A large-scale study of changes to the quantity, quality, and distribution of video game play during the COVID-19 pandemic

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Video game play has been framed both as protective factor and risk to mental health during the COVID-19 pandemic. We conducted a statistical analysis of changes to video game play during the pandemic to better understand gaming behaviour and in doing so provide an empirical foundation to the fractured discourse surrounding play and mental health. Analyses of millions of players' engagement with the 500 globally most popular games on the Steam platform indicated that the quantity of play had dramatically increased during key points of the pandemic; that those increases were more prominent for multiplayer games, suggesting that gamers were seeking out the social affordances of video game play; and that play had become more equally distributed across days of the week, suggesting increased merging of leisure activities with work and school activities. These results provide a starting point for empirically grounded discussions on video games during the pandemic, their uses, and potential effects.

Keywords: Video games; COVID-19

The declaration of COVID-19 as a global pandemic by the World Health Organisation on March 11th 2020[1] preceded important changes to the lives of people across the world. National lockdowns and local stay-at-home orders limited behaviours in a number of ways ranging from decreased mobility to disruptions to leisure, social and civic activities (Bonaccorsi et al., 2020; García et al., 2020; Rudnicka et al., 2020). Conversely, other pursuits saw increased interest as providers of 'stay-at-home' tools for work, education, and leisure such as Netflix, Peloton, and Zoom substantially increased in engagement and valuation as the pandemic, and the global response to it, took hold. Just as the activities that people are engaging in appear to have shifted during the pandemic, so too has *when* people do things, due to changes in living conditions and other disruptions caused by the pandemic. Although the research literature on this topic is nascent, proposed effects range from changes in sleep patterns to a greater incorporation of family and leisure time into the working day (Raabe et al., 2020; Rome et al., 2020; Rudnicka et al., 2020).

Because of their interactive nature and social affordances, video games are a domain we would expect to be affected by the pandemic, and the individual and societal responses to it. Indeed, school closures may have led young people to have more time for video games, and the redistribution of adults' working lives, unmoored from commuting and face-to-face meetings on weekdays, may have enabled individuals to play games during times when they might otherwise be occupied (Amin et al., 2020). Shifts in these patterns of play are plausible, but research concerned with this

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[1] https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

idea is sparse and predominated by self-report data and samples of convenience, leading to potentially inaccurate results that do not generalise well to broader populations. For example, participants in one study of 465 individuals exposed to a COVID-19 lockdown in Italy reported playing more multiplayer video games during lockdown than they had before (Gabbiadini et al., 2020). In another survey, 78 gamers recruited from online platforms such as Twitter and Reddit reported playing more multiplayer video games during lockdown than they had before (Cmentowski & Krüger, 2020). Survey data from one larger, nationally stratified sample, suggests there might have been a slight uptick in video game play, about 12 minutes a day on average, in April 2020 during the second week of the U.K. lockdown, but that shift quickly returned to baseline (Creative Industries Policy & Evidence Centre, 2020). Such work lends general support to our intuition of what might have happened to patterns of video game play during the pandemic, but also that actual changes might have been too small to merit discussion. However, because self-report measures of digital activities such as game play are known to be unreliable (Johannes et al., 2020; Parry et al., 2020), and because results from convenience samples are unlikely to generalise directly to the broader populations, we actually don't know whether these isolated data points reflect true (small) upward global trends in the quantity of video game play, or whether they are artefacts of sampling protocols or self-report biases.

Beyond quantity of play, even less is known about the types and qualities of the games which were played during the height of the pandemic. This oversight is important because modern online video games such as Fortnite, Minecraft, and Call of Duty afford multiple channels of socialising and virtual venues for connecting, collaborating, and playing together, all of which might be important when interactions in person are made more difficult. Marston & Kowert (2020, p.5) proposed that games provide a "useful tool for mitigating some of the negative impacts of COVID-19 for adults" because of the benefits of in-game socialization to "[reduce] stress, depression, and sense of loneliness". A range of similar claims about the social benefits of games have been made by others who have observed that "games can help cope with the negative effects of social isolation… multiplayer games are known to strengthen the connectedness with a virtual community, which could benefit the overall mental health by reducing feelings of solitude" (Cmentowski & Krüger, 2020, p.2). On the basis of nearly two decades of research on video games that shows they can provide rich opportunities for players to meet their fundamental psychological needs, including feeling a sense of belonging, we would expect this could be true (Orben et al., 2020). That said, there is little evidence these games in particular are seeing an outsized increase in engagement versus other forms of video game play, although the idea that there have been significant increases in social video game play, and that such play might be beneficial to well-being, has taken hold in popular discourse (Baraniuk, 2020; Fishman, 2020; Stieg, 2020).

