayaking with the adaptive equipment.'

'So rather than passively watching a screen in front of them, they're transported there. It's encouraging them to get up on their feet and to look around and to explore the environment around them.'

Social Bonding and Group Dynamics

Staff highlighted the social connectedness VR and RoboPets created. Quantitatively, the most improved survey domain was Social Relationships, with marked increases in perceived friend support and personal connections.

'Other people that are in the group would be either going down their own places or they could launch into the same area and those that didn't have a VR headset on would be able to see it on the tablet as well.'

'All of these experiences that people went on encouraged them to do them together and to talk about them and act together. And they wanted to show each other where they'd been, and they wanted to tell each other about the travels they're taken and the things that they'd seen. People would come out from their bedrooms.'

Autonomy and Motivation

Hydra Smart Cups gave residents a renewed sense of control over hydration, which aligned with qualitative reports of independence and quantitative increases in related satisfaction scores.

'It really helped the staff, but more important was the resident and it would remind them to drink.'
'It's bringing independence back and having that that choice again and feeling that they can have that reminder of things.'

Operational and Logistical Constraints

Despite overall positivity, both interviews and surveys suggested implementation barriers and occasional discomfort with technology.

'If you wash [the cup] up and it gets water in it, it's electric, it's broken.'

'It's good to have the training because other people might just go and try and immediately throw a headset on rather than building up and showing them what they're going to see and preparing them.'

'If [staff] are going to do the sessions, making sure that they've got the full training to be able to do them safely.'

'The technology is not designed in mind for people with disabilities or cognitive impairments, but there are always ways to adapt and make things more accessible.'

'It would be great to have access to these tools at all times because I'm very conscious that in the middle of the night when someone's anxiety or pain is really bad then having this VR headset that they can just come and bring the Dolphins to them whenever they need them is really powerful.'



Mini case Studies: personal impact of VR therapy

The following mini case studies illustrate the diverse and often profound impact that VR interventions had on individual residents. While each experience was unique, recurring themes emerged: reconnection with identity, emotional healing, cognitive stimulation, increased mobility, and enhanced social engagement.

Overcoming grief

Peter, who was grieving and socially withdrawn after his wife's death, engaged deeply with VR experiences like racing and music concerts. These experiences prompted emotional reconnection, helping him share memories and become more socially involved.

A train conductor's journey

A former railway worker re-engaged cognitively and emotionally when experiencing a VR steam locomotive journey, recalling past routes and technical details.

Journey to Japan

Li, who had forgotten much of her childhood in Japan, used VR to reconnect with her cultural roots, leading to emotional fulfilment and restored identity.

Physical benefits

Residents with mobility challenges participated in adaptive VR kayaking and cycling, resulting in increased physical engagement, coordination, and mood.

Bringing back lost memories

A woman toured her childhood town virtually, triggering vivid memories. She led others through the experience, fostering empowerment and social connection.

Calming anxiety

An ex-military resident with PTSD calmed significantly during a Spitfire simulation. The experience improved emotional regulation and readiness for other activities.

Reducing agitation

A woman with severe agitation was soothed through a calming dolphin VR session, significantly reducing anxiety and distress.

Virtual travel aiding connection

Paul, with cognitive decline and non-verbal tendencies, emotionally connected with a VR trip to Nigeria. It improved communication and shared cultural understanding.

Music and art as cognitive stimulation

A disengaged man with severe dementia responded positively to interactive VR painting and musical performances, surprising staff with his creativity and joy.

VR for Social Connection

Anthony, socially withdrawn, responded enthusiastically to a VR Christmas theatre experience, which revived personal memories and encouraged peer interaction.

