

Brothers in Arms?
Moderator variables, protective perception, addiction,
and positive effects of digital games

**Manteltext der kumulativen Habilitationsschrift zur Erlangung der Habilitation im Fach
Psychologie an der humanwissenschaftlichen Fakultät der Universität zu Köln**

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You might recognize that some titles of the following text are at least related to specific songs or bands. Music saved my life – and my work, especially the music battling contests and new influences. Best of all, everybody important in my private and business life relates to me via music. I hope and I *know* that the persons who deserve to be in this acknowledgments list will connect and find themselves with the following. Therefore, I would like to thank: all the classical, metal, and gothic stuff, especially my headbanger and ‘grufti’ friends for finding a way to deal with pain. And I would never forget where I came from, so thanks to the grunge music and friends – you are still the most important factor for my own mood regulation. In addition, (some of you might be disturbed right now) last but not least: thanks to the *good* techno/house/minimal music which kept me on track when there would have been so much distraction. And there goes my special thanks to the best of all distractions; thank you Paule (Kalkbrenner) for keeping me alive during travelling, being challenged, catching my emotions, and my experience while listening - thank you for Aaron ♥

‘this is my kind of love, the kind that moves on, the kind that keeps me (not) alone.’

(Mother Love Bone, crown of thornes, 1990)

Julia, Jules, and the other ones

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- Elson, M., Breuer, J., Van Looy, J., Kneer, J., & Quandt, T. (2013). Comparing apples and oranges? Evidence for pace of action as a confound in research on violence in digital games. *Psychology in Popular Media and Culture*. doi: 10.1037/ppm0000010
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Abstract

This paper is a summary of nine articles including eleven studies which are used as paper-based habilitation in order to achieve the habilitation in Psychology at the Faculty of Humanities at the University of Cologne. The first two articles focused on moderator variables which are discussed to potentially cause ambivalent research results on violent digital games and aggression. Two further articles dealt with the perception of digital games and implicit defense reactions of the younger generation when being primed with game content. In addition, two papers were included which focused on digital game addiction and risk factors. The next game-related study investigated positive effects of digital games on mood regulation. Based on the results of games as effective tool to distract from negative states and two further studies on the topic cognitive dissonance and smoking, some basic ideas for a serious game for smokers are presented as outlook.

Zusammenfassung

Die vorliegende Schrift stellt eine Zusammenfassung von neun Publikationen dar, die sich aus insgesamt elf Studien zusammensetzen und als kumulative Habilitationsschrift zur Erreichung der Habilitation im Fach Psychologie an der humanwissenschaftlichen Fakultät der Universität zu Köln vorgelegt werden. Die ersten beiden Artikel fokussieren auf Moderatorvariablen, die als mögliche Ursachen für die ambivalente Ergebnislage im Bereich gewalthaltige Computerspiele und Aggression diskutiert werden. Daran anschließend werden zwei weitere Artikel zum Thema Wahrnehmung von Computerspielen und implizite Verteidigungsmechanismen der jüngeren Generation vorgestellt. Zwei weitere Publikationen beschäftigen sich mit dem Thema Computerspielsucht und möglichen Risikofaktoren. Ein weiterer computerspielbezogener Artikel behandelt das Thema Stimmungsregulation durch Computerspiele. Aufbauend auf den Ergebnissen dieses Artikels und zwei weiteren Arbeiten im Bereich Rauchen und kognitiver Dissonanz werden abschließend erste Ideen zu der Entwicklung eines gesundheitsorientierten Computerspiels für Raucher vorgestellt.

Overview

Popularity of digital games has grown since the first worldwide known digital game named Pong was released by Atari (1972). Forty years afterwards, digital games are still in the focus of public and scientific debates – not only discussing possible negative effects especially concerning aggression and addiction but also starting to focus on potential positive outcomes, for instance mood repair.

However, most game research still emphasizes possible influences on aggression. This might be due to the fact that results on this topic always were and still are inconsistent. The scientific debate is not only ongoing but has also become trench warfare. Instead of trying to combine investigations from “both” sides in order to clarify *why* results are so ambivalent, most publications only follow one side and publications from the other side are not even cited (Elson & Ferguson, in press). One major problem might be due to the fact that digital games are especially loved by the younger generation. The ongoing debate about digital games and the “not-understanding” of the older generation is therefore probably resulting in reactive behaviour of the younger ones which is then mistaken as aggressive. It wouldn't be the first time that new media content is loved by the younger generation while older adults are still very concerned about possible negative effects..

Therefore, my own research first focused on the question why the results on violent digital games are so ambivalent. Besides violent content of digital games, other variables might influence behavioural, emotional, and cognitive outcomes. We have to keep in mind that nowadays participants of such game studies are in most cases members of the so called net-generation (Leung, 2004). This means, they all grew up with digital games as “normal” leisure time activity. Therefore, negative effects might mirror something else than real aggression: Protection of peers and own or peer-relevant free time activities.

The first two studies presented here investigated two moderator variables which influence aggression apart from violent content (Elson, Breuer, Van Looy, Kneer, & Quandt, 2013; Glock & Kneer, 2009a): game speed and playing experience. The results of the second publication indicated that playing experience is an important factor for the activation of aggressive concepts when being primed with violent games. Following those results, the next studies focused on the net-generation and implicit associations with digital games (Kneer, Glock, Beskes, & Bente, 2012; Kneer, Munko, Glock, & Bente, 2012). The results of these two studies indicate implicit

defense tendencies when it comes to digital games and associated negative categories, for instance, aggression. In addition, the second study revealed that younger adults associate positive outcomes to digital games which are linked to two original game play motives: social interaction and achievement. However, the results also give some hints that younger adults perceive one playing motive as negative: immersion. Immersion is defined as escaping from daily life (Yee, 2006) and often seen as “wrong coping” mechanism. Therefore, members of the net-generation might interpret immersion as connected to another possible negative result of game play which is – in contrast to aggressiveness - taken very seriously by younger adults: digital game addiction.

To investigate possible outcomes of game playing and the interplay of differences in the underlying motivation, the next step of this research project focused on problematic and non-problematic players and their implicit and explicit playing motives; especially immersion (Kneer & Glock, 2013), independent of the game genre. The results of this study confirmed that problematic playing behaviour is connected to immersion as playing motive. The next studies focused on interviewing experts in the field of digital game addiction (Kneer, Rieger, Ivory, & Ferguson, under review). Besides counsellors, we interviewed players about their knowledge of factors which might contribute or inhibit the development of a digital game addiction. Players as well as counsellors are aware of digital game addiction and name three main risk factors which are independent of the game genre: bad social ties, low self-esteem, and immersion. However, players name also some game-related factors which are not only able to inhibit the development of addiction but are able to help players in general.