This exuberance about the potential positive aspects of games stands in contrast to similarly earnest warnings that increased video game play during lockdown is a harbinger of games-related problems. Indeed, some have proposed that COVID-19 provides a dangerous mix of home confinement, stress, fear, and uncertainty – and that this is likely to lead to the excessive use of "reinforcing behaviours" such as video games (Király et al., 2020, p.2). Similarly, Ko & Yen (2020, p.2) posit the stressful nature of the pandemic, coupled with the high relative availability of video games, make it likely that the "maladaptive use of gaming has become more frequent during the COVID-19 outbreak because many alternative [coping] strategies have become impracticable." Yet others have proposed that the prolonged lack of structure arising from school closures may leave children and adolescents more susceptible to "loneliness, addiction to videogames and binge watching" (Poletti & Raballo, 2020, p.1). Going further, (King et al., 2020, p.2) assert that "significant increases in gaming … may pose risks for vulnerable individuals including minors and those affected by and at risk of gaming disorder".

Taken together, these warnings can be understood as speculative applications of diathesis stress models, whereby COVID-19 related stressors drive vulnerable individuals toward increasingly harmful patterns of behaviour, including video game play, to the extent that it further interferes with healthy functioning. Taking for granted that increases in play have negative effects and that increases in engagement are in evidence, one might assume the combined pressures of the pandemic and steps to remediate it amplify health risks assumed to be associated with video games. However, as with studies suggesting potential benefits of games during the COVID-19 pandemic, the literature focusing on their potential negative impacts has also exclusively used self-report methodologies in addition to convenience samples to their potential detriment (see also Li et al., 2021; Teng et al., 2021).

Taken as a whole, it is clear that the rhetoric and discourses surrounding video games during the pandemic have outstripped what we empirically understand about the ways human play behaviour shifted, or not, during 2020. On the basis of anecdote and common sense it is plausible that various changes in engagement behaviour may have occurred

during the COVID-19 pandemic but the scale, time course, and lasting impacts on play behaviour are unknowns. Leisure behaviours such as video game play are known to have temporal cycles, such as the regular increase in video game play on weekends, and these patterns may have been disrupted or indeed magnified: COVID-19 related changes to patterns in work and the restructuring of school and family time may have increased the accessibility of games during the week, shifting these cycles and freeing up more time for play, thus restructuring how individuals spend their time. In addition, there have likely been changes to the qualities of the games played, specifically their social affordances in the form of multiplayer features may have experienced outsized popularity during this period. Although large-scale research using actual gameplay data has found that time spent playing games such as *Animal Crossing: New Horizons* and *Plants vs. Zombies: Battle for Neighborville* is slightly but positively correlated with well-being (Johannes et al., 2020), it remains unclear if play has actually increased to a degree that should encourage those excited about positive aspects of game play, or worry those concerned about possible harms associated with play.

The present study

Our goal in this study was to examine how video game play behaviour changed during the COVID-19 pandemic and in doing so provide an empirically grounded perspective to inform the fractured discourse surrounding the assumptions that are being made about changes to gaming behaviours and their health effects during this period. This study does not directly address mental health; instead, we are interested in changes to the base rate of gaming behaviour and argue that this is a necessary datum to be defined before proceeding with more fine-grained investigations of what the changes might mean psychologically.

To this end, we aggregated and analysed data on a diverse range of the 500 globally most popular games played on the Steam online games platform[2]. Our aims for analysing data generated by several millions of daily players across a wide range of popular video game titles were threefold. First, we wanted to derive an estimate of the quantity of change, if any, in video game play during the pandemic. Second, we wanted to evaluate if any changes in play depended on the differences between single- and multiplayer games. Finally, we examined whether the pandemic influenced the cyclical nature of play, changing the distribution of game engagement across the week.

Method

We gathered the data analysed in this study from the *SteamDB* website[3], which interfaces with Steam's application programming interface (API) and records the peak number of simultaneous players for each game on the Steam platform on each day. Although these data originate from the official Steam API, some aspects of video game play on the platform may be absent from the dataset. For example, players who do not have an active internet connection during play are not counted, nor do those playing certain downloadable content (DLC) expansions that are listed separately from the original game count in the player tally of the original game. The scope of the dataset is global: players may be located anywhere in the world, but the times on *SteamDB* are recorded in UTC±00:00. This means that, for example, a player on the American west coast playing a game on a Friday night may be counted towards the peak number of players on a Saturday.