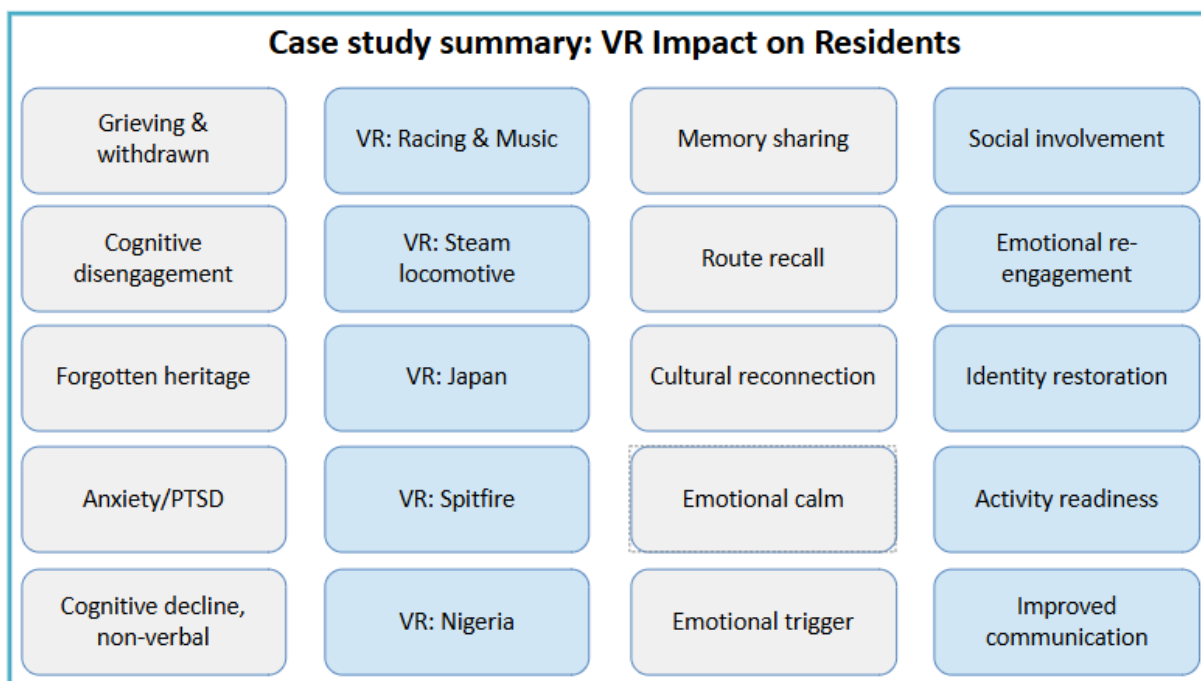


Figure 5: Summary of VR impact on residents

Stakeholder Feedback

Perspectives were gained from staff, residents and families:

Care Staff observed notable improvements in resident mood, communication, and participation. VR sessions in particular sparked storytelling and emotional expression, especially among those typically withdrawn. While time and training were initial concerns, staff grew in confidence and saw clear benefits to residents' wellbeing. They noted that residents were calmer after the sessions; it improved their mood and reduced confusion, which put less strain on the staff compared to when they are distressed and needing a lot more support and supervision to keep safe. This improvement to mental health then made mealtimes calmer, which impacted their food intake and physical health.

Residents responded with enthusiasm, describing the experiences as “real,” “magical,” and “uplifting.” Many enjoyed revisiting meaningful places or attending virtual concerts, with some showing increased sociability and confidence; *‘I really enjoyed the VR it made me happy.’*

Family Members noted positive changes in their loved ones, including greater emotional openness and conversational engagement. One relative shared that a VR session helped spark a long-forgotten memory: *“I haven’t heard Mum talk about her childhood in years, but after the VR session, she was telling me all about the places she used to go.”*



Overall summary of thematic data

The interventions had a demonstrably positive impact across emotional, cognitive, physical, and social dimensions of resident wellbeing. VR enabled memory-based engagement and immersion, enhancing emotional and cognitive stimulation. RoboPets were associated with calming effects, companionship, and reduced agitation. Hydra Smart Cups supported hydration, independence, and routine-building.

Participants expressed high levels of joy and engagement. Notably, reminiscence triggered by VR scenarios enhanced identity and self-worth. Social themes, especially those involving shared VR experiences, highlighted reductions in loneliness and promoted group cohesion.