Besides the negative effects of games, it is important for me to present some positive aspects of digital games (Rieger, Frischlich, Wulff, Bente, & Kneer, revision). Similar to other media, games might be able to regulate negative mood and might be even more successful compared to non-interactive media. Interactivity is the main criteria for digital games which other media (e.g., TV) are not able to provide. Based on research on non-interactive media and their impact on mood regulation, we conducted a study in which we compared non-interactive media with digital games. We found that digital games are better able to foster mood regulation than comparable non-interactive formats.

Last but not least, besides investigating the moderators of negative and positive effects, I suggest a possibility of how to use the fascination about digital games for good by modeling a basis construct for a serious game. My suggestion is based on insights regarding health communication and behaviour – in this case smoking behaviour and how digital games can be a

form to provide help when it comes to quitting smoking. Two of my publications focused on dissonance reduction strategies used by smokers (Glock & Kneer, 2009b; Kneer, Glock, & Rieger, 2012). Results showed that focusing on health-damaging consequences like warning labels on cigarette packages only led to short-term cognitive dissonance. If the goal is to change behaviour, for instance, quitting or at least reducing smoking, long-term cognitive dissonance is needed. What we know so far is that socializing and stress reduction are the two main smoking causes for someone to start and to keep smoking (Glock, Unz, & Kovacs, 2012). A computer game which is about smoking offers the possibility to induce long-lasting cognitive dissonance by threatening these two main smoking causes (e.g., smoking is not relaxing and smoking is not cool). At the same time, such a game is able to offer different strategies compared to smoking which relates to mood repair and might in addition help against craving.

1 Much ado about...what exactly? Aggression and the impact of moderating variables

1.1 Speed... give me what I need: The role of pace

Elson, M., Breuer, J., Van Looy, J., Kneer, J., & Quandt, T. (2013). Comparing Apples and oranges? Evidence for pace of action as a confound in research on violence in digital games. *Psychology in Popular Media and Culture*.

Violent games like First Person Shooter games are still supposed to increase anti-social behaviour. This public debate is mirrored by the scientific one and both seem to cut a ditch between generations. While the older generation is concerned about negative influences of digital games, the younger tend to deny any relation with anti-social behaviour by arguing that the term *violent* is misleading. Instead of connecting digital games with violence, younger people associate them with positive outcomes like fun, relaxation, and joy. Research concerning negative effects of digital games is still controversy. Some studies found no association between violent digital game play and aggressive reactions (e.g., Collwell & Payne, 2000; Durkin, 1995; Durkin & Aisbett, 1999; Ferguson, Smith, Miller-Stratton, Fritz, & Heinrich, 2008; Kestenbaum & Weinstein, 1985; Scott, 1995; Valadez & Ferguson, 2012; Williams & Skoric, 2005) while others provided evidence for the negative effects of violent digital game playing (e.g., Anderson, 2004; Anderson & Dill, 2000; Barlett, Harris, & Bruey, 2008; Bushman & Anderson, 2002; Bushman & Huesmann, 2006; Carnagey, Anderson, & Bushman, 2007; Deselms & Altman, 2003; Kirsh,

Olczak, & Mounts, 2005; Uhlman & Swanson, 2004; Weber, Ritterfeld, & Mathiak, 2006). The question whether virtual violence affects real-life behaviour is still far from being answered. Despite – or maybe because of – the mixed scientific evidence, the public and academic debate about this issue is not only ongoing but also heated (Elson & Ferguson, in press).

One possible reason for these mixed results might be due to the difficult selection of stimulus material (Ravaja & Kivikangas, 2009). Most studies which tried to investigate the effect of violent content on aggressive behaviour and physiological arousal used two different games: a violent and a non-violent game. However, violent content is usually not the *only* dimension on which the games used in these studies differ. For instance, Adachi and Willoughby (2011) expect *pace of action* to be one of the four main factors in game design. Besides *violence*, *competitiveness*, and *difficulty* – pace of action might have an effect on physiological arousal during and aggressiveness after game play. Thus, authors suggest to control for it in experimental designs (e.g., Adachi & Willoughby, 2011).

Drawing on the suggestions made by Adachi and Willoughby (2011), our study focused on pace of action as further influence on outcome variables. Because the current research on violent game content is still ambivalent, we formulated our hypotheses two-directional. We expected that, 1) displayed violence in a digital game has an effect on post-game aggressive behaviour, 2) displayed violence in a digital game has an effect on autonomic arousal levels during play, and 3) pace of action in a digital game has an effect on autonomic arousal levels during play.

In contrast to previous studies, we used the game *Unreal Tournament 3* (Epic Games, 2007) for the violent and the non-violent condition. Displayed violence was manipulated systematically via game modifications (modding). For the non-violent conditions, characters would drop their weapons, freeze, and become transparent when they were shot instead of the usual death animation involving blood and gore. In addition, the player's weapon was modified to look and sound like a tennis-ball shooting nerf gun. The pain screams of the player's avatar and all opponents were disabled and aggressive language was removed in the non-violent. To modify pace of action, game speed was either set to the default value of 100% for the normal speed conditions or to 140% for the high-speed conditions.

To measure aggressive behaviour, we used the standardized version of the CRTT suggested by Ferguson et al. (2008). Autonomic physiological arousal was assessed via heart rate (HR) and skin conductance level (SCL). In addition, we measured behavioural physiological

arousal via body movement using a Nintendo Wii Fit Balance where participants had to sit on during gameplay and via key pressure using seven SparkFun Force Sensitive Resistors (for measurement details please see Elson et al. (2013)).

Results neither showed a significant influence of displayed violence nor of game speed on post-game aggressive behaviour or a significant interaction effect. Therefore, both game characteristics had no influence on aggressiveness. For SCL, we did not find any main effects but results showed a significant interaction between displayed violence and game speed. Participants in the low game speed and low violence condition showed significantly higher average SCL while the analyses for HR did not reveal any effects for both game characteristics. The inconsistent results for autonomic arousal are hard to explain but indicate that the expected influence of violent content cannot be confirmed. One reason for the higher SCL levels in the low game speed and low violence condition might be due to the toy-weapons which are rather unfamiliar in FPS games.