The full dataset consists of 40,009 games and begins Jan 1, 2000. To limit the scope of the manual coding while retaining the most played recent games, we elected to analyse the top 500 games based on their mean peak daily players during 2019. We reached this decision because the distribution of players was heavily right-skewed, with the top 500 games of 2019 accounting for 91.3% of the total peak player counts during that year. Therefore, coding additional games would not have substantially increased the scope of the data (games 501–1000 account for just an additional 2.8% of players).

Prior to analysis, we content-coded these 500 games in terms of their social affordances, specifically as either single player or multiplayer, defined as containing a feature which allows more than one player to remotely interact with the same game environment via the internet in a substantial way. We coded the games as single- or multiplayer based on whether the features were present in the game at the time of analysis, given that some games had added or removed features since their release (Zendle et al., 2020). We considered a game only to have a feature if it was included in the game itself, not any additional DLCs or user-generated modifications.

[2] https://store.steampowered.com/

[3] https://steamdb.info. It should be noted that *SteamDB* does not commonly allow crawling of their database, but allows exceptions for academic research. We applied for and were granted such an exception.

Two coders independently assessed the list of 500 games for the above features, having had a discussion about the above definition and how it might be implemented in practice prior to beginning the coding. The assessments drew on a variety of sources, such as the original game documentation, game-specific wikis, and forum posts and other player discussions. If a feature was difficult to identify, gameplay videos were also watched, and in the most extreme cases, the games were downloaded and played.

Cohen's Kappa measures the degree of agreement between coders to account for chance agreement, and is the most commonly used way to measure inter-coder reliability. A Kappa statistic of greater than or equal to 0.81 is classed as being "almost perfect agreement" (McHugh, 2012, p.4). For this reason, and to keep consistency with our previous work (Zendle et al., 2020), we set a minimum threshold of agreement of 0.81. Any remaining disagreements would be resolved through discussion, so that the final dataset would be fully reflective of the opinions of both coders, to ensure maximum validity.

After the first round of coding, the kappa scores for the presence of multiplayer features was 0.68. Given that this score was lower than our target of 0.8, the coders discussed and revisited elements of the definitions which may have caused confusion, landing on a clarification that multiplayer games contain "a feature that allows more than one player to remotely interact with the same game environment via the internet in a substantial way", and that this definition refers specifically to shipped versions of games, rather than updates via community modification or third-party tool use (e.g. Parsec).

The two coders then separately re-visited and re-coded the games on which there was disagreement in a second pass. After the second pass, the required threshold of a Kappa of 0.8 was met (k = 0.85). However, there remained a total of 21 games on which there was a coder disagreement. The two coders held a meeting in which they resolved any remaining disagreements through discussion. The majority of conflicts arose due to initial misinterpretation of community-modified game content as being a part of the official game, or lack of realisation that additional game features had been added or removed since the release. In the end, perfect agreement was reached for all 500 games.

The final data set consisted of 500 games' — manually coded for single- or multi-player — peak daily concurrent players on the Steam platform from January 1st 2019 to December 31st 2020. Because we were interested in the presence or absence of social affordances, not the individual games themselves, the data set was collapsed to total daily counts for single- and multi-player games.

Analytic approach

In line with the three research questions guiding this study, we analysed the daily Steam engagement data in terms of COVID-19 related changes to three features reflecting the quantity, quality, and distribution of play across the week. However, because the player counts are at a global level, they cannot be directly linked to local health advisories, and consequently we didn't use specific COVID-19 advisory time periods as predictors of video game play or changes therein. Instead, in addition to visualizations, we modelled daily Steam player counts with a Generalized Additive Model (GAM) using the *mgcv* package in R (R Core Team, 2019; Wood, 2017, 2020), with the main comparison being changes in video game play patterns between 2019 and 2020. We included week (0-52) and weekday (0-6) as predictors of the daily player count in order to describe changes in play over time within the year (week predictor) and week (weekday predictor). The week and weekday predictors were modelled using tensor product smooths, with cubic regression splines, such that the time course of the player count could take any potentially nonlinear shape as indicated by the data, and thus accurately describe any changes to the quantity of video game play over time. The smooth functions were estimated separately for years (2019 and 2020) and game types (multi- and single player) to allow comparisons between years and game types. In addition, the tensor product interaction between week and weekday allowed the differences between weekdays to change in potentially nonlinear manners over the course of the year. Thus, the model facilitated our examination of the degree to which the quantity of play, social quality of play, and its weekly distribution changed over time.