However, staff constraints, limited training, and occasional lack of clarity on device use emerged as implementation hurdles if the Care Home were to undertake VR therapy without support. These findings support the view that while the emotional and social benefits are strong, sustainability requires operational planning and training frameworks.

Survey Findings

To assess the impact of technology-based interventions on resident wellbeing, pre- and post-test surveys were administered to participants in the care home pilot. A total of 6 responses were collected pre-intervention and 6 matched responses post-intervention. The surveys

captured perceived wellbeing across four key domains: Physical Health, Mental Health, Environmental Satisfaction, and Social Relationships.

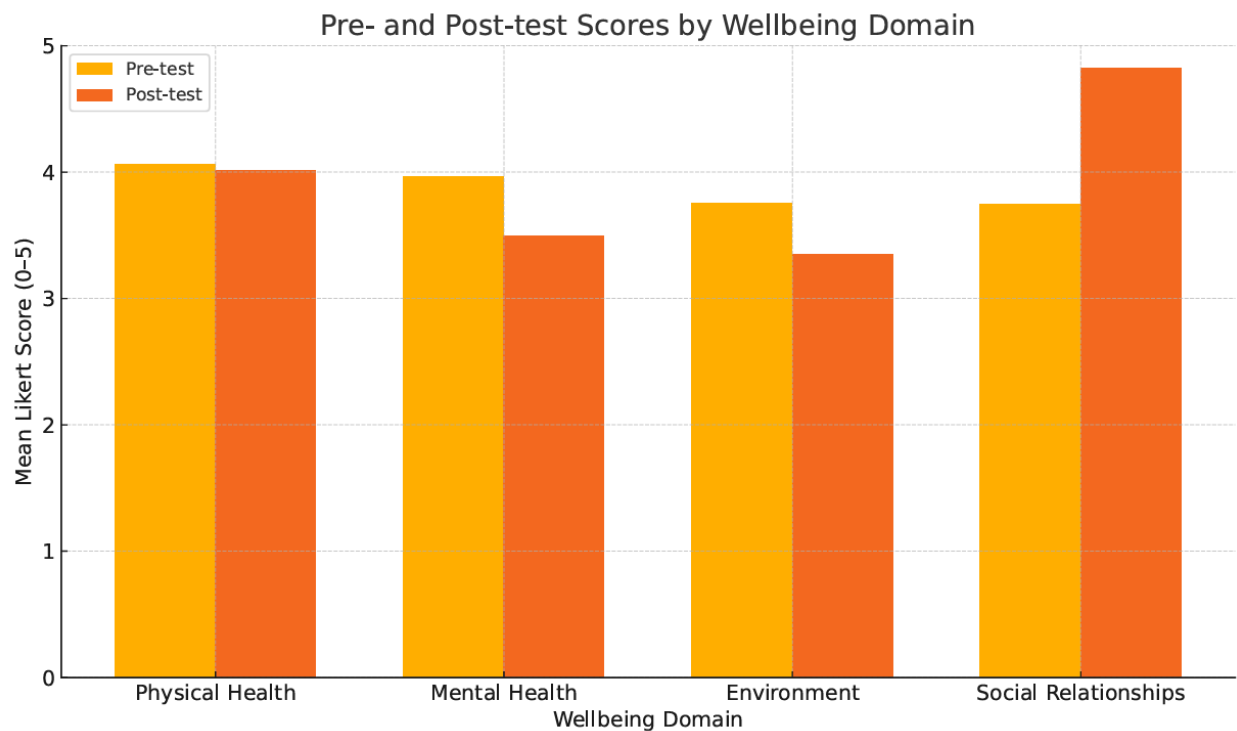


Figure 6: Pre vs Post Intervention Survey Results (1=low, 5=high)

The chart presents average pre-test and post-test scores across four wellbeing domains: Physical Health, Mental Health, Environment, and Social Relationships, based on a 0–5 Likert scale. The data show a slight decline in both Mental Health and Environment scores following the intervention, however the scores are generally high across all four domains. Social Relationships showed a notable improvement, with post-test scores increasing by more than one point on average. These findings suggest that the intervention had a positive impact on participants’ sense of social connectedness.