Results for body movement showed a significant main effect for game speed and a significant interaction effect. Participants in the normal-speed condition moved more if the game was non-violent. Concerning key pressure, we found that players in the high speed and high violence condition applied significantly more force than those in the high speed low violent condition. In addition, pressure increased in the low speed and high violence condition compared to the low speed and low violence condition. To summarize, the results of this study support the assumption that physiological arousal during gameplay is influenced by more factors than just violent content. This stresses the importance of controlling potentially confounding variables in digital games effects research.

However, there was neither a systematic effect of violent content nor of game speed, neither on online nor on post-game variables. Of course, this might be due to the specific measurements used in this study. However, these non-effects were also found by other researchers (e.g., Valadez & Ferguson, 2012). In contrast to most previous studies, we used the same game for all conditions, including game goal. The only differences were the controlled display of violence and game speed. Therefore, characteristics of the game, in this case speed and violent content, might be overrated as influences on post-game behaviour. Besides the design of the games themselves, there are relevant factors which are connected to the *players*. Players' attributes might play a more important role for post-game aggressiveness and in addition might be able to explain ambivalent research results on aggression.

The first individual factor which might influence differences in outcome variables after game play is playing experience. Most studies – even the long-term ones – had no “real” players. Players are people who like to play digital games as free time activity and not as exchange for money or credit points. This difference between “real” and “artificial” players might have a strong influence on experience with games. Different experiences result in different knowledge structures (e.g., Bartholow, Anderson, Carnagey, & Benjamin, 2005; Mussweiler & Förster, 2000). Therefore, different experiences with games can result in different knowledge structures about digital game which might have a strong impact on further outcomes. Thus, the second study was concerned with the influence of playing experience on the activation of aggressive concepts.

1.2 To be or not to be ... a digital game player: The role of playing experience

Glock, S., & Kneer, J. (2009). Game Over? The impact of knowledge about violent digital games on the activation of aggression-related concepts. *Journal of Media Psychology: Theories, Methods, and Applications*, 21(4), 151–160. doi:10.1027/1864-1105.21.4.151.

Besides game-related elements which might influence aggressive cognitions, the next step was to investigate one general player-related factor: playing experience. Some researchers would argue that long-term players might develop associations between violent games and aggression due to the consistent and contiguous occurrence of violent media content. Therefore, one major idea is that long-term players might not only develop more aggressive concepts but also activate them whenever they play a violent game. We argue in contrast, that the main criticism of most studies is that participants which are seen as long-term players needed to play several times in a laboratory in order to get paid or credit points who are not comparable to persons who actually like playing games as leisure activity at home. The so-called long-term players are therefore artificial players and cannot be seen as “real” ones. To investigate associations with violent video games we have to compare real players with real non-players which had no previous playing experience at all.

Having playing experience can lead to different knowledge about the concerning concepts. Knowledge and resulting evaluation of objects and cognitive links might derive from

individual experience as well as from media reports. Thus, people's understanding of events can be influenced by presentation of events in the media (Entman, 1993; Price, Tewksbury, & Powers, 1997). For instance, a relationship between school shootings and violent digital games is frequently discussed by media reports (Fettig, 2005). If people lack individual experience with these games, they might associate violent digital games with aggression. People who are experienced with violent digital games could also be influenced by media but they might have different associations. Players focus on competition, success, thrill, and the virtual simulation of power and control rather than hurting and killing other persons (Ladas, 2003). With repeated exposure to violent digital games, links to game specific concepts are strengthened, thereby overrunning associations to aggression induced by media reports. Subsequently, these game specific links obtain priority with increased playing experience. Activating violent digital game concepts could not enhance accessibility of aggression-related concepts in players.

By using a lexical decision task we expected the following results: (1) Non-players should have developed a strong cognitive association between violent digital games and aggression-related concepts. Priming the concept "violent digital games" should activate this link. As a result, aggression-related concepts should subsequently be more accessible for non-players. Playing a violent digital game should not alter this pattern thus providing only longer activation of aggression-related concepts. (2) No priming should not activate the link between violent digital games and aggression-related concepts. As a result, aggression-related concepts should subsequently not be more accessible, thus non-players producing no differences in response latencies. Playing a violent digital game should alter this pattern by activating aggression-related concepts, indicated by faster response latencies for aggression-related words. (3) Players should have developed a strong cognitive association between violent digital games and game specific concepts. Priming the concept "violent digital games" should activate this link. As a result, aggression-related concepts should not be subsequently more accessible than non-game-related concepts. Playing a violent digital game should not alter this pattern because playing only provides longer activation of game specific concepts.

Our priming manipulation was included in the first instruction. Participants were either informed that this study was concerned about First Person Shooters or they were not. To measure the activation of aggression-related concepts, participants performed a lexical decision task after introduction (including either priming or no priming) and after playing a violent digital game. We found that non-players responded more quickly to aggression-related words than to non-

aggression related words before playing the game but only if they were primed with the concept First Person Shooter. This effect remained the same after playing indicating that priming non-players leads to more activation of aggressive concepts than actual game play. Long-term players responded more *slowly* to aggression-related words than to non-aggression related words before playing the game. After playing, Players' response latencies for aggressive words were as fast as for non-aggressive ones. This can be explained by a defense reaction due to the priming of negative concepts linked to violent video games which are also linked to their self-concept because of their own playing habits.

This study proved that playing experience has an impact on the differences regarding the activation of aggression. The result that players seem to suppress aggression-related concepts when being primed led to more questions. Digital games, especially violent ones, are heavily discussed – being part of a community which experiences prejudice very often might result in a behaviour which is not only reactant but also protective. Therefore, the next studies focused on the so-called net-generation (Leung, 2004) and their implicit reactions when being primed with digital games.

2 With a rebel yell: Protection of digital games

2.1 Leave us kids alone: Implicit defense strategies

Kneer, J., Munko, D., Glock, S., & Bente, G. (2012). Defending the Doomed: Implicit strategies concerning protection of First-Person Shooter games. *Cyberpsychology, Behavior and Social Networking*, *15*(5), 251–256. doi:10.1089/cyber.2011.0583

The next study was not only concerned with implicit defence mechanism players might show in case of being primed with violent digital games but also how *young* non-players might react. Being part of the net-generation (Leung, 2004) might be sufficient to react if a typical free time activity of peers is being associated with negative outcomes such as violent behaviour.

When confronted with associations between violent digital games and aggression, protection and resulting defence strategies might be applied by young adults without any playing experience, due to their affiliation to this specific generation. Therefore, violent digital games and associations to aggression may *exist* for young adults even if they do not play themselves but may

be *suppressed* in order to protect their generation. This would result in thought suppression due to implicit defence strategies.