Data and code availability

The raw data and annotated analysis code are available at https://osf.io/ya9jt/.

Results

We first focused on changes to the quantity of play behaviours during the COVID-19 pandemic. Observing the daily number of players in 2019 and 2020 (shown separately in the top row of Figure 1 for multi- and single player games) it is clear that the volume of players in 2020 increased rapidly in mid-March, peaked in early April, and then slowly declined to levels comparable with January and February by late June. Following this, there was a slow increase in engagement beginning around October 2020. Relative to these changes, player numbers in 2019 remained stable throughout the year. These observations supported increased games

engagement during the early phases of the COVID-19 pandemic, and a slow return to comparably standard levels of games engagement when initial lockdowns and advisories were eased in much of the world in the (northern hemisphere) summer (see Figure 2, bottom panel).

To clarify these observed differences, the bottom row of Figure 1 shows the difference in average weekly game engagement between 2019 and 2020. It is clear that, following the WHO announcement in March 2020, there was a very large increase in play in 2020, observed for both single- and multiplayer games, reaching as many as 1.14M and 0.19M excess multi- and single players in April 2020, respectively, and a more modest increase after the relatively standard levels of play seen in June to August.

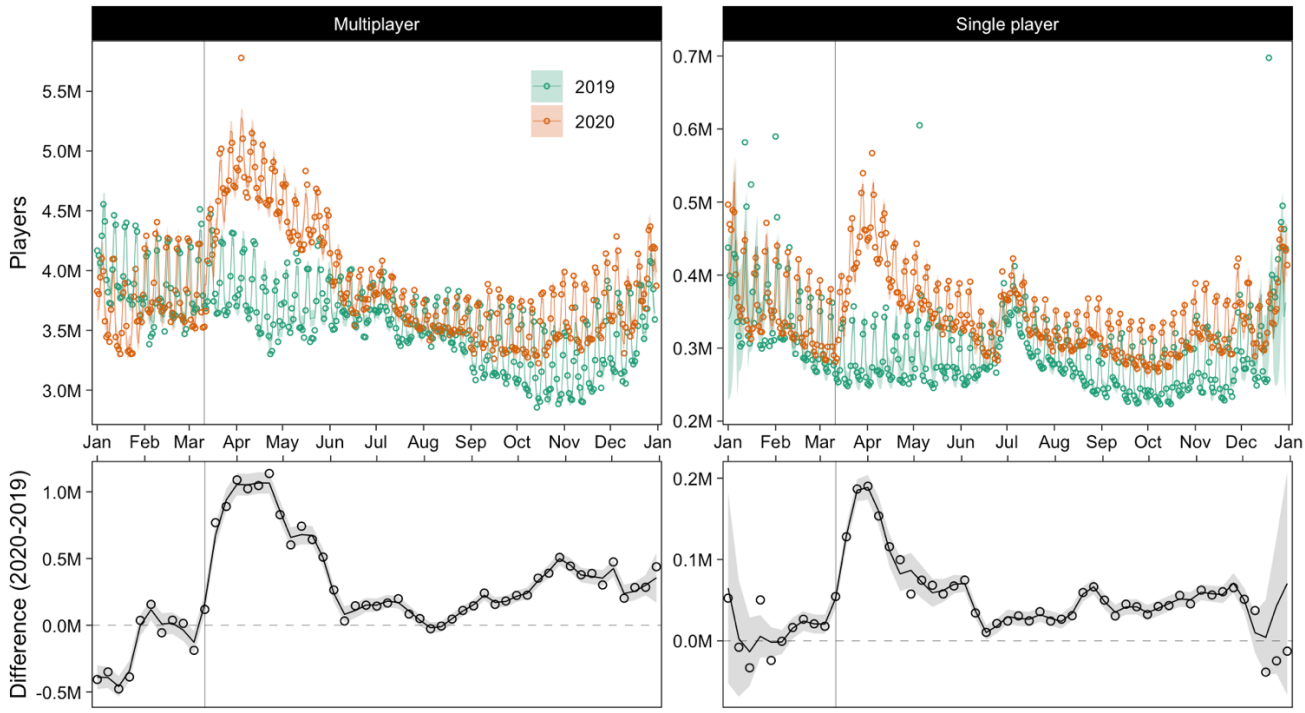

Figure 1. Top row: Daily total players (in millions) of the top 500 video games on the Steam platform (points), and generalized additive model estimates in 2020 (black) and 2019 (light grey). Lines and shades indicate model fits with 95% CIs. The vertical line indicates March 11th when the WHO declared COVID-19 a pandemic. Bottom row: Differences in the average weekly player counts in 2019 and 2020 (2019 weekly averages subtracted from 2020 weekly averages).

