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Chapter 3

Games for Health: Have Fun with Virtual Reality!

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Additional information is available at the end of the chapter

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1. Introduction

> "*The beginning of wisdom is the statement 'I do not know.' The person who cannot make that statement is one who will never learn anything. And I have prided myself on my ability to learn*" (1).

Some would not expect a quote like this in a famous and heavily discussed game like "World of Warcraft" ®. And yet, it expresses our novel approach to use virtual realities (VR) in combination with the playful motivating character of digital games for clinical-psychological learning purposes. Games have a spontaneous quality, a potential for joy and flow, and are characterized by intrinsic motivation. According to our experience, playfulness in psychological intervention can dramatically increase insight processes in patients (e.g. modeling problematic situations with the help of plasticine, building blocks, paper and felt pens etc.). The progress of technology (especially virtual reality) offers possibilities for psychologists of integrating playful elements in virtual reality (serious games). In the present chapter we both, address the potential for psychology originating from the inclusion of technology and discuss problematic aspects of games as well as ethical concerns.

There are several definitions of a "game". In general, a game is a system within which players traditionally engage in an artificial conflict, trying to solve a specific problem. A game is defined by rules and measured by a quantifiable outcome (2). According to Jane McGonigal, a game has four key elements: (a) A specific goal that people are willing to work for, (b) rules that stimulate creativity, (c) a feedback system that lets individuals know how they are doing with respect to the goal and (d) voluntary acceptance of the goal, rules, and feedback systems (3). In our opinion, when it is possible to define the rules for a game, it is also possible to create tailor-made games to specifically enhance psychological well-being. The general attributes of playing a game involve spontaneity, intrinsic motivation, defined levels of active engagement and distinction from any other behavior with a make-believe

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quality (4). It is definitely a challenge to combine the motivating and spontaneous quality of a digital game with the characteristics of a psychological intervention.

Looking at psychological research about digital games over the past years, the main focus is clear. There are more studies about the negative side effects of digital games so far (e.g., addiction, social isolation, violence) than there are regarding the possible advantages of games. Given that in the 1980's the average game player was very young, early studies focused mainly on children and adolescents. Since this population grew older, digital games have become more popular and widespread. For example, the annual reports of the Electronic Entertainment Software Association (ESA) indicate that digital games have become very popular not only for adolescents, but for adults and elder people too. 72% of the American households play computer or video games; the average game player is 37 years old (34 years in 2008) and has been playing games for 12 years. Surprisingly, 29% of gamers were over the age of 50. In general, it is a 25.1 billion dollar industry (5). Another factor is the spread of videogames from playrooms to living rooms with the help of consoles and mobile devices.

At the same time, the percentage of people suffering from psychological disorders dramatically increased. Looking at the economic costs of social phobia, they appear substantial. In western societies, the concurrent estimated costs are 136 million euro per million people (6). These facts build the basis of our research purposes. When digital games are widespread and highly in use, and the need for psychological help is increasing, why not combine both? Psychological research indicates not only negative, but also a lot of positive aspects of playing digital games. There is definitely a need and a market for digital games which are combined with an evidence-based psychological protocol. Looking at peer reviewed publications in general, there is a sudden urge of "health games" research since 2008, attributed to advancements in gaming technology (e.g. Microsoft Kinect® or Nintendo Wii®) as well as the establishment of special conferences (e.g. "Games for Health Conference") (7-9). Unfortunately, so far only a few games for health have undergone a scientific evaluation to validate their effectiveness (10). In the following chapter we discuss positive effects of games for health as well as negative aspects of playing digital games in general. It is highly important to consider negative side effects, such as excessive gaming behavior as well as social isolation before integrating digital games into therapy. At the end of the chapter, we also address ethical aspects of research in gaming environments and integrating new media into psychological intervention.

