

# Pokémon GO with Social Distancing: Social Media Analysis of Players' Experiences with Location-based Games

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Pokémon GO is a popular location-based mobile game that seeks to inspire players to be more active, socialize physically and virtually, and spend more time outside. With the onset of the COVID-19 pandemic, several game mechanics of Pokémon GO were changed to accommodate socially-distanced play. This research aims to understand the impacts of the pandemic and subsequent game adjustments on user perceptions of the game. We used an exploratory mixed-method approach, a machine learning technique (Latent Dirichlet Allocation) for topic modeling, and thematic analysis for qualitative coding of top-level Reddit comments to identify whether and how the social distancing approach changes the players' behaviors. The results demonstrate that players were less physically active, less eager to discover, and more interested in remote social practices. We discuss which players leverage social distancing changes and reflect on key game features that provide a better gaming experience in the age of remote play.

CCS Concepts: • **Human-centered computing** → **Human-Computer Interaction (HCI)**; • **Empirical studies in HCI**.

Additional Key Words and Phrases: Pokémon GO, Social Distancing, Location-based Games, Social Media Analysis, LDA, COVID-19

## ACM Reference Format:

Morva Saaty, Derek Haqq, Mohammadreza Beyki, Taha Hassan, and D. Scott McCrickard. 2022. Pokémon GO with Social Distancing: Social Media Analysis of Players' Experiences with Location-based Games. *Proc. ACM Hum.-Comput. Interact.* 6, CHI PLAY, Article 249 (October 2022), 22 pages. <https://doi.org/10.1145/3549512>

## 1 INTRODUCTION

Location-Based Games (LBG) impose a digital world onto the physical world, where the game proceeds based on the player's location [5, 67]. While games are created primarily for the players' entertainment, serious impacts frequently include implicit outcomes and, in some cases, an intentional goal of the games' designers and developers. For instance, exergames, which encourage players to be physically active in order to play [68] and seek to change behaviors that will improve health [3, 17]. Location-based GPS (Global Positioning System) mobile games inspire users to get outside instead of sitting in front of screens to play [14]. Between different sub-genres of location-based mobile games, the location-based Massively Multiplayer Online Role-Playing Games'

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2573-0142/2022/10-ART249

<https://doi.org/10.1145/3549512>

Table 1. List of the main Pokémon GO game elements and related concepts

Game Elements	Concept
<i>PokéStop</i>	Real-world landmarks that allow players to collect items like eggs and Poké Balls to capture Pokémon.
<i>Pokémon Eggs</i>	Pokémon-related resources that contain Pokémon and can be hatched by walking specific distances.
<i>Gym</i>	Locations around the world where Trainers can compete against Pokémon from opposing teams and add their own Pokémon to defend the Gym
<i>Raid Battle</i>	Special events occur within Gyms to defeat powerful Pokémon, collect special items, and catch Pokémon.
<i>GO Battle League</i>	A matchmaking system that allows players to compete against other Trainers around the world and receive awards.
<i>Incense</i>	Item that can be activated for a specific time to attract Pokémon to players' location.

(MMORPG) subcategory (e.g., Pokémon GO) supports cartographical training, social interaction, and exercise [54]. MMORPG is a video game in which many players build up their characters in a role-playing environment, and players' interactions affect each other. Due to COVID-19 restrictions, similar to other social and physical activities, there were several adjustments in the video games like Pokémon GO gameplay to accommodate a virtual and social-distancing gaming experience.

### 1.1 Pokémon GO

Pokémon GO is a free-to-play location-based augmented reality mobile game which seeks to motivate players to exercise [2], play together both physically and virtually [94], and explore the real world [78]. In doing so, individuals communicate with others, learn about the locations where they live or explore, and enjoy the Pokémon GO gameplay experience [44]. In Pokémon GO, to advance at the game, players must walk around in the physical world to engage with virtual game objects, e.g., capturing virtual Pokémon creatures, collecting items at Pokéstops, and fighting battles at Gyms. As table 1 showcases the description of the main game elements, many of the game activities benefit from teaming up with other players. Several studies and media articles reported that Pokémon GO has significant impacts on players' physical, mental, and social health [6, 37, 45, 57, 104].

Due to the worldwide spread and prevalence of COVID-19, businesses and industries applied social distancing methods to protect their communities. These changes have dramatically affected people's well-being [43], how people create social interaction with others [26, 34], and how they experience the world around them [33]. Accordingly, Niantic—the creators of Pokémon GO—in response to the pandemic-related health and safety concerns (stay-at-home orders, social-distancing, lockdowns, etc.), altered various game mechanics in its mobile games to accommodate increased social distancing [36]. Therefore, players could still play while maintaining a safe distance from certain regions and other players. Niantic prioritized updates and features that can be enjoyed in individual settings. Table 2 lists the main in-game adjustments of Pokémon GO due to the COVID-19 pandemic.

### 1.2 Research Questions and Contribution

As Pokémon GO generated over 1 billion downloads to date and \$1.23 billion in revenue in 2020 (during the COVID-19 pandemic), which was greater than the peak usage in 2016 [16], we hypothesized that in-game adjustments and remote playing have been well-received by players. Accordingly, we were interested in understanding the pandemic impacts and the subsequent game changes on users'

Table 2. Descriptive list of the main Pokémon GO in-game adjustments due to the COVID-19 pandemic in the timeframe of March 2020 to March 2021

In-game Changes	Date of Change	Description
<i>Gym interaction distance</i>	March 2020	players could access Pokéstops and Gyms from a greater distance, up to 80 meters, a feature which was formerly limited to only 40 meters pre-pandemic [66].
<i>Battle league walking requirements</i>	March 2020	Niantic temporarily disabled GO Battle League walking requirements, which was 3 Km previously to enter the battle league [75].
<i>Remote Raiding</i>	April 2020	Players could also participate in remote raids even if they are far away from the game's Gyms by having the Remote Raid Pass [58].
<i>Improved Incense</i>	April 2020	Incense lasted for 1 hour, which was previously 30 minute duration.

perceptions of the game. Increasing the number of Pokémon GO players during the pandemic and the provision of remote play by Niantic added to the game's popularity. It encouraged members of gaming communities to discuss the game and share information both online and in-person. This study seeks to learn (RQ1) how players adopt the new updates of play, including indoor and remote play elements, and (RQ2) which type of players leverage the game social distancing adjustments. To this end, the current study used social media data acquired from Reddit. Then, we used a machine-learning algorithm (Latent Dirichlet Allocation) to provide coherent topics [96] in the pre-pandemic and pandemic periods, and qualitative coding to better interpret the players' comments, identify major concepts, and find relations between them.

