FRONT PORCH CENTER FOR INNOVATION AND WELLBEING

CDW VR in Aging

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Executive Summary

With a growing population of adults age 65-plus comes a pressing need to address aging challenges, such as social isolation and loneliness, to improve health and wellness outcomes. One of the ways to address this rising need is to take advantage of opportunities afforded by new and innovative technologies like virtual reality. While the initial development of consumer VR is focused on entertainment and gaming, research and application of VR has spread to health, wellness and medical-related fields, including its use with older adults for treatments related to anxiety, cognition, rehabilitation, pain management and social engagement.

A review of the VR landscape's current and future direction in the context of older adults, combined with the Front Porch Center for Innovation and Wellbeing's (FPCIW's) own experiences with existing applications from the perspective of an aging-services provider, has suggested VR is an accessible and impactful solution for elder care. VR is most effective as a tool or medium to facilitate older adult engagement and human connection, rather than a panacea for solving social isolation. VR as a solution is only as effective as the conversations it helps produce. With that in mind, virtual reality is a viable and noteworthy tool to use for older adult engagement and wellness.

The Promise of VR to Combat Isolation

In the AARP Foundation's 2018 national report on loneliness and social isolation, a survey showed that 35 percent of adults in the U.S age 45 or older are lonely. Feelings of loneliness can be affected by factors of social isolation, which include the size and access of one's social network, mobility and physical isolation. Sixty-four percent of adults who know none of their neighbors reported feelings of loneliness. However, adults with loneliness are less likely to seek out social connections, such as talking to friends and family, attending community activities and events, and engaging in meaningful hobbies. Instead, they are more likely to continue with solo activities.

Loneliness and social isolation also strongly correlate with health risks and disabilities. According to the U.S. Administration for Community Living's "2017 Profile of Older Americans," 35 percent of adults age 65 or older report having some type of disability (hearing, vision, cognition, ambulation, self-care, independent living), with 23 percent reporting ambulatory difficulty. These health limitations contribute to the growing challenge of addressing social isolation in adults as they age.

To curb this trend of social isolation

and loneliness, stakeholders supporting the longevity market must explore innovative solutions that leverage technology for deep impact. With the power of today's technologies, such solutions can be designed and adapted to meet the need for social engagement in older adults. For example, internet-enabled video communication solutions such as Skype connect older adults with long-distance friends and family. Further, voice-enabled technologies like Amazon Alexa support safer connected environments, and robotic animal companions such as PARO help reduce anxiety and promote social interaction. Indeed, technology promises numerous opportunities to disrupt aging challenges. Another technology solution ripe with opportunity to address social engagement needs is virtual reality.

As evidence has demonstrated, VR can be a powerful vehicle to promote health, wellness and engagement across multiple populations. Based on a massive and growing body of research on the impact of VR among older adults, the Front Porch Center for Innovation and Wellbeing has been actively investigating and testing different VR products, platforms and solutions across all levels of senior care. With the sponsorship and support of CDW, FPCIW has evaluated how virtual reality can be used to connect older adults and their care circles to meaningful and impactful experiences.

Why VR?

Virtual reality has captured the interest and imagination of the public. According to a November 2018 survey by YouGov, 11 percent of adults in the U.S. reported owning VR hardware or software, and 34 percent reported knowing a bit about VR, such as related companies and games. These figures represent increases from 7 percent and 31 percent, respectively, from August 2017. Once seen as a niche object of science fiction that required sophisticated hardware, VR is emerging as an accessible consumer product. In 2012, a Kickstarter-backed company called Oculus and its immersive desktop PC-powered Oculus Rift head-mounted display launched the modern-day VR boom. Since then, significant development in the VR industry has brought smaller and lighter wireless headsets that are more affordable, realistic and portable. While originally created for and popularized by the video game industry, VR has been used by a variety of fields — including healthcare, education, journalism, art and film — to immerse and transport the user into different perspectives, cultures and experiences.

VR is of growing interest among organizations looking for innovative ways to address a range of challenges

98 million

The projected number of U.S. residents age 65 or older by 2060[1]

surrounding social engagement, caregiver support, meaningful participation and accessibility among older adults. VR has the power to send older adults who may have limited real–world mobility across the globe to ice–climb Mont Blanc in the Alps, stand atop the Eiffel Tower, revisit a childhood home or fly in a jet again — feats often inaccessible to those with impaired mobility or cognitive limitations. VR can connect older adults with friends and family who live far away, and allow users to feel like they have a seat at the table.

But a growing body of research is also finding VR to be a promising option for physical and neurological rehabilitation; for instance, as intervention after a stroke or other neurological trauma; as an aid in acute or chronic pain management; and as treatment for anxiety–related disorders, including post–traumatic stress disorder.

VR applications have had an impact on senior care and have also found their way into the media:

- AlohaVR: "Virtual Reality Aimed At The Elderly Finds New Fans" (npr.org, June 2016)
- Rendever: "Local seniors experience Patriots Super Bowl parade through virtual reality" (patriots.com, March 2019)
- Embodied Labs: "What does it feel like to have Alzheimer's? Virtual reality programs may help you find out" (*Chicago Tribune*, August 2018)
- Next Avenue: Virtual Reality Offers the Ability to 'Travel' (Next Avenue, December 2018)

What Is VR?

Virtual reality has been defined as a real–time, simulated 2– or 3–dimensional, interactive computer–generated experience that may also provide multisensory immersion (Pimentel, K., & Teixeira, K. [1995]. Virtual Reality: Through the New Looking Glass. New York: McGraw–Hill). The interactive, computer–generated nature of VR is facilitated by hardware such as a computer; gaming console (for example, Sony PlayStation or Microsoft Xbox); or a head–mounted display (HMD), which can be computer–powered (such as HTC Vive and Oculus Rift), smartphone–powered (for example, Samsung Gear VR and Google Cardboard) or self–powered (such as Oculus Go and Lenovo Mirage Solo).

VR can take the form of an experience or a game. A VR game can be also considered a VR experience, but not all VR experiences are games. This white paper will focus on immersive head–mounted displays, which come in several types.

22%
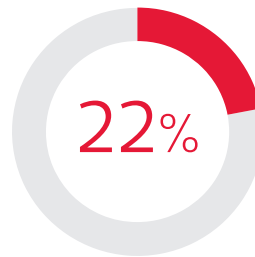
The percentage of adults age 85 or older who need help with personal care[1]

Types of VR
Smartphone–Based VR

Smartphone–powered VR headsets consist of a smartphone that attaches to a head–mounted display. The most basic of these, Google Cardboard and similar products, can be made out of materials as simple as cardboard or more durable plastic and paired with Apple iPhone or Android–based smartphone. Users who download the Google Cardboard app (or another smartphone app that supports VR) can then insert the smartphone into the headset for an experience reminiscent of the classic View–Master. Comfort and fit are minimal, and the quality of content is limited, but it is the quickest, simplest and most affordable way to experiment with VR.

Headsets such as the Samsung Gear VR and Google Daydream View offer a significant upgrade to Google Cardboard and similar products. These headsets are compatible only with specific smartphones that are powerful enough to pair with the head–mounted display's hardware. They provide superior viewing comfort and quality, which lends to a more immersive experience, and often come with a motion and touch controller that serves as a remote to select content on screen. VR headsets typically feature a media center user interface through which the user can select programs, applications and media to engage with.

Stand–Alone (All-in–One) VR

Stand–alone, "all–in–one" VR headsets are a recent break–through. Stand–alone headsets deliver the wireless functionality of a smartphone–based VR headset but remove the need for a smartphone by including all the necessary computer hardware in the headset itself — making a middle–tier HDM VR headset acces-sible to those who may not want to acquire the specific smart–phone needed to power a Samsung Gear VR or Google Daydream View. This reduces the cost to access a quality VR experience, lightens the physical weight of the headset, and increases overall performance focused on VR because the hardware doesn't also function as a phone. Oculus Go and Lenovo Mirage Solo are ex-amples of stand–alone headsets currently on the market.

Tethered VR

Tethered VR headsets such as the Oculus Rift S and HTC Vive require attachment by cables to a high–end computer, or in the case of Sony's PlayStation VR, to a gaming console. This tier of VR headsets is the most powerful of the consumer–ready VR appliances. The headsets have additional technology that enables positional tracking, which allows for a user's physical movements around a small space to translate to the virtual world

Physical/ Neurorehabilitation (such as Occupational/ Physical Therapy)	Pain, Anxiety, Stress Management	Social Engagement/ Meaningful Activity for Cognitive Stimulation	Caregiver Education/Training	Vision Impairment Aid
▪ University of Southern California Neural Plasticity and Neurorehabilitation Lab's REINVENT (stroke rehab)	▪ AppliedVR (pain, anxiety) ▪ Oncomfort ▪ XRHealth	▪ Rendever ▪ Lumeum ▪ Alcove ▪ MyndVR	▪ Embodied Labs	▪ IrisVision

(for example, if users physically step forward, they will also move forward on screen). The addition of this positional tracking adds to the realistic immersion of the VR experience, as it allows the user to move more naturally. On a smartphone–based or stand–alone VR headset, movement is typically limited to sitting with a 360–degree view in a fixed point.

Aging–Related VR Applications and Their Developers

Virtual reality developers are in high demand as more technology startups, established companies, organizations and academic institutions invest in the platform to address health and social challenges, including needs related to aging and caregiving. The use cases are vast and varied, a testament to the platform's opportunities for user engagement, wellness and health (*see Table A*). The growing body of research on VR health applications continues to demonstrate the technology's impact on clinical, health and wellness outcomes. While not exhaustive, the following summaries are examples of VR development as applied to different needs of older adults.

Physical and Neurorehabilitation

Interdisciplinary professionals focused on rehabilitation — for example, occupational therapists, physical therapists and physicians — have been investigating the use of VR for aid in recovery of motor and cognitive functions after a stroke or with conditions like Parkinson's disease or Alzheimer's disease. One example is the University of Southern California's Neural Plasticity & Neurorehabilitation Lab and their project REINVENT (Rehabilitation Environment using the Integration of Neuromuscular–based Virtual Enhancements for Neural Training). Sensors, neurofeedback and an Oculus Rift VR headset work together to treat severe motor impairment that often

occurs after a stroke. Movement of a paretic limb in the virtual world can help the body regain control of the affected limb.

Pain, Anxiety and Stress Management

The immersive nature of VR can be a powerful redirection tool for pain and anxiety management. In the ongoing fight to decrease opioid dependence in pain management, research by Cedars–Sinai Hospital in California, in partnership with AppliedVR, has found immersive VR content successful in reducing reported levels of acute pain by 24 percent among 100 hospitalized patients of varying medical condition. AppliedVR and similar companies, such as Oncomfort, use VR as a nonpharmacological tool to provide therapeutic experiences to relieve stress, anxiety, chronic pain and acute pain faced before, during and after medical and surgical procedures such as chemotherapy, radiation and even minor surgery, when paired with a local anesthetic. In the same vein, XRHealth's suite of VR apps include brain health exercises, upper body and upper extremity exercises, pain management, and a virtual therapist powered by artificial intelligence as part of the first telehealth–VR medical platform that connects healthcare providers and family members directly to patient data; the platform provides data analysis to inform a patient's physician, who can then personalize the patient's VR healthcare solution.

Social and Meaningful Activity Engagement

Owing to VR's roots as a recreational device, the amount of entertainment content is ever–growing. VR can provide on–demand, personalized experiences of travel, sports, history, education and games from a variety of media sources, such as YouTube. When carefully curated for quality and content, VR can provide a sense of participation in any activity of interest, with a first–person point of view. Research by the Massachusetts

TABLE B

Hardware and interface features of the small sample of VR solutions mentioned in this paper.

|	Alcove	Applied VR	Embodied Labs	Lumeum	MyndVR	Oncomfort	REINVENT	Rendever	IrisVision
VR Hardware	Oculus Go	Samsung Gear VR	Oculus Rift	Oculus Rift	HTC Focus	Samsung Gear VR	Oculus Rift	Samsung Gear VR	Samsung Gear VR
Requires PC	No	No	Yes	Yes	No	No	Yes	No	No
Requires Smartphone	Yes (for setup)	Yes	No	No	No	Yes	No	Yes	Yes
Individual Use	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group Use	Yes	No	No	No	Yes	No	No	Yes	No
Facilitator External Control	No	No	Yes	Yes	Yes	No	Yes	Yes	No

Institute of Technology AgeLab found that older adults who used a VR system showing travel and other entertainment–related, 360–degree video and images were more likely to feel positive about their health and emotions, less likely to be depressed, and less likely to feel socially isolated compared with those who viewed similar content on TV. Older adults can reminisce while sitting in a virtual jazz club from the 1930s, walking down the street of their childhood home, "visiting Paris" and crossing it off their bucket list — even if their mobility, health or resources may limit them from traveling outside of their community (much less their rooms, if they have severe physical restrictions).

Research–backed startups such as Lumeum (which uses the Oculus Rift system), MyndVR (which uses the HTC Focus or Samsung Gear VR) and Rendever (which uses the Samsung Gear VR) offer solutions that explore this aspect of VR use with older adults. Such solutions provide older adults with cognitive stimulation, promote cognitive and psychological health, and enable opportunities for reminiscence through meaningful and entertaining experiences. Both MyndVR and Rendever offer mobile experiential solutions and shared group viewing experiences through synchronized headsets. The ability to have shared viewing experiences promotes a critical element of social engagement. With Rendever, older adults can go on a group tour, with a "tour guide" facilitator; share with each other stories and sights from their personal history; and even play games with each other.

Rendever also features a "resident portal" where the older adult's family members and caregivers can craft personalized content that tell the older person's story in an intuitive, user–friendly way. The portal allows family members to upload, directly to the platform, 360–degree videos recorded on a 360–degree camera. With such a toolkit of features, VR can be a powerful driver of social connection through conversations sparked by reminiscences, new experiences and family engagement.

Alcove is a new VR app from the AARP Innovation Labs, and is currently available exclusively on the Oculus Go headset. Alcove promotes social connection by enabling older adult users to meet with family and friends in a virtual "home," where they can interact and speak with each other through microphones and avatars. Together, everyone can participate in social activities such as watching videos, traveling or engaging

11%
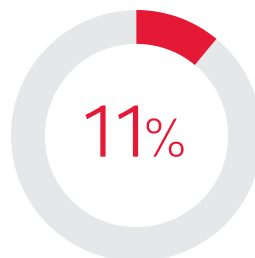
The percentage of U.S. adults who reported owning VR hardware and/or software[1]

in health and wellness exercises like mindfulness meditation. Alcove strives to be a tool to connect families to their older adult loved one even when being in the same room is not possible. It combines core features of Rendever and XRHealth to create experiences that address social engagement, family connection, cognitive stimulation, and health and wellness needs, particularly for older adults aging at home.

Caregiver Education and Empathy Training

When designing technology for an aging population, it is critical to consider not only the needs of older adults but also the challenges of their caregivers, healthcare professionals, and others who directly support their care. VR can be a powerful tool for empathy training, allowing a viewer to virtually walk a mile in an older adult's shoes. A notable startup, Embodied Labs, uses the power of VR storytelling to let caregivers, family members, staff and students virtually experience the challenges that come with aging by assuming the perspective of those for whom they provide care. Labs and modules allow viewers to "embody" a variety of experiences, including end-of-life conversations, transitions of care, Alzheimer's disease and macular degeneration. Founded by Carrie Shaw, who became a young caregiver after her mother developed early onset Alzheimer's disease, Embodied Labs strives to inspire more effective and empathetic care by creating a culture of understanding. The

The Next Direction for VR in the Aging Space

Virtual reality, once thought of as a product of science fiction and then as a platform for video gamers, has developed into a viable and innovative solution that can appeal across all generations. VR is being used to address many needs, including healthcare, training, education, social engagement, meaningful activity and cognitive stimulation. It is not a solution for every older adult, but the technology is flexible, adaptable, and continually evolving and improving.

Conducted responsibly and with clear goals (for example, for social engagement), VR can be stimulating and produce effective outcomes on its own. However, where the technology often shines is in its use as a tool or medium for conversations, the sharing of stories, revisiting memories, connecting with family members and fulfilling bucket lists. No matter what VR solution is selected, it is key to be mindful of how this powerful technology can be used to facilitate engagement, human connection and meaningful experiences.

technology can now be found at some medical schools, nursing programs, hospitals, senior service organizations and retirement communities.

Vision Impairment

Virtual reality completely immerses users in a computer-generated world that visually occludes one's ability to see the real world. With augmented reality (AR), computer-generated content is superimposed on the real world so that one sees both simultaneously.

In a compelling use case for seniors, IrisVision explores the use of AR with a smartphone-based VR headset (such as Samsung Gear VR) to aid users who are visually impaired. Using the smartphone-based VR headset's outward-facing camera, a person wearing the headset can adjust factors such as magnification, contrast and brightness to compensate for their own vision problems. This augmented vision happens in real time. Solutions such as IrisVision represent a promising sector of work making strides to solve health issues by supporting, adapting and compensating for impairments through the power of augmented reality. As AR and VR technologies continue to mature, form factors and user interfaces will improve, and applications of these technologies will likely be developed for a variety of health and function-supporting roles.

Experiences and Outcomes with VR

FPCIW has been testing and exploring VR solutions since 2016, tracking the industry's growth in relation to applications for aging patients. To better understand the need for implementation of a VR solution at Front Porch, FPCIW experimented with VR-related projects and partners. The following text highlights findings from key pilot initiatives:

Individual and Group Sessions, and Care Center Visits

FPCIW initially tested Samsung Gear VR headsets by introducing them to Front Porch communities to collect feedback from a small group of residents living independently. These older adults were briefly introduced to the VR headsets (for fit and focus adjustment) as well as the motion controller that serves as a remote for selecting content. The residents were shown how to access 360-degree videos from the Samsung VR app in the Oculus Store, and then were asked to fill out a post-activity survey to share their thoughts about the experience.

Here are insights from the trial VR session:
- When asked about favorite leisure activities that they did not participate in anymore but wished they could, residents responded with travel, sports and outdoor adventures such as sailing and mountaineering.
- When asked about the type of content they would like to

view, participants all responded with "unique experiences" and "animals," and most wanted to see "travel." Other popular categories were sports and documentaries.

- Among the trial participants, 3 out of 4 found it difficult to navigate through the menus using the controller on their own without a longer training period.
- Residents in the group felt that VR would be enjoyable both as an independent activity and a staff–led group activity.

Notable issues for the participants included the need for higher–quality footage and displays, and the need for more extensive orientation and training to use the motion controller to navigate the Oculus Store user interface. From this experience, FPCIW learned a solution was needed that could synchronize multiple headsets so that a group of residents could enjoy viewing experiences together. While residents were in the same room trying the same activity, they were isolated in their own viewing experiences. Additionally, an easier way for a facilitator to help direct the experience was needed to minimize disruption of the group viewing experience (such as repeatedly removing the headset from the resident to troubleshoot or help navigate content).

FPCIW also explored the use of VR at Front Porch skilled nursing care centers, and worked with the communities' Life Enrichment staff to identify older adult residents who might benefit from trying VR. Criteria for recruitment included residents interested in viewing VR content, residents who did not leave their rooms often, and residents who did not regularly participate in group activities due to limited mobility, limited social connections, low engagement or reasons that otherwise inhibited typical participation.

From fall 2017 to early spring 2018, FPCIW introduced VR to care center residents for 22 individualized sessions (some residents were repeat participants). Among this group, travel–related content was also a popular topic, but sessions were personalized as much as possible after conversations with each resident about interests. Due to the varied physical and cognitive abilities of the participating residents, FPCIW used observations and interviews to gauge impact on individuals rather than self–reported surveys. The following are some highlights from field notes of VR sessions by volunteer interns with residents of our care centers:

Bill was in the care center recovering from knee surgery and had just finished with his occupational therapy session. He was visibly irritated and in moderate pain but was agreeable

90%
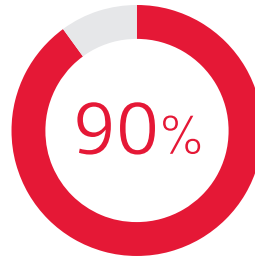
The percentage of elderly participants who reported feeling more relaxed and rated their well–being higher after engaging in VR sessions[1]

to trying VR. Bill mentioned he had traveled to Mexico before and wished he could see it again. Footage of San Miguel, Mexico, was selected for him. Bill was tense and silent at first, but he slowly started to look around with the headset on in wider and wider sweeps of his head. After the experience, he shared that he had never been to that part of Mexico and liked learning more about it from the video narration. *By the end of the session, Bill appeared much more relaxed and conversational.*

Marvin was quiet and sitting in his wheelchair outside his room. After an introduction to VR and inquiry about his interests, he viewed a video of Sydney, Australia, on the headset. Suddenly, Marvin became very animated and talkative, trying to point out and grab things he was seeing. His mood lightened, and he reported he felt "relaxed" after the experience. Marvin became a repeat participant of other VR visits, and shared that *he was not necessarily excited about the content or the technology itself but rather the human interaction and conversation the technology facilitated.*

Adelaida was simply sitting in her wheelchair outside her room when approached. She shared that she wanted to see sights of her hometown in the Philippines because she loved all its natural outdoor beauty. The VR headset did not have any footage of the Philippines available at the time, so nature scenes in Los Angeles were agreed upon instead. *Once immersed in the experience, Adelaida became very animated, reaching out and describing out loud everything she saw in the headset — the colors and details of the scene.*

Marion was anxious and irritated about her roommate's TV volume. She agreed to view a "Los Angeles Relaxation" experience on VR. During the experience, she expressed how "tranquil" and "pretty" the scenes were and seemed to relax. After the experience, *Marion opened up about her childhood growing up in Los Angeles, recalling her address, local friends, favorite activities and even a few very personal memories of her son.*

This sharing of personal stories and connections after viewing VR experiences often comes about naturally with minimal prompting from the facilitator, especially when the content is personalized and meaningful to each person. However, as FPCIW has learned from these experiences, meaningful content is only one ingredient of the experience. Isolated viewing of VR material can be interesting on its own, yet the conversations that surround the viewing activity are as much, if not more, important

Source: [1]Next Avenue, "Virtual Reality Offers the Ability to 'Travel,'" December 2018

VR in Senior Living

Every senior living community and individual will naturally have different needs and operations. The following are some general tips to help get started exploring VR solutions.

- Research and develop a working knowledge of what VR solutions are available.

- Ask stakeholders what activities are needed, valued and meaningful for the community and individual.

- Decide which needs you want to address using VR, such as social engagement, pain management and caregiver training.

- Explore solutions that incorporate some social engagement program, such as guided conversations. An alternative would be to develop a simple set of questions and discussion points to help connect the user to the content and with others.

- Test the products yourself and with key stakeholders.

- Stay in regular communication with your solution partner to share questions, answers and support.

- To continue encouraging effective innovation, share lessons and analyses with solution partners so that they can benefit and grow from community insights.

Additional Tips for Senior Living with Limited Resources

- Apply for grant funding to help purchase a VR solution.

- Partner with another organization or provider that has access to a portable VR solution to either create a VR-share program or collaborate with volunteers to visit your community to facilitate VR experiences.

- Invite volunteers, such as from university programs, to help facilitate VR groups when staffing is limited.

- Identify resident champions or "superusers" who have high interest in and understand the VR equipment. They can be a resource to facilitate resident-run VR clubs or peer groups when staffing is limited.

to evoke reflection, sharing and human connection to create a truly meaningful and engaging experience.

Connected in 360

FPCIW's project "Connected in 360" was a case study during summer 2017 that explored the feasibility of older adult residents' family member engagement by an occupational therapist intern. Using a 360-degree camera to record and create personalized content to share with the older adult loved one, FPCIW assembled a family kit that included a Samsung Gear VR headset, a Samsung Gear 360 camera, a tripod and instructional guides for operation of the devices and video uploading to YouTube. Orientation with the resident and primary family member included an overview of the devices and preproject surveys. The surveys aimed to collect data from the resident regarding self-reported health status, mood, family engagement, valued activities, and the resident's perception of his or her ability to engage in those activities. Surveys for the family member inquired about comfort levels with technology, perception of the resident's health, and how it impacted engagement and connection with family activities.

David's family was taking a vacation to his home state of Hawaii. However, David himself could not join because of health and mobility challenges that made traveling difficult. His family agreed to try using a 360-degree camera and VR to bring home some of the experiences from the vacation. During the orientation period, David shared that his top hobbies were fishing, hiking and gardening, even though he was no longer able to do these activities due to his health. His granddaughter shared that she felt David's health challenges limited his participation in family activities, and she wished it were easier to include David in family activities and events. During the Hawaii vacation, the granddaughter captured footage related to David's reported interests, including views of the ocean, sailing and nature, as well as a dinner with family and friends.

Once the family returned home, a viewing day with David was scheduled. David was irritable that day and not feeling well, but his family convinced him to attend the session. He ended up enjoying watching the 360-degree vacation videos in VR, but his greatest enjoyment came from the moments when he got to see his family members enjoying their vacation activities. What ultimately evoked the greatest reaction was the dinner with family and friends, where a 360-degree camera was placed on the dinner table. Family and friends spoke to the camera as if David was actually sitting there with them. David tried to lean in and started talking back to his friends on screen. It was a touching scene, and David's mood was significantly happier than when he first came in.

David's granddaughter reported that she felt the ability to record 360-degree videos to be viewed in VR was a meaningful way to share family experiences and help stay connected with him. However, the technical knowledge and steps required to record and then upload the videos to a 360-degree compatible video platform such as YouTube was a reported pain point. Affordable (under $300), consumer-level 360-degree cameras at the time also did not produce very clear video for viewing in a VR headset. Key takeaways from this project were that

360-degree cameras are a promising way to encourage family engagement and connection through sharing of experiences, even if the older family member could not attend events in person. Finding the right content that resonates with the older adult is also critically important. Even if David were reasonably interested in the Hawaii scenery, what he really connected to was feeling like he could still be at the table with family and friends.

Other Factors and Considerations for Older Adults

There are a variety of VR solutions to consider for senior engagement, and as the technology continues to evolve, it is important to note several issues when choosing a solution for use with an aging population.

Potential Adverse Side Effects of Virtual Reality

- **Motion sickness:** As the technology continues to mature and allow for more natural positional tracking, motion sickness as a side effect is decreasing. However, users who are already susceptible to motion sickness may not adapt well to viewing content inside VR headsets, especially content that involves motion. Motion sickness often occurs when there is a mismatch between motion that is seen and what is felt. A common tip offered by the VR community to combat motion sickness is to place a fan blowing light air in front of the user. The light wind from the fan can simulate the sensation of movement to match the action on screen.
- **Vertigo:** Those who are prone to vertigo may experience its symptoms, as being in VR can disorient users in the absence of clear environmental cues of depth.
- **Claustrophobia:** Those who experience claustrophobia may feel being in a VR headset is claustrophobic due to relative awareness of a narrow field of view.
- **Disembodiment:** Many VR experiences do not display a body when users look down while wearing the headset, which can induce a sense of disembodiment.

Safety Recommendations

- Older adults should be seated while viewing VR content to prevent falls, as their real-world vision is obscured. Users may experience a disorientation of their real surroundings.
- When possible, the VR user should sit in a swivel-type of chair for the best viewing experience. A swivel chair enables easier exploration of the 360-degree view in a VR headset without neck and back strain.
- If a user starts to feel a headache, dizziness, eye fatigue, nausea or any other adverse symptom, he or she should take a break, and the VR headset should be removed.

- Generally, users should take a break from VR after 15 to 20 minutes of viewing.

Care and Maintenance

- Choose VR headsets that are easy to clean and disinfect with alcohol-based wipes, especially if headsets will be shared among multiple users or will be used in clinical environments.
- Ensure that staff, caregivers or users know how to charge the VR device.

Functionality

- **Compatibility with eyeglasses:** Consider if a headset can fit over an older adult's glasses. Even headsets that can adjust the focal distance may not be adjustable enough to accommodate an older adult user's vision without glasses.
- **Weight:** Consider the weight of the headset; the devices may be light in hand but can be unbalanced and top-heavy while resting on the face.
- **Controllability:** Consider who will control the experience: An older adult? A facilitator such as a caregiver or staff member? For the older adult user, consider the control interfaces offered with the VR headset. Are the buttons large enough and easy enough to push, even with limited fine-motor dexterity and strength? If using with an external facilitator, is there a user-friendly way for the facilitator to direct and monitor the experience?

We Get Virtual Reality

CDW Healthcare is your all-in-one resource, an extension of your IT team, with a deep bench of experts and proficiency in the latest solutions. Our field-proven experience focuses on you, from assessment to deployment, to put you ahead of technology's challenges on day one.

We work with a variety of VR partners — including HTC, Lenovo, Acer, HP and Samsung — to ensure you have the best solution to meet your needs.

We understand you need not only technology, but also a partner that can provide knowledgeable guidance, respond quickly to your questions and help maintain your hardware and software for optimal performance.

From foundation to application and innovation, you can work closely with your dedicated CDW Healthcare account manager to access our broad spectrum of services. Our goal is to help you maximize ROI and ensure your technology investment continues to add value to your organization well into the future.

front porch

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CDW PEOPLE WHO GET IT®