1. Physical Health

Pre- and post-intervention scores suggest general satisfaction with health, sleep, and energy levels. While VR and Smart Cups aimed to support mobility and hydration, the effects may require longer-term tracking to detect measurable physical improvements. However, when

asked specifically about the impact of the technologies on physical health all 6 reported an improvement.

2. Mental Health

Residents reported improved emotional states in qualitative interviews; however, post-survey scores on mental health were slightly lower. This discrepancy may reflect momentary conditions during the post-survey period or the small sample size. When asked specifically about the impact of the technologies on mental health all 6 reported an improvement.

3. Environmental Satisfaction

Environmental satisfaction declined slightly from pre- to post-test, with residents reporting lower contentment with their surroundings, leisure opportunities, and financial security. These areas are likely influenced by broader institutional or seasonal factors, such as the fact that the post test was undertaken in winter. When asked specifically about the impact of the technologies on environmental satisfaction all 6 reported increased opportunities for leisure activities and increased confidence.

4. Social Relationships

This was an improved domain in the post-test results. Residents indicated higher satisfaction with friendships and personal relationships, aligning with qualitative findings that VR and RoboPets fostered shared experiences, communication, and peer bonding. This suggests the positive effect of the interventions on emotional and social connectedness. When asked specifically about the impact of the technologies on social relationships all 6 reported a reduction in social isolation.

Survey data summary

The survey data suggests that technology-based activities (VR, RoboPets, Smart Cups) had a positive impact on subjective wellbeing, particularly in emotional and social areas, personal satisfaction, and daily functioning. The overall pattern aligns with qualitative reports of enhanced mood, reminiscence, and social inclusion.

Overall findings summary

The integration of qualitative and quantitative findings indicates that technology-based interventions had a broadly positive impact on multiple dimensions of resident wellbeing, with the most significant outcomes observed in emotional uplift and social connectedness.

Emotional Wellbeing

VR experiences notably enhanced mood, reduced anxiety, and supported emotional regulation. Residents frequently expressed increased engagement, particularly during personalised reminiscence activities that helped reinforce identity and memory.

Physical Activation

Several residents with limited mobility participated in adaptive VR activities such as kayaking and cycling, promoting gentle physical movement and renewed interest in activity.

Hydration and Autonomy

The use of Hydra Smart Cups led to improved hydration habits and encouraged greater self-management. Residents were more likely to drink independently, supporting both physical wellbeing and a sense of control.

Social Connection

Group-based VR and RoboPet sessions promoted meaningful interaction among residents. These activities fostered conversation, and peer bonding, helping to reduce social withdrawal.

Implementation Barriers

Challenges included limited staff time, inconsistent confidence with technology, and the need for ongoing training and support to ensure smooth facilitation.

In summary, the findings support the conclusion that immersive, person-centred technologies can meaningfully enhance wellbeing in care settings, particularly when thoughtfully implemented and tailored to individual needs.

Discussion

The findings of this evaluation align closely with the project's aims and research questions, demonstrating that technology-based interventions can meaningfully enhance the wellbeing of care home residents. Each technology addressed different facets of resident needs in distinct but complementary ways. Virtual Reality (VR) provided highly immersive and personalised experiences, proving particularly effective in reminiscence therapy and emotional regulation. RoboPets offered emotional comfort and companionship, especially valuable for residents with dementia. Hydra Smart Cups supported physical wellbeing by encouraging hydration and reinforcing a sense of autonomy. Collectively, these tools contributed to improvements across emotional, cognitive, physical, and social dimensions of wellbeing.

From a policy and practice perspective, the study reinforces the growing imperative to integrate person-centred digital interventions into long-term care strategies. The benefits observed, especially in social connection, mood, and engagement, support wider calls for technology-enabled care models in national policy frameworks. However, successful implementation requires more than investment in devices; it demands attention to training, staff confidence, and organisational readiness.



