Virtual reality (VR) has potential as a method for engaging in meaningful play therapy. Therapists in a variety of contexts use multiple types of activities to advance sessions with their child patients. Despite the wide availability of electronic games, virtual reality, and children’s near ubiquitous use of these technologies in their free time, there is limited adoption of these technologies in play therapy. As with any game, video games and virtual reality provide means of teaching interactions, developing problem solving, and discussing questions of sportsmanship, fairness, cooperation, rivalry, and the nature of winning and losing. More importantly, VR translates to the essential components of play: (a) the child has the capacity to make his or her own decisions; (b) the child experiences full immersion in the moment; (c) the activity in the VR environment is intrinsically motivating; and (d) the play is enjoyable, spontaneous, and not scripted.

Recently, VR applications have received considerable research and popular attention. VR has shown some promise in cognitive retraining (Lock, 2015), exposure therapy (Miloff et al., 2016), and play therapy (Mumford, 2016). Since the early millennium, researchers and clinicians have placed increasing attention on therapy modalities that can supply greater realism, fluidity, and immersion, all of which increase the functional aspects of VR for therapeutic use. Early VR play therapy started with serious games, in which the player engages in a series of complex interactions in a game play setting. This ultimately morphed into therapeutic virtual reality as it is being developed now (Annetta, 2010; Lamb, Annetta, Vallett, & Sadler, 2014). In this context, VR is understood as the use of three-dimensional graphic systems in combination with various interactive interfaces to provide the effect of immersion and interaction in a 360-degree environment (Ihemedu-Steinke, Erbach, Halady, Meixner, & Weber, 2017).

Virtual Reality Play Therapy

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VR has been used in educational contexts with children as young as 4 years old, for a maximum of 10 minutes per session with a rest period of 30 minutes, and a maximum of two sessions per day. The amount of time for each session and rest between sessions increases or decreases, respectively, as a person gets older, up to a maximum use period for the VR headset of one hour for adults per VR therapy session. Currently there are few studies on the amount of time a child can engage with VR, and this research is ongoing. In a recent study of 2,442 children aged 7 to 11, Pujol et al. (2016) suggested that playing video games for nine or more hours per week was linked to conduct problems, peer conflicts, and reduced social abilities.

Therapeutic Virtual Reality

Within the next three to five years, therapeutic VR will provide new opportunities for collecting and understanding individual patient data and analytics (Mohr, Burns, Schueller, Clarke, & Klinkman, 2013). Therapeutic VR provides opportunities for a clinician to observe a child’s abilities to engage in prospective decision-making, to recall and make use of prior cues and knowledge, to engage in socially acceptable control, and to release aggression (Didehbani, Allen, Kandalaf, Krawczyk, & Chapman, 2016). In addition to VR’s cognitive affordances, the child may benefit from VR’s social aspects, such as a view of the child’s ability to cooperate and to coordinate activities. This is advantageous, because play is regarded as the most effective setting to assess cognitive, social, and behavioral characteristics for children in a controlled environment (Harris & Reid, 2005).

Therapeutic VR is becoming a new and rapidly growing approach due its lower cost and greater availability. With this rapid growth, it becomes important to characterize the aspects of VR that provide affordances or barriers to play therapy, including the use of neuroimaging to assist in the triangulation of underlying outcomes. As computer-based VR simulations develop, the immersive nature, interactivity, and customizable nature of the environments (i.e., the broad interactivity and the realism of action), will allow children and clinicians to examine phenomena at multiple levels and to make transitions as needed to promote therapy.

Two critical factors that link VR play to effective therapeutic approaches are the increased level of engagement and the opportunity to practice. Other factors include using VR systems to guide and facilitate play interactions and to include cooperation. Children will engage with VR in therapeutic settings because, for some, it may be a more enjoyable option than others the therapist presents. Although VR cannot replace important, traditional aspects of therapy, such as relationship building, home contingencies, drawing, and creative ventilation, it may enhance these activities.

VR Characteristics and Affordances in Play Therapy

Within the VR context, both mental and sensory immersion need consideration, and each is an important feature for creating a successful personal experience. The visual, auditory, or haptic devices related to sensory immersion must change in response to user movement in the VR environment responsively and in an interpretable way (MacLean, 2008). Haptic devices allow the integration of physical contact and feedback between the computer-generated environment and the user. This integration usually occurs through input output devices, such as sensor-enabled gloves or other sensor-enabled clothing that identifies body movements and provides tactile feedback to the user. Responsiveness and feedback are particularly important in the context of VR-based play therapies. If these do not occur, users may experience vertigo or other dysphoric events, reducing the activities’ effectiveness (Ferrer-García & Gutiérrez-Maldonado, 2012). Dysphoric events will greatly inhibit the therapeutic process and potentially make a child unwilling to use the VR environment.

When used appropriately, VR environments built with therapeutic approaches and the end user in mind allow users to interpret visual, auditory, and haptic cues to gather information while using systems to navigate and control objects in the virtual environment. In contrast to sensory immersion, mental immersion refers to the “state of being deeply engaged” within a VR environment (Huang, Rauch, & Liaw, 2010, p. 1172). For example, if a VR world is designed for therapeutic use, client success in mental immersion is contingent upon how involved the user becomes with the environment (Hale & Stanney, 2014).