Second, we compared changes to the quality of play, contrasting the popularity of multi- and single player games, over time in 2019 and 2020. Figure 2 (top panel) shows the difference between player numbers for these two game types for each week in 2019 and 2020. In addition, Figure 2 (bottom panel) shows the stringency index of the national response to COVID-19 for 9 nations that accounted for the majority of Steam traffic in 2018[4] (Guidotti & Ardia, 2020; Hale et al., 2020), a measure of the degree to which life was restricted in response to the pandemic in those countries, to allow comparing changes in the game engagement data (top panel) to responses to the pandemic (bottom panel). Concurrent with the changes to the volume of play described above, and to the changes in COVID-19 responses show in Figure 2 (bottom), beginning in late March 2020 there was a large increase in the popularity of multiplayer games over single player games. The difference between multi- and single player players reached 4.38 million players in April 2020, in contrast to a difference of only 3.52M in February 2020. No such trend was observed for 2019, when the difference between single- and multiplayer games had remained rela-

[4] https://www.statista.com/statistics/826870/steam-distribution-country/; we left out China even though it was in the top-10 that year, because Steam was not officially available there until 2021.

tively more stable (February: 3.45M; April: 3.46M), suggesting the increased popularity of multiplayer games in 2020 (2nd quarter) was at least partly driven by COVID-19 responses.

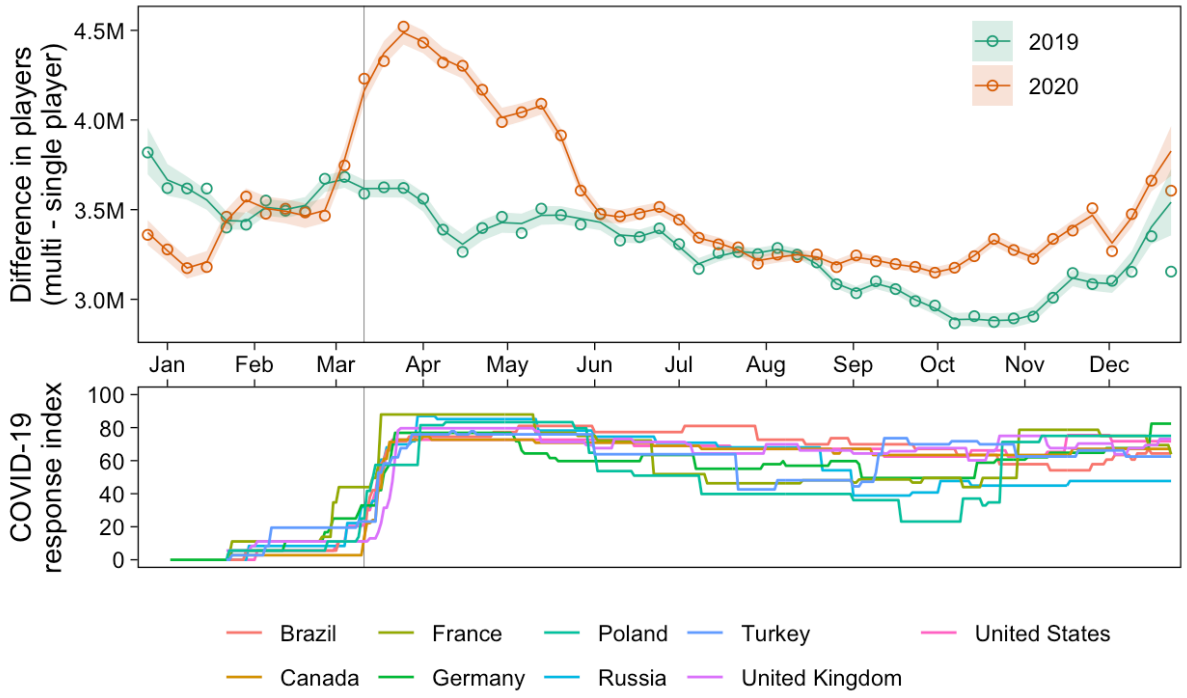

Figure 2. Top panel: Difference between the number of players engaged with multi- and single player games for each week in 2019 (green) and 2020 (red). Points are observed differences between the weekly multiplayer and single player counts (weekly means), lines and shades are model-implied differences and 95% CIs. Bottom panel: Index of the stringency of 9 nations' response to the COVID-19 pandemic (Hale et al., 2020).