The three major contributions of this study for the HCI community are (1) an understanding of players' practices and experiences before and during the pandemic in the context of Pokémon GO, (2) how social distancing approaches in the game affect Pokémon GO players' perceptions, and (3) identifying benefited players along with the key game elements that accommodate remote play experiences.

## 2 RELATED WORK

This section reviews previous works regarding how and in which areas LBGs (e.g., Pokémon GO) influence players' behaviors and experiences, grouped into three relevant categories for location-based mobile games: socialization, outdoor exploration, and health. We also provide COVID-19 impacts on LBGs.

### 2.1 Location-based mobile games and Socialization

Previous HCI research has studied how current gaming activities influence people's social connectedness in both contexts of online and in-person settings [22, 34, 70, 101]. According to earlier research, LBGs initiate meaningful play-based social experiences for players by providing activities like hunting, exploring, and exercising [30]. Among different LBGs' categories, MMORPGs develop interpersonal interactions between players by providing a sense of belonging to a team and a community [38, 60]. Researchers have also studied how gaming might help vulnerable members of society, such as people with disabilities, to connect with others [15]. Laato et al. empirically indicated that LBGs (e.g., Pokémon GO) encourage players to be socially connected even during the COVID-19 pandemic [51].

According to the previous studies, Pokémon GO has a positive impact on a player's social health [42] through building a sense of community belonging [44], improving bonds between friends and

family [27, 61, 64, 94], enhancing social interactions [4, 41, 87], reducing social anxiety [80], and allowing players to meet new people [102, 104]. For instance, players' interactions with Points of Interest (POIs) such as Pokéstops and Gyms are common ways of socializing in Pokémon GO. Players also cooperatively battle the Pokémon of opposing teams through attending Raids, in which players need to join a group that can be either pre-formed on social platforms (e.g., Discord, Facebook, Reddit, or other game communities) or formed when they are physically in the range of a Gym with an active raid. Although these groups are typically lasting for a short time to complete the mission [10, 102], studies showed that Pokémon GO raid battles bring people together for online socialization [23] and face-to-face communications [10, 51], helping them build a sense of community belonging [44].

Socialization in Pokémon GO also occurs through in-game events like Community days, which are monthly worldwide events to encourage players to participate in Pokéstops and Gyms in densely populated regions to gather special bonuses, and Pokémon GO Fests, which are held annually to celebrate players' love for the game [73]. Moreover, familial playing of Pokémon GO assists families in learning the game and the environment while playing together, which is indicative of Joint Media Engagement [94, 100].

## 2.2 Location-based mobile games and Exploring Outdoors

Prior works represented that exposure to nature has many benefits of physical and mental fitness for people [35, 62]. In contrast, lack of exposure to the outdoors can contribute to mental and physical health problems such as obesity and depression [62]. LBGs include a strong interplay between physical and virtual space activities [5]. When LBGs use real-world maps in their gameplay, they open up a discussion on how virtual gameplays might invite us to reassess how we see the world [55]. Researchers indicated that these games (e.g., Pokémon GO, Pikmin Bloom) provide opportunities to foster a sense of adventure [84] and connectedness to nature [49, 89, 91]. However, LBGs sometimes distract players from their surroundings because of required in-game interactions, leading to players losing their way, environmental hazards, or safety issues [18, 88, 103].

In the game industry, Pokémon GO is one of the most successful LBGs [16], which motivates players to get outside [41, 88] and explore their surroundings [32]. However, unequal gaming opportunities [18] sometimes cause bad behaviors among players, leading players to engage in spoofing instead of exploring to reach more rewards and level up faster [10, 81]. In Pokémon GO, players navigate their avatars in the virtual environment using their device's GPS capabilities by physically navigating through real-world areas [21, 94]. Pokémon GO increases the players' enjoyment by making them be present at the physical locations and promoting their sense of discovery to explore the real world [41, 44, 109]. In particular, Pokémon GO expresses territoriality through expanding the space's aspects to incorporate physical and digital routes by using Gym points of interest [52, 107] and encouraging players to defend and maintain control of specific locations by attending battles.

## 2.3 Location-based mobile games and Health

A subset of video games that combine exercise/exertion and gaming activities, called Exergames, have been identified as an effective and entertaining way to promote physical activity and healthy behaviors among people of different ages [20, 63, 85, 86]. Studies illustrate that incorporating health promotion aspects as a supplementary motivator into existing games that are routinely played by a large number of players can result in broader and more major impacts [105].

Some of the spatially-aware games have added a layer of health promotion to the game mechanics that are primarily intended for enjoyment [45], while not directly emphasizing exercise [54]. LBGs intrinsically reward players for visiting specific locations or physically going a given distance, which

can influence players' physical, mental, and social well-being [45]. Earlier research revealed that LBGs (e.g., Harry Potter: Wizards Unite, Pokémon GO) as exergames promoted physical exercise [50, 54]. For instance, Pokémon GO has a significant impact on players' health both physically (e.g., promoting physical activity [6, 37, 57], increased steps [18], etc.) and mentally (e.g., encouraging socializing [28], relieving stress, etc.). While studies indicated that positive effects of physical and mental health which are derived from playing Pokémon GO decrease over time [104]. On the other hand, despite these benefits, unequal game opportunities lead to risky behaviors like driving instead of walking or crossing the street without looking while playing to collect more items [81, 103], exposing them to danger [18].

#### 2.4 Location-based mobile games and COVID-19

Due to the COVID-19 pandemic and related government regulations (e.g., stay-at-home restrictions), online gaming has experienced record numbers of players. Based on Nielsen research, 82% of global consumers spend a lot of time playing or watching video games [76]. To mitigate the impacts of the COVID-19 pandemic, game developers provided rapid external and in-game adjustments to LBGs (e.g., Pokémon GO, Ingress Prime, Orna, etc.) that allow players to play remotely while still encouraging them to go outside and socialize [9, 50, 51]. Moreover, LBGs (e.g., Harry Potter: Wizards Unite, Pokémon GO, Ingress Prime, etc.) canceled in-person events, reinforced solo and stationary play, supported online social cooperation, and reduced the prices of in-game items during the pandemic [53].

LBGs, such as Pokémon GO, require players to go out, explore and meet others; however, with the shelter-in-place regulations during the initial outbreak of the pandemic, players were encouraged to do the exact opposite [50]. For instance, Niantic canceled events (e.g., community days), increased the gifts from Pokéstops, doubled the distance of interacting with Gyms, halved Egg hatching distances, and introduced Remote Raid passes [73] in different periods during the pandemic. Moreover, studies indicated that players continued to use LBGs, particularly Pokémon GO, during the pandemic to maintain social connections and alleviate their mental health [25, 51]. However, for many Pokémon GO players, socialization was recontextualized with online interactions replacing in-person connections during the pandemic [23]. Besides, the players-space relationships also have changed in Pokémon GO, during the COVID-19 pandemic, due to online explorations and the social-distancing approach of catching Pokémons [23].

