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Benefits of recreational gaming

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Abstract

Video games have shown to have several positive effects on one's behavior, skill and capabilities. To determine these benefits we analyzed a total of 133 articles of which 46 were used in this review. We find different genres and playing methods contribute to stimulating different attributes. The positive effects of video game entertainment include tension relief and allow for stress coping mechanisms. In addition, there are game-derived skills, including several higher attentional capabilities, vision improvement, happiness, and prosocial and civic behaviors. We present an overview of these effects in the Dekker Gaming Skill Overview. All in all, we conclude that recreational gaming has the potential to improve real-life skills like learning, reading, creativity and problem solving. Moderation in playing video games is important to attain these benefits. In contrast, excessive gaming may lead to emotional, physical, and social problems.

Keywords: Gaming; cognition; social-emotional skills; benefits

Highlights:

- Several skills can be improved by gaming, impacting real-life skills.
- Different game elements show divergent effects on gamers.

Background

Gaming, specifically playing violent video games, has been linked to negative behavior. Wigand (1986) and Griffiths (1993) mention how gaming was being related to aggression, non-social behavior or just being inherently evil by promoting violence, hate and destruction. More recent studies like those Hellströmet alia (al.)(2012) and Farchakh et al. (2020) demonstrate how excessive gaming, gaming to escape from certain situations or feelings, to gain status or to comply to expectations (for example (e.g.), group pressure) can have significant negative impact on a person with effects ranging from dissocializing to neglecting oneself. In contrast to earlier work, these more recent studies also recognize positive effects induced by gaming. These include, but are not limited by, research from Adachi (2013), Bavelier (2012), Eichenbaum (2014), Green (2012) and Oei (2013). Moreover, work by Ferguson (2015) presented evidence that many biases and flaws existed in the earlier studies. Instead of linking the negative effects to gaming itself, they were linked to an unhealthy lifestyle, environment, and addictions in general (Sublette, 2012; Hühn, 2018).

There are ample benefits to be gained from gaming, when done responsibly. A great deal of research and reviewing has already been done on the positive effects of gaming. Research from Jones (2014), Granic (2014) and Eichenbaum (2014) portrait a more positive side of gaming and discuss its potential in vision, social, emotional and cognitive growth.

The purpose of this study is to explore and summarize the effects of recreational gaming on a person. We aspire to uncover the best practices that attain positive effects while minimizing unwanted side effects. In this work, we use the terms 'casual gaming', 'gaming' or similar, to refer to the act of playing a commercially available video game in a non-professional capacity, unless otherwise specified.

Methodology

In this work, we present a literature review on the effects of recreational gaming. A structured search was conducted using Google Scholar. We included articles from the period 1986 to 2020, written in English. The search queries consisted of combinations of the terms: game, video game, gaming, computer game, computer gaming, videogame play, gameplay, game-playing, casual, leisure, consequence, outcome, reaction, effect, mental, psychological, emotion, physical, cognitive, cognition, social, health and well-being. Firstly, the titles were screened for relevance. After this, the abstracts were reviewed and considered for inclusion based on the description and relevance. Articles were excluded when they were not related to commercially available video games or gaming. Board games, physical sports and activities, serious gaming, gamification and iGaming were excluded from this search. Figure 1 displays a schematic view of the articles found and used for this article.

Initial articles found	18.100
After title screening	465
After Abstract screening	133
Total articles used	46

Figure 1: Article search

Results

Our literature review identified several concepts in which the effects of recreational gaming can be categorized, namely: emotional, social, civic, somatic and cognitive which encompasses vision and learning. This work is structured around these concepts which have been summarized in table 1 with exception of 'learning'.

Emotional

Games are a trigger for intense positive emotions (McGonigal, 2011). According to Granic (2014) and Jones (2014) experiencing these helps build social relationships to provide support for goal attainment, aids coping with failure, nullifies negative emotions and it promotes motivation in general (Lafreniere et al., 2009). Although happiness is fundamental to well-being (Fredrickson, 2001), the ability to control and modulate emotions is equally important.