If and how thought suppression works is discussed ambiguously (Wenzlaff & Wegner, 2000). There are many studies which found that thought suppression results in the increased activation of the concerning thought what is known as a rebound effect (Macrae, Bodenhausen, Milne, & Jetten, 1994). To suppress unwanted thoughts, motivation and cognitive capacities are needed which are both influenced by personal affection (Monteith, Sherman, & Devine, 1998). Players should be motivated to choose the protection of their favorite games, since this includes protection of their personal affairs. Defence strategies in terms of thought suppression can only be applied by young adults without playing experience in case they are personally affected. If defence mechanisms are applied by non-players, priming the concept “violent digital games” should activate aggressive concepts which are suppressed due to being part of the net-generation.

But the activation and proximate suppression of negative thoughts or concepts can be driven by a further motivation that differs from protection of violent digital games: Non-players could also try to protect themselves in terms of personal mood. In this case, non-players might show defence strategies in order to avoid negative feelings induced by violent digital games and instead of protecting the playing habits of peers.

In the following study, we investigated three questions: 1) Does FPS priming affect players and non-players in the same way? 2) Do players protect their gaming habits by suppressing aggressive associations? 3) Do young people without gaming habits suppress aggressive concepts, too? Do they initiate defensive strategies regarding their generation or do they simply try to avoid negative feelings induced by violent video games? 4) If young adults with or without playing experience were actively instructed to suppress aggressive concepts, is there no further need for defensive strategies?

To prime players and non-players equally, we used screenshots of violent video games (FPS) instead of playing one to avoid frustration due to excessive demands concerning gaming skills for inexperienced persons. We used a lexical decision task and assessed response latencies of players and non-players as an implicit measure to investigate concept activation. Participants were asked to respond to aggressive, neutral words, and non-words in a lexical decision task. This study included four different experimental conditions. 1) The first group was primed by FPS screenshots followed directly by the lexical decision task. 2) The second group was primed and afterwards asked to write an essay about a typical player who likes to play FPS games before they

were confronted with the lexical decision task. These participants were asked to *avoid* the mentioning of aggression. 3) The third group was also primed followed by the request to write an essay about riding a bicycle. 4) The fourth group had no priming at all. The second and third conditions were included to count for differences in non-players due to avoidance of negative thoughts concerning the violent content of the screenshots instead of the activation of implicit defence mechanism.

Results indicated differential activation patterns: Response latencies for aggressive words increased compared to neutral words but only for the first and the third experimental condition. This defence reaction still occurred independent of own playing habits. Response latencies for aggressive and neutral words did not differ in the other two conditions. Young adults suppressed aggressive concepts when being primed with violent game content. Psychological experimental settings might induce extreme cautiousness when confronted with violent game content. Our specific instruction to avoid negative associations in the suppression-condition led to relaxation and confidence that our study might not aim to investigate negative consequences of video games, especially violent ones.

Based on these results, we argue for an internalization of implicit defence strategies independent of own playing behaviour. The question arises what motives non-players have to avoid negative associations with violent games. It could be argued, that activated aggressive concepts are suppressed in order to block negative content and not in order to protect generational gaming habits. Therefore, the missing differences for the second condition for non-players could be based on time-delay and not on relaxation processes. However, response latencies for aggressive and neutral words in the third condition (bicycle essay) still differed. If the relaxation concerning prejudice against violent digital games is missing, defence strategies still occur.

The question arises how these defence strategies work. Protection of violent digital games can be realized by emphasizing positively related concepts (Wegner, 1992; Wenzlaff & Wegner, 2000). Our stimulus material of this study did not include words which concerned the *specific* positive concepts associated with video games. Players were found to associate digital video games with enjoyment, fun, action, and competition (Ladas, 2003). The next study was conducted to clarify if the activation of positive game-related concepts can help to suppress negative concepts.

2.2 Joy division? Positive and negative associations with digital games

Kneer, J., Glock, S., Beskes, S., & Bente, G. (2012). Are digital games perceived as fun or danger? Suppressing and supporting different categories concerning digital games. *Cyberpsychology, Behavior and Social Networking*, 15(11), 604-609.
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In the previous study, we found that not only players but also non-players applied defensive reactions (Kneer, Munko, et al., 2012). Comparisons to the control conditions revealed that the found effect for non-players was not due to blocking negative content when being primed with violent games but due to activated defence strategies. If young people really try to protect violent digital games, how do they suppress negative associations?

Distractors were found to help neglecting negative thoughts (Wegner, 1992). The activation of related positive concepts helps to suppress negative concepts (Mikulincer, Dolev, & Shaver, 2004). Depending on personal affection and motivation, the activation of negative concepts can be stopped and positive concepts can be heightened. Concerning digital games, persons should decrease negative and increase positive associations when personally affected. Recent research has shown that playing a violent digital game activated negative and positive game-related concepts, independently of the participants' playing habits (Bösche, 2010). But what specific positive concepts are activated? Some researchers argue that persons who regularly play digital games associate positive concepts like relaxation and achievement with the act of playing (Sherry, 2007) which can also explain motivational reasons for game play.

A well-known player motivational taxonomy is Yee's model which suggests three main motivational reasons for digital game play in terms of Massively Multiplayer Online (Role-Playing) Games (Yee, 2006): achievement, social interaction, and immersion. Yee's main dimensions are confirmed by studies on further game genres (Jansz & Tanis, 2007). They are also general enough for different game genres and specific enough to be applied to this interactive medium (Bostan, 2009). If social interaction, achievement, and immersion are the main reasons for people to play digital games, these could be the concepts which might help to suppress negative associations.

We designed the following study to answer three questions: 1) Do players and non-players activate positive game-related concepts and suppress negative ones in order to defend

digital games? 2) Do players and non-players differ in the activation of positive related concepts? 3) Does only the priming of violent game content lead to defensive strategies or does digital game content in general heighten positive game-related concepts? Screenshots of violent and non-violent digital games were used for priming. Participants were required to respond to negative (aggression and emotional instability), positive (social interaction, achievement, and immersion), neutral, and non-words in a lexical decision task.

As in the previous study, we found that independent of playing experience defensive reactions occurred when being primed with digital game content. Response latencies for aggression and emotional instability were faster compared to non-game-related neutral words but slower compared to game-related positive words. These defensive processes were also independent of the primed game content regarding violence. For playing motives, we found that response latencies for social interaction and achievement were faster than the response latencies for aggression and emotional instability. The only exception was found for immersion. Response latencies for immersion were slower than for social interaction and achievement and did not differ compared to the negative words. To summarize, members of the net-generation apply implicit defence processes in order to protect games and their players against negative prejudice related to aggressiveness by activating positive playing motives. These defense reactions occur independent if the game content is violent or not.

