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Users' Perspectives on Ethical Issues Related to Playing Location-Based Augmented Reality Games: A Case Study of *Pokémon GO*

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ABSTRACT
Location-based augmented reality games are becoming increasingly popular, which causes a variety of tensions among players as well as between players and non-players. Subsequently, numerous ethical issues and challenges in designing and playing these games emerged. We conducted an online survey and analyzed 2,023 responses to better understand users' participation in various game actions in location-based augmented reality games, and their perspectives on how ethical the actions are and for what reasons. We provide descriptive statistics showing people's participation in these actions and analyze users' expressed reasons as to why they think these actions are ethical or not. We use the theoretical lens of three ethical traditions–consequentialism, deontology, and virtue ethics–in our analysis, showing the dominance of consequentialism and deontology in people's ethical judgment related to playing the game, and discuss implications and future consideration for game design.

1. Introduction

Location-based augmented reality (LBAR) games, which blend the digital world and the real-world via gameplay by featuring the player location as a key element (Avouris & Yiannoutsou, 2012; Rashid et al., 2006), are becoming increasingly popular. Among the LBAR games, the tremendous popularity of *Pokémon GO* in 2016 led to a significant increase in the number of players around the world and impacted how people perceived LBAR games (Lee et al., 2017; Sobel et al., 2017). This game prompts players to capture virtual creatures called Pokémon by traversing in the real-world. "Wild" Pokémon appear based on the game mechanics, which affect their spawn rate, location, and time. The game is based on three factions (Instinct, Mystic, and Valor) that battle for territory through controlling "Gyms," stations in which players leave Pokémon to fight and defend the location. Gyms are mapped onto real-world locations, often in areas that are believed to be high-traffic and high-interest areas for players.

Due to the commercial availability of mobile technologies, high-speed internet infrastructure, and the franchise popularity of Pokémon, the game has achieved immense popularity since its inception. *Pokémon GO* has introduced millions of new players to ARG experiences and continues to be relevant, as evidenced by recent statistics of the number of players and its revenue (Iqbal, 2020; Taylor, 2019). *Pokémon GO* has been downloaded more than 500 million times worldwide (Key, 2020). In 2020, its revenue exceeded one billion USD despite the COVID-19 pandemic (Key, 2020; Rauschnabel et al., 2017). Several studies examined why people play *Pokémon GO*. Physical

or outdoor activity were commonly found motivations for playing *Pokémon GO* (Hamari et al., 2019; Kaczmarek et al., 2017; Khalis & Mikami, 2018; Kogan et al., 2017; Rauschnabel et al., 2017; Watanabe et al., 2017; Yang & Liu, 2017; Zsila et al., 2018). However, Wagner-Greene et al. (2017) warned that players engaging in physical activities such as driving, biking, and walking while playing the game can increase the potential risk of user injury. Hamari et al., (2019) investigated how *Pokémon GO* was used as a source of gratification. The authors found that the appeals of *Pokémon GO*, such as game enjoyment, outdoor activity, ease of use, challenge, and nostalgia, were associated with players intention to reuse the game. Interestingly, they found that privacy concerns and trendiness were not associated with the intention to reuse. Caci et al. (2019) points out that the motivation to play *Pokémon GO* is also related to personality traits and gaming habits, meaning players who are introverted and players who are competitive have different personal and social needs that they try to fulfill by playing the game.

As the popularity of the game has grown, tensions have emerged among the players themselves, as well as between players and non-players. Many questions were raised by players and non-players alike about the "right" or "legal" ways to play in terms of the game's impact on safety, privacy, and ownership of virtual space (Lee et al., 2017). For instance, people and local governments have used lawsuits to request *Niantic* (i.e., developer of *Pokémon GO*) to remove PokéStops (i.e., smaller stations that allow players to obtain game resources and tasks) in certain locations (Mitchell, 2016). Mainstream media has reported dozens of incidents

where conflicts arose or individuals were killed or hurt because the players ended up in dangerous situations during gameplay (e.g., Baynes, 2018; Sim, 2016). LBAR games are unique in that the virtual game itself is embedded in the real-world, and the actions players take in the game directly affect real people and locations. Thus, for LBAR games, there is the possibility of both virtual and "real life" wrongs to occur (Powers, 2003).

While more people are playing *Pokémon GO* and other similar games (such as *Ingress* or *Harry Potter: Wizards Unite*), we do not yet have a good understanding of how to ethically and safely design or play this kind of game, let alone how players will adapt their own ethical viewpoints to this emerging Augmented Reality Game (ARG) space. For instance: Is it ethical to play the game in places like cemeteries or hospitals? What if the use of these games leads to a tragedy of the commons where public parks are overused? Is it moral to incentivize players to sacrifice privacy and security so that they can play these games? Investigating these questions, as well as other ethical ambiguities that arise through gameplay, can reveal important insights into the ethical stances of LBAR game players and the kinds of ethical breaches that are being performed. These sorts of questions became the motivation for this paper to investigate the players' ethical standpoints and actual gameplay.

Ethics, which includes the study of moral obligations, theories of value, and ethical character analysis, are important because they help us understand the choices, decisions, and consequences of LBAR gameplay. "In-game" decisions may have an ethical component, as well as actions or behaviors that affect individuals, institutions, or businesses outside the game. In this paper, we examine these issues specifically from the player's perspective, considering how the gameplay affects the wider world. We attempt to better understand what users currently perceive to be an ethical way to play these games, and how much of that perception is shared among players.

Based on an online survey of 2,023 *Pokémon GO* players, we provide descriptive statistics about their engagement in various game actions. Additionally, we qualitatively coded and analyzed the open-ended responses to specific questions about what people consider when they make decisions about how ethical various game actions are. We analyzed the findings in light of three prominent ethical traditions: consequentialism, deontology, and virtue ethics. These theories are useful in that they are well known and mark out fairly distinct strands of reasoning about ethical principles or stances. As non-experts in ethics it is understandable that *Pokémon GO* players would not know or understand the theoretical commitments that provide the foundation for what they might declare as right, wrong, or permitted game play. Nevertheless, when taking an ethical stance, non-experts will generally appeal to consequences, duties, or virtues. Through the lens of these ethical traditions, we want to better understand how players may think and justify certain actions in LBAR games, and also gauge whether certain ethical stances are more prominent than others among the players in the context of LBAR gameplay. This research aims to answer the following two research questions, addressing the empirical and theoretical aspects related to this topic.

1. Both internally and externally to the game, what kinds of game actions do *Pokémon GO* players participate in, which have various ethical consequences?
2. What kinds of actions do *Pokémon GO* players perceive as ethical or unethical? When players make these ethical judgments, what kinds of moral philosophical stances do they take?

The main contributions of this paper are to 1) provide empirical data that situates perceptions of ethics among a popular LBAR game, 2) help improve our theoretical understanding of how we frame ethics in the world of mixed reality, and 3) offer future considerations for designers of LBAR games by revealing the players' participation in and perceptions of various game actions with different ethical consequences.

2. Literature review

2.1. Overview of normative ethical theories

Normative ethical theory has been traditionally broken into three domains: theories of the good (or value), theories of right (or obligation), and theories of moral character (or virtues). A theory of the good concerns the moral evaluation of agents, states of affairs, intentions, and the like as good, bad, valuable, and valueless. In general, a theory of the good attempts to answer the question: "What is morally valuable?" A theory of the right, or a theory of moral obligation, concerns the moral rightness or wrongness of actions and policies. Theories of the right attempt to answer questions like: "What makes an action right or wrong?" What justifies a right to privacy, or for that matter, a right to property? The theory of moral character or virtue is less focused on moral values or moral obligations. Instead, this domain centers on the question of what sort of virtues or dispositions we should promote. What kind of person do you want to be, and what kind of person do you want sitting next to you as a fellow citizen? How these three domains connect or interact determines the type of moral theory in question.