Granic (2014) suggests that while gaming, people can simulate emotional states, which in turn has a positive effect on emotion regulation. Adaptive regulation strategies have been proven to lower negative affectivity (The experience of sensations, emotions, and sentiments), promote social behavior, lower depressive symptoms and stress, and stimulates emotional stability (Jones, 2014). Examples of these strategies include acceptance, resolving and reappraisal (Granic, 2014). Games provide a safe and proven environment to practice these strategies, reappraisal in particular (Aldao, 2010).

When gaming actively, participants may achieve a state of flow or transportation (a state of mind where all attention is put towards a single goal or purpose and all other stimuli are dimmed down). This elicits relaxation, pride, concept of self, a sense of control and positive emotions (Jones, 2014). This flow has also been linked to increased commitment towards activities. In a learning environment, it drives towards goal orientation and achievement. Which as a result leads to higher self-esteem and less anxiety (Nakamura, 2002; Ferguson, 2015). Higher stress and feelings of depression negatively impact one's academic performance (Khesht-Masjedi et al, 2019), gaming potentially negates these.

When gaming for more than 10 hours a week, it is suggested that mild displays in problematic feelings such as anxiety, insomnia and social disfunction and somatic issues including musculoskeletal complications are more likely to arise (Dieris-Hirche, 2020; Allahverdipour et al., 2010). It is important to note that not gaming at all poses a greater risk to display problematic behavior, especially to boys (Jones, 2014). Spending between 1 and 10 hours a week gaming accesses these emotional benefits. This suggests that gaming isn't just entertaining to do, it can in fact add value to a healthy lifestyle and stimulate academic results when done with moderation.

Social and Civic

Play-fighting in real life promotes growth in parts of the brain that coordinate highly social activities and helps develop emotional self-regulation (Pellis, 2007). Putting time in violent games helps to develop social competence, much like play-fighting (Granic, 2014; Pellis & Pellis, 2012). In games, the participants often have the opportunity to converse with other gamers, discussing

approach, priorities, strategy or have casual conversations. This gives ample opportunity to practice social skills.

By focusing on games that reward cooperative gameplay, it leads to immediate and long-term improvement in prosocial behavior (Gentile, 2009). In this regard, there is a significant difference between violent and gentle games. Ewoldson (2012) and Ferguson (2011) argue that when a violent game is aimed at cooperation instead of competition, gamers are even more likely to exhibit helpful behavior than in a non-violent equivalent. Cooperative gaming in social groups also reduces hostility and decreases a gamer's access to aggressive cognition (the intentional initiation and planning of aggressive behavior) (Granic, 2014; Schmierbach, 2010). It overcomes outgroup (a group with whom one does not identify with) membership compared to gaming alone or competitively (Velez, 2012). This suggests that gaming promotes social inclusion and communication. It may stimulate cohesion in areas where numerous people meet, like in schools, social settings, offices and other social related scenes.

When a game contains civic experiences (e.g., Civilization, Madden, World of Warcraft and The Sims), individuals are presumed to engage in real-life civic activities like voting and keeping politically informed, debating, charity collaboration and participating in marches or protests (Lenhart, 2008). Therefore, it shows that gaming has potential to increase interest in politic involvement, committing oneself to a cause or promoting positive social interaction.

Cognition

Besides the social and emotional benefits, considerably more can be gleaned from gaming. In the action and shooting genre in particular, potential for cognitive growth has been highlighted (Qiu, 2018). Studies have found that people who game are manifesting faster reaction times and sustain attention, or vigilance, more easily compared to people who do not game (Eichenbaum, 2014). People who play action games have displayed neurological changes. Amongst others, it includes enhanced spatial thinking containing three categories as described by Uttal et al. (2013). The first one is spatial perception, which means perceiving orientations in respect to one's own orientation. Following that, there is mental rotation. This is the ability to rotate objects in one's mind without doing so physically. Thirdly there is spatial visualization, described as a multistep manipulation of spatial information. These skills are related to map reading and navigational competence (van Zoest, 2015).