2. The "fun part"

Exposition is a very powerful technique of confrontation with an anxiety or phobia related stimulus in cognitive behavioral therapy (CBT). This technique has already been used in the middle of the 20th century by behavior therapists and was afterwards adopted by cognitive pioneers such as Aaron Beck, describing the cognitive and behavioral rationale for example in one of his books 1979 (11). Early behavioral experiments showed that direct confrontation with phobic stimuli (without avoidance) leads to habituation and a substantial decrease in

anxiety in most humans and animals. The development of different confrontational methods included gradient confrontation starting with stimuli that are perceived as less dangerous on a subjective scale and proceeding to the more dangerous ones well as non-gradient procedures or flooding, which starts directly with the feared object or situation or animal etc. More recent approaches even include concepts for so called one-session-treatment, as developed by Oest for specific phobias (12).

The traditional way of confrontation is to use imagination, confrontation in sensu, or to use real life situations, confrontation in vivo. Relatively early in media development the question of possible additional forms of confrontation has been asked, e.g. “confrontation in video”. Already 2002 an article in the practice oriented German speaking journal “Psychotherapeutische Praxis” has been published that mentions the use of so-called computer simulations in psychological practice as equivalent method (13).

Virtual reality as an adjunct in psychological practice is not limited to confrontational techniques. Another relevant example is the inclusion of virtual environments in newer therapies of the so called "third wave". That term has been described by Steven Hayes (2004) as description for the mindfulness and acceptance-oriented cognitive behavioral therapies that have already been included in practical work in earlier years (14). All therapies in the third wave have that common goal to undermine destructive, or maladaptive using the traditional term, cognitions, emotions and behaviors. All mentioned therapies include experiments and a lot of training to accomplish the individual goal. As well as for confrontation, exercising in real life using mindfulness or similar concepts is quite complicated because a lot of unpredictable and uncontrollable situations happen in real life. Although of course relevant, because exactly that is the complicated aspect of life for many people, for working on a special skill or awareness is easier if disturbances are reduced.

Listening to the voices of nature around for example is a very powerful and meditative exercise in mindfulness training that can easily be ruined by an emergency helicopter landing near that spot chosen for the exercise. However, virtual environments offer 100% control including the option to simulate unpredictability in certain situations. In addition the virtual environment can easily be enhanced to increase motivation based on individual preferences of the participant.

That option to increase the motivation by using the technological and psychological possibilities is the “fun part” of working with virtual environments. The work itself is based on group work and a multiprofessional team. Only technological and psychological experts together, including aspects of treatment, design, development, programming and other relevant parts of every virtual environment, are able to develop a motivating game that is effective, includes enough options to generate individual settings based on clinical psychological diagnostic aspects and is motivating enough to actually be fun to play. What is known for children is the same for adolescents. Learning in combination with fun is more effective and guarantees long term changes. Fun in games is based on an interesting storyline, graphics and all other mentioned aspects and many others. Those basic requirements for fun already show that it is not possible that a single profession is able to create all that.

It is definitely a challenge to combine VR with the motivational character of games. Although games are an essential part of all known human cultures, the impact has grown over the past decades. Games for health offer a novel multidisciplinary working approach for psychologists, game designers and computer scientists, but they should solely concentrate on the player experience (15). We do not believe that psychologists can be game designers and vice versa, we need a strong interdisciplinary cooperation to focus on the player's needs. Psychologists can be advocates for players, providing fundamental knowledge about the impact of games, the side-effects and – last but not least – elements of therapy. Game designers provide creativity, inspiration and a motivational immersing player experience.

3. Side effects of playing digital games

Before speaking about side effects or problems that might occur with intensive or even dependent gaming behavior, an underlying methodological aspect has to be pointed out strongly. Although common knowledge, we tend to forget that the coexistence of two phenomena has nothing to do with causality. Even if we would find that gamers in general suffer significantly more often from psychological disorders than the general population, (besides the fact that there is no evidence that we could ever calculate a result in that direction) we would not be allowed to conclude that they are showing more psychological disorders because of gaming. Concluding the opposite; that people with psychological disorders are more likely to start gaming than the general population, is not acceptable as well.