This paper seeks to understand players' behaviors toward Pokémon GO in-game adjustments and those who affected by these changes.

### 3 METHODOLOGY

Social media platforms deliver unobstructed user expressions and reactions of users on a large scale [8]. Therefore, they are a rich medium for conducting research in the age of remote life, as people use these online platforms to share their experiences/opinions and connect with others [90]. Reddit, the 18th-most-visited website in the world with more than 430 million monthly active users [95], is one of the most favored online destinations for gamers to discuss their experiences, game updates, and tips/tricks [7]. To this end, Reddit supports gamers' interactions through specialized forums, called subreddits, via threaded discussions. Users can create a new discussion thread by publishing a submission or commenting on a submission or another comment in an existing discussion thread.

Moreover, Reddit provides free, high-quality data from a wide range of players within different geographical locations, age ranges, and gaming experiences (e.g., from casual players who recently played to game enthusiasts who regularly play the game.) As such, we selected Reddit as the social media source of data for this study. Since Reddit data are publicly accessible, we did not seek

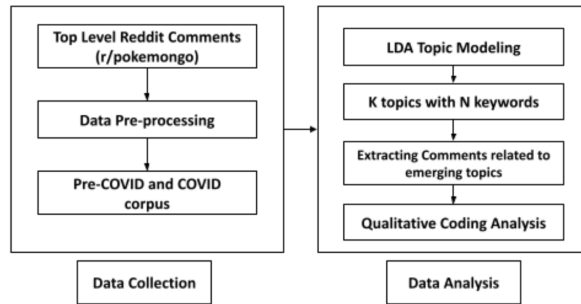


Fig. 1. Study methodology overview: data collection and processing of top-level comments from the /r/pokemongo subreddit and data analysis, including LDA topic modeling and qualitative coding analysis.

permission to use the data, though we never attempted to identify any Reddit user, and we used the data anonymously.

We selected a data-informed methodology to provide an in-depth understanding of what players discussed on the Reddit platform, how COVID-19 affected players' behaviors and experiences, and who benefited from Pokémon GO in-game changes. We believe that data will not tell the full story as it may include biases in its collection and analysis [39]. However, using both data and intuition will help us come up with comprehensive findings. Figure 1 illustrates our methodology, including data collection (data selection and data pre-processing) and data analysis steps.

### 3.1 Data Acquisition

We scraped comments from one of the popular and the most viewed subreddits related to Pokémon GO with 3.9 million subscribers (/r/pokemongo), where the study was conducted. Members use this discussion forum to share their experiences, find friends for playing, ask questions, and express their concerns. We used Pushshift.io API <sup>1</sup> [1] to collect all top-level comments, which are the parent comments in a thread of discussion, between March 2019 to March 2021. Within using Pushshift API, we could make 120 requests per minute, and we could get 100 entries per request. To capture the full corpus of top-level comments for the period, the third author wrote a script to repeat the operation until all of the comments were retrieved for the specified timeframe. Once collected, we segmented the data into two categories, pre-pandemic and during the pandemic. COVID-19 was officially declared a global pandemic by the World Health Organization (WHO) on March 11, 2020 [79], hence we selected that date as the pandemic start date. We selected a particularly large timeframe, one year before and after the start date of the pandemic, to account for seasonality and sampling biases. In addition, the official website and in-game news were the primary sources of information about the Pokémon GO game updates [73, 106].

### 3.2 Data Cleaning and Pre-processing

Pre-processing the unstructured data has a significant impact on operationalizations, and further analyses [29]. Hence, we pre-processed the data corpus by tokenizing the original character sequence into the words, stemming, lowercasing, deleting stop words, and doing lemmatization (converting inflections to a base lemma, for e.g., mapping both "gone" and "went" to "go") [92]. We also eliminated the comments that had been removed by the moderators or were against the Subreddit rule. Comments averaged 150 characters; however, there were 215264 comments less than 15

<sup>1</sup><https://files.pushshift.io/reddit/>



Table 3. Descriptive characteristics of the collected data on /r/pokemongo dataset before and during the COVID-19 pandemic

Category	Timeframe	Number of Comments
Pre-COVID	March 1, 2019 - March 10, 2020	114076
COVID	March 11, 2020 - March, 1 2021	96620

characters, not containing useful information. Hence, we excluded those comments. On the other hand, the Latent-Dirichlet Allocation algorithm, which we want to use for extracting players' discussion topics, does not perform well on short texts (less than 20 words) [108], so we included the comments which contain more than 20 words for further analysis.

We then used keywords focused on discussing social distancing game adjustments during quarantine time (e.g., social distancing, covid-19, pandemic, interaction distance, remote raids, walking distance, quarantine), and discussing game experience before and during the pandemic considering the Niantic's final goals (e.g., exploration, walk, adventure, social interaction, raid, friend) to check the relevancy of the scraped comments. Our final data set incorporated 210696 top-level comments, which we used for analysis. Table 3 provides the characteristics of the collected data.

### 3.3 Analysis

To analyze data from top-level comments on Reddit, we adopted a multi-method approach: a machine learning technique, Latent Dirichlet Allocation [13] for coherent topic modeling, and a qualitative approach, following the guidance of reflexive thematic analysis [56, 59]. We chose a data-informed approach to use both intuition and data, as the qualitative analysis complements the quantitative findings.

**3.3.1 Latent Dirichlet Allocation (LDA).** We leveraged Latent Dirichlet Allocation (LDA) [13], an unsupervised machine learning algorithm that extracts the hidden topics from a huge corpus of textual data. We chose LDA because we are interested in discovering subjects of Pokémon GO players' discussions on the Reddit platform (/r/pokemongo subreddit) before and during the COVID-19 pandemic. Other studies also leveraged LDA, a probabilistic model, to analyze online community discussions in different areas [19, 40, 48]. LDA topic modeling approach generates topics, which each topic is accompanied by a group of keywords known as Lexical Groups (LG) [98]. As we needed to estimate the number of topics for training the LDA model, we calculated topic coherence for various numbers of topics (value ranging from 2 to 18) and selected the model with the highest topic coherence score. Figure 2 shows different coherence values for different number of topics. The coherence score of each k topic model represents how keywords of a topic are related to each other [98]. Higher coherence scores in LDA models better reflect human assessments, implying that the subjects are more distinct [98]. This resulted in the k=8 and k=6 topics before the pandemic and during the pandemic, respectively, which we believe represent the whole corpus of data. We then labeled the emerged topics manually.