Gaming has also shown to stimulate faster and more accurate attention allocation, where one’s focus of attention is directed to a specific stimulus, while ignoring distracting or irrelevant information. Attention allocation has been connected to searching, driving and other tasks that require one to distinguish necessary and unnecessary information (Hubert-Wallander, Green & Bavelier, 2010). It makes sense that these would be improved by gaming as a gamer has to navigate its way through various maps and areas whilst constantly having to shift focus and determine what targets or objects are important.

Vision

Along with spatial thinking, higher spatial resolution has been linked to long-term career success and achievement in science, technology, engineering, and mathematics (STEM). STEM has an important role in this and future centuries (Wai, 2010) as STEM jobs are predicted to grow

exponentially (Deming & Noray, 2018). Both spatial thinking and spatial resolution are significantly improved when partaking in action videogames over non-action games, even up to the same level of formal, high school and university-level, courses aimed at enhancing these same skills (Uttal, 2013). It is apparent that gaming might have potential as a training tool, stimulating STEM performance. This may prove useful in preparing for future job applications.

According to Green and Bavelier (2007) spatial resolution is affected by one's visual crowding, referring to how small one can differentiate stimuli within (similar) distractions It also contains the visual acuity, referring to the distinguishing of shapes and detail at a given distance. Green and Bavelier (2007) show that the crowding threshold is reduced, and that visual acuity has significantly improved after playing action video games. Contrast sensitivity has shown to improve with gaming as well. It lets us distinguish differences in shades and differentiate foreground and background and is the primary limiting factor in how well one sees (Li et al., 2009). Both contrast sensitivity and spatial resolution are connected to activities like reading (Eichenbaum, 2014). This advocates that gaming improves vision on a whole, specifically reading activities and perhaps other tasks that rely on the perception of details and contrast as well. Another aspect linked to vision is visual selective attention, which can be improved by gaming too. It can be separated into three elements: attention across space, in time, and in relation to objects. The insight required for participating in traffic is an example of selective attention across space which is generally linked to the prediction of movement (Green, 2012).

Attention across time or retaining spatial information over time, could help bolster computer skills and study related activities. The tests used by Oei (2013) to measure improvement in this area show similarities to these kinds of tasks. For example, remembering the location of certain buttons or text in software or information that mostly appear on the same spot. Gaming can also essentially eliminate the attentional blink (Oei, 2013). The attentional blink is the loss of attention after a moment of focus. It might allow for more efficient filtering of information by switching the attention more quickly without missing anything (Oei, 2013). Attention in relation to other objects, describes the ability to keep track of objects in relation to one another. For example, a pedestrian moving towards a crossway at a certain speed. This attention form could be utilized when keeping track of the distance and path of the pedestrian, in relation to other road users. When keeping track of multiple objects at the same time, gamers perform significantly better than non-gamers (Dye, 2010).

According to Granic (2014), these enhancements are a product of the visually rich three-dimensional navigational spaces and the fast-paced demands that require split-second decision-making as well as acute attention to unpredictable changes in context. These elements are mostly found in live action multiplayer shooting games in the manner of Halo and Grand Theft Auto where enemy movements are not artificially scripted as with Non-Playable Characters. From this perspective, currently popular games like Valorant, Counter-Strike, Titanfall or battle royal games such as Call of Duty: Warzone and Fortnite might also have potential in stimulating cognitive growth.

Learning

Tracking multiple objects has also been linked to a better ability to learn. Especially in people with low gaming experience, action video games improve the rate at which someone learns

(Zhang, 2020). This shows that gaming has the potential to improve your learning capacities at work, school or in other situations where learning has an important role.
Game-derived skills are not limited to learning by studying or training. Reflective problem-solving abilities can also be addressed with gaming. Examples of these abilities include taking time to gather information, evaluate various options, formulate a plan and consider changing strategies and/or goals before proceeding further (Prensky, 2012). Reflective problem solving is mostly seen in different types of roleplaying, strategy and puzzle games. Especially in open-ended games resembling World of Warcraft, but also Pokémon, Final Fantasy and Portal (Granic, 2014; Prensky, 2012). "These games often provide very little instruction about how to solve in-game problems, providing players with a nearly blank palette from which to explore a huge range of possible solutions based on past experience and intuitions." (Granic, 2014). Fast paced action, fighting (e.g., Mortal Combat) or racing games (e.g., Grand Turismo) do not give the opportunity to form a plan and strategies on the same level as strategy focused games do (Adachi, 2013; Steinkuehler, 2008).They do however stimulate creativity. During a survey of 491 12-year-old students by Jackson et al (2012),a correlation was found between gaming and creative thinking in children. According to this study, this connection transcends genre and gender.
Interestingly, Passmore et al. (2014) suggests that videogames also drive an incremental theory of intelligence, meaning intelligence is not a fixed innate trait. Instead, it's malleable, cultivated by effort and driven by a positive view on failure. Games are designed to reward effort through failure, to motivate the gamer to continue the game (Dweck, 2005). The incremental theory of intelligence is connected to higher levels of achievement and surmounting failure (Blackwell, 2007). It's interesting to think about the gaming implications throughout all stages of life. It would suggest that gaming could be beneficial in learning environments, and places where reflective skills and problem solving are prevalent.

Gaming Skills Overview

To gain better overview of how gaming might influence one's skills, behavior and capabilities, we categorized all found game derived effects and illustrated these in the Dekker Gaming Skill Overview (DGSO) (Figure 1). The overview consists of five elements: Cognition, visual, emotional, social and somatic. The somatic category was added to accommodate the only physical effect of gaming we found in our research. Some effects, especially the visual ones, could be assigned to multiple categories. Making a separate 'visual' category alongside the cognitive and somatic category produced a more clearly demarcated overview. This was helpful in separating skills with possible implications across a diverse spectrum.

Moving outwards from these five elements, all main effects cited in this work are included. This overview was generated to highlight positive and negative skill effects. Negative effects have been highlighted with a thin red marked border. Where possible, these main effects are followed by subskill, capability or behavior. The outermost ring represents any associated use or related subject getting closer to actual real-world skills.

At this moment the DGSO gives an expansive range of evidence based effects derived from gaming and serves as a starting point. Even though it could be considered non-exhaustive in its current form, there are many useful implications for this figure. For example, increasing awareness of the effects of gaming or specifically educating about how gaming can have a positive

impact. Ultimately, the DGSO should inspire to do more research on possible effects of playing videogames and how to use them in the most favorable way.