2.1.1. Consequentialism, deontology, and virtue ethics

Axiologists claim that "the good" determines and is more fundamental than "the right." In other words, the good is prior to the right. That is, we know what we ought to do by appealing to moral value and nothing else. The most prominent example of an axiological theory is ***consequentialism***, which holds that moral rightness and wrongness depend on the value or disvalue of consequences. Consequentialists sometimes argue that rights and virtues are rules that, when followed, lead to good consequences. Prominent consequentialists include Jeremy Bentham (1970/1789), Mill (1931), and Sidgwick (1874/1962). In the analysis presented below, we note how players mention harms, benefits, and appeal to "no harm, no foul" rules. When doing so, these participants are grounding an ethical position in consequentialism.

Strict ***deontological theories***, on the other hand, hold that considerations of moral value are irrelevant to determining the rightness or wrongness of actions. Rightness and moral duty, according to this view, determine and are more

fundamental than the good. The right is prior to the good. For example, Immanuel Kant (1948) famously stated that there is nothing that is good except good will. A person with a good will is someone who does the right thing for the right reasons, independent of goodness or badness of consequences. Prominent deontologists include Kant (1948), Locke (1689/2013), Rawls (1971), and Nozick (1974). Many comments made by respondents in our survey mention fairness, autonomy, merit, and respect for individuals. Moreover, sometimes players note that these moral principles are resistant to claims that appeal to goodness and badness of consequences. When doing so, these respondents are defending a deontological viewpoint.

As noted above, theories of moral character focus on the wider questions of what it means to be a good person or citizen. We know, for example, what excellence is related to various objects, crafts, and entities, but what does it mean to be an excellent person or human being? The virtuous person has internalized specific ways of behaving that promote practical rationality and a flourishing life. Obviously, moral duties and the goodness of consequences play a role in human excellence and flourishing. While controversial, many include recent work in feminist ethics, or the ethics of care, within the virtue ethics tradition. Conforming to the priority we give to family and friends, an ethic of care centers on responding to needs. Morality does not involve simply calculating results, bargaining, or duties. Aside from Plato and Aristotle, prominent virtue ethicists include Anscombe (2011), MacIntyre (1981), Foot (2001), and Held (2006). As with appeals to consequentialism and deontology, sometimes players highlight the virtues of playing the game well, being a good teammate, or playing honestly.

Moderate consequentialist, deontological, and virtue theories may properly be called "hybrid" theories. These theories reject the rigid view that only consequences matter, only duties matter, or only virtues matter. We utilize consequentialist, deontological, and virtue theories as a framework to examine the various ethical decisions that *Pokémon GO* players offer as they participate in LBAR games.

2.2. Ethical issues in location-based AR games

With millions of people engaging in gameplay worldwide, unanticipated consequences and actions occur both in real-world and game world settings. News reports around the globe indicate ethical issues in real-world play, such as trespassing on public and private property (LaSusa, 2019), property damage (LaSusa, 2019), racial, gender, and sexuality bias toward players (Guynn, 2016), unauthorized gameplay at sacred properties (e.g., the United States Holocaust Museum) (Peterson, 2016), harassment (Conroy, 2017), and even player deaths during gameplay (Sim, 2016). Within the game world, issues of cheating (Paay et al., 2018), online harassment (Warner & Raiter, 2005), and GPS modifications (spoofing) (Paay et al., 2018) have become rampant.

Despite persistent media coverage of player behaviors in both the digital and the real-world, what is unknown to researchers are the motivations as to why players engage in ethically questionable behavior. Paay et al.'s (2018)

investigation on the motivations and practices for cheating in *Pokémon GO* identified ten practices that players engage in to circumvent the rules. Such practices include using bots to play, exploiting GPS vulnerabilities in the game design, and selling accounts. Notably, nine of the ten practices shown in Paay et al.'s investigation are digital interactions. The only form of physical interaction mentioned was using a vehicle to play. While Paay et al.'s investigation shows why people cheat (e.g., desire to participate without moving, inequality of game elements in different locations), this research aims to further the understanding of the underlying reasons people believe specific actions are ethical or not.

Alomar et al. (2019) designed six "real-world gaming scenarios" for *Pokémon GO* that position players in situations where they might violate respected rules and regulations, threaten the safety of others, obstruct physical movement of pedestrians, and engage in risky habits. They asked 5,739 crowd workers about their behavioral decisions in these scenarios and compared their responses to 3,492 active *Pokémon GO* players in equivalent scenarios. The investigation notes that the long-term negative impact of *Pokémon GO* players on the real-world is minimal. While the authors demonstrate six possible risky scenarios, they do not provide the exact motivations for why players and non-players engage in these behaviors. The study notes that it was impossible to examine specific nuances of players' motivations, denoting a critical gap in understanding why players behave in certain ways in risky situations.

As LBAR games are situated in mixed reality, the laws that govern the real-world are colliding with those that regulate virtual interactions. Laws and ethical considerations play catch up as fast-moving technologies create more opportunities for us to experience a state of mixed reality. *Pokémon GO* is no exception, as issues of risky behavior, trespassing, and physical property are now at the forefront of LBAR games. For instance, Kochan (2017) discusses physical trespass issues in *Pokémon GO* as the game is layered over the real property without the owner's consent. The legal term of trespass consists of any of the following three components without lawful justification: "(1) entering on to land in another's land, (2) remaining to the land, or (3) placing or projecting any object on it" (Kochan, 2017, p. 78). The author brings up Niantic's argument that "there cannot be a 'virtual trespass' because nothing tangible intrudes upon real property by mapping property and creating augmented-reality overlays" and points out a need for adapting to technological advances in law.

Questions of ethics in gameplay come in the form of who is responsible for such choices. Legal scholars bring up the idea of "likelihood of harm," a legal term focusing on people's responsibility as it pertains to incitement of harm and the role of the First Amendment (Gilmore, 2017). Incitement focuses on 1) the intent to incite; 2) the imminence of the incited action; and 3) likelihood the incited action will occur. Incitement asks whether *Pokémon GO* influences where the player goes, and whether the player moves to that location. Imminence focuses on whether *Pokémon GO* mobilizes players for immediate action. Intent looks at whether the game is so involved that players are not paying attention to

their environment. For companies like Niantic, does *Pokémon GO* have protections under Free Speech laws? Does the design of *Pokémon GO* incite illegal and unethical behavior, in which the players are not as accountable? In general, there are questions of how ethical decision-making comes to light as a result of players' decisions and the design of the game.

2.3. Risks and safety issues related to Pokémon GO

2.3.1. Traffic related risks

Sharma and Vassiliou (2016) uncovered that *Pokémon GO* has caused serious road traffic accidents in their research exploring ARG's impact on players. Despite a clear understanding that distracted driving leads to risky situations and negative impacts in the physical world, *Pokémon GO* players often play while driving vehicles, not riding as passengers (Ayers et al., 2016). Wagner-Greene et al. (2017) reported the survey results from 662 adult players regarding possible causes of physical risks while playing *Pokémon GO*. More than a quarter of *Pokémon GO* players reported that they like to play the game while driving (27.3%), biking (43.4%), walking without paying attention (31.5%), and while sleep deprived (37.8%). Sometimes this behavior led to accidents. The literature generally shows the rate of playing while driving and the negative impact on the world (Ayers et al., 2016; Faccio & McConnell, 2020; Wagner-Greene et al., 2017), rather than considering players' motivations. However, if players comprehend the dangers of distracted driving, we may wonder why such practices continue.

2.3.2. Trespassing and virtual trespassing

To examine some of the real-world ethical decisions in *Pokémon GO*, real estate and trespass law need to be considered. Kochan's (2017) law review of *Pokémon GO* examines what physical trespass means and what access limits players should assume. Because trespass law is grounded in legal precedents and real property, players need to decide if they can enter property without a property owners' consent. According to Ayers et al.'s survey (2016), 11% of respondents have entered private property, and 14% of *Pokémon GO* players played in areas where they did not feel safe. Players may commit illegal actions of trespassing for play, but they are rarely punished due to the difficulty of identifying wrongdoers (both individual and large-scale trespass). Due to this difficulty, Kochan asks if ARG makers have a legal or, at least, an ethical obligation to provide enough information to let players know of their wrongdoing.

2.3.3. Personal privacy risks

As technology becomes more personalized and ubiquitous, privacy issues are also becoming more important. For instance, Rauschnabel et al. (2017) discuss ethical issues in the context of privacy. The authors point out that the use of various sensors (e.g., camera) while playing ARGs can pose threats to individual privacy. Another privacy issue relates to data privacy from the provider as players tend to worry about possible loss of personal information or question their security due to potential hacking (Malhotra et al., 2004). Additionally, as perceptions of privacy regarding use of

a particular media or technology degrade or change, users may be unwilling to adopt a new technology (Barney & Hansen, 1994; Connolly & Bannister, 2007; Lewis & Weigert, 1985). Aside from data capture and manipulation there is also the issue of how players within these games may stalk or infringe the privacy of other players and non-players.

2.3.4. Racism and marginalization in Pokémon GO

An unintended consequence of *Pokémon GO* in the physical world is that it marginalizes some groups as self-identifying with a specific race or gender, and some players have encountered safety issues as a result of their race and gender. Mobile AR games amplify the experiences of harassment at the intersection of physical and digital spaces. For instance, women report uninvited advances in the physical world as they play in the digital world (Myers, 2016; Winegarner, 2016). Black Americans have always noted ties to stigmatization and safety in physical spaces (Guynn, 2016). There is also little representation of Black players in *Pokémon GO*. For instance, Akhtar (2016) notes that there are more PokéStops in majority-White neighborhoods than majority-Black communities. As such, digital gameplay requires Black players to go into spaces that they have traditionally been excluded from (Hudson, 2016). Windleharth et al. (2020) also discuss how Ingress players from traditionally marginalized groups were cognizant of potential safety issues, and felt vulnerable while playing alone in certain areas. Both gender and ethnic background affect one's perceived safety level, as *Pokémon GO* players need to make real-life decisions about entering traditionally unwelcoming spaces or limiting their gameplay. While game designers have an ethical responsibility to consider player safety, it may be a difficult task when there are social barriers present.

3. Study design and method

We deployed an online survey in a national distribution of mostly US players. The survey had 26 questions asking about player behavior related to *Pokémon GO*, perceived importance of the game to individual players, whether players have engaged in a series of game actions with various ethical consequences, what their opinions are regarding those actions, and what they consider to be most ethically problematic issues and why. The list of game actions was created to comprehensively capture various choices *Pokémon GO* players make as they engage in the gameplay, based on the consultation with active *Pokémon GO* players recruited from the local *Discord* server. The actions were not posed as ethical or unethical but as actions that can potentially raise questions about ethics. Additionally, we asked participants to ethically evaluate their own behavior, actions, and gameplay. The full questionnaire is included in the appendix.

We distributed the survey via 187 *Facebook* groups and *Discord* servers related to *Pokémon GO*, as well as the online community *The Silph Road*. We released the survey in January 2019 and left it open till February 2019. We had a total of 2,207 responses. After cleaning up the data set, removing incomplete and invalid responses, we were left

Table 1. Participant characteristics.

	# of people who participated (n = 2023)	% of people who participated
Gender		
Male	1304	64.46
Female	645	31.88
Other	24	1.19
No Answer	50	2.47
Race		
Caucasian	1479	73.11
Asian	273	13.50
Hispanic	190	9.39
Native American	21	1.04
Black	18	0.89
Mixed	12	0.59
No answer	30	1.48
Region		
North America	1150	56.85
Europe	523	25.85
Australia	83	4.10
Asia	80	3.96
South America	44	2.17
Africa	4	0.20
No answer	139	6.87

Table 2. Codes used in qualitative coding.

Code	Description
Alignment with goal of the game	Decisions based on whether the player's action aligns with and contributes to the goal of the game. (e.g., kicking another player out of the gym)
Assistance versus replacement of game action	Decisions based on technology either assisting people to play the game better or replacing a game action (e.g., using a scanner versus spoofing)
Contextual appropriateness	Decisions based on contextual factors such as place and time affecting the gameplay (e.g., playing during a funeral at a cemetery)
Degree of violation	Decisions based on the player's degree of the violation of Terms of Service or social etiquette
Efficiency	Decisions based on players becoming more efficient, advantageous, and better
Effort	Decisions based on the person feeling that a game action is ethical or not based on the amount of effort individual players put in
Etiquette	Decisions based on whether the player's action follows the etiquette surrounding the various gameplay actions (e.g., gym etiquette)
Explicit knowledge	Decisions based on whether and how much involved players knew about the relevant circumstances to the game action (e.g., knowingly trading for Pokémon obtained by spoofing)
Fairness	Decisions based on the fact that the game disadvantages certain player(s) based on their ability, possession, or characteristics (e.g., time, transportation, age, physical ability, density of play area, social, financial reasons)
Impact to others (players)	Decisions based on the action's overall impact to other players, considering whether the player's action benefits or harms them
Impact to others (non-players)	Decisions based on the action's overall impact to other people outside of the game, considering whether the player's action benefits or harms them
Official endorsement from company	Decisions based on whether the company endorses tools/devices that allow the particular action
Physical barriers	Decisions based on player's feelings toward physical barriers and player's ability to overcome such barriers (e.g., gym at the top of the hill)
Retaliation	Decisions based on the action taken as a form of revenge against others
Safety and harassment	Decisions based on the action's impact to physical and mental safety of people (e.g., playing at night, bullying)
Social pressure/ acceptance	Decisions based on the fact that many others in the community are also participating in the specific action which people perceive as justification of the action
Tracking and privacy	Decisions based on how much privacy is violated because private information is shared with others due to the gameplay

with 2,023 responses to analyze. Table 1 shows the participant characteristics.

Overall, the engagement of the players was fairly high given the amount of time and resources they were devoting to playing this game. Majority of the participants (88.97%) spent more than four hours per week playing this game. Almost half of our participants (49.43%) were level 40, which was the max level in the game at the time of data collection. Participants' responses were mixed when asked about putting in real currency to play this game; 52.64% considered themselves as a free-to-play player, whereas 46.81% did not. We asked the participants to estimate the amount of money they spent so far in-game and outside of game (e.g., gas, travel and attending offline events). For in-game purchases, the average was $234 USD, with Median of $50 and Std. Deviation of $767, ranging from $0 to $20,000. For outside purchases related to playing the game, the average was $317, with Median of $50 and Std. Deviation $1,496, ranging from $0 to $40,000 (with three outliers removed). We also asked about reasons participants like playing this game. The top three reasons were: they like collecting Pokémon (83.39%), it encourages them to go outside and walk more (76.96%), and they like playing with their friends and family (70.34%).

4. Results

4.1. Codebook

The responses to the open-ended questions about why some action or behavior was ethical or not and what was perceived to be most problematic were qualitatively coded via an iterative process. We initially developed the codebook from a part of the responses using an inductive approach (Corbin & Strauss, 2014), and then we refined the codebook via test coding of additional open-ended responses related to which action players think the ethicality depends on the context where it was done. The final list of codes is presented below in Table 2.

Rather than using a particular measure for testing the interrater reliability and accepting the coded results as "satisfactory," the approach we took involved a deeper discussion during the coding process as the coders discussed each instance of disagreement (Hill et al., 1997). We assigned two independent coders to review and code the responses, find any discrepancies, and discuss those cases aiming to reach a consensus in code application. When the two coders could not reach an agreement, the third researcher acted as a tie-breaker. After we finished coding the data, we used three prominent philosophical stances to frame our analysis (i.e., consequentialism, deontology or duty-based ethics, and virtue

ethics). In most cases, responses that appeal to goodness or badness of outcomes, harm to other players, rules capturing the idea of no harm/no foul, or little harm/little foul, etc. are consequentialist based. For instance, players with this perspective may believe using multiple accounts is fine as long as they do not affect another player's progress. Responses that appeal to desert, merit, fair gameplay, contracts, and the like are deontological or duty-based. An example would be when a player insists abiding by the game's Terms of Service. Finally, responses that note norms of etiquette and characteristics of what it is to play the game with honor are virtue-based, such as when a player leaves a gym alone when the Pokémon has only been there for a short time.

4.2. User participation in and perception of game actions with various ethical consequences

We presented users with a list of game actions with varying ethical consequences and asked if they participated in any of those actions. Table 3 presents the results with the count and proportion of people who indicated their participation in the action, and people who thought each action was ethical (Completely Ethical [CE] + Somewhat Ethical [SE]).

The results show that the majority of participants utilized out-of-game resources like social media to obtain game information (85.12%), and third-party apps to obtain Pokémon's statistics (82.06%). There were several other actions where approximately half of the participants were involved, such as playing the game for other adults (56.95%), playing in culturally sensitive locations (54.62%), going to a business to play the game (52.20%), playing while driving (51.66%), and using third party maps or scanners to find Pokémon (51.31%). Actions like multi-accounting (playing with multiple accounts) and attending an EX-raid

(special raid events that require invitations) for others were also engaged in by 38.90% and 38.36% of participants, respectively. Approximately one out three participants reported using Gotcha (a device that allows you to automatically catch Pokémon and collect items) (30.89%) and trespassing on public properties (28.92%). Using bots to play and playing for financial incentives (or paying someone to play for you) were infrequent, with only 1.33% and 1.04% of participants taking part, respectively.

We also wanted to investigate the relationship between people's engagement in various actions, and their perceptions of whether the actions were ethical or not. Figures 1 and 2 present the comparison of the proportion of players participating in each action and players who perceived the action to be ethical. Figure 1 shows the actions where the proportion of people engaging in the action was higher than people who considered the action to be ethical, and Figure 2 vice versa. The actions where we saw the largest difference included "Playing while driving as the driver, not the passenger," with 51.66% having done it, but only 6.18% thinking it was ethical, and "Playing inside a culturally sensitive location," with 54.62% of participants engaging in that action, but just 26.40% thinking it was ethical. A total of 28.92% of participants engaged in "Trespassing on public property," although only 14.63% thought it was ethical.

On the contrary, there were also a number of actions that participants themselves did not engage in, but still thought were ethical. The largest difference was regarding "Playing for children as their guardian" with only 15.76% having done so but 70.19% thinking it is ethical. This was followed by other actions like "Creating a private lobby to exclude people who are not visually present who might be spoofing" with 44.54% having done it with 73.75% thinking it is ethical, and "Attending an EX-raid in place of friends, family, or an acquaintance who cannot make it" with 38.36% having done

Table 3. User participation in and perception of ethically questionable actions.

| Ethical Questionable Action	# of people participated	% of people participated		# of people who think action is ethical	% of people who think action is ethical
Using social media to obtain information	1722	85.12	<	1780	87.99
Using a third-party application to evaluate a Pokémon	1660	82.06	<	1729	85.47
Taking down a gym of the other team's Pokémon	1489	73.60	>	1331	65.79
Playing for friends, family, or acquaintances	1152	56.95	>	1121	55.41
Playing inside a culturally sensitive location	1105	54.62	>	534	26.40
Going to a business for playing Pokémon GO	1056	52.20	<	1087	53.73
Playing while driving as the driver, not the passenger	1045	51.66	>	125	6.18
Using third-party maps or scanner to find Pokémon	1038	51.31	>	866	42.81
Using third-party maps or scanners to find raids	981	48.49	<	1233	60.95
Creating a private lobby to exclude spoofing people	901	44.54	<	1492	73.75
Taking down a gym shortly before midnight	844	41.72	<	1259	62.23
Playing with multiple accounts	785	38.80	>	677	33.47
Attending an EX-raid in place of players who cannot make it	776	38.36	<	1357	67.08
Using a "Gotcha"	625	30.89	<	1208	59.71
Trespassing on public property	585	28.92	>	296	14.63
Asking someone to join a different raid group	527	26.05	<	744	36.78
Using another account to kick your own Pokémon out of a gym	366	18.09	<	553	27.34
Playing for children as their guardian	319	15.76	<	1420	70.19
Trading a Pokémon when you suspect that it was caught by spoofing	314	15.52	>	224	11.07
Changing time on device to get the next day's raid pass	294	14.53	<	309	15.27
Gym shaving	259	12.80	>	223	11.02
Trespassing on private property while playing	223	11.02	>	60	2.97
Spoofing your location in game	180	8.90	>	75	3.71
Using a bot to automatically play	27	1.33	<	54	2.67
Playing for financial incentives	21	1.04	<	121	5.98
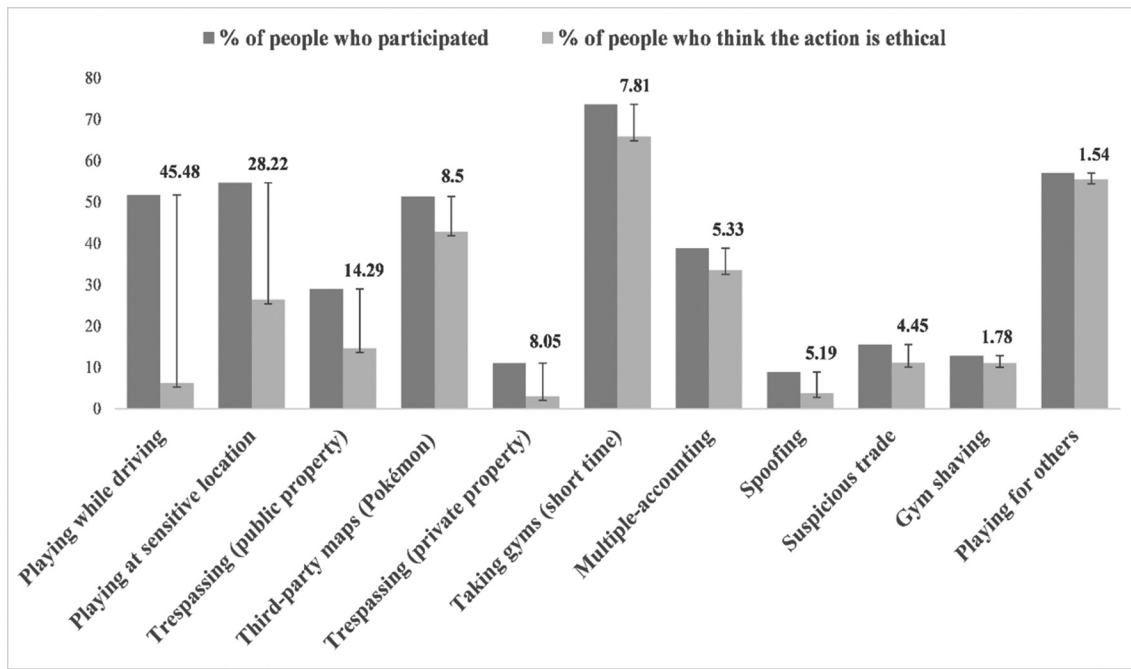
Figure 1. Comparison of the proportion of people who participated in the action and people who thought each action was ethical where the former is higher than the latter.
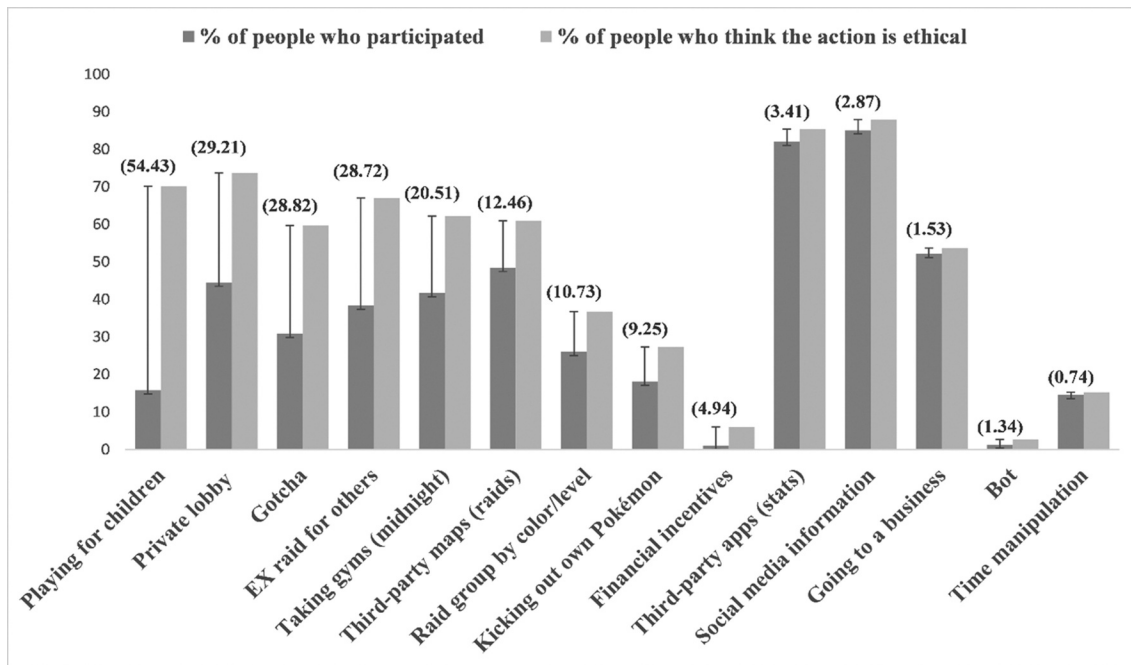

Figure 2. Comparison of the proportion of people who participated in the action and people who thought each action was ethical where the latter is higher than the former.

it but 67.08% think it is ethical. These are actions that could be impossible because of the individual player's situation (e.g., they do not have kids), or actions that they may not have had a chance to encounter themselves (e.g., they did not get invited to EX-raids). Some of these actions involve using tools or technologies outside of the game–for instance, "Using a 'Gotcha' to automatically catch Pokémon or spin Pokéstops/Gyms" with only 30.89% of participants actually doing it, but 59.71% thinking it was ethical.

4.3. User perception and reasons for ethical judgments

For the same set of game actions, we asked respondents why they perceive each action to be ethical or not. In the following

sections, we discuss actions they considered predominantly ethical and predominantly unethical, focusing on which characteristics are shared by each group of actions.

4.3.1. Actions considered predominantly ethical

4.3.1.1. Actions that benefit others.
First, players tend to state that the action is ethical if it benefits other players. For instance, playing for other friends, adult family members, or acquaintances (35.20% CE, 20.21% SE), playing for children as their guardians (51.16% CE, 19.03% SE), and proxying at ex-raids (45.33% CE, 21.75% SE). As a way of highlighting the different ethical stances participants took related to different survey questions, we briefly analyze several responses. Squarely within a consequentialist framework, P1084 mentions the game's potential benefit and harm to people:

> I think it's ethical to play on someone's behalf if there is a limited time event that occurs during a time when that person cannot be present … If a rare Pokémon brings a hardworking adult joy, there is no harm in assisting them. - P1084

As an appeal to good consequences and a kind of "no harm, no foul" rule, P2147 noted how EX-raid pass sharing allows for win-win scenarios:

> Myself and my boyfriend have to log in to complete the ex-raids if one is working and can't make it. It should be a reward that is achievable and for most EX-raids they occur during the week during work hours. If there was an option to trade ex-times or dates then we would not have done that. Since the ex-pass sharing, we no longer do this as we can trade with others to get times that do work rather than missing out. - P2147

P2181 also noted that some players, like children, have less agency in how they play and, therefore, adults feel justified playing for them. Additionally, children, especially younger ones, might have more difficulties catching the Pokémon. However, they also talked about how some people try to exploit this to justify their multi-accounting behavior.

> Playing Pokémon or catching Pokémon for children is completely ethical to me considering there are children that might not have the ability to catch or play as easily as adults. - P2181

> … helping your child play, especially if the child is actually present … is different than always showing up at raids with your own and "your child's" account, the latter is simply multi-accounting. - P1836

Note that these responses do not offer any sort of justification that mentions one of the ethical traditions. Perhaps playing for children who lack agency or ability, but who are nonetheless present during gameplay, is seen as obviously morally permitted and no justification is needed.

4.3.1.2. Actions that support community interactions and information sharing.
Second, participants using third-party tools like Facebook groups or Discord servers for community interactions or obtaining game information (76.67% CE, 11.32% SE) is generally considered as ethical. Similarly, the majority of participants noted that using these tools for finding raids (39.20% CE, 21.75% SE) or evaluating Pokémon (73.80% CE, 11.67% SE), were considered ethical because these tools do not negatively impact other players.

Participants made several points concerning why this action was ethical. Some talked about the technical aspect (requiring shared login information with third-party apps) or the game company's intention, especially related to what the game affords. The actions also fall within what they consider as part of the spirit of the game and communicating with other players.

> Can I also add, about using Discord/ FB etc, Niantic seem to want us to be sociable & communication, but we can't communicate in game, so it makes sense to use those apps to find people for raids/ ask for help with pokestop research, it helps people work together. - P2154

Since helping players work together is one of the benefits of communication outside of the game, this is a form of consequentialism. The communication is technically not allowed within the game, but it benefits the players who take part in the action without harming those not taking part in the action. Others focused on the fact that the third-party app simply brings increased efficiency to their actions, and that players still have to actively engage in the actions.

> Third-party software that augments your ability to play (maps, iv calculators) but for me is in a different category, as the player still needs to complete actions in game in order to receive the benefits of these tools. - P1493

These examples appeal to the good consequences of using third-party applications where efficiency is increased and there is little or no negative impact on overall gameplay. Players do note that they still want and need to put in some work, even with the assistance of third-party applications. The negative impact on gameplay is dependent on the player but, in general, the responses from participants showed that the majority of them are against applications that do all the work for players, such as bots. The use of bots automatically completes actions for players, allowing them to bypass the work needed to progress through the game normally. This sentiment would seem to imply merit or desert and a deontological viewpoint.

4.3.1.3. Actions with potential negative impact on others but are allowed in the rules of gameplay.
Third, the majority of participants highlighted actions that might negatively impact players in-game but are allowed in the rules of gameplay as ethical. These actions include kicking out another team's Pokémon only after it has been there for a short time (53.98% CE, 11.81% SE) or taking down a gym shortly before midnight (52.35% CE, 9.89% SE).

> Taking down a gym just before midnight/after a short time is potentially annoying for the player kicked out but not really against the rules. And there might be [a] fair reason to do it such as if you're leaving an area soon or can only play late at night. - P14

This example demonstrates the belief that bad consequences, or virtual harm to other players, are permissible if it is part of the community-based game contract that allows such activity. Those harmed cannot complain because they agreed to take part in such activity. This is an example where contractual-based duties, likely grounded in deontological considerations, trump the goodness or badness of consequences. The duty

players consider in these scenarios is making sure their way of playing the game falls within the terms of service.

4.3.1.4. Actions to retaliate "cheaters."
Fourth, the majority of participants highlighted that actions players take to combat people who are considered cheaters were also deemed as ethical. For example, this includes creating a private lobby to exclude people who are visually not present and could be potential spoofers (56.70% CE, 17.05% SE). Players believed that this was important for the game and the community.

> Maintaining the "spirit" of the game (i.e. playing together as a community in real life) is very important to some people, and cheaters go against that concept by trying to reap rewards without interacting with the community. - P1318

In-game actions that harm players who cheat are permitted because the "spirit" of the game contract has been broken. Hinting at retributive justice, players punishing cheaters rebalances the scales of justice that have been upset by the contract violation. The idea that punishing cheaters is permitted, even if that leads to harm, is deontological. Also included are notions of "maintaining the spirit" of the game and "playing together as a community," which may hint at virtuous game play.

4.3.1.5. Actions that help keep people safe.
Lastly, actions players take which helps ensure the safety of players and non-players are generally considered ethical. For instance, we asked them how they felt about playing with Gotcha. This action was predominantly regarded as ethical (42.02% CE, 17.70% SE), despite the fact that Gotcha is not an officially endorsed product by Niantic.

> I consider gotcha completely ethical because I use it while driving and I find go plus distracting. Since go plus is legit, and it pretty much auto-catches, gotcha is the same, only much safer. - P231

This quote demonstrates the value accorded to the goodness of consequences. Playing the game safely and not being distracted while driving are good consequences. Using a Gotcha promotes safety while, at the same time, no one else is harmed. The response justifies the use of Gotcha. Aside from not harming and promoting safety, the respondent notes how Gotcha is no different from using the GO Plus. Since GO Plus is legitimate, and sanctioned by Niantic's Terms of Service (ToS), the player notes that "Gotcha essentially is the same only safer," then it follows that using Gotcha should be permitted. One interpretation is that the player is noting that there are no contractually based reasons that would trump a rule promoting good consequences. If so, this is a nice example of a sort of hybrid reasoning about ethical theory. The rule would promote good consequences, so long as there are no other fundamental obligations at play. While the foundations of these other moral obligations are not indicated, presumably they would be grounded in duties or virtues.

4.3.2. Actions considered predominantly unethical
4.3.2.1. Actions with negative real-world impact.
Playing for or offering financial incentives (67.28% Not At All Ethical (NE); 14.48% Somewhat Unethical (SU)), playing while driving (52.50% NE; 24.52% SU), and trespassing on private property (57.29% NE; 27.43% SU) all have an impact to players' financial status, safety, and privacy in real life.

> My reasoning is that it just promotes a 'work for it? nah, I'll just buy it' attitude. It's supposed to be a free game, not someone's point of income. - P1551

> I believe the most unethical act playing *Pokémon GO* is to get money off of "selling" your Pokémon (trading your good Pokémon for something you wouldn't normally trade, motivated by the fact that you're getting paid). However, if the person doing it is in need at the time I wouldn't go as far as to call it unethical. It is just that I have never seen someone in need do it. - P1473

The first quote hints at a deontological principle of merit. The gameplay is about working, earning rewards, putting in the time, and obtaining expertise; however, all of these are undone by simply buying these goods. From these participants' perspectives, those who would buy and sell Pokémon do not have the right attitude. The second quote also mentions motivation; that selling Pokémon is unethical except when there is a great need. Player P1473 has not seen this behavior before, but could imagine a case where selling Pokémon would be permitted if real-world needs were dire. Thus, playing in accordance with the game contract could be overbalanced by consequentialist concerns.

> Choosing to put others at risk by playing the game. Too often I see people playing the game while driving, or putting themselves at risk by paying no mind to the environment around them. It is your duty to do no harm to others while playing. - P1084

Here, player P1084 offers a straightforward consequentialist rationale for unethical behavior. In this case, the player condemns actions that would physically harm other people, even those who do not play the game. Participants also had strong feelings toward trespassing, especially on private property, even though the harm to others may not be physical.

> I think one of the most serious ethical issues listed in trespassing on private property. Though it can be tempting to go on private property for something in the game, doing so is illegal and can make a negative impact for the owners of the property. - P1717

While P1084 in the first quote mentions "being respectful," which could hint at virtuous play or deontic duties, it ends with an appeal to a kind of "no harm, no foul" rule for places where the public are generally permitted to occupy. The quote from P1717 appeals directly to how trespassing is both illegal and has a negative impact on owners and thus skirts the line between deontology (property rights hold independent from consequences) and consequentialism (property violations create negative impacts on owners.

4.3.2.2. Actions that manipulate game technologies to gain advantages.
The second theme had to do with falsifying the temporal or spatial data or manipulating/exploiting devices to either automate or gain advantages in the gameplay. These actions included spoofing the players' location (70.74% NE, 13.45% SU), changing the time on the device to get an extra pass or do another special trade (32.92% NE, 30.05% SU), and using a bot to play (81.56% NE, 9.89% SU). Here, participants

often talked about the "spirit" of the game and how such actions demoralize other players and de-incentivize honest play.

> The entire point of the game is to adventure, meet people who can help you (trades) and complete your collections. People who spoof or accept spoofed Pokémon in trades aren't living up to the spirit and intent of the game and it just feels like a slap in the face for people who play correctly. - P1773

> My concern is with spoofing. It can totally destroy a local *Pokémon GO* community. I used to spoof and I used a bot all the way back in 2016, and I regret it because I know that it could easily have had a very detrimental effect on the community. - P1699

> Changing settings to get what you want is very frowned upon in my opinion, having patience is part of the fun. - P1294

In these examples, there are at least two appeals to virtuous gameplay. To play with honor is to live up to the "spirit and intent" of the game (P1773) and to play with patience. Between these appeals to virtue is another direct indication of how spoofing causes bad consequences by "totally destroying" a local Pokémon community (P1699).

When we asked about their opinion on trading a suspicious monster that might have been caught by spoofing, participants still mostly considered it unethical but with less intensity than spoofing themselves (22.24% NE, 37.17% SU). Other participants condemned the action because it allows people to gain benefits without putting in an appropriate amount of work or effort. This also appeals to virtue ethics since neither player is putting the work in, or playing with honor, to catch the monster normally without spoofing.

> Using a bot to play - this is one of the more unethical things as you benefit from doing little to absolutely no work. You could "complete" the game (as much as it can be completed) without ever really putting in effort. This reduces the accomplishments of people who actually work to play the game. -P1709

The idea of benefitting without putting in the work is a deontic-based principle grounded in merit and desert. Note that in this response the player contrasts the lack of effort of those who spoof with the hard work exhibited by honest players. Moreover, by engaging in unethical behavior, spoofers obtain a competitive advantage, and thereby reduce "the accomplishments" of others. Thus, there is a sort of hybrid analysis present in these cases. The contract of gameplay is based on effort and hard work and this is deontic. Nevertheless, spoofing also creates bad consequences for those who play the game correctly.

5. Discussion

5.1. Real-world vs. virtual-world laws and ethics

Prior literature notes that cheating, fair play, and safe play are important issues for players in *Pokémon GO* (e.g., LaSusa, 2019; Paay et al., 2018). Both legal guidelines and the ToS show some of the ambiguities between real-world and digital interactions (e.g., Conroy, 2017; Kochan, 2017). Our research aims to expand on this conversation by discussing the ethical reasonings of the players. Whether their decisions are

dangerous, rude, or misguided, our data suggest that players make ethical judgments not strictly based on the rules (as represented by the ToS), but a range of different factors. Some factors are from outside of the game world, including moral values from their daily life or social etiquette. Because of influence from social norms, what players ultimately decided to do was also fluid in some situations.

> I see no problem dividing up raid teams after team colors so you get maximum premier balls, as long as you're not excluding any kids or other nice/respectful adults (I don't mind excluding rude, loud 40-something players for example). (P71)

Participants also discussed the conflicts that emerge as they consider how they should be behaving – i.e., how should I behave as a good person vs. how should I behave as a good player? They also took into account how people were like in real life when they were judging their behavior in-game, as a player. In AR games, where the games are mixed with the real-world, these are not always consistent.

> I would never exclude someone from a raid based on their team color because I don't actually care about team colors over the real person behind the screen. (P442)

> I feel as though making multiple accounts for the sole purpose of enabling toxic behaviors (unrelenting control over an area's gyms, for example) is unethical; but most of my personal experiences with people who multi account (sic) is that they're all really nice and conscientious people who just like not being helpless at raids because they're not in a Facebook group. (P35)

While this kind of conflict is not unusual in gaming, it is interesting to observe what happens when that application of morals comes face-to-face with moments and observations involving other players in real-life and digital form. For instance, people might be able to make a decision when they talk about a hypothetical situation. However, when they see people in real life who will be directly impacted by their decision, the choice can be harder to make (e.g., actively fighting against another player at a gym until realizing that their opponent is a small child).

We also show in this survey that ethics/moral judgment is based on various "hidden costs" associated with gameplay, such as: transportation, movement, time to the location, and social costs. Cost is not simply about the money players spend in the game. There are numerous consequences to the cost of having a game in the physical world. Additionally, because many players see other players in their typical play area repeatedly, there exists a different kind of social cost/value. However, because they do not have clear cases to point to or guidelines from a legal perspective, players are left on their own to make what they consider to be "ethical" decisions.

5.2. Societal impact

Beyond *Pokémon GO*, AR as a medium has the potential to impact societies negatively. Hein's research (2017) on societal consequences of AR wearables raises three societal risk factors: societal loss of awareness, societal risk of social cohesion, and societal risk of public privacy. Similar to Hein's research discussing the concern smart glasses pose for the decline in consideration to others, our findings show *Pokémon GO* also

carries this risk factor with players carrying out game actions such as trespassing and driving while playing. Despite many players perceiving them to be ethically problematic, players participate in these actions. Smart glasses are an example of AR raising public privacy risks, because the public may be under surveillance without knowing it (Hein et al., 2017). Social cohesion, a second risk factor of AR wearables, can be supported by some of our findings. Actions such as dividing raid teams may disrupt social cohesion. However, many players voiced their concern that this action would not be ethical if other players are being excluded from completing the raid. Lastly, the societal risk of public privacy is a concern for AR. For example, Hein noted how smart glasses may be used to surveil the public without their knowledge. Rauschnabel (2017) discusses how players are aware of privacy risks, but only physical risk played a minor role in hindering consumer reactions. These examples show how AR raises privacy concerns. However, users were generally more worried about the public's privacy than their own. Certain players' ethical views and game actions in *Pokémon GO* seem to exhibit similar societal risk factors identified by Hein, which exemplified how AR, as a medium, can potentially create negative consequences in society.

5.3. Understanding the player's ethical stances

When tasked with completing an ethical analysis of gameplay and behavior, both in the game and in the real-world, *Pokémon GO* players tended to mostly appeal to deontological and consequentialist viewpoints. While considerations of character are mentioned, like being honest or patient, considerations of virtue were not as prominent in the responses.

Deontological considerations in players were regularly voiced and highlighted in the use of terms such as "effort," "merit," "fairness," "agency," "autonomy," and "contracts." When making these appeals, participants sometimes noted that the consequences were irrelevant to the analysis. Some behavior is wrong, independent of the positive or negative effects on others. For example, to violate a contract, or to engage in unfair activity, was considered unethical independent of good or bad consequences. Additionally, behavior labeled as "cheating" was generally couched in deontic terms.

While some of our future work on ethics in LBAR games may include an analysis of the moral psychology of cheating, there are several aspects to be highlighted here. Many (perhaps most) *Pokémon GO* players bend the rules of the game, and then justify this activity by appealing to some ethical principle: when looking into their own engagement in various game actions, we observed that 56.95% (1152) played for other people, 51.66% (1045) played while driving, 38.80% (785) engaged in multi-accounting, 28.92% (585) trespassed on public property, 11.02% (223) trespassed on private property, and 8.90% (180) engaged in spoofing. Many players thought that spoofing or multi-accounting were unethical, except in cases where there was a fairness issue or when a "no harm, no foul" principle applied. While the gameplay is not always competitive, there is a prestige and reputation factor, and few players want to be labeled as a "cheat." So even if there is no direct benefit from cheating, and there almost

always is, there is a reputational benefit provided that the player is not discovered as cheating. Oddly, the player who covertly bends the rules to achieve benefits knows that they are presenting a false picture of themselves to *Pokémon GO* peers. The drive for false prestige is an interesting feature of LBAR games.

Another common refrain related to bending the rules is that "everyone is doing it," so to be competitive, one must cheat as well. Few players understood the futility of this practice, although it is mentioned. The result of an arms race of cheating is to completely undermine the purpose of playing.

Consequentialist considerations were more likely to be mentioned when compared to either deontological commitments or virtues. Prominent were appeals to actions that left other players, all things considered, unaffected in terms of negative consequences. Securing a benefit without costs to others was also a consistent theme. Consequentialist reasons were typically couched in phrases like "safety," "harm," "benefit," "advantage," and "risk of harms or benefits." When non-experts are asked to provide an ethical analysis of various activities connected to playing *Pokémon GO*, one would expect the sorts of replies offered. Presumably, non-experts in ethics would generally appeal to the bad or good consequences of gameplay.

Lack of transparency and accountability are two factors implicated in rule-breaking or unethical behavior. For example, playing for other people, spoofing, or multi-accounting are difficult to discover if a player takes appropriate precautions. Contrast this with cheating at a chess tournament or while playing recreational hockey. Hockey players that cheat, bend the rules, or engage in risky behavior are easily discovered and are dealt with by the referees or by other players. In many instances, justice is melted out on the ice, which increases the costs of engaging in this sort of behavior. The benefits are simply not worth the risks. Similarly, with every move cataloged, it is nearly impossible to cheat during a chess tournament. Engaging in unethical behavior while playing *Pokémon GO* can be largely conducted in a transparency or accountability free zone if the player is careful enough. Unless these factors are controlled, one could expect continued and even pronounced levels of unethical play.

5.4. Future considerations for game design

If ethical decisions made by players can be influenced by game design, we may wonder who should be responsible for making these decisions: the players, the designers, or both? The participants did consider how their actions aligned with the game's goal, which would suggest that designers do have some responsibilities. However, other aspects participants considered concerned etiquette and impact on other players (how to interact with other players), both of which are less about the particular design of the game and more about the social dynamics, which are more difficult to control from the designers' perspective.

In terms of risky behavior, we know that people still engage in some of these game actions, such as playing while driving. However, the majority of survey participants indicated that

playing while driving is unethical. Many people are not able to resist the temptation to engage in risky *Pokémon GO* behavior–partially because the likelihood of being caught is low. Our findings suggest that designers of the game need to be better informed about what motivates players so game design can be tailored to decrease risky behavior. Since consequences and duties dominate the reasons offered for ethical and unethical gameplay, we believe that Niantic should modify the game with this in mind. Niantic does appear to be working in this direction. For example, by offering more rewards via hatching eggs rather than simply catching in the wild (the former promotes walking the latter does not) Niantic may deincentivize playing while driving.

In addition, Niantic also responded to the unprecedented situation in early 2020 where, due to COVID-19, restrictions have been placed upon moving and socializing in many locations around the globe. The company responded to this change in the real-world and adapted the gameplay by reducing the walking requirements for GO Battle League, providing discounted bundles for items, and creating remote raid passes (Niantic, 2020). Essentially, Niantic is now allowing actions that were against the ToS in the past. It will be interesting to see whether these conditions will revert afterward or stay permanently in the game, and how people will react to those decisions. Given that this research was based on data collected prior to the COVID-19 pandemic, further research is warranted to better understand how the pandemic has impacted players' perception on ethical play in LBAR games.

6. Conclusion

Our study investigates the engagement and perceptions of game players with regards to a set of ethically questionable behaviors in location-based AR games, specifically looking into the case of *Pokémon GO*. We presented an empirical analysis of game players' ethical judgments on various game actions through the theoretical lens of three ethical traditions: consequentialism, deontology, and virtue ethics. Our findings suggest that, in the absence of strict legal regulations and difficulties in perfectly enforcing ToS, players often rely on their own ethical judgments to decide which actions are acceptable or not in these games sometimes based on community practices and customs. The reasons offered for engaging or accepting certain actions could be mapped to all of the three ethical traditions with consequentialism and deontology dominating virtue ethics. While players sometimes displayed hybrid perspectives on some issues, they mostly relied on specific strands of justification linked to consequences and duty.

In future work, we plan to do further analysis of the survey data using quantitative methods to complement this study's findings, which employed a qualitative coding approach. In particular, we will investigate whether there are differences in people's behavior and perception based on their demographics, such as age and gender. In addition, we will continue to explore how our findings compare when we investigate players of other location-based AR games, which are designed with different game goals. Lastly, we hope to reach out to the creators of these games to inquire about their reasons for making specific game design decisions, how they consider different ethical issues as they try to design a compelling game, and understand the challenges they have experienced.

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Appendix

Survey Instrument

1. For the past couple months, approximately how many hours a week have you spent playing Pokémon GO? (multiple choice)
   - Less than 1 hour a week
   - 1–3 hours a week
   - 4–6 hours a week
   - 7 or more hours a week
2. Approximately how much money have you spent related to Pokémon GO in-game purchases? (e.g., coins, clothes, raid passes, incubators, etc.) (in US dollars) (short answer)
3. Approximately how much money have you spent related to Pokémon GO outside of the game? (e.g., gas money, social events, attending GoFest, Gotcha/GO Plus, etc.) (in US dollars) (short answer)
4. Do you consider yourself a free-to-play player in Pokémon GO? (multiple choice)
   - Yes
   - No
5. Which team have you chosen in Pokémon GO? (select all that apply) (check boxes)
   - Mystic
   - Valor
   - Instinct
   - I do not have a team yet
6. What is your current level in Pokémon GO? (short answer)
7. Why do you play Pokémon GO? (select all that apply) (check boxes)
   - I like Pokémon games and/or the franchise
   - I like collecting Pokémon
   - I like leveling up and/or obtaining badges
   - I like battling with Pokémon
   - I enjoy playing with friends and family
   - I enjoy meeting new people through playing this game
   - I like exploring new areas and discovering interesting physical locations
   - It encourages me to go outside and walk more
   - It helps me destress
   - I like Pokémon games and/or the franchise
   - I like collecting Pokémon
   - I like leveling up and/or obtaining badges
   - I like battling with Pokémon
   - I enjoy playing with friends and family
   - I enjoy meeting new people through playing this game
   - I like exploring new areas and discovering interesting physical locations
   - It encourages me to go outside and walk more
   - It helps me destress
   - I like playing new types of games and wanted to try an AR/location-based mobile game
8. How important is this game to you? (1: Very important; 5: Not important at all) (multiple choice)
9. Has the game's importance to you changed since you started playing? (multiple choice)
   - Increased over time
   - Decreased over time
   - Fluctuated over time
   - Has not changed
10. Which of these game related actions have you performed before? (select all that apply) (Check boxes)
    - Playing with multiple accounts
    - Playing (e.g., catching Pokémon, raiding) for friends, adult family members, or acquaintances
    - Playing (e.g., catching Pokémon, raiding) for children as their guardian
    - Attending an EX-raid in place of friends, family, or an acquaintance who cannot make it
    - Playing (e.g., catching Pokémon, raiding) for financial incentives OR offering financial incentives to someone to play for you, including buying/selling accounts
    - Playing inside a culturally sensitive location (e.g., cemetery, religious location, hospital)
    - Playing while driving as the driver, not the passenger
    - Asking someone to join a different raid group based on their team color and/or level
    - Creating a private lobby to exclude people who are not visually present who might be spoofing
    - Spoofing your location in game (playing while not moving)
    - Trading and obtaining a Pokémon when you know or suspect that it was caught by spoofing
    - Changing time on your phone to get the next day's raid pass or do multiple special trades a day

- Using a bot to automatically play
- Using Facebook groups or Discord servers to obtain information about raids, wild Pokémon, and research tasks
- Using third party maps or scanner to find specific types of Pokémon or Pokémon with good stats
- Using third party maps or scanners to find raids
- Using a third party application to evaluate a Pokémon's stats (e.g., Poke Genie, CalcyIV)
- Using a "Gotcha" to automatically catch Pokémon or spin PokéStops/Gyms
- Gym shaving (having an account from a different team "open up a spot" for your Pokémon in a gym of your color which was full)
- Using another account to kick your own Pokémon out of a gym
- Taking down a gym when the other team's Pokémon have only been there for a short time
- Taking down a gym shortly before midnight
- Trespassing on private property while playing
- Trespassing on public property (e.g., parks after hours)
- Going to a business for the express purpose of playing Pokémon GO

11. What is your opinion on the following game related actions? (1: Completely ethical, 2: Somewhat ethical, 3: Neutral (no opinion), 4: Somewhat unethical, 5: Not at all ethical, 6: It depends on the situation) (multiple choice)
    - Asking someone to join a different raid group based on their team color and/or level
    - Attending an EX-raid in place of players who cannot make it
    - Changing time on device to get the next day's raid pass or doing multiple special trades a day
    - Creating a private lobby to exclude people who are not visually present who might be spoofing
    - Going to a business for the express purpose of playing Pokémon GO
    - Gym shaving (having an account from a different team "open up a spot" for your Pokémon in a gym of your color which was full)
    - Playing for children as their guardian

- Playing for financial incentives OR offering financial incentives to someone to play for you, including buying/selling accounts
- Playing for friends, adult family members, or acquaintances
- Playing inside a culturally sensitive location
- Playing while driving as the driver, not the passenger
- Playing with multiple accounts
- Spoofing your location in game (playing while not moving)
- Taking down a gym shortly before midnight
- Taking down a gym when the other team's Pokémon have only been there for a short time
- Trading a Pokémon when you know or suspect that it was caught by spoofing
- Trespassing on private property while playing
- Trespassing on public property
- Using a "Gotcha" to automatically catch Pokémon or spin PokéStops/Gyms
- Using a bot to automatically play
- Using a third-party application to evaluate a Pokémon's stats
- Using another account to kick your own Pokémon out of a gym
- Using social media to obtain information about gameplay
- Using third-party maps or scanner to find specific types of Pokémon or Pokémon with good stats
- Using third-party maps or scanners to find raids

12. Of the actions above where you selected the option "It depends," can you select one or two specific actions and explain what makes it okay in some situations but not in others? (open-ended)
13. Can you pick one of the most ethically problematic issues related to playing Pokémon GO and tell us more about your thoughts or reasoning? If you are having trouble deciding, it could help to think about a first-hand experience. (open-ended)
14. Is there another game-related action (within the game or outside of the game) you consider to be ethically questionable that was not in the list above? If so, what is it and why may it be unethical to engage in that action? (open-ended)
15. If you play another location-based mobile game (such as Ingress), how is your ethical stance in that game compared to Pokémon GO? (open-ended)