Third, concerning the distribution of play across week, we investigated the extent to which the weekend effect—the greatly increased amount of video game play on weekends—had changed over time. The weekend effect is salient as the sawtooth pattern in Figure 1; to illustrate it in more detail, the top row of Figure 3 shows the amount of play for each day of the week for a select number of weeks. As is shown, game engagement in early 2020 and 2019 was relatively stable from Monday to Thursday, with a small increase on Friday, and a pronounced increase on Saturday and Sunday. The middle row of Figure 3 displays the magnitude of this weekend effect (weekend – weekday engagement) over time in 2019 and 2020. Toward the middle of the year, the weekday effect diminished in both 2019 and 2020, but even more so in 2020. The bottom row of Figure 3 shows the difference in the weekend effect between 2019 and 2020: Even though the yearly trend whereby the weekend effect was smaller in the middle of the year was observed both in 2019 and 2020, the difference between years shows that, broadly following March 11th, the weekend effect was and remained notably smaller in 2020 as compared to 2019, an effect observed for both single- and multiplayer games. As an example, the average weekend effect in April 2019 was 0.19M, but in April 2020 only 0.11M—almost 60% smaller. That is, when people played had become more evenly distributed throughout the week during the 2020 COVID-19 pandemic, such that the difference between weekend and weekday engagement was smaller. This observation suggests that COVID-19 related changes might have driven changes in patterns of behaviour, allowing for (relatively) more video game play time during the week.