However, immersion seems to be a specific game play motive which cannot only be judged as positive but also as negative. Besides relaxation, escapism is also included in the concept of immersion (Chou & Ting, 2003; Yee, 2006), what could be interpreted as “false coping” from real world problems. Escaping from real world problems might outshine relaxation as positive aspect of immersion and a new threat comes into attention: *digital game addiction* (Young, 1998). Immersion might not only be interpreted as a relaxation option but also as a (false) coping strategy (Klimmt, Schmid, & Orthmann, 2009) and as a possible moderator of addiction (Chou & Ting, 2003). However, only few researchers focused on playing motives in terms of addiction (Hellström, Nilsson, Leppert, & Åslund, 2012). Therefore, the next two studies were no longer concerned with aggression but with playing motives – especially immersion – and their impact on addictive tendencies.

3 Diab(o)lo remains: Addictive game play behaviour

3.1 Walking in a player's shoes: The role of game play motivation

Kneer, J. & Glock, S. (2013). Escaping in Digital Games: The relationship between motivations for play and addictive tendencies in males. *Computers in Human Behavior*, 29(4), 1415-1420. doi: 10.1016/j.chb.2013.01.030.

Besides aggression, digital game addiction has come into focus of public debates and scientific research on digital games – a phenomenon which is rather discussed independently of violent game content. In June 2013, digital game addiction was recently classified as new disorder (DSM-5) which came up in the digital century and especially with the occurrence of online games. Debates do not further focus on its existence but instead emphasize diagnostic instruments (Byun et al., 2009), treatments (Yellowlees & Marks, 2007), and causes of this pathological behaviour (Byun et al., 2009). Playing time is not only seen as one of the main risk factors but is also considered as the main diagnostic criterion, as it was found to have a strong impact on negative outcomes (Hellström et al., 2012). It is not surprising that addicted persons show the problematic behaviour more frequently than healthy persons do. But playing time as single risk factor is not sufficient to explain problematic playing behaviour (Hellström et al., 2012). General risk factors were also found among traits and social settings. For instance, low self-esteem (Collwell & Payne, 2000; Niemz, Griffiths, & Banyard, 2005), loneliness, and shyness (Lemmens, Valkenburg, & Peter, 2011; Whang, Lee, & Chang, 2003) were connected to addictive tendencies. In terms of social settings, problematic playing behaviour was related to poor parental relationships and poor connections to teachers (Niemz et al., 2005).

Digital games seem to offer perfect coping strategies for all real life problems that have been identified as risk factors for problematic playing behaviour. The virtual worlds of Massively Multiplayer Online Role-Playing Games (MMORPGs) offer the opportunity to engage in a virtual life that is completely controlled by the player. Players are able to create their own so-called avatar (virtual character) which corresponds to their ideal identity. New families can be joined and new friends can be found. Players have the opportunity to achieve something even if real work or school life seem to fail. In addition, online games can be used to cope with real-world related stress in general by offering the opportunity to escape. These three playing motives formulated by Yee (2006) are the reasons for someone to start digital game playing and stay with

this free time activity. However, only a few studies focused on the motives for game playing and their impact on addictive tendencies. Hellström and colleagues (2012) provided evidence for social interaction and achievement as main playing motives to decrease problematic playing behaviour. The higher the motive immersion was judged, the more problematic was the playing behaviour. In contrast to Hellström and colleagues, Klimmt, Schmid, and Orthmann (2009) found that players with addictive tendencies emphasized all three motives if these motives were also used to cope with real life problems. In this study, playing motives explained problematic playing behaviour better than solely playing time. However, both studies used explicit measurements for playing motives. Particularly, when habits develop the motives causing the behaviour operate automatically (Aarts & Dijksterhuis, 2000; Bargh & Ferguson, 2000). In addition, measuring explicit playing motives strongly depends on the persons' willingness to report their motivational reasons (e.g., Fazio & Towles-Schwen, 1999; Wiers, Van Woerden, Smulders, & De Jong, 2002).

Measuring playing motives implicitly, in the previous study, we also found that immersion seems to differ from social interaction and achievement and we discussed this result in terms of digital game addiction. Therefore, we combined explicit and implicit playing motives and investigated if there is an influence on addictive tendencies. In order to activate implicit playing motives, all participants were instructed to describe their experiences including emotions and thoughts when playing digital games in their own words. Implicit motive activation was measured via lexical decision task and explicit motivation for game play was measured via Likert scales. To assess problematic playing behaviour, we used the questionnaire of Grüsser and Thalemann (2006). In addition, we asked participants about their playing time per week.

For explicit playing motives, we found that the ratings for immersion were as high as for social interaction and achievement but only for problematic players. Non-problematic and excessive players rejected immersion as a playing motive and judged social interaction and achievement as being more important, which is in line with the findings of Hellström et al. (2012). Results for implicit motives showed that problematic players activated all three playing motives higher than did excessive and non-problematic players. In addition, the excessive and non-problematic players' activation of social interaction and achievement increased compared to immersion. Players with problematic playing behaviour activated immersion as high as social interaction and achievement.

In order to compare explicit and implicit playing motives, we analysed differences between implicit and explicit motives. The comparisons between explicit and implicit motives

indicated that all three game playing motives became automatic when problematic gaming behaviour has developed. This internalization occurred especially in the case of immersion as playing motive. These results for the differences might hold as explanation for the impact of immersion as motive on addictive tendencies. Only players with problematic playing behaviour internalized immersion – immersion has become a stronger implicit than explicit playing motive. To analyse immersion as a risk factor for problematic playing behaviour, we also conducted a hierarchical regression analysis. Results showed that implicit and explicit immersion and playing time were strong predictors for addictive tendencies. In addition, implicit immersion could explain more variance than immersion as explicit motive and playing hours.

As supposed, immersion has a strong impact on problematic playing behaviour concerning addiction. Especially when immersion becomes an implicit playing motive, attention has to be paid on the possible development of unhealthy playing behaviour. The question arises, whether players are aware of immersion as risk factor for game addiction and whether they are aware of addiction at all or if they also *deny* it like our results showed for aggression. Therefore, our next study was concerned with players and counsellors as experts on digital game addiction.