In addition to the problem of causality an entire group of other methodological aspects that go along with gaming research has not been mentioned yet. Hence, a short discussion about other critical research aspects is included in the chapter about ethical aspects.

As mentioned above, most research studies concentrated on the negative side effects of playing digital games over the last years. In general, the perception of gamers in mass media is that they are highly addictive, that games can lead to social isolation or evoke depressive tendencies, and promote violence or cause aggressive behavior. As discussed the methodology of such findings has to be analyzed in depth before any conclusions can be drawn.

Yet, some studies indeed show negative aspects of using online games as mentioned above, such as problematic computer gaming behavior (16), social isolation (17), and aggressive tendencies of computer gamers (18). However, contrasting findings as in (19) exist as well, which suggest that the common stereotypes of online gamers are wrong.

3.1. Problematic computer gaming

Although widely and inflationary used, there is a huge lack of conceptualization in the concepts of "pathological computer gaming" or "computer game addiction". Several definitions, criteria and descriptive symptoms make it very difficult to characterize the

maladaptive behavior of problematic computer gaming. An analysis of the studies over the past years reveals that some core criteria seem to be relevant over conceptual frameworks and might therefore have an especially high relevance for operationalization (a) withdrawal symptoms, (b) relapse/loss of control, (c) tolerance, (d) preoccupation, (e) negative consequences and (f) mood modification (19-21). Some authors suggested that the elements such as mood change, tolerance and cognitive (and not behavioral!) preoccupation should be explained better by using the term "highly engaged gamers", because the players show merely symptoms according to a high level of interest in the given activities. Therefore, it makes sense to distinguish between an "addictive" and an "engaged" behavior (20). There are significant differences between highly engaged players and "addicted" players, with highly engaged players often mistaken as addicted. "Addicted" players spend significantly more time playing MMORPGs, and there are more negative consequences in their lives (resulting in poorer quality of life), in comparison to highly engaged players. Therefore it makes sense to distinguish between these two types of gamers (20, 22).

Beyond these discussions about terms and definitions of problematic behavior in computer games, recent research as in (16) indicates that there are differences between several game types regarding problematic computer gaming behavior and psychopathology. Especially "Massively Multiplayer Online Role Playing Games" (MMORPGs) are one of the game types which are often associated with problematic behavior. Especially the social elements of MMORPGs lead to addictive behavior (23, 24). Other computer game types, such as real-time strategy games and ego-shooters, are less linked to problematic computer game behavior as a form of a behavioral addiction.

3.2. Social isolation of gamers

The general stereotype of a gamer is that he or she is socially isolated and sitting alone in front of a computer. Several studies succeeded in revealing the contrary. For example, some found MMORPG players not to be socially isolated, instead interacting in real time with other players to gain goals and achievements and in order to survive (25). MMORPGs require a certain level of social skills; unsocial behavior is not accepted in most guilds of MMORPGs such as World of Warcraft®. Yet, this observation is not limited to MMORPGs only. The majority of recent Ego-Shooters and Real-Time Strategy Games are also playable online with the possibility or exigency to interact with others (26). Studies show that playing computer games for reasons like relieving loneliness or escaping from everyday life problems leads to problematic behaviors mentioned as the first negative aspect (16, 27).

3.3. Violence in computer games

Another common stereotype, especially communicated by mass media, is that the average game player is aggressive and violent. Indeed, many popular computer games on the market include explicit violent and aggressive content. Usually, playing these games is associated with real life aggression. A meta-analytic review seems to support this opinion (28). Moreover, several current studies revealed that virtual violence may lead to

desensitization in real life, partly confirming these assumptions using fMRI (29). These studies show that the act of killing virtually is connected with a decreasing potential in regions of the brain which are associated with empathy. Nevertheless, the impact of computer games with violent content on aggressive behavior should be discussed very critically. In fact, there is no clear evidence about the causality. We do not know whether games cause aggressive behavior, or players with aggressive behavior tend to buy games with violent elements. This would ignore the possibilities that people with higher trait aggression play violent games, or players discover this negative emotion of aggression in a controlled environment to explore their own self (30).