This has implications for commissioning, workforce development, and infrastructure planning in the care sector.

A key strength of the project was its focus on real-world feasibility, combining qualitative feedback and survey data to capture both impact and lived experience. Personalisation emerged as a critical success factor: VR sessions tailored to individual histories elicited strong emotional and cognitive responses. However, the small sample size and short evaluation period are limitations that should be addressed in future studies.

An unexpected insight was the degree to which these technologies fostered social interaction. Residents not only engaged with the tools individually but often shared experiences and stories, highlighting their potential to combat isolation and build community. Challenges included variability in staff confidence, logistical constraints, and the need for adaptable content that can respond to rapidly shifting emotional or cognitive states.

Ultimately, these findings suggest that digital interventions, when personalised and well-supported, can offer a holistic enhancement to residential care. They serve not only as recreational tools, but as meaningful contributors to physical health, emotional fulfilment, social connection, and dignity in later life.

Key Recommendations

1. Build cross-shift staff capacity: ensure multiple staff members are trained in facilitating technology-based activities to embed sustainability and reduce dependency on individual champions.

2. Implement a hybrid delivery model: combine in-house facilitation with periodic input from external specialists to maintain momentum, deepen expertise, and ensure high-quality delivery.
3. Offer both personalised and inclusive content: develop a balanced library of VR experiences that includes universally engaging content alongside bespoke, person-centred options tailored to residents' histories, interests, and needs.
4. Establish routine wellbeing monitoring: integrate regular feedback loops and behavioural observation tools to assess individual and group outcomes, and to inform continuous improvement of the interventions.
5. Prioritise usability and accessibility in technology procurement: invest in intuitive, dementia-friendly interfaces and simplified hardware to minimise barriers to use for both residents and staff.

Impact and Sustainability

The introduction of technology-based interventions led to measurable improvements in resident wellbeing, including reduced anxiety, enhanced mood, improved hydration, and greater social interaction. Residents became more socially active, demonstrating the inclusive potential of these tools. The evidence points to a strong case for broader adoption, provided that staff are adequately trained and implementation processes are streamlined.

These technologies offer a promising return on investment, not only in terms of resident outcomes but also through reduced staff burden and improved quality of care. Their relatively low marginal cost, coupled with adaptability to diverse care environments, enhances scalability across settings.

Long-term sustainability will rely on robust infrastructure, cross-role staff capability, and ongoing evaluation to ensure continued relevance and impact. With the right support, these interventions can become a valuable, embedded part of holistic, person-centred care.

Implementation Considerations

Successful integration of technology in care settings, particularly VR, requires far more than access to equipment. This pilot study highlights several critical factors that influence effective adoption and long-term sustainability:

Tailored Experiences

Personalisation is key. VR content must be thoughtfully selected and adapted to align with each

resident's cognitive, emotional, and sensory needs. This ensures meaningful engagement and maximises therapeutic benefit.

Staff Confidence

Training is essential, not only in using the equipment but in understanding how to facilitate sessions empathetically and responsively. Staff need to feel confident adapting sessions, managing resident reactions, and troubleshooting minor technical issues.

Technical Accessibility

Interfaces and hardware must be dementia-friendly, intuitive, and physically accessible. Technologies should accommodate varying levels of mobility and cognition while remaining easy for staff to operate with minimal friction.

Lessons from this pilot point to the value of a hybrid delivery model that blends internal staff facilitation with periodic input from external specialists. This model strengthens implementation capacity, supports skill development, and reduces reliance on any one individual.

With these considerations addressed, there is strong potential for wider rollout, supported by clear evidence of improved resident wellbeing and enhanced care quality. Such an approach also offers a compelling return on investment through scalable, person-centred innovation.