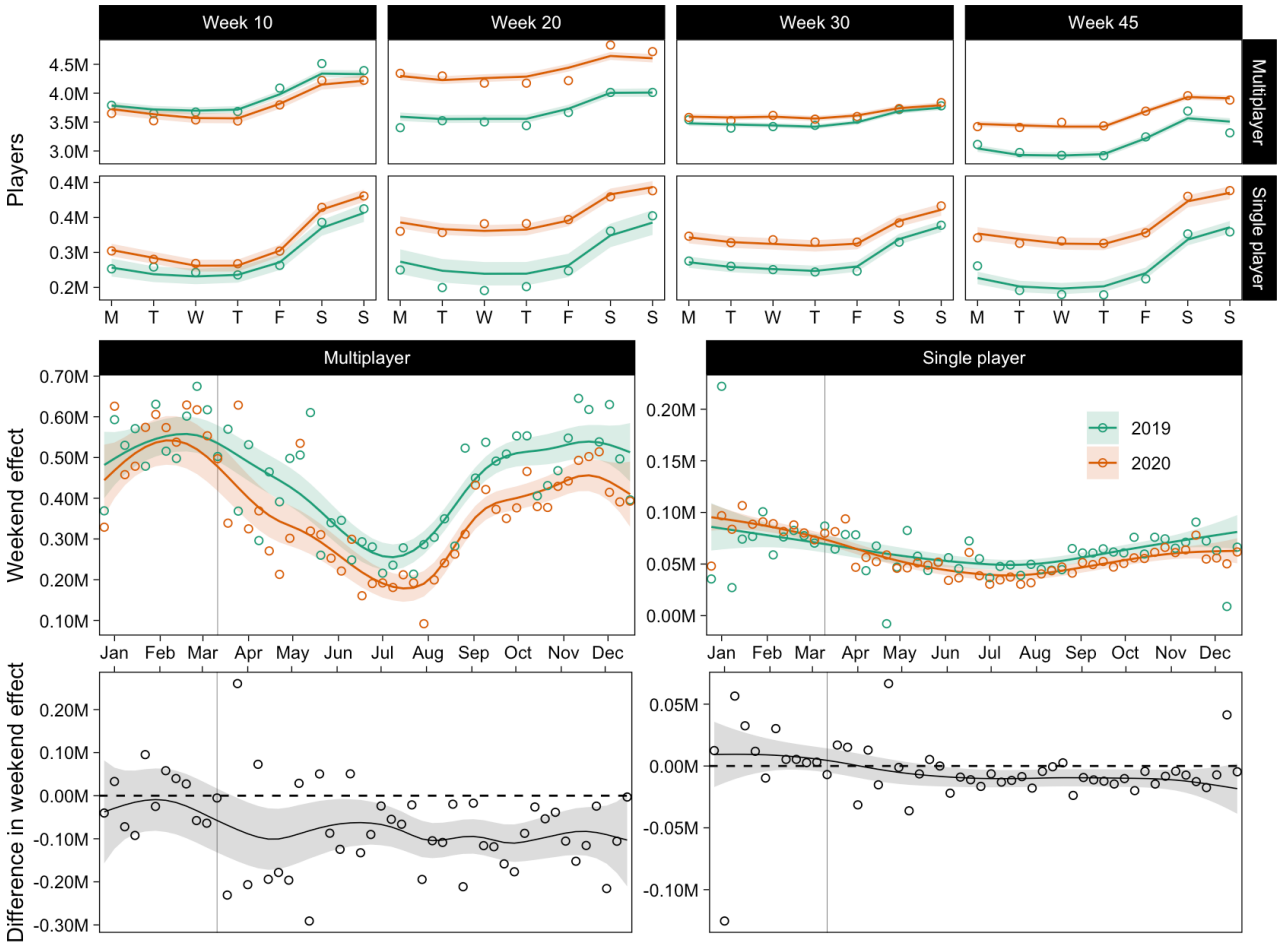

Figure 3. Differences in the distribution of play across the week. Top: Number of players on each weekday for a sample of illustrative weeks (columns), separately for single- and multiplayer games (two rows). Points indicate observed data; lines and shades are GAM fits with 95%CIs. Middle: The weekend effect (mean of weekday players subtracted from the mean of Saturday and Sunday players) separately for 2019 (green) and 2020 (red). Bottom: Difference in the weekend effect (2020 – 2019).

Discussion

Speculation in the media and among researchers about the impacts of the COVID-19 pandemic on video game play behaviour and its lasting effects on players is rife (Cmentowski & Krüger, 2020; Gabbiadini et al., 2020; Király et al., 2020; Ko & Yen, 2020). However, large-scale and representative examinations of actual changes to game behaviour have not yet been conducted. The results of our study, based on data from millions of players from the popular Steam platform, provide evidence that video game behaviour did in fact substantively increase during the pandemic. The number of people engaging with the top 500 games on Steam remained relatively stable from the beginning of March 2019 to the end of June of 2019 (ranging from 0.28M to 0.30M players for single player, and 3.70 to 3.94 players for multiplayer games). However, during 2020, a new and distinct pattern of behaviour emerged: a sharp increase in play of both single-player and multiplayer games after the WHO pandemic declaration on March 11th, with player numbers ranging from 0.33M to 0.42M for single player and 3.85M to 4.80M for multiplayer in the months of March to June. These changes were broadly in line with fluctuations in the stringency of governments' responses to the pandemic, as observed in Figure 2 (Hale et al., 2020). This suggests that global changes in the behaviour of individuals associated with the COVID-19 pandemic did indeed have marked short-term effects on games engagement. Interestingly, our results also suggested a return to regular overall video game engagement volumes in July of 2020, and a slower increase beginning in October. At least in terms of the overall volume of play, this evidence runs counter to the

idea that the pandemic unlocked prolonged "significant increases in gaming" as some have feared (King et al., 2020). However, it should be noted that the data analysed here is aggregated at the level of individual games: Whilst it may suggest a return to pre-pandemic levels of overall gaming after July of 2020, it cannot speak to changes in the patterns of gaming amongst individuals. For example, such a regression may be the consequence of an influx (and outflux) of new gamers. It may well be the case that overall increases in gaming within individuals is masked by this level of data aggregation. Furthermore, the broader importance of this result is unclear as it is evidence that play, along with other behaviours, returned to at least partially regular patterns of daily life after initial lockdowns and stay-at-home orders ceased to be in effect.

Building on these observations, our analyses indicated that the social affordances of games, namely whether they were single-player or multiplayer, accounted for much of these differences (Figure 2). Indeed, the peak number of daily players of single-player games in April 2020 was 0.57M and 5.78M for multiplayer games, in comparison to only 0.36M and 4.24M respectively in April 2019. Critically, although multiplayer games were vastly more popular in 2019 than were single player games, this difference increased even further beginning in March of 2020, and again starting in September 2020, following a brief period of differences comparable to 2019 in the northern hemisphere summer months (Figure 2).