**3.3.2 Qualitative Coding.** The pre-processing procedure of data can sometimes actively disguise useful patterns, such as social meaning [99]. Therefore, we used humans' intuitions as a source of domain knowledge to help us interpret the findings from the LDA topic modeling. We performed thematic analysis [56] of the data corpus to answer our research questions about understanding the different types of players' perceptions, lived experiences, and concerns regarding social distancing game changes. The first two authors applied open coding to 100 sample comments most relevant to

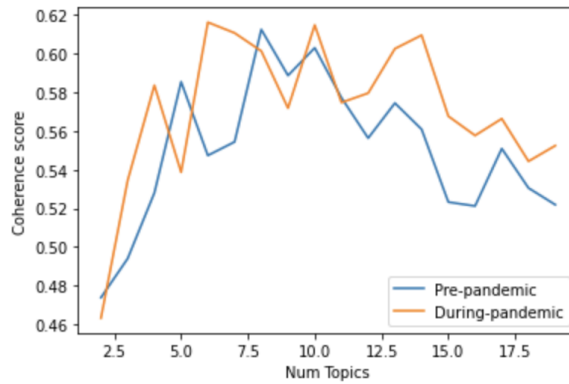


Fig. 2. Coherence scores for different number of topics in training the LDA model for both timeframes of pre- and during-COVID-19 pandemic: showing the ideal number of topics to achieve the highest coherence score.

each emerging topic to categorize comments. In total, each researcher read 800 comments (8 topics \* 100 comments) and 600 comments related to pre-pandemic and during the pandemic, respectively. Indeed, the first and second researchers read 2800 independent comments. To analyze comments, the coders read all of them independently and took notes in different Google spreadsheets about which theme emerged within comments that best captured the topic. They then used axial coding to uncover the meaning of emerging themes and elicit consensus meanings from them. During this phase, the coders evaluated the derived themes to ensure that all findings were grounded in the data [77]. If there were disagreements between the emerged themes, the coders returned to the raw data to decide whether the themes would hold or be merged, refined, or discarded. Selected themes were both particular and broad enough to encompass a collection of ideas in numerous comments.

## 4 FINDINGS

This section describes the main themes that emerged from our analysis (topic modeling and qualitative coding) regarding players' experiences, concerns, and behaviors about playing Pokémon GO during and before the pandemic and how different types of players adopted the COVID-19 game adjustments.

### 4.1 Topics from Pokémon GO Subreddit Comments before and during COVID-19

As we aimed to find key topics shown in the top-level comments of the /r/pokemongo subreddit, the researchers judged that the relevant topics could be classified into three main categories: Socialization, Exploration, and Exercising. Each category contains several sub-categories which help us understand the players' discussions in-depth. Although the details of their discussions in these three areas were different, there were similarities and overlaps between some of the topics, and sometimes the discussions were related to several topics. Table 4 and table 5 show the results of the topic modeling analysis, including the main topic categories, within sub-categories, and the main top words of each sub-category in the periods of pre-pandemic and pandemic, respectively.

**4.1.1 Socialization.** Topics before and during the COVID-19 indicated that socialization is a major part of playing Pokémon GO. 35.2% and 36.4% of Pokémon GO players' discussions on Reddit were related to in-game social connections, social features, social events, and in-game rules/concerns to participate in these social parts before and during the COVID-19 pandemic, respectively. Players used Reddit to share their game-related concerns/experiences; Ask questions predominantly about



Table 4. Pre-pandemic LDA topics, categories and top descriptors from /r/pokemongo subreddit comments (Pre-COVID dataset)

Topic Category	Topic (% of Tokens in the Corpus)	Topic Descriptors
Socialization	Interpersonal Connections (8.7%) Playing together (15.1%) In-game motivators (11.4%)	friend, trade, gift, level, lucky, interaction group, local, discord, raid, drive, spoof power, attack, raid, move, team
Exploration	Outdoor Events (15.5%) Adventure in-game motivators (10.7%) Players' Issues (12.5%)	community, event, spawn, shinies, catch battle, catch, ball, reward, research issue, connection, account, driving, downtown, screen
Exercising	Outdoor activities (7.8%) In-game motivators (18.3%)	walk, distance, count, adventure, steps, health hatch, candy, evolve, coin, community

Table 5. Pandemic-era LDA topics, categories and top descriptors from /r/pokemongo subreddit comments (COVID dataset)

Topic Category	Topic (% of Tokens in the Corpus)	Topic Descriptors
Socialization	Interpersonal Connections (18.3%) Virtual Multi Playing (18.1%)	friend, trade, gift, remote, raid, invite, legendary battle, league, remote, discord, raid, attack
Exploration	Adventure conditions (16.5%) Virtual Events (20.8%)	Niantic, local, distance, issue, virus, location, adventure Community, candy, evolve, research, incense
Exercising	Catch Pokémon (inside/outside) (17.4 %)	stops, house, drive, walking, exercise, inside
COVID-19	COVID-19 Concerns (9%)	player, space, money, leave, coronavirus, revive, coin, rural

finding a group for raid battling on Reddit or other social platforms like Discord; Trading or transferring different Pokémon; Exchanging gifts with friends to increase their friendship levels; And, inviting Pokémon GO players with different levels and powers to join specific groups.

As the emerged topics showcase, there is a transition from in-person to virtual in social-related game features, bringing up discussions among Pokémon GO players on the online game community (/r/pokemongo) on Reddit. For instance, players needed to join a group to participate in raid battles in person before the pandemic. During the pandemic, however, they were able to join raids remotely with using remote Raid Pass.

**4.1.2 Exploration.** Another predominant topic by Pokémon GO players revolves around the exploration aspect of the game. Players presented their issues related to catching various types of Pokémon in different environmental conditions and in-person events. The limited and even non-existent Pokémon creatures in rural areas, the dominance of the number of Pokémon in certain urban areas like downtown, the need to drive to access the Pokémon in inclement weather conditions, etc., were some discussed issues examples of players on Reddit.

Players also talked about community days from different perspectives. Some of them discussed how to benefit from event bonuses (e.g., catching special pokémon, evolving their current pokémon), while others were concerned about when and where these events will take place (e.g., considering weather conditions, required walking distances). Players considered community days as events where they could socialize and explore simultaneously. With the onset of the COVID-19 pandemic

and government self-isolation restrictions, Niantic created some in-game updates like making community days remote. Hence, players seek to get guidance from others about participating in these social events, ask questions about the changes in virtual events, and discuss the risk of getting sick because of the exploration.