4. Positive effects of virtual reality and digital games

While some researchers focus on the negative effects of computer games such as the aforementioned "game addiction" or violent behaviour, we emphasize the positive aspects of VR and digital games. Literature suggests, that with the appropriate design and use, digital games have the potential to be very effective psychotherapeutic tools (31). Technology is changing the psychologist-patient relationship in every way, and helps to provide visual and auditory stimuli that are difficult to generate in real life settings. Psychologists are able to create new VR environments in which patients can engage during a therapy. To date, the effectiveness of VR in therapy is investigated in the treatment of anxiety disorders, phobias, addiction, depression and attention-deficit hyperactivity disorder (ADHD) as well as a tool for stress management (31).

Usually patients interact in VR with the help of peripheral devices, such as head-mounted displays and keyboards. The effects of virtual exposure to flight, heights and social settings are well studied (32, 33). They can be more cost and time effective for both therapists and patients, thereby improving the accessibility of therapy to individuals who may previously have been unable to afford treatment. Over the past decades, with the spread of new technologies (e.g. Internet, video game consoles, mobile devices) in households across various social classes, psychologists tried to integrate VR to provide low-threshold, efficacious and less time-intensive interventions (34). For example, VR combined with biofeedback (BFB) is a scientifically proven method that includes technological feedback to provide body relaxation. Decreased anxiety and physiological arousal have been demonstrated in patients who gained insights into their physical arousal immediately on a computer monitor and who consequently learned to control their bodily functions. In general, there is an estimated savings of $540 – $630 per client when new technology is integrated in therapy (34, 35). Furthermore, a variety of research has been conducted on technology-aided interventions such as online-based self-administered interventions, and promising results concerning anxiety and stress reduction have been reported (36). Self-administered treatment programs provide cognitive-behavioural therapy (CBT) with minimal therapist support, but effective outcomes (37, 38). These programs lack game plays and reward systems, they are not games per definition. However, these studies provide answers to the crucial basic research question, if technology-aided interventions are successful at all. VR has been used successfully for the treatment of phobias, using protocols

based on CBT. CBT is the so called goldstandard when it comes to treatment of phobias (39). Usually, exposition in CBT treatment can be performed in vivo or in sensu. We propose a third approach "in virtu", demonstrating similar effects to in vivo or in sensu (33, 39-41). Garcia-Palacios and colleagues state that most patients suffering from phobias prefer VR over in vivo therapy (41). Accordingly, Piercey and colleagues find that the presentation of spiders in VR produces significantly increased skin conductance responses in arachnophobic patients, who perceive the virtual surrounding as "real" (39). In general, these results suggest that the use of technology in therapy can dramatically enhance insight processes (36).

Moreover, VR can be well combined with the motivating character of (serious) games. They offer plenty of varieties of social interaction with other users or non-playing characters/avatars. Almost any real life situation can be displayed in VR. Gaming in general is perceived by many gamers as a positive emotional experience, with positive effects on emotional health. Stress and psychophysiological arousal are important triggers and maintaining factors when it comes to the aetiology of many psychological disorders. Tailor-made games provide innovative ways for health improvements using stress management methods (4). The biggest impact of games with psychological intervention purposes is the potential to increase motivation through a mechanism that is usually activated in games within the context of play. There is a certain trend in the last years, most studies focus on the outcomes of exercise and rehab games and the games concentrate on physical activity and nutrition (7). So called "exergames" are interactive video games combined with exercise and movement. Exergames such as interactive dance videogames are very popular among adolescents; they can cause an increase in heart rate and physical expenditure. In their study of "Dance Dance Revolution", Maloney and colleagues found potential to use exergames to boost physical activity among overweight and obese adolescents. There was a significant improvement of physical activity in a treatment group (12 weeks of playing "Dance Dance Revolution"), compared to a decrease in a control group (42).