3.2 You could have just asked: The knowledge of experts on risk factors

Kneer, J., Rieger, D., Ivory, J., & Ferguson, C. (under review). Awareness of Risk Factors for Digital Game Addiction: Interviewing Players and Counsellors

As discussed in 3.1, research has found specific risk factors among traits, social settings, and playing motives. But how do players and counsellors judge these risk factors? Are players aware of those or do they even discount the existence of digital game addiction? Can players discriminate between healthy and unhealthy playing behaviour and do they know about risk factors? How do social workers and therapists judge risk factors for addictive tendencies? To answer these questions, two studies were conducted. A qualitative approach was chosen in order to broaden the existing knowledge. Therefore, semi-structured interviews with players and counsellors were conducted.

Twenty-eight German players were recruited during the *gamescom* 2012 fair in Cologne. Participants were first asked about demographical data including own playing behaviour. The following questions concerned game addiction. Participants were asked if they knew any people

who might have addictive tendencies. They were not asked about own problematic playing behaviour in order to reduce social desirability and reactance in responses. Participants then were asked to name factors which could support or inhibit digital game addiction including traits, social settings, playing motives, and further conditions.

In addition, seven counsellors (social workers and therapists) were interviewed face-to-face or by telephone. They were asked about 1) motives, 2) specific traits, 3) attributes of the social setting, and 4) further conditions which could support digital game addiction. The fifth question concerned the three known playing motives from Yee (2006). Experts were asked to judge which motives were considered as problematic and to explain why.

Results of the interviews with both groups indicated that awareness of digital game addiction is high and the knowledge about risk factors is closely related to results of current research in this area. No player denied the existence of digital game addiction and only one player did not know any problematic players. Both groups were able to name playing motives, traits, and social settings as possible risk factors. The most important risk factors mentioned were: *lack of social life*, *low self-esteem*, and *immersion*.

The results of the players' interviews indicated that for players especially the *quality of social life* is seen as main factor which distinguishes between problematic and non-problematic playing. If real social life is lacking, digital games offer the perfect coping strategy to escape from real life problems. Not surprisingly, the counsellors' focus was more on traits, in particular, on psychological problems. They mainly pointed towards the role of anxiety, introversion, and other psychological problems such as depression, social phobia, or anxiety attacks. However, it is interesting to see that players concentrated more on social settings and playing motives than on traits. In addition, most players did not perceive social interaction and achievement as prevention factors while immersion was seen as a risk factor. These results are in line with the previous study, which showed that immersion is the most risky playing motive. In contrast, counsellors judged social interaction and immersion as the dangerous playing motives. This difference between both expert groups is surprising, taking into account, that players focused more on *real* social interactions than counsellors did.

These findings are especially important concerning the development of diagnostic instruments and prevention and intervention programs. Members of both groups can be considered as experts for digital game addiction. As counsellors treat problematic players, their experience and knowledge is crucial for the realization of diagnostic instruments and treatments.

However, their experience is in most cases still an *etic* one, that means their analytic view is provided by their disciplinary knowledge and therefore limited (Lindlof & Taylor, 2011, p. 95). On the other hand, players are “natives” for the digital game world and possess an *emic* view. According to Pelto and Pelto “the native’s categorization of behaviour is the only correct one” (Pelto & Pelto, 1978, p. 56).

Players have the possibility to contribute their knowledge and can help finding factors which distinguish between problematic and non-problematic playing. In our interviews, players were not only able to name risk factors among playing motives, but also interpret some playing motives as protective. Indeed, most players mention games as helping to increase life satisfaction. The question arises in which way digital games might contribute to a player’s well-being? Therefore, the next study focused on the positive effects of digital games.

4 Useless? The positive effects of digital games

Rieger, D., Kneer, J., & Bente, G. (revision). Eating Ghosts: The Impact of Interactive and Non-Interactive Media on Mood Repair and Physiological Arousal

The presented studies of the last chapters focused on possible negative outcomes of digital games, the first four on aggression and the last two on addiction. However, consulting the results of Kneer, Glock, Beskes, et al. (2012), we found that younger adults also link positive outcomes to digital games independent of game genre and violent content and our interviews in the last study revealed that some players interpret games as possibility to increase general life-satisfaction. This is not surprising: playing a game as leisure activity must include positive effects for the player, otherwise there would be no reason to play at all. The question arises, what role – in terms of positive outcomes – do digital games play? In addition, do games differ from non-interactive media, for instance movies concerning positive outcomes?

The positive effects of non-interactive media have been investigated pretty well, especially in terms of mood regulation. The main idea of Mood Management Theory (MMT; Zillmann & Bryant, 1985; Zillmann, 1988a, 1988b) is that humans have a hedonic motivation to reduce negative states and to improve their positive moods (Knobloch-Westerwick, 2006). MMT was first applied in terms of digital games by Bowman (2010). The main results were, that digital games (flight simulators) were more successful in repairing noxious moods than their non-

interactive equivalents (watching a flight simulation without own controls). Bowman and Tamborini (2012) concluded that this repair was mainly a function of the potential of heightened intervention through higher task demands in video games as compared to non-interactive media and thus might be more effective in distracting from negative states.

The next study investigated how effectively sadness as negative state is regulated after a digital game, a game-play video, and without media consumption (control group). We expected that: 1) Mood repair is higher after the use of interactive media compared to non-interactive media followed by a non-medium control condition, 2) Interactive media induce a higher task load compared to non-interactive media followed by a no-media control condition, and 3) Involvement with the emotion-inducing movie clip will be lower for those engaging in an interactive medium compared to those engaging in a non-interactive medium.

To analyse the intervention potential of digital games, we induced sadness by showing a movie clip before participants either played Pacman, watched a game-play video of Pacman, or had a break with no media intervention. We assessed mood regulation via the two subscales for positive and depressed mood of the SES (Hampel, 1977), task load via 7-point Likert scale (perceived effort), distraction from the negative emotion via involvement with the shown movie clip, objective arousal by measuring the electrodermal activity (EDA), and subjective arousal via the activation / deactivation subscale of the SES (for details of the measurements and for the results of the arousal assessments, please see Rieger et al. (revision)). Results showed that mood repair was most successful in the digital game condition in which the intervention potential was high and decreased over the low intervention potential condition (watching the game-play video) to the control condition. In addition, digital games led to more task load than non-interactive media and to a greater distraction from the negative emotion.

To sum up, digital games can thus be considered as even more effective than non-interactive media in attenuating negative moods by directing attention away from the unwanted state. The interactive characteristic of digital games and the potential of distracting from negative states might provide an opportunity; namely using digital games to increase health. If digital games are able to distract from negative states, they should also have the potential to help when it comes to one specific health-related negative state: craving. Therefore, the next chapter focuses on the application and development of a health game and its potential to help against craving in terms of smoking.