**4.1.3 Exercising.** Players discussed their concerns on Reddit regarding issues in tracking their steps through playing Pokémon GO and cheating occurs in the game (e.g., driving to reach pokéstops instead of walking); On the other hand, they noted how in-game features encouraged them to walk. For example, some players shared their experiences about increased walking steps thanks to the game and how their movements impact their health. With the pandemic's beginning and quarantine-compatible forms of play, players discussed how increased interaction distance to catch Pokémon and reduced walking requirements to hatch eggs influence their gaming experience. Unsurprisingly, due to accommodating playing at home, players talked less about exercise-related features during the pandemic, as their discussions dropped by 8.7% from the pre-pandemic period to the during-pandemic period.

**4.1.4 COVID-19.** In general, COVID-19 affected players' discussions. It led them to share their opinions regarding the acceptability of continued play, the quarantine-compatible forms of play (such as increased interaction distance to catch Pokémons, remote raids), virtual events, and the risk of getting sick because of the exploration. 9% of discussions belonged to COVID-19 and its related game changes. Moreover, players talked about the impacts of stay-at-home game changes on their experiences and the company's revenue. Players noted these changes as the main positive reasons for the game's revival in the COVID-19 period.

In addition, the first and second authors delved into the comments to interpret players' discussions and understand their experiences and concerns before and during the COVID-19 period regarding the game's alterations. The findings are reported in the following subsections.

## 4.2 Players' concerns at the start of COVID-19 pandemic

**4.2.1 Conflicts - Desire to Play vs. Risk of Health vs. Social Acceptability of play.** Niantic asserted that Pokémon GO aims to encourage players to move, explore the real world, and safely play together in-person [74]. With the onset of the COVID-19 pandemic, we observed conflicts between players in terms of continuing to play or stopping playing during March 2020 because of the quarantine and lockdown conditions (2064 comments out of the whole corpus of data included the "risk" or "health" words during the pandemic times). Unsurprisingly, factors associated with the COVID-19 pandemic, such as fear of contracting COVID-19 from close encounters with others and the existence of little information about it, discouraged several players from physically playing together or going outside.

Reddit community members expressed conflicting feelings about playing the game during the pandemic. Several members said, *"If you can't stop playing a game until this all blows over, then you have a problem. Don't risk your health for a game!", "PoGo should do something to prevent people from going outside. I'm staying home and not going out, but I'm losing a lot by doing this! There are a lot of people that do not care, and they will walk a lot and spread the disease..."* In comparison, several Redditors stated, *"It's not enough that they doubled gym distance, gave out free incense, boosted spawn rates, doubled incense duration, cut egg hatch distance in half, and increased daily rewards. If that's not enough, then you should probably stop playing until the quarantine is over.", "At the same time, I'm losing all interest in the game due to Corona. I'm Italian, and here we can't get out of our houses. (we can get in jail if we do) This game is basically unplayable to me at the moment."*

**4.2.2 Adapting different form of play based on the circumstances.** Attending raid battles and being able to team up with friends are parts of playing Pokémon GO, which help players level up and engage with others socially. We identified that Reddit community members discussed game mechanics such as raid battles and the risk of getting sick with the start of the COVID-19 pandemic. Some members asserted that being physically present in the specified places to attend raid battles is against the COVID-19 precautions. Whereas there were players who, however, acknowledged that there is a risk of playing, they noted that there is also a safe way to play the game: *"The good thing about raids is you can stand far away from a group and still do it. Also inside your car if possible."*, *"We have confirmed cases here, but for our raid group, we generally stay in our cars anyway unless we have to get out to reach the gym. We don't interact with others outside of the group."* Relying on the low probability of getting sick outdoors and adopting a new form of playing, staying in the cars during battling, players encouraged themselves to continue playing with the start of the pandemic.

Prior work showed that environmental conditions affect the way people use technologies in outdoors [65], our analysis revealed similar observations. According to the Reddit comments, several players played the game prior to the pandemic and participated in raid battles from the safety and comfort of their cars; this choice was motivated by bad weather, disability issues, laziness, etc. These players preferred to continue this form of play during the pandemic to protect their health. For example, one Reddit user noted, *"By a late-evening of really bad weather, I was driving home from work, like every day, and decided to take a Gym on my road. I parked my car and began to fight."*

Concerns about COVID-19 also led to many players choosing a more solo gameplay experience (825 comments out of the whole corpus of data included the "solo" word during the pandemic times). For instance, some of the Redditors stated, *"I play solo and mostly on my walk to work. I guess it depends a bit how things progress in my country (UK)."*, *"I played solo and even reached level 40 last year. It's a lot of fun for people who enjoy walks. Happy catching to you!"* While some players did not enjoy the solo game experiences, a number of players found solo playing enjoyable. Solo players were interested in catching rare and powerful pokémon and taking in-game challenges [23]. Solo players used to play the game while they walked. Moreover, players tried to suggest solutions to other game community members regarding how to deal with the COVID-19 restrictions and continue playing. An individual said, *"No change. I solo unless I'm playing with my wife or our raid group on Wednesday. Even with the raid group, we don't leave our car."*

### 4.3 Players' experiences afforded by the "Social Distancing" game updates during the COVID-19 pandemic

The purpose of creating Pokémon GO was to help people get outside, explore the world, and engage with others socially [71, 74]. As the COVID-19 pandemic spread worldwide, Niantic made some changes to Pokémon GO to accommodate stay-at-home restrictions and safer forms of play. They call it, *"Embracing real-world gaming from home"* [71].

**4.3.1 Transformation of "Pokémon Go" into "Pokémon Stay-at-Home".** Pokémon GO's updates applied to all game objectives. For instance, from the social aspect, they launched virtual events of "Community Day" and "Pokémon GO Fest" instead of in-person events. They enhanced the in-game virtual social features such as "remote raids" to allow participants to communicate when they are unable to meet in person [71]. According to the exploration aspect of the game, which makes players get outside, they introduced discounted incense for attracting more Pokémon creatures to players [71], and increased interaction distance (From 40 meters to 80 meters) to accommodate social distancing to get Gyms and PokéBalls. With regard to exercise point of view, they increased the effectiveness of incense while players are walking and reduced walking requirements to zero to

attend "GO Battle League," so players can participate in the battles from the comfort of their homes [71, 72].

We noticed that most of the players quickly adapted to the new changes and even enjoyed the game more during COVID-19 because of the game's quarantine-compatible updates. For instance, Reddit members stated, *"The minute spawns in incense happened with the COVID-19 changes, and is SO awesome!"*, *"I started playing more because of all the awesome changes they made for the Covid and social distancing rules. Made the game super fun."*, *"We've gotten well over 100 new members because of this (and still more coming in)!"* Results of LDA topic modeling also represented the vast conversations revolving around the game changes and how it is formed quarantine-compatible. (e.g., 7465 comments included the "remote" or "virtual" word during the pandemic.)

We also found that this transformation improved the gaming experience of several types of players, including trainers who have Gyms near them, rural players, trainers with disability, and trainers with young children. For example, Reddit users mentioned, *"I think the Covid changes have made the game too easy as well, but it's nice for people in rural areas to still be able to play the game and abide by Covid rules."*, *"I'm one of the few people it has helped. I have a gym that's nearby, with the radius doubled. I can now reach it from my apartment, but only from outside on the balcony at one corner!"*

**4.3.2 Spoofing as a form of cheating.** Spoofing in Pokémon GO refers to the act of deceiving the phone's GPS into thinking it's in a different location. Based on the emerged topics from the LDA results, which included the "spoof" word, and delving into related comments, we identified players spoofing for various reasons and justified their choice to cheat by reasoning about the difficulties in accessing raids, PokéStops, and Gyms in different areas before and during the pandemic. *"I spoofed a bit when it first came out just to get the exclusives. Also, there were no stops in my area. I only got a stop last year, and it's still the only stop less than an hour and a half walk away."*

Similar to study [82], players' reasons for cheating include inequality of access to game elements (e.g., PokéStops and Gyms) in various geographic locations, difficulties in efficiently collecting items, and getting level-up faster. The Reddit discussions revolved around how to do spoofing during playing, why players need to do spoofing, and why spoofing is unacceptable and unfair to others before the pandemic. However, during the pandemic, players did not need to spoof, as COVID-19 adjustments made many game elements playable for all players without leaving the house. The authors conclude that the pandemic-related game alterations introduced affordances, leading people to do less spoofing during COVID-19. The findings also revealed fewer comments, including the "spoof" word during the pandemic. This number decreased from 2986 to 950 comments out of the whole corpus of data from pre-pandemic to during-pandemic period.

Furthermore, players presented their opinions about spoofing from different aspects like marketing, ethics, technology, and design. Although most of the players agree that spoofing is unjustifiable, they wondered why Niantic does not take proper action toward spoofers. Some players believe Niantic detects spoofers with automated tools with technical issues, while others assume the company earns money from spoofers. *"I've never heard of any action being taken against spoofers due to community reports. I'm sure SilphRoad or Pogo subs would have rejoiced if this had actually happened."*, *"Niantic relies on their automated tools to detect spoofers. The issue is that the tools search for specific fingerprints, and if activities don't trigger them, it's a massive uphill battle to get them to take action."*

We also found that players also used different mobile applications, spoofing discord servers, and other Reddit communities like /r/PokemonGoSpoofing subreddit to find ways to spoof and increase their chance of winning the raids. For instance, one Redditor wrote, *"Spoofing discord servers. Let's say you are a rural player and there's a 5-star raid, but you don't know anyone who plays Pokemon*

*GO in your area. You can go to the server and plan a time to do the raid with like ten spoofers, which would raise your chances of winning the raid. That would make the game easier and more accessible for rural players."*

#### 4.4 Impacts of social distancing changes on players

The social network analysis revealed different types of players affected by the game's social distancing adjustments, which may have been underprivileged of enjoying the game before.

**4.4.1 Rural players.** Prior work indicates that people who live in urban locations with significantly more PokéStops/Gyms density have different advantages over those who live in rural or suburban areas [18]. We found that players who live in rural areas leveraged the lockdown game changes to participate in remote raid battles, level-up by using incenses, and connect with more players without having to travel to certain locations. In this case, they do not need to drive or walk for a significant amount of time to attend raids. Some rural players mentioned that *"Niantic completely rejuvenated the raid scene."*, *"If that rural, it may just be more economical to buy coins than waste fuel getting to gyms."*

**4.4.2 Players with disabilities.** In the gaming industry, accessibility is a major concern [12], and Pokémon GO is one of the games that has been widely criticized for being inaccessible to those with various disabilities (e.g., who has mobility difficulties, neurodiversity, and visual impairments) [46]. Based on the comments, we figured out that Pokémon GO did not accommodate well for those who had mobility issues or who were unable to walk long distances before the pandemic. They could play the game whenever the Gyms and PokéStops were reachable by car, steep inclines, or by getting help from others to play the game themselves. Since several game mechanics have changed to accommodate navigating lockdown (e.g., increased interaction distance, no walking requirement for GO Battle league, increased incense duration, remote raids), many players with disabilities who were stuck indoors or used auxiliary devices could play, enjoy the game, and feel more connected with the community of Pokémon GO players. One player noted in a comment, *"I am in the very same situation when it comes to not being able to walk due to disability! This increased distant thing has really improved my playing."*

## 5 DISCUSSION

Prior sections described how we used topic modeling to identify the main topics of players' discussion in the top-level comments of the subreddit, /r/pokemongo, and leveraged qualitative coding to interpret the topic-related comments and extract insights regarding players' experiences, concerns, and behaviors. This section reflects on which players leveraged social distancing game adjustments positively and negatively. We explore which key game elements accommodate pandemic-era social distancing, their intended and unintended consequences, and implications for LBG designers and developers. We conclude with limitations and future directions with regard to this study.

### 5.1 Advantages and disadvantages of social distancing changes for players

Our findings highlight Pokémon GO's ability to provide indoor game settings accompanying outdoor game elements to influence players' gaming experience and behaviors during pandemic situations. The social media analysis showed different types of players affected by the game's social distancing adjustments, whether they may have been underprivileged to enjoying the game before or those who took advantage of these changes in a way that goes against the game's goals. In this section, we examine more closely the advantages and disadvantages of social distancing game changes for players, which can be leveraged by location-based game designers with regard to the importance of considering a wide range of players and their concerns during the design

procedure. We speculate about possible future effects, leveraging our findings and related work on other location-based games and activities.

The research findings indicate that in-game adjustments like digital socialization and increased interaction distance helped rural players and players with disabilities engage more in the game and enjoy it as much as other types of players (e.g., urban players). Previously, unequal game opportunities (e.g., shortage of PokéStops/Gyms in rural areas and small towns [18], inaccessible routes, etc.) created a gaming experience discrepancy among Pokémon GO players. Despite advantages of comfort and safety that come with digital socialization, the remote game features like remote raiding can cause disadvantages such as reducing exercise, exploration, and in-person social interactions [31]. Moreover, many players can take advantage of these features: any disabilities do not limit their play and there are adequate stops and gyms in their area. These players could use the existing conditions to their advantage more than others to promote their levels in the game because they can leverage both physical and virtual rewards.

Altogether, the findings highlighted that social distancing game adjustments grow the community and bring more diversity to the game and levels, and Niantic progressively makes more profit from more game components (e.g., remote raids) [16]. In addition, those game updates not only made the game more quarantine-compatible, but also made the game more inclusive for all. On the other hand, examining existing evidence on the behavioral effects of playing LBGs, including Pokémon GO, indicated that these games promote physical activity [4, 45, 50], reduce sedentary behavior [6], impact social well-being [28], and encourage players to get outside [4, 88, 89]. Regarding in-game adjustments during COVID-19, some of these benefits (e.g., increasing sense of exploration and daily steps, in-person communications) were ignored or may not be reachable.

Accordingly, Niantic announced on May 22, 2022 that they would alter the game features to encourage players to play together in person, conduct in-person socialization, discover local communities, and encourage getting outside [75]. This doesn't mean that remote game features are going away entirely; rather, Niantic wants to return gameplay to something akin to its pre-pandemic form in order to support initial goals associated with in-person play [74], i.e., being more active, exploring outdoors, and playing together. For example, players can still join the remote raids but need to buy Remote Raid Passes at a higher price to play together in outdoors. As a learned lesson, we believe that LBG developers and designers need to be aware of the potential consequences of in-game changes and continuously evaluate these modifications to deliver alternatives aligned with the main game's goals.

## 5.2 Effective game elements to support social distancing during the COVID-19 pandemic

Shortly after the start of the COVID-19 pandemic, Niantic changed some of the game rules and mechanics to accommodate the global health crisis by making the game more playable from home. Our findings showed that players appreciated most of the social distancing game updates; with the rising rate of COVID+ cases, players were concerned about playing the game safely, and discussions on this theme highlighted possible conflicts and tensions surrounding the desire to play, health, and safety concerns. However, while some players expressed relief that these updates could allow them to play safely, the major discussion among players involved how to leverage the social distancing updates as a way to level up faster and improve their gaming experience. They also shared their experiences, concerns, and strategies in the online forums, leading the gaming community to be aware of the effective and admired game features during remote play. This section provides three main game features that have changed to adapt to lockdown circumstances and their consequences.



*5.2.1 Increasing "PokéStops" and "Gyms" interaction distance.* Increasing PokéStops and Gyms interaction radius (from 40 meters to 80 meters) created benefits for players with mobility and sensory issues, rural players, and others who are stuck at home for any reason (see section 4.4 for more details). These changes mitigated barriers affecting play or enjoyment of the game by providing opportunities for such players to play the game in a manner that was not easily available to them before. However, there were some complaints concerning players who took advantage of this game feature differently. For example, some players who lived near PokéStops/Gyms could catch more Pokémon and level up faster just by staying at home. Players who also drove near these points of interest locations could play the game while sitting in the car.

This game change also provides more safety for players, as they do not need to risk their health to cross dangerous roads, trespass on private properties, and encounter a group of people during COVID-19 to reach or interact with a Point of interest location. Accordingly, we believe that LBG designers should consider place-person interaction distances as an important factor during design decisions, providing equal and safe game opportunities for different types of players as well as encouraging them to explore their surroundings.

*5.2.2 Supporting virtual multi-playing through "Remote Raids" and "GO Battle League".* Similar to earlier research [50], our findings reveal that in-game social features were well-received by players, whether in-person or remote. Due to the COVID-19 pandemic, Niantic changed "Raid Battles" and "GO Battle Leagues" to make them playable virtually, so players could play the game together when having to stay indoors. While these changes helped players engage more with Pokémon GO, connect with their friends around the world through the lockdown, and level up in the game, the increased complexity created disruptions in connecting to the lobby and communicating with the group, which might have decreased their level of enjoyment [10]. Additionally, since remote raiding provides more convenience for players, attendance for in-person raiding has decreased, and it has destroyed several local raiding communities [97].

With the quarantine-compatible social game changes, the general structure of the LBGs, particularly Pokémon GO, has changed, and it is not completely aligned with Pokémon GO's primary goals. On the other hand, as players get used to the new game's conditions, there are concerns about getting the game back to normal. Although these alterations engaged and attracted some types of players positively to the game, there are other game benefits like players' sense of community [44], in-person social interactions, engagement through in-person socialization [23], being active, and outdoor activities, which are somehow overlooked. Accordingly, Niantic announced changes in remote social features (e.g., increasing the price of Remote Raid Passes) to disincentivize remote raiding and to get players back to the Gyms when COVID-19 was deemed to be under control. Still, in-person raiding isn't encouraged unless it is more rewarding and significantly improves the experience [97]. It also should be noted that, although selling Remote Raid Passes could make money for Niantic, significantly raising the price of remote features may discourage people from buying and playing.

Given the long pandemic time and the added conveniences of the changes (e.g., delivering a reliable and time-efficient way to play) that social game changes have provided to different types of players, we believe that transitioning from virtual to in-person play should be done slowly with maintaining some of the remote features (e.g., remote raids) within some modifications. LBG designers and developers can deliver a hybrid version of their games, including virtual and in-person social features, to make the game more enjoyable for a wide variety of players and motivate them to explore their surroundings simultaneously in different ways. If game designers aim to encourage in-person game features and experiences, discouraging remote features does not address the issue; rather, they need to make in-person elements more rewarding.

**5.2.3 Expanding the effectiveness of in-game "incense" item.** To adapt to COVID-19 and quarantine constraints, Niantic increased the effectiveness of Incenses for a longer time (60 minutes), which typically lasts for 30 minutes. Although this updated game feature made the game much easier to play at home, especially for some players, there were concerns about changing Incense effectiveness after the pandemic. Our LDA results also identified the word "incense" as one of the topic descriptors during the pandemic. Indeed, there were many discussions about this game feature on Reddit during COVID-19. The number of comments, including the "incense" word, has increased from 658 to 2528 from the pre-pandemic to during-pandemic data corpus. Since the pandemic incense-related adaptations were well-received by the players, overcoming the convenience and getting these changes back to pre-pandemic required some improvements [93, 97]. Accordingly, Niantic increased the in-motion bonus while reducing the number of spawns per minute for stationary incense to motivate players to leave their houses and get them move [97]. However, players argued that the current version of moving incense is somehow useless as players cannot always move fast enough or dedicate a lot of time to playing Pokémon GO to make the effective incense take place, so this feature needs more improvements [47].

Similar to other mentioned game changes, expanding the effectiveness of the in-game "incense" item was also useful for players who have mobility issues or live in rural areas, where Pokémon is rarely found, and this feature helped them enjoy the game a lot more [47]. However, some players think this updated in-game item creates unfairness. Once again, if Niantic aims to get players to move, it needs to improve the intended option while not making the convenient one worse. Therefore, we suggest that LBG developers consider all the affected players before deciding on changing in-game features and deliver semi-customized features based on players' locations and movement patterns.

### 5.3 Pokémon GO and Pokémon Stay-at-Home

Our quantitative and qualitative findings revealed that in-game modifications by Niantic during the COVID-19 pandemic were embraced not only by active users but also attracted different types of players (e.g., rural players, players with disabilities). It happened for various reasons—etting level-ups faster, engaging with the game without going outside—making it inclusive for more players, and continuing socialization during quarantine [11, 25]. We observed that both versions of the game (Pokémon GO and what has been dubbed Pokémon Stay-at-Home) are attractive to players, and each has its advantages and disadvantages in specific circumstances.

Pokémon GO motivates players to get outside by making them travel to catch Pokémon [4, 45, 88], meet people in person and socialize through engaging with the game [28, 104], and explore the real world [32, 88]. However, the game was not accessible for all types of players [46], and there were geographical biases in the game [18], which made the gaming experience unpleasant for rural players.

Pokémon Stay-at-Home provides opportunities for players to play the game without requiring them to leave home during the quarantine and COVID-19 restrictions. Similar to prior studies, we found that the in-game alterations deliver virtual socialization, in which players can have remote interpersonal connections all over the world [23, 51]. Our findings also revealed how players adapted their form of play both in-person (e.g., staying in cars) and virtually (e.g., remote raid battles) to socialize and play the game during the COVID-19. The results also indicated that the quarantine-compatible game changes affected players' game behaviors. For example, the rate of spoofing reduced thanks to virtual in-game features significantly [50]. In addition, due to the reduced walking and in-person attendance requirements, players could level up faster and catch more Pokémon in less time, leading players to spend more money on the game by purchasing different items (e.g., Remote Raid Passes, lucky egg) while staying at the comfort of their homes.

Some players mentioned when they tasted the remote raiding; they were tempted to buy more. This feature was one of the main elements that caused Niantic's Pokémon GO to see a considerable revenue spike during the COVID-19 pandemic.

We also identified some player types (for instance, rural players and players with disabilities) engaged more in the game because of their greater access to Pokéstops, Gyms, and easier ways to find friends to join in social events like Raids internationally. However, unsurprisingly, these updated game features reduced the players' movements in outdoor places and affected players' sense of adventure. While quarantine fatigue can affect players' perceptions of space [83], Dunham et al. also found players' living space became a point of interest in the LBG, which shifted playing experience from offline interactions with people and space to online experience [23]. Finally, our research strengthened previous studies' findings, [23, 25, 50], regarding how Pokémon GO affects players' behaviors socially and how they could cope with pandemic restrictions while playing.

Around two years have passed since the World Health Organization declared COVID-19 a pandemic [79] and it is not clear when it will end [69]. Pokémon GO players' gaming experiences have also changed because of the game adjustments during the pandemic; however, these changes have positive and negative impacts from different perspectives. We believe that finding a balance between accommodating remote and in-person play can benefit a wider community of players while not far aligned with the game's primary goals in motivating exercise, exploration, and socialization [74]. For instance, steps taken to discover new places could be accrued as a form of payment to allow access to remote play features. Besides, we acknowledge that providing a hybrid version of the game, including both reality and virtual world, may somehow change the definition of LBGs, which use only players' locations in order to proceed with the game [11, 24].

LBG researchers and developers should consider gratifications/values may easily be swayed for convenience. Therefore, future design decisions need to take these into consideration as gratifications associated with spending time outdoors and exercising are superseded when taking convenience (e.g., playing at home). In addition, LBG developers should be mindful that any game mechanic changes for any purpose, whether improving safety or accessibility, can significantly impact the overall game's goals, so their substitutions should be designed to maintain ways of reaching those goals. For instance, if the game aims to promote outdoor exploration, delivering play-at-home game features may not be a suitable substitution.

#### 5.4 Future Work

This research has some limitations, which we believe future research can address. We observed that our findings were affected by the demographics of the main Reddit online community related to Pokémon GO, /r/pokemongo, with more than 3 million subscribers. Although this online game community provided us with vast data, there is a wide range in the type of content. While we can get a good glimpse of the discussions' topics raised in these communities, we cannot go into a full and deep understanding of all the conversations. Besides, our dataset comprises Pokémon GO players who are passionate enough about the game to seek out dedicated online forums and interact with the discussions, resulting in data skewed by socially-oriented vision. Besides, we utilized top-level comments online community, so maybe there are more potential details in other types of discussions, and no conclusions can be drawn with generalizability. Additionally, we had a big corpus of data, which we couldn't consider all of the comments for qualitative analysis. Players out of the range of study (in terms of the number of comments and the considered period) may have different concerns and experiences while playing Pokémon GO.

According to the findings of this research, we identify future directions for research investigating the influence of social distancing game changes on players' behaviors and experiences for the long term when the pandemic is over. Future research can also compare the Pokémon GO

players' gaming experience with other LBG players regarding how quarantine-compatible in-game adjustments impacted players' behaviors, providing design implications for adapting location-based mobile games during similar circumstances to COVID-19. Moreover, future work can leverage our findings to research the broader LBG context and explore the opportunities for providing hybrid LBGs, including virtual and in-person game features. LBG researchers can delve into LBG players' experiences by conducting surveys and interviews to get an in-depth understanding of COVID-19 impacts on players' mental health, movements patterns, and person-place interactions. We believe our work can serve as a companion for exploring Pokémon GO players' perceptions regarding COVID-related in-game changes in a remote life age and understanding a broader context of LBG players' experiences in exceptional circumstances.

## 6 CONCLUSION

This paper presented a mixed-method analysis of Reddit top-level comments in the context of Pokémon GO to understand the impacts of the COVID-19 pandemic and the subsequent socially-distanced game adjustments on players' perceptions. Through a social media analysis of how players appropriate the new form of Pokémon GO play, we identified players' discussions revolving around three major topics (Socialization, Exercising, and Exploration), along with detailed sub-topics that describe their concerns and game experiences before and during the pandemic. Based on that, we discussed which types of players benefit from these changes and which key game elements support Pokémon GO with the social distancing approach. Our study highlights the tendency of players to virtual in-game social features rather than exploration and exercise aspects of the game during the COVID-19 pandemic. These findings are useful to LBG researchers and developers in understanding the potential of LBGs to provide hybrid gaming experiences for players and other stakeholders to understand the impacts of the COVID-19 and digital playing on players' perceptions in the context of playing Pokémon GO.

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Received February 2022; Revised: June 2022; Accepted: July 2022