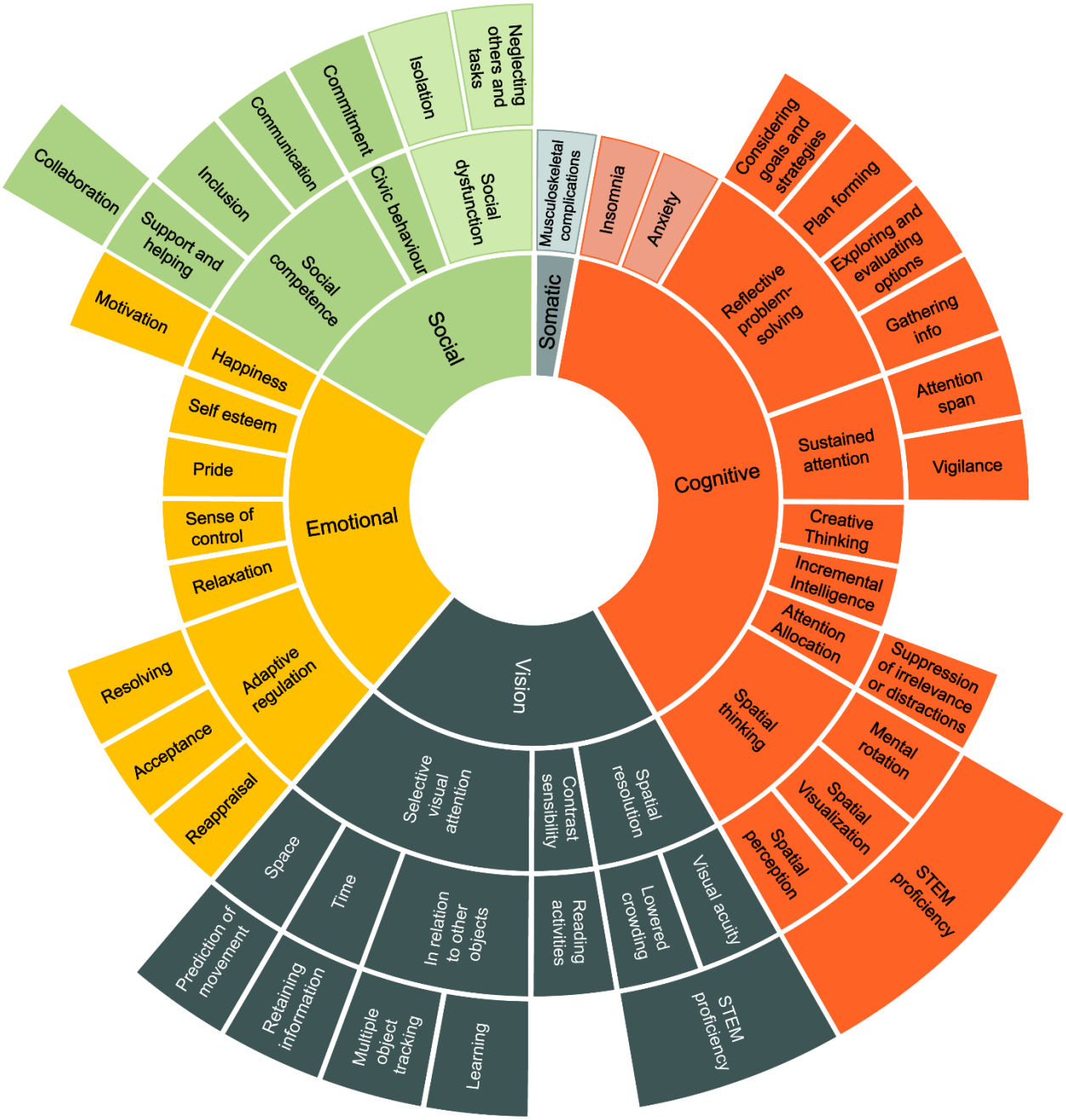

Figure 1 – Dekker Gaming Skill Overview (DGSO).

Limitations

In this work we only considered articles written in English. The choice to keep this review compact resulted in a generalist view of some of the subjects, losing some of the detail to all the effects of recreational gaming.

Future Research

It would be interesting and relevant to do follow-up research on problematic gaming behaviors and behavior adjustment to understand more about stimulating responsible gaming behavior. This study implies that gaming for more than 10 hours a week increases the chance of negative effects on the gamer. It might also be beneficial to uncover how these findings translate to esports athletes. Exploring how game derived skills translate to real-life skills or occupations would also be of interest as it presents a better perspective of the implications for gaming.

The DGSO will need to be expanded upon. A category reorganization and deepening are expected, to allow for more information and easier interpretation from this overview.
To add on to the DGSO, it would be relevant to include game genre or essential elements of games into the overview. With this the DGSO may find use in connecting real-life skills to specific games or genres, potentially paving the way to game-based skill training for people of all ages.

Conclusion

From these studies, we derive that a diverse set positive effects can be attained by engaging in gaming. The associated effects from a game depend on aspects that a game contains, or how the game is played. It is relevant to keep potential downsides of gaming in mind. Most of the benefits derived from gaming are directly or indirectly transferable to real-life situations.

Conflicts of Interest and Source of Funding

No conflict of interest or financial disclosures pertaining to this manuscript exists.

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