Narrative self-recreation in virtual reality

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The narrative essence of human nature is that humans are storytellers, and this ability helps to constitute our identities. Challenges that disrupt this innate ability are adverse events that affect the human perception of the world and undermine the meaning one finds in reality. Such events might range from short-term stressors to long-term testing conditions such as pandemics. Tools for overcoming these negative effects and for achieving self-preservation might be sought in individual storytelling abilities in relation to self-constitution and identification. An example of an interactive digital narrative medium that provides a platform for such expression of complex issues is virtual reality (VR), which has been used as a visual narrative storytelling tool for decades. This study sets the notion of trauma in a new light, as a break in the individual story used to explain one's life and as a story to be intertwined with and re-adapted to one's overall lifetime. In the healthcare context, this experience can be most effectively presented in VR because it offers added meaning, potential choices, closure, and resolution as methods of utilization. Therefore, VR can be seen not only as a medium whereby traumatic events can be processed but also as an alternative viewpoint of the goal of self-(re)creation. This research discusses a theoretical proposal for ways of playing with self-construction mechanisms in the context of an immersive VR environment to create more opportunities to change one's narrative and, hence, one's real-life story.

KEYWORDS

virtual reality, narrative, self-recreation, trauma, healthcare, storytelling, therapeutic approach, self-construction

1 Introduction

There exists a long tradition of efforts to address traumatic experiences through the deployment of technologies such as virtual reality (VR), which has been proven to create engaging narrative experiences that immensely aid these efforts (Franco, 2016). Virtual reality presents more options than other media, offering personalization, gradual adaptation, and therapeutic effects for various purposes, such as practicing cognitive restructuring, self-assurance techniques, and even self-actualization. Complex concepts—such as the social and interpersonal explanations of events and the meaning-making of adverse ones, catharsis, transformation, and growth—could be better understood if applied to the processes of addressing trauma in VR. The endeavor to assess trauma and create new, healthier experiences has led to exposure techniques that rely on habituation and desensitization, which surely can be best trained

in virtual simulations. However, this research focuses on narrative therapy in VR (Hammond, 2017), which offers a more holistic approach to the idea of trauma and seeks healthy ways to interpret life events in VR (Bruce, 2020). The research is based on a theoretical proposal (Georgieva and Georgiev, 2019) arguing that immersive VR is the perfect medium for visualizing people's narratives, as these narratives are complex systems that can be understood by overlooking past approaches and retelling techniques, which, in a sense, form the essence of any healing process (Twist, 2015). Corresponding research analyzes the effectiveness of personal construct therapy in comparison with other therapies, such as cognitive–behavioral therapy, which is based on an idiographic approach in which treatment is tailored to the individual regarding the construction of their identity and of their surrounding world (Montesano et al., 2021).

The interactive digital medium is a perfect place to become susceptible to influence, persuasion, and motivation when the interactor is placed at the center of events (Nikpour Khoshgrudi, 2021). In the context of trauma, this is done with the notion of high risk and with knowledge of the medium's influence. Hence, this study defends the idea that an understanding of what trauma is should be unified under the whole concept of treatment. This understanding is not only medical and psychological but also philosophical, social, cultural, and, most importantly, profoundly individual. As such, it is the perfect example of complexity depending on a plethora of factors. Indeed, personal psychological trauma is a complex phenomenon that results from accumulated traumatic experiences, from the psychological predisposition of the person, and from the context of events and factors that might never be fully definable for each person. As such, it should be addressed as a complex issue that can be resolved through narrative work in an interactive environment that adjusts to the specifics of each case and to the progression of the treatment.

Digital products, such as games, can be created to understand trauma and its causes (Higgins, 2021). More importantly, they can address trauma in the same way or even teach coping mechanisms that translate into real skills in safer and less stressful ways (Spencer, 2018). Koenitz et al. (2021) see interactive digital narrative (IDN) as a means of representing and understanding complex topics. In this sense, trauma is a phenomenon that can be assessed, understood, and treated more successfully through IDN. As the literature suggests, forming a "coherent memory" (Bailenson, 2018) of trauma can diminish its power, and VR is the tool that can most successfully represent trauma's complexity in an interactive and impactful way. Review studies have shown that the lack of interactivity in sensory simulation does not contribute to the active experience of the immersed subject, which is crucial for the healing effect of the experience (Kamkuimo et al., 2021).

Researchers have shown that there might be various narrative construction techniques for addressing trauma (Kybartas and Bidarra, 2016). This study suggests that a deep understanding of what trauma is might conceptually enrich these methods and inform the choice of method in each specific case of trauma, as each case is an instance of its own. Distancing from and externalizing traumatic events might serve as a basic method for designing interactive narrative therapy in VR (Hacmun et al., 2021).

This research will look further into the combination of such complex methods and into the possibility of representing one's personal story in VR—and of re-creating it *via* IDN tools—by connecting this idea with various narrative approaches that use models to describe personal stories. The research will propose the best theoretical approaches for obtaining significant results in growth and self-actualization after a traumatic experience as the possibility for such growth has been discussed before (e.g. Knaevelsrud et al., 2014).

2 Self-reconstruction perspective toward narrative therapy in VR

Approaches toward trauma treatment, however varied, seem to lack substantial depth in conceptualizing trauma genesis, namely, in identifying the philosophical understanding of self and identity, respective to trauma and treatment, or how to define a healed person, especially in a contradictory context when the onset of trauma cannot be explained. For example, an extreme view considers trauma to be a certain force of evolution in life, with its processing depending on coping mechanisms and the personal strength to turn an adverse event into a stepping stone (Moran et al., 2013). Would this mean that there are people who are more fit to narrate themselves out of adverse events and others who are stuck in them? In the context of trauma, it is sometimes difficult to define what is healthy and what is not yet within its limits (Perram and Ensslin, 2022). It is important to consider these inquiries seriously. However, this research examines how the virtual affects the real and in what way therapy in a virtual setting might have benefits in comparison to other treatment options, considering exactly the narrative essence of the virtual that encourages narrative therapy (Dilgul, 2021). The re-authoring experience and the provision of multiple perspectives on life issues are certain features of digital storytelling techniques for influencing well-being (Brailas, 2021).