Conclusion

This pilot study demonstrates that technology-based interventions, Virtual Reality (VR), Hydra Smart Cups, and RoboPets, can significantly and measurably enhance the wellbeing of care home residents. Far from being mere recreational additions, these tools deliver therapeutic value across emotional, cognitive, physical, and social dimensions. They support residents in feeling more connected, more engaged, and more in control of their daily lives.

Among these, VR therapy emerged as a particularly powerful and scalable innovation. Its ability to deliver immersive, personalised experiences enabled residents to reconnect with meaningful memories, explore new environments, and reduce emotional distress. The flexibility to tailor

content to individual needs makes VR especially well-suited to supporting the diverse challenges of later life, promoting both autonomy and mental resilience.

Feedback from both residents and staff indicates that these technologies are not only impactful but also feasible to integrate provided there is adequate investment in training, simplified implementation, and infrastructure support. The model tested in this pilot has shown strong potential for replication, offering a robust framework for broader rollout across the council's care network and beyond.



As the care sector increasingly turns to innovation to meet growing demands, VR and related digital interventions represent a compelling, evidence-based solution aligned with person-centred care principles.

The success of the pilot supports the expansion of VR Therapies across other care homes within the council's network. The model developed here can serve as a replicable framework, delivering measurable improvements in wellbeing and quality of life. VR stands out as a scalable, sustainable, and deeply humanising tool for the future of residential care.

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Appendices

Appendix A: Interview prompts

Thank you for participating in our research on health and well-being in relation to your recent experiences with Virtual Reality, Smartcups or Robopets. This study is undertaken by researchers from the University of Northampton, VR Therapies and West Northamptonshire Council. It aims to understand your perspectives.

To ensure ethical standards, this research adheres to the guidelines set by the British Educational Research Association (BERA). All your responses will be treated as confidential, and any data shared in reports will be anonymised to protect your privacy. You can opt out at any time.

The following questions inquire about your feelings regarding aspects of your daily life. Please choose the answer that best reflects your experiences. If you are unsure about a response the first answer that comes to mind is often the most appropriate.

Thank you for your valuable contribution to our research. It will help us to design activities using these innovative technologies that will help improve health and wellbeing.

General impressions of impact of the technologies

Physical Health

Do you think your VR, smart cups or Robopets experience has helped residents' physical health? This could be through moving more or increasing activity levels.

Do you have any additional feedback or thoughts in relation to VR, smart cups or Robopets experiences and physical health?

Mental health

Do you think your VR, smart cups or Robopets experiences have helped with mental health? This could be through easing symptoms of anxiety or depression, developing coping strategies or simply having more fun and enjoyable activities.

Do you have any additional feedback or thoughts in relation to VR, smart cups or Robopets experiences and mental health?

Environment

Do you think your VR or Robopets experiences helped increase opportunities to engage with the environment? E.g. Increased access to help and support, Increased opportunities for leisure activities, Increased confidence, Increased health, Expanded horizons

Do you have any additional feedback or thoughts in relation to VR, smart cups or Robopets experiences and the environment?

Social relationships

Do you think VR or Robopets experiences helped reduce social isolation? This could be through attending group sessions or online interactions.

Do you have any additional feedback or thoughts in relation to VR, smart cups or Robopets and experiences?

Anything else to add?

Next steps?

Thank you so much for answering these questions and your honesty. All data will be kept confidential.

Appendix B: Care Home Evaluation Survey

Dear Care Home Resident,

Thank you for participating in our research on health and well-being in relation to your recent experiences with Virtual Reality, Smartcups or Robopets. This study is undertaken by researchers from the University of Northampton, VR Therapies and West Northamptonshire Council. It aims to understand your perspectives. To ensure ethical standards, this research adheres to the guidelines set by the British Educational Research Association (BERA). All your responses will be treated as confidential, and any data shared in reports will be anonymised to protect your privacy. You can opt out at any time. The following questions inquire about your feelings regarding aspects of your daily life. Please choose the answer that best reflects your experiences. If you are unsure about a response the first answer that comes to mind is often the most appropriate. Thank you for your valuable contribution to our research. It will help us to design activities using these innovative technologies that will help improve health and wellbeing

Introductory questions

1. Please can you give us your birthday month and the first two letters of your mother's Christian name so that we can make sure your responses are anonymous.