“Technologies have intrinsic properties and activate cognitive systems that help children to engage in meaningful learning and to solve problems.”

A second important feature that separates VR from other therapeutic technologies is the real-time interactivity in a stereoscopic 3D environment. That is, a VR system is able to interpret gestures and respond to new activities with relatively few lags in environmental changes. This responsiveness results in more authentic and real world-like immersion. Interactivity, control, and VR’s ability to respond
promotes the sensation of immersion by responding to user intentions with actions on the screen. This response allows users to visually interact with objects and to manipulate graphic objects on the screen (i.e., touching and feeling the objects using auditory, haptic, and tactile inputs; Jafari, Adams, & Tavakoli, 2016).

Technologies have intrinsic properties and activate cognitive systems that help children to engage in meaningful learning and to solve problems (Lamb, Annetta, Hoston, Shapiro, & Matthews, 2017). Therefore, a VR environment triggers the human brain’s capacity to process environmental inputs in the same way as the real world (Lamb, Firestone, & Adasheva, 2016). In short, VR technology is well-suited to convey difficult abstract concepts due to the visualization, fluidity, interactivity, and immersion ability of the environment (Stephens, Lamb, Riman, & Pearson, 2017).

The infusion of digital content information into virtual environments is now possible, making them nearly indistinguishable from reality. Most recent VR work makes use of video from the real world in both 4K digital resolution and 8K digital resolution: 4K resolution is a horizontal resolution of 4,000 pixels and 8K digital resolution is a horizontal resolution of 8,000 pixels. These resolutions are several orders of magnitude greater than what the human eye can resolve, making the images incredibly realistic and detailed at scale. The perceived immersion of VR allows clinicians to begin to address the immersive experiences afforded by VR, which we saw with Autumn.

Case Example: Autumn
Autumn (pseudonym) is a 12-year-old client, and some details have been changed to protect her identity. As with other child-centered approaches, virtual reality was a key component in Autumn’s success. Autumn was referred for anxiety and a high need to control the environment in her everyday functioning. Initial diagnostic visits provided evidence of intact perceptual systems and understanding conceptual ideas, but also the presence of a parent who provided rigid, prescribed scheduling and control for as long as Autumn could remember. Autumn did not illustrate other clinically significant cues.

Autumn was initially “trained” in the use of the VR controls via a small virtual robot avatar contained inside of the VR environment. The robot taught skills, such as how to grasp objects, how to interact with the environment, and how to walk and move in the environment. Notably, the VR system allows full ambulatory movement with visual cues demarcating the boundaries.

Many of her sessions were spent immersed in a simulation of a Jurassic-era tropical forest with a wide area to explore, including rivers, large forests, caves, and cliffs. The open and interactive nature of these environments allowed Autumn to interact and maneuver through the available activities at her pacing and planning. During her initial immersive experiences in the forest environments, Autumn exhibited timid exploratory behaviors and severe inhibition in exploring the cave and river components of the environment. Anxiety caused Autumn to approach exploration with a sense of rigidity and the repetition of mistakes. During VR sessions, she would often freeze the VR environment; she discussed how being afraid of new things may lead to less enjoyment of the world and an inability to try new things. The discussions often focused on how she felt in an environment that contained potentially threatening outcomes, and that disrupted her initial plans of how to explore the environment. Her concerns created anxiety as she attempted to cope with these environments.

Within the virtual environment, the client must continually reason, plan, and engage with unknowns. After several sessions over a period of months, Autumn came to understand the virtual reality environment, to generalize the thoughts of how she felt to thoughts of how another might feel, and to how others may respond to her actions. Ultimately, Autumn could move from self-referencing specific behaviors to assessing the impact of her activities in a wider community. Over time Autumn’s fears and rigid need to control the environment slowly diminished, and she began to function more easily in the VR environment and in the real world.

Conclusions and Future Perspectives
VR technology engages children in an immersive context and provides them with authentic experiences and a large degree of environmental control. These experiences allow children to engage in social scripting, environmental control, and exploration in a safe, soft-failure environment. This safe context coupled with the ability to collect data outside classroom and home, to interact with an avatar, or to communicate face-to-face with peers make VR functions critical to the therapeutic process.

In his work, Lamb has even begun to make use of functional near-infrared spectroscopy, a neuroimaging device, to examine the effects of cognitive retraining related to executive function using VR. Therefore, it is prudent to suggest that therapists understand how VR technology could further assist within practice. For example, through directive psychodynamic therapies in the play context, VR can be used as a diagnostic tool to determine the cause of maladaptive behaviors and to engage self-help mechanisms. This can be accomplished through clinician inquiries and greater direction through self-reflective questioning.

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VR is thought to have considerable potential for applications, and several researchers have probed its therapeutic effects on cognitive
retraining, feedback, interest, emotion regulation, and other abilities. The results mostly illustrated participants attitudes and affordance related to VR (e.g., satisfaction or perceived usefulness), and indicated improvement in outcomes. However, few researchers have examined the aspects of VR that may impede therapy, and to further identify future directions for VR use and ways to improve VR for use.

References

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