The use of videogame consoles as an analgesia treatment alternative has been studied at the Burn Center of New York Presbyterian Hospital (43). Most burn injury patients feel an intense amount of pain as the body repairs itself, together with extreme anxiety. These factors can lead to less commitment to medical exercise regimens, resulting in limitations in movement. Nurses often play videos or music to distract burn patients from pain. In the last years this treatment has been combined with VR environments such as "Snow-World", a virtual reality set in cold surroundings like the Arctic to distract burn recovery patients from pain (44). Video game consoles work on similar premises. Nintendo Wii ® is a popular console with motion sensors; it allows modulating therapeutic environments as well as the duration of the exercise. Although it is difficult because of the diversity of burn patients to devise standard treatment protocols, the authors conclude in general that the potential of digital games as analgesia is enormous. Burn injury patients can use a defined set of physical games, the gaming system records the progress and the movements of the player and sends the data automatically to a therapist, who is able to adjust the therapy according to the progress (43). Yohannan and colleagues state that burn

patients can benefit therapeutically from videogames. In their case study a burn patient performed better after a game treatment over two weeks in terms of reaction time and maximum excursion than conventional therapy alone. The functional mobility increased faster, there was more motivation for the therapy when game-based interventions were included (45).

Some studies focus on games especially for older people. This is no surprise given the fact, that the average game player is 37 years old, and an estimated 29% of the gamers are over 50 years old (5). Older people can benefit from digital games as well; they have a positive impact on their health condition and improve their capability to carry on activities in their everyday life. The key factors of an interest in games for health are challenge, socialization, escape from a daily routine and fun. Focus groups stated that they would use specifically designed digital games on a daily basis (46). VR and digital games provide the opportunity to support the independence of older people. Especially in rural areas, where distance makes it inconvenient for older people to access adequate health services, technology can provide easier possibilities to measure the health status. In their narrative review, Marston and Smith identified several possibilities of using technology for older people. Commercially available game consoles, such as Sony Playstation with EyeToy ® or Microsoft Kinect ® make it easier to provide older people with exergames for rehabilitation purposes (47). Several studies report a positive outcome when it comes to fall prevention and stroke rehabilitation. Especially Nintendo Wii ® facilitates wrist rehabilitation by specifically designed programs (with the possibility to add joint therapies for knees or elbows) (48). In general, the results are promising. The use of games for health (both off-the-shelf or specially designed for rehabilitation purposes) can have a dramatically increasing effect of the physical abilities of older people (47).

Contrary to studies about exergames, there are only limited studies about games especially for psychological health. One example is “SPARX”, an online role-playing game for the treatment of depression (http://sparx.org.nz), based on a CBT protocol. The player can choose an avatar and undertake a series of challenges in a virtual fantasy world. The main goal of the game is to restore a balance of “Gloomy Negative Automatic Thoughts”. There are seven modules (e.g., psychoeducation about depression, activity scheduling and behavioral action, dealing with emotions, problem solving, cognitive restructuring and relapse prevention) over 5 weeks available. Intervention studies revealed promising effects. There were significant decreases of depression scores, compared to a waiting-list condition. “SPARX” seems to be an innovative and effective game-based treatment for students with symptoms of depression (49). Another study examined the effects of an online-based self-administered social skills training with playful elements, especially for shy students. This online-training consist of 14 text-based lessons, combined with playful elements such as “identifying negative automatic thoughts” with the help of a drag-and-drop game. Lehenbauer and colleagues revealed significant effects of this training, a highly significant increase of social skills as well as a highly significant decrease of social fears in the intervention group, with no results in a control group undergoing no intervention (8, 50).

5. Ethical challenges

In light of manifold possible applications of technology in therapy and research, there is a discussion about related ethical principles and their field of scope. Research in virtual environments should follow all "standard" ethical principles and has to take the special setting into consideration. Interestingly especially qualitative researchers have dealt with ethical aspects of researching gaming environments over the last years (51, 52).