2. Have you taken part in any of these activities? VR therapies Robopets Smart cups

Physical Health

3. How satisfied are you with your health?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

4. To what extent do you feel that physical pain prevents you from doing what you need to do?

An extreme amount Very much A moderate amount A little Not at all

5. How satisfied are you with your ability to perform your daily living activities?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

6. How much do you need of any medical treatment to function in your daily life?

An extreme amount Very much A moderate amount A little Not at all

7. How satisfied are you with your sleep?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

8. Do you have enough energy for everyday life?

Not at all A little Moderately Mostly Completely

9. How well are you able to get around?

Very poor Poor Neither poor nor good Good Very good

10. Do you think your VR, smart cups or Robopets experience has helped your physical health?

This could be through moving more or increasing your activity levels.

An extreme amount Very much A moderate amount A little Not at all

11. Do you have any additional feedback or thoughts in relation to your VR, smart cups or Robopets experiences and physical health?

Mental Health

12. How much do you enjoy life?

An extreme amount Very much A moderate amount A little Not at all

13. How often do you have negative feelings such as despair, anxiety or depression? Always

Very often Quite often Seldom Never

14. To what extent do you feel your life to be meaningful?

An extreme amount Very much A moderate amount A little Not at all

15. Are you able to accept your bodily appearance?

Not at all A little Moderately Mostly Completely

16. How well are you able to concentrate?

An extreme amount Very much A moderate amount A little Not at all

17. How satisfied are you with yourself?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

18. Do you think your VR, smart cups or Robopets experiences have helped your mental health?

This could be through easing symptoms of anxiety or depression, developing coping strategies or simply having more fun and enjoyable activities.

Yes No Maybe

19. Do you have any additional feedback or thoughts in relation to your VR, smart cups or

Robopets experiences and mental health?

Environment

20. How safe do you feel in your daily life? An extreme amount Very much A moderate amount

A little Not at all

21. How satisfied are you with your access to health services?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

22. How healthy is your physical environment?

An extreme amount Very much A moderate amount A little Not at all

23. Have you enough money to meet your needs?

Not at all A little Moderately Mostly Completely

24. How available to you is the information that you need in your day-to-day life?

Not at all A little Moderately Mostly Completely

25. To what extent do you have the opportunity for leisure activities?

Not at all A little Moderately Mostly Completely

26. How satisfied are you with your capacity for work?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

27. How satisfied are you with your transport?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

28. Do you think your VR or Robopets experiences helped increase your opportunities? Tick as many as you agree with.

Increased access to help and support

Increased opportunities for leisure activities

Increased confidence

Increased health

Expanded horizons

29. Do you have any additional feedback or thoughts in relation to your VR, smart cups or Robopets experiences and your environment?

Social Relationships

30. How satisfied are you with your personal relationships?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

31. How satisfied are you with the support you get from your friends?

Very dissatisfied Dissatisfied Neither satisfied nor dissatisfied Satisfied Very satisfied

32. Do you think your VR or Robopets experiences helped reduce social isolation? This could be through attending group sessions or online interactions.

Yes No Maybe

33. Do you have any additional feedback or thoughts in relation to VR, smart cups or Robopets and your social experiences?

Now please press submit at the bottom of this page.

Thank you so much for answering these questions and your honesty. All data will be kept confidential. If you would like to speak to our team about anything raised in this questionnaire please contact (). We aim to respond within 3 working days.