5 Excuse and Outlook: How digital games can help to quit smoking

5.1 Smoking is not cool! Cognitive dissonance in smokers

Kneer, J., Glock, S., & Rieger, D. (2012). Fast and not furious? Cognitive dissonance reduction in smokers. *Social Psychology*, *43*(2), 81-91. doi:10.1027/1864-9335/a000086

Glock, S., & Kneer, J. (2009). Are deterrent pictures effective? The impact of warning labels on cognitive dissonance in smokers. *Applied Psychology: Health and well-being*, *1*(3), 356 – 373. doi:151–160. doi:10.1027/1864-1105.21.4.151

Before introducing further ideas on the development of a health game for smokers, the results of two papers on the topic “cognitive dissonance in smokers” are summarized. In the first paper, three studies were conducted which investigated whether induced cognitive dissonance in smokers regarding health risks is reduced immediately or remains constant. Previous research only focused on explicit ratings concerning health risks. However, dissonance reduction strategies might occur immediately, especially for smokers who are used to be confronted with health risks. Therefore, we analysed ratings, but also response latencies and psychophysiological arousal. In the studies of the first paper, participants rated their smoking-related health risks twice for different diseases. Differences in response latencies and psychophysiological arousal occurred during the first testing but diminished during the second testing whereas ratings did not change. These results indicate that smokers immediately reduce cognitive dissonance and that this process seems to be automatic. Being confronted with health risks on a daily basis, smokers are able to apply fast cognitive dissonance reduction strategies.

In the second paper, a study was conducted to investigate the impact of cigarette warning labels on cognitive dissonance processes in smokers. Smokers’ and non-smokers’ were confronted with warning labels and their perceptions regarding smoking-related and non-smoking related diseases were measured with explicit ratings and with response latencies before and after presentation of warning labels. Warning labels were either textual (e.g., smoking causes lung cancer) or visual (e.g., showing a picture of a smoker’s lung). Results for ratings showed a significant interaction effect between smoking behaviour and type of disease. Smokers judged their chance higher to develop a typical smoking related disease. This was not influenced by cigarette warning labels since this difference already occurred during the first testing and did not

change with the presentation type of the warning labels. In contrast to this result, response latencies for smoking-related diseases were only higher for smokers – indicating cognitive dissonance - during the first testing. After the presentation of the warning labels, no differences between any conditions were found. In addition, pictures of smoking-related diseases had no bigger impact than textual warning labels. These findings replicate our findings of the first paper: smokers are able to reduce cognitive dissonance regarding health risks immediately.

Results of both papers have implications for intervention and prevention programs focusing on the health damaging aspects of smoking. Concerning smoking prevention, health-related information is useful for non-smokers to keep refraining from smoking because it confirms the health-related benefits of non-smoking. For smokers, health-related information about smoking only seems to result in fast cognitive dissonance reduction processes. This means, health-risks are still accepted due to the perceived positive aspects of smoking (Hendrix & Brandon, 2005; Mullenix, Kilbey, Fiscaro, Farnsworth, & Torrento, 2003). Smokers use various dissonance reducing strategies in order not to change their behaviour.

Programs still try to argue people out of smoking by inducing cognitive dissonance and fear via emphasizing the health risks. Results of our studies explain why these programs often fail. Cognitive dissonance induced through confrontation with health risks is only short-living. We have to keep in mind that smokers do not smoke to damage their health but to achieve positive outcomes; especially stress reduction or social aspects (Hendrix & Brandon, 2005; Mullenix et al., 2003). Glock et al. (2012) found that threatening these outcomes induced longer lasting cognitive dissonance than health-related information. Future research should therefore focus on ways to implement long-term cognitive dissonance in the daily life of smokers which is linked to the positive aspects of smoking.

5.2 Let's play! A basic idea for a health game called *fogland*

Basic framework of *fogland*

When thinking about ways to successfully develop intervention programs for young smokers, digital games come into mind as they are a daily habit of many young adults (Medienpädagogischer Forschungsverbund, 2009). One study on this topic used an educational game in which social smokers were confronted with a picture of a future version of their own face showing negative consequences for their appearance in case they won't quit (Song, Kim, Kwon, & Young, 2013). Results showed that smokers were more willing to quit smoking after being confronted with how they will look like if they *won't* quit smoking. Thus, the educational game had positive effects by increasing negative attitudes towards smoking. However, based on own research results, this might only be a short-term effect as smokers are used to negative health consequences of their behaviour resulting in immediate cognitive dissonance reduction (Glock & Kneer, 2009b; Kneer, Glock, & Rieger, 2012). As argued above, health damage is not a smoking motive while two other motives remain: social aspects and stress reduction (Hendrix & Brandon, 2005; Mullenix et al., 2003). These motives need to be targeted in order to reduce the *positive* outcomes of smoking. Therefore, one way to help smokers to quit smoking is to develop a serious game in which 1) cognitive dissonance concerning the positive effects of smoking is constantly established (social aspects and stress reduction), 2) playing the game helps to distract from craving, and 3) shows other ways to deal with stress and social aspects besides smoking. In the following, some ideas for the development of a serious health-related game called *fogland* are provided. Due to the fact that I am not a game developer, these ideas have to be seen as basis but might offer the opportunity to start developing such a game.

Game content. Research found that warning labels which aimed at social aspects and stress reduction had a greater impact when formulated in a general way compared to directly addressing the smoker (Glock et al., 2012). Authors proofed that fear appeals concerning anti-relaxation and anti-socializing had higher impact on attitudes and future smoking behaviour if expressed in a general way (smokers are not cool) instead of addressing the smoker directly (you as a smoker are not cool). This is due to reactive behaviour which occurs whenever the self is directly threatened by provided information. The same effects occur as in the studies described above (Glock & Kneer, 2008; Kneer et al. 2012): Smokers show immediate dissonance reduction

and in addition reactance behaviour. If smokers are addressed directly, a smoking person still identifies with this target group but the self is not threatened directly. In addition, being responsible for others is bigger than being responsible for yourself. Teaching others to quit smoking should result in shame if one doesn't quit at the same time, because own behaviour and sent messages are inconsistent which results – again – in cognitive dissonance.

Therefore, own smoking behaviour should not be focused directly and the game should not be about own negative effects of smoking. Own studies on cognitive dissonance and smoking showed that smokers are able to reduce cognitive dissonance immediately if induced via health related information. The game content should rather focus on other smokers and the negative outcomes they experience in terms of social aspects and stress reduction – both being the main smoking motives. If these two motivations are threatened, long-lasting cognitive dissonance should occur which cannot be easily reduced by stressing out the positive effects of smoking because this is not longer possible.