We suppose that the same ethical principles, which pertain to conventional psychological treatment and therapy, should also be applied in technology-aided psychological treatment (53). The manifold risks psychologists are confronted with as well as the ethical dilemmas that may arise from the adoption of technology in the realms of treatment, may be significantly different from those encountered in conventional face-to-face counseling psychology. In online-based communication, psychologists are confronted with the same probability of encountering distressing information (e.g. a suicidal attempt of a client), yet online-therapists are a lot less likely to fully apprehend the severity of this attempt if not being confronted with the patient face-to-face (54). Furthermore, absolute certainty about a client's true identity is difficult to be achieved in digital settings. It seems that these facts make it more difficult to provide effective treatment (55).Last but not least, it is necessary to consider negative side effects of digital games, as pointed out above. We believe that we can't create digital games with a specific psychological protocol, even if evidence-based and studied before, and leave the patients alone. There has to be a certain level of guidance from a psychologist. It is necessary to consider these facts to engage in a discussion about implementing new, even more specific guidelines for technology-assisted therapy. Ethical guidelines regarding the use of VR and digital games are scarce at best. To date only few mental health organizations respectively psychologists' associations have issued specific regulations, most of which pertain to online-counseling or e-therapy (56).

To date, the American Psychological Association or the European Federation of Psychologists' Associations lack specific regulations. On the other hand, specialized organizations such as the International Society for Mental Health Online (ISMHO) or the American Mental Health Counselors Association (AMHCA) stress the importance of taking into account basic ethical principles like beneficence, nonmaleficence, autonomy and confidentiality when implementing any sort of technology-assisted training. Only then, ethically sound treatment of patients can be ensured. First of all, in terms of beneficence and nonmaleficence, it has to be ensured "that clients are intellectually, emotionally, and physically capable of using technology-assisted counseling services, and of understanding the potential risks and/or limitations of such services" (57). For example, some minor groups of people who never had any contact with technology (e.g., a personal computer) or elderly people may feel intimidated by VR or digital games and may not accept them as tools for psychological treatment. Compliance may be hampered for this group of clients. Additionally, there are some mental disorders for which specific technology based treatments are not recommended. Because of their immanent difficulties of separating reality from fiction, it is argued that VR can have negative side effects for some

schizophrenic and psychotic patients (55). Patients in crisis situations as well as borderline patients, who are even in a greater need of face-to-face interaction than an average patient should not be treated exclusively via the Internet or using solely VR-applications.

We emphasize that special focus has to be put on the informed consent process when intending to use technology or conducting treatment via technological applications. Patients have the right to be fully informed about the potentials and the limitations of any technology such as the circumstances under which it can or cannot be applied to the patients' situation (58). Patients have to be provided with the information about what data is being collected about them when using the technology. They should furthermore be informed about the location it is stored at and about how long it is intended to remain there. To mitigate breaches of confidentiality, all measures have to be taken by the treating psychologist to ensure secure data storage no matter what kind of data is collected (e.g. physiological measures when using biofeedback). When providing Internet based services, psychologists should utilize secure web sites, firewalls and encrypting programs (56). In order to avoid any harm to patients, psychologists should possess adequate expertise concerning the technology they apply. In terms of serious games for health, this includes knowledge about maladaptive gaming behavior as well as any other negative side effects. Psychologists are to assure that their treatment method is in no violation of local laws or ethical regulations such as professional membership organizations (57).