Previous research on the topic sees trauma as a personal discontinuity in the story of one's life (Georgieva and Georgiev, 2019), and even if this concept is proposed theoretically, it still seems necessary to ask how we can understand trauma in general and the types, levels, or layers that make one event utterly traumatic for one person and transformative for another in order to create meaningful experiences within an interactive narrative medium and to reach into the core of the trauma

(Mehl-Madrona, 2015). The necessity of using therapeutic means of consolidating traumatic memories to create a coherent narrative of the events is a starting point for various therapies in VR (Frewen et al., 2020).

As a starting point, we examine the ways in which storytelling creates transformative experiences in a non-therapeutic context, as these have been present for ages and have significantly impacted people's senses of being able to overcome personal traumas through the reference and transfer of experience merely by perceiving and participating in stories, games, and works of art. It is certain that the "sharing of stories has the ability to release emotion, open opportunities for insight, and create empowerment and a sense of control over one's life" (Angus, 2013, p. 18). Could that same process be connected to our own internalization in the virtual spaces in which we redefine ourselves (Georgieva, 2011)?

This research adopts the concept that VR can offer a canvas for working on trauma by being a space of potential narratives that combine fixed and dynamic elements to address complex trauma by changing explanations and meanings that do not serve a person's well-being and to identify alternatives leading to healing experiences (Koenitz et al., 2021). Previous research also suggests the possibility of patients themselves recreating such interactive virtual worlds, seeing this as a novel approach that includes expressive writing as a life-review therapy in which reminiscence can benefit mental health (Tielman et al., 2017).

A narrative has, by default, a part that is finished by the recipient as an inevitable reaction to content. However, when a person consciously works to change a narrative, they adopt authorship over it; the benefits of the sense of choice and of owning the story, in a therapeutic context, could be explored further (Torres Pernas, 2020). When there is a possibility of choosing a different view of a story, the person can be enriched: going through interactive work reflects choices back like a mirror and provides awareness and responsibility for one's own experience (Nisi and Haahr, 2006), which is often broken due to trauma, as discussed before. It is, of course, impossible to neglect the negative consequences of a traumatic experience; however, having the sense of owning the experience might return the person to the selfhood that is displaced by trauma.

3 Discussion

3.1 Storytelling techniques that relate to healing experiences

When designing experiences in digital media, it is quite common to rely on techniques that have been proven to lead to certain narrative effects and to create the necessary interactions and results in order to produce an end experience. For example, retrospective storytelling (Bucher, 2017) is considered a way of adding meaning to something

that has happened to draw conclusions, learn lessons, and gain perspective. This is a certain way to provide the "why" when someone is curious about the event and, as such, is used in therapy to attach meaning to challenging events in order to process them and overcome their negative effects on the self (Georgieva and Georgiev, 2020). Also, memory telling (McLean, 2005) is described as a tool for the creation and maintenance of narrative identity, which helps people to reorder memories into a coherent story and to make sense of what has happened. Of course, this pertains not only to ordinary events but also to those that are most crucial for the evolution of our psyche, such as the challenges we fight to process instead of let traumatize us. These methods work well when exercising our narrative ability to make sense of the world, but when it is necessary to not only explain how things happen but also to feel like an active author of one's overall life story again (Lee et al., 2021), it is important to be able to feel creative.

The process of reflecting on one's life narrative and of externalizing life experiences through authoring tools in IDN has proven to be beneficial for mental health support (Brown and Chu, 2021). To influence the immersed person, interactivity needs to relate to decisive narrative points leading to changes in a character's life (Gallon, 2021) or highlight choices made in real life by adding meaning to them and providing a transformative experience (Ryu and Price, 2021). This could also happen through creating motivation for action (Murray, 2016), as such experience in a gamified environment might lead to performing tasks and roles that lead to confidence and to overcoming difficulties. This resembles how heroic scenarios are done, and the journey of catharsis and growth has been repeated throughout the history of narrative (Turkle, 1994). However, this study would like to propose a further perspective on the journey of the self that explains and constitutes itself through stories (Schechtman, 2012) and to see how one can re-establish his or her self through narrative in a virtual experience that does not necessarily rely on traditional storytelling perspectives. Even so, the question of how the stories would be designed and made interactive in order to unfold in a natural way is perhaps the most complex topic theoretically discussed here.

3.2 Understanding the concept of trauma to better match its treatment

This study begins from the concept that traumatic experiences are gathered under the concept of trauma. Trauma itself is a very broad notion, and understanding how we can define trauma can lead to better approaches to addressing it. Terminologically, trauma has previously been seen as a break of or in the narrative of the self, which causes a person to lose the sense of ownership and authorship of the self-narrative that helps them to constitute their reality (Georgieva and Georgiev, 2019). In a sense, traumatic experiences deprive a person of the ability to

construct a future vision of life and thus undermine humans' innate storytelling ability, which helps them to overcome adversities through retelling and making sense of such events (Redmond, 2018). This can be done to elicit heroic feelings or to transfer the experiences and takeaways of previous histories to personal lives (Rosenthal, 2003), or it can escape traditional notions of how stories go and seek other therapeutic effects of not-necessarily-happy endings. The desire to return to previous events so as to obtain a sense of mastery over the past has been discussed in other studies that see the interactivity of media as a primary way to deal with traumatic experiences (McSweeney and Joy, 2019). Hence, the best treatment approach would be to make a visual representation of the story and use the methods of cognitive–behavioral and narrative therapy traditions, combined with storytelling therapeutic means and enhanced by how VR affects the self, to create a hybrid therapy that might overcome traditional concepts. This hybrid method of IDN design could reveal how posttraumatic growth can be achieved in a story that does not follow traditional storytelling techniques but instead aims to provide certain outcomes and takeaways (Koenitz et al., 2018). For example, a cognitive narrative therapy might consider not only our senses or descriptions of life episodes but also the use of metaphors that appear to give meaning to those episodes and which support their integration so that people can move on and perceive again the positive side of their life stories (Soares, 2012).