The main idea concerning the game goal is to find and help other smokers to quit smoking by telling them about positive effects of quitting regarding both main smoking motives. These other smokers are represented as smoking MOB (mobile object blocks) which should first appear as depressed, unhealthy, and stressed. In case the player helps them to quit, their appearance should change into happy, healthy, and relaxed. Every successfully convinced ex-smoking MOB joins the player and contributes to building up a “team” which strengthens the player's avatar (in-game representation of the player) by increasing its attributes (in-game capabilities). Every MOB who keeps on smoking has to be left alone. This first goal – to gather ex-smoking MOB by searching for smokers and helping them to quit – directly deals with social aspects of smoking: the message that smokers who do not quit are left behind and therefore lonely, attacks the first main smoking motive and induces cognitive dissonance in terms of social ties. In addition, the message that smokers who quit are no longer lonely, implicitly offers the possibility to reduce this induced cognitive dissonance by changing the smoking behaviour.

With advancing game content (higher levels), *distractors* should be introduced additionally; situations which are known to be dangerous for relapse of smokers and, in terms of game techniques, might therefore cost the player ex-smoking MOB who start smoking again. The goal in this situation is to find other possibilities to relax which directly attacks the second main smoking motivation. Introducing ex-smokers to healthy relaxing activities (e.g., Yoga, nature, dancing) strengthens the social bonds and prevents against these distractors. Thus, the

goal becomes twofold: continuing to save smoking MOBs which also improves own attributes and dealing with distractors in order to keep the team of non-smoking MOBs together.

Playing time and game platform. Smoking one cigarette lasts between three and eight minutes, thus, the duration of the game-rounds should be adapted to this time frame. Smoking appears to be a habit which occurs in several different situations (Van Gucht, Van den Bergh, Beckers, & Vansteenwegen, 2010). To intervene smoking whenever these situations occur, the main game platform has to be available immediately. This calls for a game which can be played on mobile devices. In addition, smoking is a behaviour which includes hand moving. If both hands are needed to play the game, smoking is no longer possible. One idea is, that actual moving the mobile device to move the avatar might compensate for hand moving behaviour which occurs during smoking and which might also increase embodiment. Higher levels which include distractor situations should also provide the possibility to be played on game platforms of the 7th generation with motion sensing input devices (e.g., Wii, Xbox 360). This offers the opportunity to actually perform alternative relaxing behaviour which should strengthen the player's attributes in the game more than merely teaching it to the ex-smoking MOBs.

Single- or multi-player. fogland should be playable in a single-player mode as well as in a multi-player mode. Especially regarding the importance of the possibility for immediate game play whenever the wish for a cigarette occurs, the option for a single-player mode should be provided. In addition, playing at home or playing more than one game-round should offer the possibility to join other players. This is also the first step to count for social aspects, due to the fact that joining other players online can help to compensate for this first main smoking motivation.

Evaluation of *fogland* to test for effectiveness

Once the game software has been written and the game is implemented, the effectiveness of *fogland* has to be evaluated. This is done via several dependent variables which need to be connected to 1) the establishment of cognitive dissonance which aims at social aspects and stress reduction, 2) distraction from craving, and 3) knowledge about alternative ways to deal with stress and social aspects. In addition, attitudes towards smoking concerning the two main motives and possible changes in own smoking behaviour should be analysed to test for explicit effectiveness of the game.

The first step is a laboratory study in which players play the game. This allows to eliminate confounding variables (e.g., distraction during game play) and to apply precise measurements (e.g., objective arousal) which cannot be assessed without the specific technical equipment. In addition, *fogland* can be adapted based on the results of this laboratory study. The second step is to conduct an online study with *fogland* players which has a bigger number of participants and in which repeated measurements can be applied. This allows to test not only for short-term effects but also for long-term effects of the game.

Laboratory study. After arrival, 200 participants have to fill in a questionnaire concerning demographical variables, especially own smoking behaviour (e.g., number of cigarettes smoked per day, smoking years, Fagerstrom test for nicotine dependence (Heathertin, Kozlowski, Frecker, & Fagerstrom, 1991)). Questions about own smoking behaviour are able to activate the smoking self (Kneer, Glock, & Rieger, 2012) which is important for the following measurements. To test for cognitive dissonance in terms of social aspects and stress reduction, participants will be asked to respond on a 5-point Likert Scale (1 = not true; 5 = true) to several statements as quickly as possible. These statements are related respectively not related to smoking behaviour and represent aspects of social life and relaxation. Response latencies as well as the explicit answers will be assessed. In addition, an affective priming task assessing implicit attitudes towards smoking will be conducted. To assess mood, participants have to fill in the SES (Hampel, 1977) and additional questions about actual craving. Afterwards, 100 participants will be introduced to *fogland*. The other 100 participants are introduced to a different, not smoking related game. During game play, HR (heart rate) and SCL (skin conductance level) will be assessed, as well as game-related events. After actual game play, measurements for cognitive dissonance, the affective priming, the SES, and additional craving questions will be repeated. In addition, task load will be assessed via 7-point Likert scale (perceived effort). This repeated measurement design allows testing for differences before and after game play. Participants will be called on the next day and asked about the number of cigarettes smoked during the last 24 hours.

Online study. Objective arousal cannot be tested in an environment outside the laboratory and will therefore be excluded. The other measurements from the laboratory study will also be used for the online study including assessment of cognitive dissonance, the affective priming, SES, craving questions, game events and questions about actual smoking behaviour. To minimize the testing time and boredom, all measurements will only be assessed after gameplay and only if

the game is played on a computer and not on a mobile device. To test for actual effects of this specific game, a control group (smokers) will play a different, not smoking related game while the same measurements will be assessed. The online study will last about three months.

Conclusion

Many studies still focus on the negative effects of digital games, especially aggression. The results of the first four studies described showed that players and even young non-players don't perceive (violent) games as a cause for real aggressive behaviour. Members of the net-generation are not only used to digital games as common free-time activity; they also know the positive outcomes of playing digital games. However, they also do not underestimate digital game addiction and are completely aware of possible risk factors. To summarize my work on digital games, results showed that we have to talk to players and discuss risks of digital games directly with them. In addition, studies on digital games need real players as participants or at least members of the net-generation. Besides the risks, research on digital games also started to investigate positive outcomes. In the face of still growing popularity of digital games, we need to know how digital games can be used to improve well-being. If we know which factors and game characteristics lead to enhanced mood and might even influence health-related behaviour, we have the chance to use this medium to enrich the *real* life.

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