Although not directly connected with ethical aspects regarding humans the possibilities of VR to reduce the suffering of animals "used" in treatment has to be mentioned and underlined (59). Confrontation in virtu seems to be an extremely powerful form of exposition that might not only be used as adjunct, but even as replacement for in vivo therapy. As described above there exist a lot of different forms of specific phobias and a relevant part of those pertain to animals. Exposition in vivo clearly means that animals have to be handled by the therapist and by the patient for a long enough time to let the anxiety level go down. Speaking of a session that might last up to a couple of hours the stress on the included animal(s) is obviously unbearable. That stress may reduce the quality of life of the animal and lead to behavioral disorders as well as physical illness or under the worst circumstances it might even end the animals' life. For example including wasps in order to treat "spheksophobia" leads to the death of many animals; they tend to kill each other in an area that's not large enough in relation to their natural environment. The question has to be asked if the suffering of animals is acceptable to treat a patients' phobia. Technology offers a very interesting alternative that shows a way without the discussion of ethics in human-animal-interaction or thoughts about animal experimentation. Working with animals in virtu includes all positive aspects of virtual environments that were mentioned before and does not harm any other living being while having a powerful effect on the patient. Rethinking the ethical problems of harming an animal or worse might be a burden for some professionals that can easily be reduced by employing technical adjuncts to therapy.

All in all, the integration of technology in psychological treatment has experienced a vast surge during the last couple of years. Ethical boards and psychological researchers are even

more enforced to consider possible harm as well as potential that may arise from VR usage and transfer them into comprehensible, internationally applicable ethical guidelines.

6. Conclusion

Interestingly the focus of research on gaming has been relatively narrow in direction of problematic behaviour in combination with gaming. In relation the developmental side has been more or less neglected by some research groups. But especially experts on gaming behaviour are equipped with knowledge and skills that would enhance the development of interventions.

The development of interventions is mostly based on cognitive behavioural theories in psychology and psychotherapy. As these theories are based on well known learning research the fun aspect of games for health has been identified to be a core aspect for efficiency. To create fun in a virtual environment a game character of an intervention is the number one option. Good game design is difficult to achieve and not possible for psychologists. Multiprofessional teams and respectful interaction in those teams are needed to create an effective intervention with the mentioned fun aspect. In addition new fields are opening for computer scientists as well as for psychologists. Job opportunities are going to include less traditional positions. Psychologists might grow to be more developers and designers of interventions that are used with only limited help afterwards. Computer scientists might increase their focus on human-technique interaction and psychological aspects of technology. Both professions need to develop a sense of interdisciplinary work and different viewpoints of the same phenomenon.

Ethical considerations in the development of virtual environments have to be discussed with different professions and the intended target group. Of course the side effects need to be considered as well, and extensive differential diagnostics in clinical psychology are a prerequisite for participants as long as research was not able to show clear directions in causal relations.

A very relevant question that needs to be discussed for the future ist the availability of the developed and evaluated interventions. Who is going to be allowed to buy VR interventions? Based on open source ideas and the powerful empowerment aspect of knowledge free distribution is a very appealing way. A number of problematic thoughts are related with free distribution, amongst other aspects the following points have to be considered: (a) subjective value of the system: some theories suggest that free help is valued less or considered as not effective as help one has to pay for. (b) Use for other as the intended purposes. (c) Efforts of the developing team and their value system. (d) self help systems as an option or different modes (well known from self help guides with supplements for professionals – or the other way round).

We state that there is definitely more research needed to draw a clear picture of positive outcomes of games for health. Most studies in this area often included trials with small sample sizes, only a few include large scale trials. Some studies also lack explicit exclusion

criteria as well as the establishment of control groups. Kharrazi and colleagues state that most studies regard a relatively short intervention period (1 ¼ months) as well as a lack in theoretical frameworks (7).

The third wave in behavioral psychotherapy looking at mindfulness, acceptance and commitment as well as compassion targets all needed prerequisites for personal change, enhancement of well-being, work-life-balance and many other concepts that are often present in the media. The fact that second life has a huge mindfulness group with people meeting for meditation and the growing number of mindfulness or (self-) compassion apps for iPhone, Android, iPad and other hardware shows that technology might as well be the cure to an enhanced life. A psychological and psychotherapeutical virtual environment allows us to change our viewpoint and monitor, develop and/or optimize our behavioral as well as cognitive patterns. Including assessment functions or psychophysiological measures the individual possibilities seem never ending for designing treatment protocols. Playing a game for health means change in the sense of self-actualization as well as in the sense of treating disorders with many additional possibilities real life can not offer.

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