3.2.1 Self-reconstruction mechanisms

Which processes should such therapy include? This proposal considers the following steps that combine different approaches in the service of creating a meaningful story about one's life that includes the traumatic event: personalization of the experience crafted in VR for a specific case, a design that aims to change the previous point of view toward the traumatic event, an experience that helps the person process or include these events into a coherent story, a process of explaining or finding meaning in the events, an experience that brings a resolution to the elements that are seen as problematic, and a goal of obtaining closure even if it sometimes does not include certain events. These steps to allow the person to regain ownership or authorship of their life story and eventually re-create the self that has undergone trauma into a new self that is able to overcome it. The process of claiming that new self would have the most beneficial and healing effect.

How can this be designed? For example, the cognitive restructuring process and reflection on the events can happen while the person is immersed, and these can be combined with a process of rewriting or overwriting events with positive meaning and charge. This would happen if the environment resembles the real one but with an added meaning that changes the perspective toward the events. Such a gradual adaptation of the storyline in a three-level exposure design was previously proposed (Georgieva and Georgiev, 2019), and it aims to provide an opportunity to see
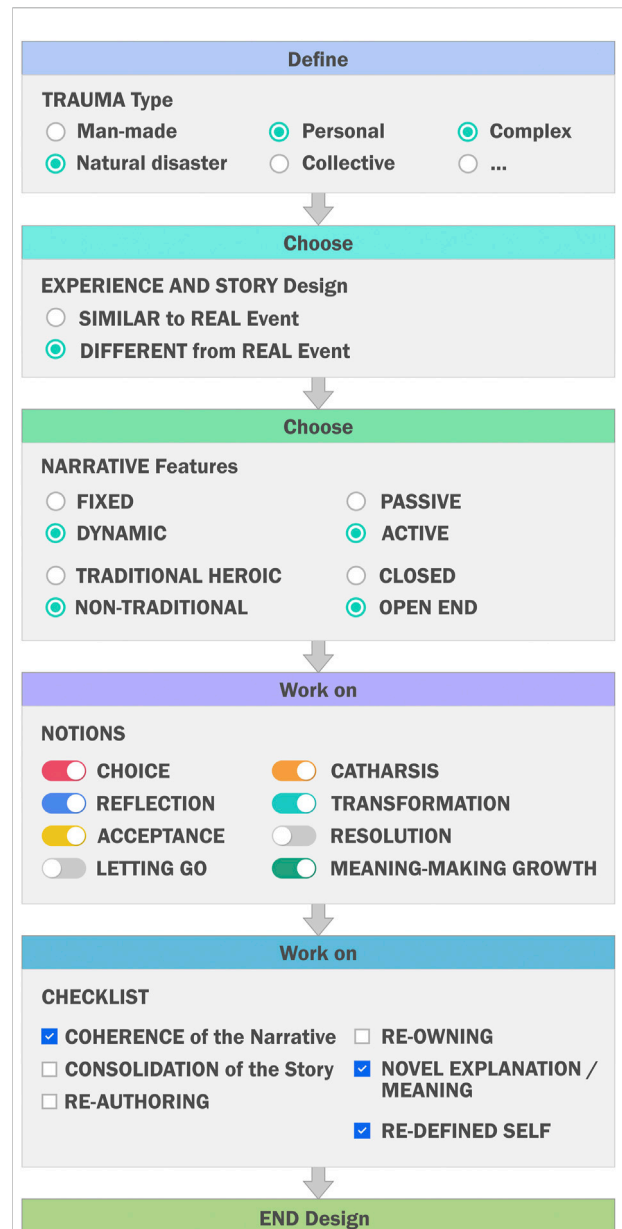

FIGURE 1
Proposal for workflow of designing IDN experience aimed at addressing trauma.

adverse events as a ground for growth and self-actualization (Neimeyer, 2014).

Even though these were previously discussed as possible approaches to address traumatic experience, whether non-traditional approaches and designs might have even stronger effects—as they are not overly represented in media—is a truly important consideration. For example, the Figure 1 proposes a design flow for the choice of immersive design based on the concepts discussed here.

This design flow represents a possible connection of concepts and following of steps that can be adjusted to types of trauma as necessary. It is not exhaustive, as other elements can be added to reflect novel findings on the subject. Similar to a research design (Botella et al., 2008) that is based on the idea of different sub-designs arranged like chapters of a book, this proposal might include episodes and types of narratives to complete the overall outcome of the therapeutic experience. In fact, the design might be made in such a way that it is completely related to real world events and yet still fantastic, as suggested in game design that deals with trauma (Mochocka, 2022). Unlike games, though, the therapeutic design should consider that some users might not be able to exercise necessary traits such as imagination (Setlak, 2022) due to trauma impact, and so the design might need to be adjusted to categories such as activeness and flexibility. It is actually most beneficial if various perspectives are acquired in order to show events from different angles and let the immersed "construct their own meaning" (Koenitz et al., 2022, p. 226) while escaping from traditional, heroic narrative features and working on specific personal experiences such as the experience of kindness in another instance (Schänzel et al., 2022). In fact, reliving an event can have a profoundly therapeutic influence if it is experienced in a significantly better way after the endured hardship or if it elicits an exactly contrary feeling that would lead to an acceptance and overruling of the past. The proposed framework of choice for the design is not limited to the notions proposed in the figure; it rather shows the process of developing the experience. This proposal is based on several basic notions about the essence of trauma, namely that the most probable occurrence of trauma is the conflict between expectation and reality, as traumatic events are beyond any imagined scenario. Rather, they are perceived as something inevitable and their impacts as impossible to change. The illusion of passiveness, because trauma is something that happens *to* a person, creates the sense of being a victim, which inevitably creates further passiveness. Therefore, we propose the ability to regain choice through interactivity and to obtain understanding that the meaning we assign to happenings, and the stories we tell about them, creates the complex experience of an event. In this sense, a change in perception might elicit changes in reality and beliefs about it in the same way as trauma influenced them. However, perceptions and beliefs are not changed easily, so a realistic and immersive environment is the best place to rework them.

3.2.2 Processes common in stories are easily recreated in virtual environments

It is important to understand why this setting should be achieved in a virtual environment. A narrative simulation can allow safe, flexible, immersive storytelling; moreover, it offers a sense of presence, ease, control, and agency. As such, it allows experimenting, forming, and reframing, and hence re-creation of the self-narrative.

What processes are common in stories? It is natural for a human being to see events as a story; however, seeing them as such can also lead to a higher-order understanding that stories have interpretations and different viewpoints. Thus, there are choices in creating a certain self-narrative, or at least the direction and conclusions one can take away from it. It is important to understand that as a result of the above processes, interpretation of certain events can be similar or different from the previous. As we can choose to create a similar or different self-representation (Georgieva, 2011) in a virtual world, we can choose the direction of the story's interpretation to match what was initially perceived, or choose to find meaning and explanation in negative events to process and accept them in a novel way. There might also be an experience in which one learns to accept negative events more easily and to practice letting go of expected outcomes. As Schechtman (2012) puts it, the actions and experiences of a fictional character interact with the life episodes of the author who creates them or the actor who portrays them. In this sense, even if a virtual story differs slightly from real events, the expected effects for a person experiencing it can lead to the necessary healing results if they follow the narrative rules for gaining a certain experience. This is possible because we, as human beings, are used to receiving certain experiences from engaging in a story and to gaining transformative and therapeutic effects, even if they are not personalized or at least not obviously personal. The result of such traumatic growth would be greater if the narrative relates to the personal story of the individual and if they have the opportunity to experience it in an interactive, transformative, and cathartic way.

3.2.3 Application of the therapeutic approach

It is important to consider the possibility that such a therapeutic approach could be effective not only for traumatic experiences but also in other varied situations when narratives must be reassessed and internalized differently. The process of re-writing events with changed explanation or meaning in order to transform and re-construct one's self-narrative is based on the concept that experiences are a form of narrative that is part of the continuity of the self (Schechtman, 2014) and that they can be acquired and internalized as knowledge or skill (Riva, 2011). This happens because a sense of presence and immersion makes it seem real (Markham, 1998). In this sense, experiencing a story in a virtual setting can work for other conditions, such as those that target acquiring social skills (e.g., autism), building motivation and changing self-perception (e.g., eating disorders), fighting with negative patterns (e.g., addiction), rehabilitation (e.g., after-stroke), Activities of Daily Living (ADLs) (e.g., movement disorders), and so forth (Roemmele et al., 2017; McMahon, 2022). This application of VR is not novel (for example, Strickland, 1997) but rather an instance of the broad application possibilities of IDNs designed to address and answer needs (Jeffs, 2009) that are more general, such as education, entertainment, training, therapy, and those that are more fine-

tuned, such as socialization, rehabilitation, cognitive enhancement (Lányi et al., 2006; Georgiev et al., 2021), building and transferring specific skills (Bryant et al., 2020), fighting with specific habits and behaviors (Rizzo et al., 2000), and reinforcing abilities such as empathy (Fenison, 2020), motivation, and creativity (Hu et al., 2021). This characteristic of interactive immersive technology needs to be understood further, as it might fit into certain niches where other attempts to restore or heal humans' balance of well-being have failed (Coyle et al., 2012). If VR has such potential as a solution to complex needs, then it can address the trigger of a trauma in a more precise way or fix unhealthy narratives that do not serve someone who suffers from its unconscious internalization.

In the words of Schechtman, experiences in a virtual setting can have a profound effect on the real self, and they feed back into self-perception and elicit behavioral changes even after the slightest exposure to such deep narratives. Similarly, a VR therapist could direct such cognitive restructuring, which influences and elicits changes in negative patterns of reality perception—that is, a self-narrative—and consequently changes in behavior in real life.

How can we define such a therapeutic approach? As it relies on intertwining a new story and explanation into one's life's storyline, it is actually a process of re-creating one's life narrative or creating a new narrative about one's life that theoretically is a form of narrative self-recreation in a virtual context (Nagy and Koles, 2014) that is open to many possibilities and adaptive in the sense that it is resilient (Schachter, 2005). Therapy is also a form of a story or a journey of the self that is grounded in the possibility of seeing oneself as an alternative hero, perhaps not like any traditional one: we speak of traumatic events where the power of the person seems undermined and exactly because of that it should be restored. If a typical story includes resolving conflicts and accomplishing goals (Bucher, 2017), then therapy can turn these aims into a canvas for overcoming the issues or the break that results from a traumatic experience, achieving relief after prolonged tension and seeing that surviving is a sufficient reward, to be perceived into different light. The process of regaining one's self after a traumatic experience can have many narrative features that might be interactively played out and acquired in VR: for example, a person can objectify the trauma and become active instead of passive, confront issues and share experiences, conduct reflective exercises such as writing and meditation (Lee and Cha, 2021), or gain multiple perspectives for self-reflection (Baker et al., 2021) that enrich the self and help to perceive trauma as a deep experience that is part of life.

Of course, the traditional hero journey can be experienced in VR, and many virtual narratives rely on it; however, here the perspective is to see in what way the change in the heroic scenario would fit the context of trauma, which is more of a self-journey to a self-rediscovery after understanding and accepting the broken self. This is a rather philosophical view toward the potential of VR for therapy—indeed, a hybrid method combining previous and novel approaches but which seeks a different perspective toward the recreation of a narrative in a virtual environment and combines methods to gain insights into the complexity of the matter (Smethurst and Craps, 2015).

3.3 Practical possibility and limitations of the hypothesis

The practical possibility of the hypothesis can defend the idea that the same processes happens through experiences in other media, such as games and film, that result in therapeutic outcomes (McSweeney and Joy, 2019) even though they are not utilized as such. This perspective offers a theoretical framework with key concepts about the narrative constitution of the self; as such, conceptualization is necessary since therapies search for the origin of traumatic experiences and carefully consider the problematic fact that each traumatic break is a personal kind of trauma and seek what its role is in learning and advancing in life for each specific complex case.

A critical approach might argue that this cannot qualify as a narrative *per se* that is used to create understanding and make sense of autobiographical events (Shibolet, 2019); however, it is a narrative if an added meaning and novel story are proposed. This research sees the possibility of further creative narrative exercises as having a therapeutic effect on the storytelling ability of the self (Gong et al., 2022a). However, it must be said that there cannot be universal narrative models (Koenitz et al., 2018), and each trauma case presents an example of profound complexity. Therefore, a sufficiently therapeutic effect is to create an opportunity to revisit the story behind the trauma and to retell it, thereby gaining a better understanding of it in order to turn it into or to replace it with a better-serving narrative of the self (Huberman, 2021). Working on complex narrative structures might show that making a simple choice or changing a single variable would result in an entirely different narrative and an entirely new reality (Rettberg and Coover, 2020). The choice to present a narrative as a role-play with an avatar can still have transformative effect on the self-representation of the immersed person (Gong et al., 2022b), as a simple change in the concept of the self has a ripple effect on the process of healing.

VR narratives in healthcare could exemplify or be used as case studies in support of this theoretical study to solve such a research gap. As a starting point, it is important to define trauma from various points of view and disciplines—for example, to identify it as man-made or not and as affecting some people and not others—and to ask why this understanding can best happen through the narrative lens. Of course, such examples in case

studies and specific use cases will be the goal of future research in this direction.

3.4 In summary

This perspective is based on previous research on the topic, and it summarizes and proposes a novel view that could be further developed and implemented. It is a changed view toward a common topic that has not sought its application in a traumatic context and so connects concepts from various fields, such as philosophy, psychology, and narrative theory, presenting an example of a complex phenomenon analysis.

McAdams' innovative theory of human identity (McAdams, 1993) claims that the way in which we define ourselves is often an unconscious process of creating a heroic myth; this is an example of an underlying way of establishing ourselves in our current reality. A personal myth is the culmination of the journey of the self in the process of shaping our personality and is defined as an integration of a remembered past, a perceived present, and an anticipated future. According to this theory, we create ourselves through myths, so every one of these myths is unique. However, it is important to ask whether we may overemphasize perceived and programmed patterns of the way things should be or should unfold, as these patterns might stop us from seeing the preciousness of every single event in human life, some of which are traumatic and truly difficult to process.

Trauma can be understood as an event that cannot be integrated as narrative memory, has no real place, or cannot be understood (Caruth, 1995); as such, the only way to address it is to work on its integration into the personal story and to find its place in time and memory to make peace with it. However, if the person is stripped of the ability to perceive notions of control, authorship, and reliability, as occurs in traumatic dissociation, they might experience further traumatic accumulation or eventually redefine what it means to be a human self in a digital world as a point of view that might oppose the proposal here or give an alternative outlook on such complex processes (Hoydis, 2021). In a sense, a therapeutic approach might be to internalize the fact that sometimes we do not have control and that letting go and building acceptance might form a kind of peace, leading to another level of resolution primarily serving to regain a sense of agency (Roth and Koenitz, 2019). This resembles a turn to religious or spiritual faith in a higher power that sees the benefit in obviously unfortunate circumstances that can be understood only by looking backward with a changed perspective or point of view and that provides peace with one's life narrative (De La Lama and De La Lama, 2011). Such a perspective can be presented as an IDN in a virtual environment; rewriting one's story might have the most beneficial effect (Baceviciute et al., 2012) of returning to one's initial open state toward life as attempting to control outcomes and not

own the responses most strongly related to the onset of trauma. It is possible to say that this notion is outdated and our lives are not dramatic, and the narrative feature is something that is constantly necessary to be restored through effort to make sense of incoherent life (Roth, 2015).

In connection to this, the research point of view here tries to support the claim that trauma is the inability to exercise this creative force rather than the lack of heroic features; it is an event that removes the ability to feel potent in creating and owning the personal story, rather than a failure to win or gain the satisfaction of a happy end. Similarly, as Neimeyer (2014) put it, the posttraumatic growth sought here is a form of meaning reconstruction as a result of crisis and loss, and it follows a form of substantial narrative disruption and disorganization of the survivor's self-narrative following exposure to a traumatic event and, as such, is transformative for the self.

4 Conclusion

It seems that the methods of storytelling that affect us most strongly can be incorporated into therapeutic means of trauma treatment, just as when the protagonist in the movie *Tenet* sees her other or older "un-reversed" self and feels an even stronger pull toward a change of perspective, integration, and empowerment towards what she has become; this is an effect of seeing oneself as a protagonist while being the author. The same effect of association can be sought while returning to past events to "fight with oneself," to see past states in a new light, to let go of unhealthy meaning and explanation, and to realize actually achieved post-traumatic growth and its extent through re-telling one's life story in VR. The same is done by playing games based on real-life principles and allegories of real-life situations through resemblance. This could happen as per the long-realized truth that as human beings we are *homo narrans* or *homo narrativus*, or as Sartre put it, "[f]or the most commonplace event to become an adventure, all you have to do is start recounting it. This is what fools people: a man is always a teller of tales, he lives surrounded by his stories and the stories of others, he sees everything that happens to him through them, and he tries to live his life as if he were recounting it. But you have to choose: to live or to recount" (Sartre, 2021, p. 61). This means that therapy in VR should result in a return to real life with a self that is ready to be a healthy author and the owner of a renewed life.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, and further inquiries can be directed to the corresponding author.

Author contributions

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Angus, R. (2013). Digital narrative counselling: Counselling children through storytelling. *BU J. Graduate Stud. Educ.* 5 (1), 17–20.

Baceviciute, S., Rützou Albæk, K. R., Arsovski, A., and Bruni, L. E. (2012). "Digital interactive narrative tools for facilitating communication with children during counseling: A case for audiology," in International conference on interactive digital storytelling (Berlin, Heidelberg: Springer), 48–59.

Bailenson, J. (2018). *Experience on demand: What virtual reality is, how it works, and what it can do*. New York, NY: WW Norton & Company.

Baker, S., Kelly, R. M., Waycott, J., Carrasco, R., Bell, R., Joukhadar, Z., et al. (2021). School's back: Scaffolding reminiscence in social virtual reality with older adults. *Proc. ACM Hum. Comput. Interact.* 4, 1–25. doi:10.1145/3434176

Botella, C., Osma, J., Palacios, A. G., Guillén, V., and Banos, R. (2008). Treatment of complicated grief using virtual reality: A case report. *Death Stud.* 32 (7), 674–692. doi:10.1080/07481180802231319

Brailas, A. (2021). Digital storytelling and the narrative turn in psychology: Creating spaces for collective empowerment. *Glob. J. Community Psychol. Pract.* 12 (4), 1–19. doi:10.17613/4h64-8470

Brown, S. A., and Chu, S. L. (2021). "You write your own story": Design implications for an interactive narrative authoring tool to support reflection for mental health in college students," in International Conference on Interactive Digital Storytelling (Cham: Springer), 312–321.

Bruce, T. A. (2020). "Enactive approaches to designing and understanding immersive interactive virtual environments in mental healthcare," in *Proceedings of the 33rd International BCS Human Computer Interaction Conference (BCS HCI 2020), BCS Learning & Development*. Keele, UK: Keele University. doi:10.14236/ewic/HCI20DC.19

Bryant, L., Brunner, M., and Hemsley, B. (2020). A review of virtual reality technologies in the field of communication disability: Implications for practice and research. *Disabil. Rehabilitation Assistive Technol.* 15 (4), 365–372. doi:10.1080/17483107.2018.1549276

Bucher, J. (2017). *Storytelling for virtual reality: Methods and principles for crafting immersive narratives*. New York, NY: Routledge. doi:10.4324/9781315210308

Caruth, C. (1995). *Explorations in memory*. Baltimore, MD: The Johns Hopkins University Press.

Coyle, D., Linehan, C., Tang, K., and Lindley, S. (2012). "Interaction design and emotional wellbeing," in CHI'12 extended abstracts on human factors in computing systems, Austin, TX. Austin, Texas, USA: ACM, 2775–2778.

De La Lama, L. B., and De La Lama, L. (2011). *Counseling a terminally ill agnostic seeking to reclaim spirituality: A narrative approach to dying well, ideas and research you can use: VISTAS 2011*. Available at: http://counselingoutfitters.com/vistas/vistas11/Article_103.pdf.

Dilgul, M. (2021). *Development and feasibility of a virtual reality group therapy for patients with depression*. London, UK: Queen Mary University of London. Doctoral dissertation.

Fenison, C. (2020). *Virtual reality training simulation-A patient's point of view: Teaching providers teamwork and empathetic communication skills via immersive perspective taking, interaction and narrative transport*, MA Thesis, Chapel Hill, NC: The University of North Carolina at Chapel Hill.

Franco, G. E. (2016). Videogames as a therapeutic tool in the context of narrative therapy. *Front. Psychol.* 7, 1657. doi:10.3389/fpsyg.2016.01657

Frewen, P., Mistry, D., Zhu, J., Kielt, T., Wekerle, C., Lanius, R. A., et al. (2020). Proof of concept of an eclectic, integrative therapeutic approach to mental health and well-being through virtual reality technology. *Front. Psychol.* 11, 858. doi:10.3389/fpsyg.2020.00858

Gallon, R. (2021). *Lights, camera, interaction! Interactive film and its transformative potential*. York, UK: University of York. Doctoral dissertation.

Georgiev, D. D., Georgieva, I., Gong, Z., Nanjappan, V., and Georgiev, G. V. (2021). Virtual reality for neurorehabilitation and cognitive enhancement. *Brain Sci.* 11 (2), 221. doi:10.3390/brainsci11020221

Georgieva, I., and Georgiev, G. V. (2019). "Redesign me: Virtual reality experience of the line of life and its connection to a healthier self. *Behav. Sci.* 9 (11), 111. doi:10.3390/bs9110111

Georgieva, I., and Georgiev, G. V. (2020). Reconstructing personal stories in virtual reality as a mechanism to recover the self. *Int. J. Environ. Res. Public Health* 17 (1), 26. doi:10.3390/ijerph17010026

Georgieva, I. (2011). The similarity between the virtual and the real self–how the virtual self can help the real self. *Stud. Health Technol. Inf.* 2011, 20–25. doi:10.3233/978-1-60750-766-6-20

Gong, Z., Lee, L. H., Soomro, S. A., Nanjappan, V., and Georgiev, G. V. (2022b). A systematic review of virtual brainstorming from the perspective of creativity: Affordances, framework, and outlook. *Digit. Creat.* 33, 96–127. doi:10.1080/14626268.2022.2064879

Gong, Z., Wang, M., Nanjappan, V., and Georgiev, G. V. (2022a). "Instrumenting virtual reality for priming cultural differences in design creativity," in *Proceedings of Creativity and cognition*. Venice, Italy: ACM, 510–514. doi:10.1145/3527927.3535205

Hacmun, I., Regev, D., and Salomon, R. (2021). Artistic creation in virtual reality for art therapy: A qualitative study with expert art therapists. *Arts Psychotherapy* 72, 101745. doi:10.1016/j.aip.2020.101745

Hammond, N. (2017). *Identity in digital space: A phenomenological study with narrative therapy implications*. Master Thesis. Athabasca, Canada: Athabasca University.

Higgins, M. (2021). *Cognitive psychological principles for game design to facilitate narrative interpretation as play*. Portsmouth, UK: University of Portsmouth. Doctoral dissertation.

Hoydis, J. (2021). Dialogues with the machine or ruins of closure and control in interactive digital narratives. *Open Libr. Humanit.* 7 (2), 1–24. doi:10.16995/olh.4695

Hu, X., Nanjappan, V., and Georgiev, G. V. (2021). Seeing from the users'eyes: An outlook to virtual-reality based empathic design research. *Proc. Des. Soc.* 1, 2601–2610. doi:10.1017/pds.2021.521

Huberman, A. (2021). "Erasing fear & traumas based on the modern neuroscience of fear (No. 49) [audio podcast episode]," *Huberman lab. Podcast notes*. Available at: https://podcastnotes.org/huberman-lab/episode-49-erasing-fear-traumas-based-on-the-modern-neuroscience-of-fear-huberman-lab/.

Jeffs, T. L. (2009). Virtual reality and special needs. *Themes Sci. Technol. Educ.* 2 (1-2), 253–268.

Kamkuimo, S. A., Girard, B., and Menelas, B. A. J. (2021). A narrative review of virtual reality applications for the treatment of post-traumatic stress disorder. *Appl. Sci.* 11 (15), 6683. doi:10.3390/app11156683

Knaevelsrud, C., Böttche, M., Pietrzak, R. H., Freyberger, H. J., Renneberg, B., and Kuwert, P. (2014). Integrative testimonial therapy. *J. Nerv. Ment. Dis.* 202 (9), 651–658. doi:10.1097/nmd.0000000000000178

Koenitz, H., Barbara, J., and Eladhari, M. P. (2021). "Interactive digital narratives (IDN) as representations of complexity: Lineage, opportunities and future work," in International Conference on Interactive Digital Storytelling (Cham: Springer), 488–498.

Koenitz, H., Eladhari, M. P., Louchart, S., Nack, F., Roth, C., Mekler, E., et al. (2022). "A shared vocabulary for interactive digital narrative (IDN): An encyclopedia project," in Games and Narrative: Theory and Practice (Cham: Springer), 207–229.

Koenitz, H., Pastena, A. D., Jansen, D., Lint, B. D., and Moss, A. (2018). "The myth of 'universal'narrative models," in International Conference on Interactive Digital Storytelling (Cham: Springer), 107–120.

Kybartas, B., and Bidarra, R. (2016). A survey on story generation techniques for authoring computational narratives. *IEEE Trans. Comput. Intell. AI Games* 9 (3), 239–253. doi:10.1109/tciaig.2016.2546063

Lányi, C. S., Geiszt, Z., Károlyi, P., Tilinger, A., and Magyar, V. (2006). Virtual reality in special needs early education. *Int. J. Virtual Real.* 5 (4), 55–68.

Lee, E., Faber, J., and Bowles, K. (2021). A review of trauma specific treatments (TSTs) for post-traumatic stress disorder (PTSD). *Clin. Soc. Work J.* 50, 147–159. doi:10.1007/s10615-021-00816-w

Lee, M. R., and Cha, C. (2021). A mobile healing program using virtual reality for sexual violence survivors: A randomized controlled pilot study. *Worldviews Evid. Based. Nurs.* 18 (1), 50–59. doi:10.1111/wvn.12478

Markham, A. N. (1998). *Life online: Researching real experience in virtual space*. Walnut Creek, CA: Alta Mira.

McAdams, D. P. (1993). *The stories we live by: Personal myths and the making of the self*. New York, NY: William Morrow & Company.

McLean, K. C. (2005). Late adolescent identity development: Narrative meaning making and memory telling. *Dev. Psychol.* 41 (4), 683–691. doi:10.1037/0012-1649.41.4.683

McMahon, E. (2022). "Using virtual reality to treat anxiety," in *Digital delivery of mental health therapies: A guide to the benefits and challenges, and making it work*. London, UK: Jessica Kingsley Publishers, 256–269.

McSweeney, T., and Joy, S. (2019). "Change your past, your present, your future? Interactive narratives and trauma in bandersnatch," in *Through the black mirror* (Cham: Palgrave Macmillan), 271–284.

Mehl-Madrona, L. (2015). *Remapping your mind: The neuroscience of self-transformation through story*. Rochester, VT: Bear & Company.

Mochocka, A. (2022). "Allegation and world-building in video games," in *Games and narrative: Theory and practice* (Cham: Springer), 315–323.

Montesano, A., Medina, J. C., Paz, C., García-Mieres, H., Niño-Robles, N., García-Grau, E., et al. (2021). Does virtual reality increase the efficacy of psychotherapy for young adults with mild-to-moderate depression? A study protocol for a multicenter randomized clinical trial. *Trials* 22 (1), 916. doi:10.1186/s13063-021-05809-1

Moran, S., Burker, E. J., and Schmidt, J. (2013). Posttraumatic growth and posttraumatic stress disorder in veterans. *J. Rehabilitation* 79 (2), 34.

Murray, J. H. (2016). *Hamlet on the holodeck*. New York, NY: The Free Press.

Nagy, P., and Koles, B. (2014). The digital transformation of human identity: Towards a conceptual model of virtual identity in virtual worlds. *Convergence* 20 (3), 276–292. doi:10.1177/1354856514531532

Neimeyer, R. (2014). "Re-storying loss: Fostering growth in the posttraumatic narrative," in *Handbook of posttraumatic growth* (New York, NY: Routledge), 82–94. doi:10.4324/9781315805597-11

Nikpour Khoshgrudi, Y. (2021). *Cyber souls and second selves*. MA Thesis. London, ON, Canada: The University of Western Ontario.

Nisi, V., and Haahr, M. (2006). Weird view: Interactive multilinear narratives and real-life community stories. *Crossings* 2, 27.

Perram, M., and Ensslin, A. (2022). The possibilities of illness narratives in virtual reality for bodies at the margins. *Digit. Creat.* 33, 128–156. doi:10.1080/14626268.2022.2074047

Redmond, D. B. (2018). Narratives of resilience. Presentation at 29th national youth advocacy and resilience conference, 72.Available at: https://digitalcommons.georgiasouthern.edu/nyar_savannah/2018/2018/72

Rettberg, S., and Coover, R. (2020). Addressing significant societal challenges through critical digital media. *Electronic Book Review*. doi:10.7273/1ma1-pk87

Riva, G. (2011). Presence, actions and emotions: A theoretical framework. *J. Cyber Ther. Rehabilitation* 4 (2), 204–206. doi:10.1093/benz/9780199773787.article.b00153438

Rizzo, A. A., Buckwalter, J. G., Bowerly, T., Van Der Zaag, C., Humphrey, L., Neumann, U., et al. (2000). The virtual classroom: a virtual reality environment for the assessment and rehabilitation of attention deficits. *Cyberpsychol. Behav.* 3 (3), 483–499.

Roemmele, M., Mardo, P., and Gordon, A. (2017). "Natural-language interactive narratives in imaginal exposure therapy for obsessive-compulsive disorder," in *Proceedings of the fourth workshop on computational linguistics and clinical psychology—From linguistic signal to clinical reality*. Vancouver, BC, Canada: Association for Computational Linguistics, 48–57. doi:10.18653/v1/W17-3106

Rosenthal, G. (2003). The healing effects of storytelling: On the conditions of curative storytelling in the context of research and counseling. *Qual. Inq.* 9 (6), 915–933. doi:10.1177/1077800403254888

Roth, B. (2015). "How Sartre, philosopher, misreads Sartre, novelist: Nausea and the adventures of the narrative self," in *Narrative, philosophy and life* (Dordrecht: Springer), 81–102.

Roth, C., and Koenitz, H. (2019). "Bandersnatch, yea or nay? Reception and user experience of an interactive digital narrative video," in Proceedings of the 2019 ACM International Conference on Interactive Experiences for TV and Online Video. Salford (Manchester), UK: ACM, 247–254.

Ryu, S., and Price, S. K. (2021). Embodied storytelling and meaning-making at the end of life: VoicingHan avatar life-review for palliative care in cancer patients. *Arts Health*, 1–15. doi:10.1080/17533015.2021.1942939

Sartre, J.-P. (2021). *Nausea*. Penguin London, UK.

Schachter, E. P. (2005). Erikson meets the postmodern: Can classic identity theory rise to the challenge? *Identity* 5 (2), 137–160. doi:10.1207/s1532706xid0502_4

Schänzel, D., Taylor-Giles, L. C., and Turner, J. (2022). "Gamifying kindness: Toward a praxis of the ephemeral," in *Games and narrative: Theory and practice* (Cham: Springer), 61–76.

Schechtman, M. (2014). *Staying alive: Personal identity, practical concerns, and the unity of a life*. Oxford, UK: Oxford University Press. doi:10.1093/acprof:oso/9780199684878.001.0001

Schechtman, M. (2012). The story of my (second) life: Virtual worlds and narrative identity. *Philos. Technol.* 25 (3), 329–343. doi:10.1007/s13347-012-0062-y

Setlak, W. (2022). "Changing scope, keeping focus: Lessons learned during the development of frostpunk narrative," in *Games and narrative: Theory and practice* (Cham: Springer), 327–336.

Shibolet, Y. (2019). *Towards a Framework for Embodied Narrativity: An enactive study of narrative phenomenology, through the lens of interactive digital media*. (Master's thesis). Utrecht, Netherlands: Utrecht University.

Smethurst, T., and Craps, S. (2015). Playing with trauma: Interreactivity, empathy, and complicity in the walking dead video game. *Games Cult.* 10 (3), 269–290. doi:10.1177/1555412014559306

Soares, L. (2012). "Take a peek at a clinical case of cognitive narrative therapy: The need for a new mobile narrative app!," in The 26th BCS Conference on Human Computer InteractionBirmingham, UK, 1–3.26. doi:10.14236/ewic/HCI2012.80

Spencer, S. (2018). *Oliver's rumination: A short video game about failure*. MSc Thesis. Rochester, NY: Rochester Institute of Technology.

Strickland, D. (1997). Virtual reality for the treatment of autism. *Stud. Health Technol. Inf.* 44, 81–86.

Tielman, M. L., Neerincx, M. A., Bidarra, R., Kybartas, B., and Brinkman, W. P. (2017). A therapy system for post-traumatic stress disorder using a virtual agent and virtual storytelling to reconstruct traumatic memories. *J. Med. Syst.* 41 (8), 125. doi:10.1007/s10916-017-0771-y

Torres Pernas, G. (2020). *Interactive narratives: The future of storytelling*. Bachelor Thesis. A Coruña, Spain: Universidade da Coruña.

Turkle, S. (1994). Constructions and reconstructions of self in virtual reality: Playing in the MUDs. *Mind, Cult. Activity* 1 (3), 158–167. doi:10.1080/10749039409524667

Twist, D. M. (2015). *People with post traumatic stress disorder heal with story*. Doctor Dissertation. Newberg, OR: George Fox University.