One interpretation of this data is that the relative uplift in multiplayer games may relate to their ability to satisfy basic psychological needs (e.g. Ryan et al., 2006). The increased gap in the volume of gaming behaviour between multiplayer and single player games following March 2020 suggests that in-game affordances which support the psychological needs for relatedness, and a sense of social belonging, might be key to driving increased gaming behaviour during the most restrictive periods of the pandemic. However, caution is warranted in this interpretation of the data: Whilst a divergence in growth between multiplayer and single player games was observed, it is unclear whether this shift may be the product of some third factor. Other plausible explanations, for example, are that multiplayer games may be less expensive, or tend to afford longer amounts of play before completion. Our data cannot speak to the motivations for shifts in play, or the consequences of these shifts in play. It can merely describe how play changed during the COVID-19 pandemic.

The pandemic has also disrupted how people structure and distribute their work, leisure, education, and family time across the week (Rome et al., 2020; Rudnicka et al., 2020). Our results highlighted the degree to which this disruption is reflected in video game play. Figure 1 indicated a cyclical pattern in the number of play sessions on Steam through 2019 and 2020, with more players engaging on Saturdays and Sundays than on other weekdays[5]. In other words, more play occurs during the weekend. However, there were important changes to this pattern following March 2020: When one considers February of both 2019 and 2020 there is a similar weekly pattern of play occurring in both cases: For example, there were an average 3.80M (2020: 3.83M) million daily multiplayers on Monday-Friday, and approximately 4.21M (2020: 4.31M) million daily multiplayers on Saturday and Sunday. By April of each year, however, these patterns had diverged. In April 2019, the average weekday saw 3.71M multiplayers, and the average weekend 4.03M multiplayers, for a difference of 0.32M. In April of 2020, the average weekday multiplayer number was 4.81M, with only a 0.17M increase to 4.98M on weekends. Crucially, weekly patterns of game play appeared to change during the pandemic: the relative boosts in engagement associated with the weekend had diminished during the pandemic and continued to be smaller throughout 2020, an effect observed for both single- and multiplayer games, but of greater magnitude for the latter (see Figure 3, bottom panel).

Keeping these findings in mind, their implications are qualified in at least three important ways. First, this data maps the daily peak number of players of the 500 most popular games on Steam (in 2019). Although Steam is the predominate platform for computer-based games, it is only one of many online games platforms and cannot therefore provide insights into play engaged on mobile phones, tablets, and game consoles. For instance, some console-specific games, such as Animal Crossings: New Horizons, were immensely popular during the pandemic. Increased engagement with leisure activities is also likely to not be specific to video games but also to e.g. watching streaming content. Second, the data we analysed captured play behaviour at a global level of analysis in terms of peak daily users and cannot speak to the specific actions happening within games. For example, we coded the game Counter-Strike: Global Offensive, a team-based first-person shooter, as a multiplayer

[5] The diminished weekend effect in mid-year, for both 2019 and 2020, but more so in 2020, might reflect the fact that the majority of Steam engagement comes from the Northern hemisphere, where generally school breaks and holidays occur during this time.

game. We infer increases in engagement with this game as evidence of increased social game engagement, at least relative to single-player games which afford no such modes of in-game social engagement. Making this assumption might overestimate social play because sessions of multiplayer game can be solitary (e.g. commerce) or underestimate it because game-related socialising happens on other platforms (e.g. Discord). Finally, the data we present provide a foundation for empirically grounded discussion on the impact of gaming during the pandemic on health, but our data are not sufficiently granular to test them. We simply do not currently have access to the kinds of detailed individual-level longitudinal data to assess such impacts. To study video game play, and how it impacts players, with the necessary level of accuracy and detail, we see large-scale transparent collaborations with the video game industry as a key path forward (Johannes et al., 2020).

This study provided an empirical starting point for discussions surrounding how video game play changed during the global pandemic. Our analysis makes clear that video game play increased, these shifts were driven mainly by games which provided players social opportunities, that play became more evenly distributed across the week, and that most of these changes to play were short-lived. These observations about changes to game play behaviours provide a foundation to discussions about potential benefits and harms of video games, and about how the pandemic may have impacted player health through changes to video game play behaviours. These findings underscore the value of objective (versus self-reported) behavioural data and underscore the need for transparent collaborations between independent and video game industry data scientists. It is indeed possible that online play and socialising does materially influence health during a global pandemic, but it will not be possible to know if, or to what degree, this is true without a step change in both scientific transparency and data access.

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