Appendix C: Participant Information Sheet:

Project Title: Enhancing Wellbeing in Care Home Settings through Technology-Based Activities

Researcher Contact Information ()

Introduction

You are invited to participate in a research project investigating the impact of virtual reality or robopet activities on the wellbeing of residents in care home settings. Before deciding whether or not to participate, it is important for you to understand the purpose of the project and what your involvement will entail. Please take time to read or listen to the following information carefully and discuss it with others if you wish. Ask () if anything is not clear or if you would like more information. Take time to decide whether you wish to take part. Your participation in this project is entirely voluntary. You have the right to withdraw at any time without providing a reason, and this will not affect your care or relationship with the care home. If you decide to take part, then change your mind you can just let Amani know. We will ensure that your survey responses are kept anonymous by asking you to create a code rather than give your name.

What is the purpose of the project?

The purpose of the project is to explore the effects of virtual reality activities and RoboPets, on the wellbeing of individuals residing in care homes.

(At this point show photos of virtual reality headsets with screenshots of typical activities and photos of robopets. Discuss that there will be choices of activities and pets and no expectation that everyone joins in or continues to join in with any of the activities).

Why have I been chosen?

We are inviting all residents to participate in this project as everyone is going to be able to choose the VR or pets activities if they wish to try them.

Project Process: If you agree to participate, you will be asked to:

- Complete a survey at the beginning of the project assessing your quality of life, mental wellbeing, and engagement.
- Potentially engage in VR activities or interact with RoboPets, if you choose to.
- If you choose to join in the activities, participate in surveys at the middle and end of the project to let us know what you thought about them.

Do I have to take part?

Taking part is entirely voluntary. If you decide to take part, you will be given this information sheet to keep and be asked to give your written consent. You will receive a copy of the signed consent form. You are free to withdraw at any time without giving a reason. Any information or responses you may have already given would then be destroyed.

What will my participation involve?

Your participation will involve completing and submitting a survey with the help of your shift leader at the beginning of the project. This will take approximately 15 minutes. You will be

given the chance to join in with the technology activities over the next few weeks. If you do this, we would like you repeat a survey in the middle and at the end of the project.

What are the possible risks and benefits?

While there are no anticipated risks, engaging in the activities may have positive or negative effects on your wellbeing. Your participation will contribute valuable insights to improving care practices for individuals in care homes.

What will happen to the results of the project?

It is expected that the results will be published as a report for West Northamptonshire Council and as an academic journal article. They will be disseminated at a relevant conference such as the Merged Futures conference at the University of Northampton. Findings may inform care home practice. Anonymised data will be publicly available on the University of Northampton's research information system, known as PURE. It will have a unique DOI identifier.

Confidentiality

All information collected during the project will be kept strictly confidential. Your name and personal details will not be disclosed in any reports or publications.

Questions and Concerns

If you have any questions about the project or your participation, please contact:

Informed Consent

By agreeing to participate, you acknowledge that you have read and understood this information sheet.

A signed consent form will be obtained from you before participate in any activities.

Thank you for considering taking part in this research.

Further information for participants:

This project has been reviewed by an ethics committee to check that your personal data will be kept secure and used only in the way you have been told it will be. Your consent will be sought for processing your data in this way. The ethics committee has also checked that data collection is "in the public interest, scientific or historical research purposes or statistical purposes... proportionate to the aim pursued" as required by the General Data Protection Regulation (GDPR) (2016, Article 9). The University of Northampton confirms that processing of your personal data will be handled in a lawful manner as required by GDPR article 89(1) and the Data Protection Act 2018 sections 19(1)(b) and (c).

Appendix D: Consent Form

Name:

Date:

Project Title: Enhancing Wellbeing in Care Home Settings through Technology-Based Activities

Researcher Contact Information ()

Please read each statement below and confirm your consent for the items.

I understand that my participation is voluntary YES/NO

I can withdraw myself and my data from the research at any point before September 30th, 2024. YES/NO

I understand that data collected during this feedback form will be processed in accordance with the University of Northampton's ethical guidelines and procedures. YES/NO

I understand that all participant data will be anonymised and that it will therefore not be possible to identify who I am. YES/NO

I understand that anonymised data will be kept in secure storage and will be deposited in an Open Access repository so that it can be used by researchers in the future. YES/NO

I have read and understood the information about the project as outlined above. YES/NO

Signed:

Name:
