Internet gaming more than 3 hours a day is indicative and more than 5 hours is diagnostic: Proposal of playing time cutoffs for WHO-11 and DSM-5 Internet Gaming Disorder based on a large Steam platform dataset

Abstract—We determine two daily playing time cutoffs, relevant for indicating and diagnosing Internet Gaming Disorder. The analysis is based on previous prevalence statistics and a large-scale database, housing all kinds of game genres and user types.

Keywords—Internet Gaming Disorder, playing time, WHO-11, DSM-5

I. INTRODUCTION

While all meta-reviews show that playing time is a critical indicator to diagnose Internet Gaming Disorder (IGD), to date there is no hard empirical evidence for any playing time threshold [1-3].

So far it has only speculated that a playing time above a threshold of between 2h and 4h a day is indicative of IGD [3, p. 6].

That is why we are the first to propose two IGD playing time cutoffs, derived empirically from an analysis of a very large Steam platform dataset. Steam is a digital distribution platform which offers multiplayer gaming [4].

Analyzing the Steam platform “... allows us to study the behavior of millions of players at once, a scale that is simply not possible with surveys and interviews” [5].

II. METHODOLOGY

To propose the empirically correct IGD playing time cutoffs, we determine these cutoffs from the prevalence rates reported by WHO and the most complete prevalence meta-review [1].

To determine the first cutoff that indicates IGD, we used the 10 percent threshold reported by WHO [6, p. 382]. This first cutoff is called “indicating” and should be used for family counseling and educational guidance.

To propose the diagnostically relevant playing time cutoff, we make use of the 4.7 percent prevalence threshold reported by the most complete meta-review [1, p. 18]. Feng et al. [1] reviewed prevalence data from 27 studies where IGD was diagnosed using established IGD scales.

For both thresholds (10 and 4.7 percent) we determine the related playing time from Steam platform data. Data preparation and analysis was made using the R software.

A. Steam platform

The Steam platform was developed in 2003 and is owned and operated by the Valve Corporation, a game developer. Steam is a digital distribution platform which offers digital rights management, multiplayer gaming, video streaming and social networking services. It hosts all kind of game genres and gaming related software, like audio and video editing, web publishing, and developing applications from a huge variety of publishers and developers [4, 5]. With over 100 million users, Steam is a very popular gaming community and distribution platform [5].

Steam also provides the user with installation and automatic updating of games, community features such as friendlists, groups and in-game voice and messaging chat functionality. Users are able to directly join games their friends are currently playing and allows users to arrange themselves in different groups, even beyond the borders of their own social network. Steam supplies a freely available application programming interface (API) called Steamworks. Developers can use it to integrate and extend many of Steam's functions into their products. Relevant topics include networking, matchmaking, in-game achievements, micro-transactions, and support for user-created content through Steam Workshop. Valve reported that there were 125 million active accounts on Steam by the end of 2015 and up to 18,537,490 (all-time peak at January 10th 2018) concurrent users online [7-9].

B. Dataset

The data we used was collected and provided by O'Neill et al. [5] from Brigham Young University. The original database is the first complete examination of any major gaming network [5]. The Steam dataset was collected in 2013 and contains more than 160 gigabyte of information of 109 million unique Steam accounts and 716 million unique games [5]. The dataset can be accessed on https://steam.internet.byu.edu/.

C. Data cleaning and preprocessing

We randomly selected 5,510 unique user IDs from the dataset with complete associated information (no missing values, total playtime > 0).

III. RESULTS

Figure 1 shows the distribution of the daily playtime among users.
Proposal of playing time cutoffs for WHO-11 and DSM-5 Internet Gaming Disorder based on a large Steam platform dataset. In BDS-2020 Proceedings: Preprint of Buettner, R.; Blattner, M.; Reinhardt, W.: Internet gaming more than 3 hours a day is indicative and more than 5 hours is diagnostic. While internet gaming for more than 3 hours a day is indicative of IGD, daily gaming for more than 5 hours is a clear diagnostic indicator.

The first cutoff of 3 hours daily playing time could be used for family counseling and educational guidance.

The second cutoff of 5 hours playing time a day is a diagnostic relevant indicator which could be used as an empirically validated cutoff. A. Limitations

Despite the large user scale (109 million unique Steam accounts), the database used for this analysis is potentially slightly biased (self-selection of people interested in gaming).

In addition, the Steam network contains only a fraction of all gaming-based data, it does not concern any other gaming network, community, distribution service or game information outside itself. It does not include insights from other PC gaming distribution platforms like “Origin” or “Batte.net” or even from other gaming systems than PC. Consoles suggest a more casual, friendly gaming experience and Smartphones are used for completely different, though also relevant, kinds of game.

B. Future work

Since Mihara and Higuchi [2] summarized in their meta-review that personality, related user-oriented concepts, psychiatric and physical health conditions, and social relations may also influence IGD, we will analyze these factors in future research in more detail.

Therefore we plan systematic experiments in our lab to assess the influence of personality [12, 13] and related user-oriented concepts [14]–[16] including cognitive workload [17]–[19], concentration [20], and mindfulness [21, 22] in multi-agent-settings [23]–[26] on IGD. In these experiments we will also triangulate objective and perceived user-oriented concepts [27]–[29] using physiological data (i.e., electroencephalographic data [30]–[33] and spectra [34]–[36], electrocardiographic data [37, 38], electro-dermal activity [39], eye fixation [40, 41], eye pupil diameter [42]–[44], facial data [45]) to increase reliability.

We also plan to use machine learning approaches to analyze and to model IGD behavior including regression modeling [46] and modern convolutional neural networks [47]. Especially the latter approaches show robust model results in a broad range of applications [47–50].

Finally we will evaluate internet technology usage models [51]–[54] and trust [55, 56] in social multi-agent settings [57]–[64] to assess the influence of social relations on IGD. For instance, while Steam is only partly a social network, it would be interesting to see how players organize themselves and interact with each other beyond the Steam borders by using other platforms like Twitch, Facebook, Reddit, etc. Many game titles have their own related communities, built up by developers, gamers and fans of the corresponding franchise. It would be interesting to see what influence these communities might or indeed do have on the individual players. One subject of investigation by analyzing these communities could be the impact on spent gaming time. Is a player spending more time...
playing a specific game when he is part of the game’s community? Another object could be to analyze the context between the number of friends a player has by being part of a community. It would be interesting to see if and how players influence each other in playing their shared, favored games and if they promote additional games among their community.

In addition, since some genres of game are more strongly related to addiction than others [65, 66], the influence of genre is interesting for future studies. For instance, massively multiplayer online role-playing games (MMORPGs) are associated with increased playing time and gaming addiction [65, 66]. MMORPG design encourages social interaction and interrelation between players since each player has access to only a limited number of in-game skills. In order to progress and achieve game goals, it is mandatory for players to collaborate [66]. Other game genres related to addiction include first-person shooter and action-adventure [4]. While game genre may be an important predictor of video game addiction and game-genres are imbalanced (see Fig. 3), future work should also study the influence of genres on IGD.

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REFERENCES


