Exploring the relationship between offline cultural environments and toxic behavior tendencies in multiplayer online games

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Abstract

In multiplayer online games, players from different cultural backgrounds come together to cooperate and compete in real time. Although these games are enjoyed by billions of players globally, behavioral issues such as toxic behavior (TB) have become rampant in some games, perhaps most infamously in multiplayer online battle arena (MOBA) games, such as League of Legends and Dota 2. A crucial step in curbing TB lies in understanding its drivers and antecedents. In the present work, we contribute to this field of research by considering the regional offline cultural environment in which players live. We draw both on Hofstede's Cultural Dimension Framework and on Kordyaka et al.'s Unified Theory of Toxic Behavior (UTTB) to compare two cross-sectional samples of MOBA players: one from North America (n = 155) and one from India (n = 119). Our analysis reveals significant differences between the samples for all UTTB variables. Additional analyses also indicate the relevance of national culture in relation to other dispositions (i.e., age) and characteristics (i.e., game-related culture). Our findings underscore the role that the offline cultural environments play in TB in MOBAs and additionally open avenues for further research that takes dimensions of national culture in the study of online behavior into account.

CCS CONCEPTS • human-centered computing → human–computer interaction (HCI); • information systems → Internet communication tools

Additional keywords and phrases: empirical studies in HCI, cultural characteristics, multiplayer video games, toxic behavior

1 Introduction

The modern world is becoming increasingly interconnected. Alongside a steady rise in migration rates, people from different cultural backgrounds are more frequently interact with one another online. Numerous online environments serve as the setting for this interaction, with one such environment being multiplayer online games (MOGs). Despite the increase in online interaction, geographic location remains an important predictor of an individual's cultural environment, which is comprised of behavior, norms, and values that people use to understand and explain their physical and social environment [8, 51]. In fact, individuals' country of residence explains about half of the variance in national cultural orientations in one large dataset of 495,011 individuals from 110 countries [8], which indicates that a group of people who have been brought up within a given country tend to share certain expectations and values.

Cross-cultural online interaction shows signs of continuing to become more complex. For example, interest in both industry [29] and research [61] is growing in the metaverse – that is, in the online virtual environment in which as many as thousands of people can interact simultaneously within the same simulated three-dimensional space [53]. MOGs are popular platforms for cross-cultural online interaction, but growth statistics suggest that they may soon become even larger. Indeed, according to Statista, the total market value of video games in 2022

was USD 197 billion, with a projected growth to USD 268 billion by 2025 [73]. Additionally, MOGs have come to be a central manifestation of technological advancements by offering players innovative opportunities to interact with others in real time, independent of each individual's location [65]. While location-based MOGs also exist [42], fully online games – such as League of Legends (LoL) – show rising levels of popularity and steadily growing player counts around the world year after year. In early 2022, LoL had 180 million players as well as a spin-off TV series on Netflix called Arcane, with universities and other establishments even offering scholarships for players of the game [21, 23, 49]. Prior studies have attributed the growing relevance of MOGs both to the design element of real-time competition (i.e., multiplayer game modes) and to the application of free-to-play business models in which players can access a game without the need to pay any fees [33, 83]. Furthermore, the success of MOGs has paved the way for the concept of digital intervention in fields that lie beyond the realm of pure entertainment, such as gamified information systems and serious games [30].

One particularly successful subgenre of MOGs is represented by multiplayer online battle arena games (MOBAs), which are an innovative form of real-time strategy games [17]. MOBAs can be considered the spearhead of the phenomenon of esports (i.e., a sub-genre of sports in which videogames are played competitively) and are currently enjoying rapidly growing popularity [23]. To date, MOBAs such as Defense of the Ancients 2 (Dota 2) and LoL are played by tens of millions of people around the world every day. The cultural significance of MOGs has been amplified during the COVID-19 pandemic, which has frequently forced people to isolate themselves from others. During this time, players have increasingly often turned to MOBAs for social interaction [52]. This development makes MOBAs particularly relevant for the study of cross-cultural online experiences and related phenomena.

Although MOBAs are enjoyed by millions and additionally lead to positive social outcomes [23], these games also suffer from negative behavioral issues [54]. One such behavioral issue that has been gaining greater attention over the last decade is toxic behavior (TB), which is related to well-understood concepts such as social exclusion [9], loneliness [43], hate speech [19], and cyberbullying [6] and can be viewed as behavior that leads to anger and frustration among players, that damages communication, and that contributes to negative morale [57]. TB differs from cyberbullying in that it is (1) impulsive and of short duration and (2) a reaction to in-game frustration in real time [2, 37, 41]. TB can manifest either through gameplay and behavior (e.g., through intentionally stealing resources from teammates) or through team communication in the form of verbal and written abuse in chats or pings [34]. Previous research has explored different gaming cultures [41, 67], and one recent study derived the Unified Theory of Toxic Behavior (UTTB), which states that attitude, toxic behavior victimization, behavioral control, and toxic disinhibition are the primary antecedent variables of TB [36]. Although considerable advances have been made in understanding TB in online games (e.g., [7, 36]), research on cultural differences in TB remains scarce. Thus far, research has drawn on exploratory chat-mining techniques, which suggest the presence of cultural differences among players [67], but a more precise and theory-supported understanding of these differences is still missing. Addressing this knowledge gap could help stakeholders both to better understand the antecedents of TB and – consequently – to devise better intervention strategies for curbing the behavior. Furthermore, previous research in related contexts has highlighted the potential that lies in integrating culture into the design of technology [45, 75, 84].

In the present study, we address this research gap by focusing on the influence of offline culture on the antecedents of TB. We build on the UTTB while referencing Hofstede's Cultural Dimension Framework, and we derive insights into the role that offline cultural environments have on online behavior. We collected psychometric survey data from two geographical regions – India (n = 119) and North America (NA) (n = 155) – that differ significantly in terms of three cultural dimensions of Hofstede's framework: power distance, collectivism, and indulgence [27]. However, both areas feature substantial player bases for several MOGs, including for the two games on which we focus in the present study: Dota 2 and LoL. This research approach led us to formulate the following research question (RQ):

***RQ**: How does a player's offline cultural environment influence their own toxic behavior and its antecedents in MOBAs?*

The remainder of the present study is structured as follows: First, in the Related Work section, we introduce relevant previous work on MOGs, the UTTB, and Hofstede's Cultural Dimension Framework [27]. Subsequently, we describe our empirical research methodology and data collection methods, and we then present our results. Next, we discuss our main findings, their implications for theory and game design, their limitations, and potential future work. The paper then closes with a conclusion section.

2 Related work

2.1 Multiplayer online battle arena games

MOBAs can be considered a homogenous and well-established sub-genre of MOGs. In terms of gameplay, MOBAs are a specific form of multiplayer real-time strategy games that fuse action, role-playing, and strategy games [11]. MOBAs are unique in terms of being highly dynamic, competitive, and frustrating while also offering less autonomy to individual players [31]. This is particularly true for ranked games, in which each player wins or loses points depending on the outcome of a game. In order to win, it is necessary to collaborate and communicate with the other (typically random) players from the given player's own team during the game. In order to communicate and interact, players predominantly use text chat and so-called ping commands (i.e., player-related alerts that provide gameplay information to the entire team) as communicative tools [40]. The MOBAs of LoL and Dota 2 are played in teams of five. It can be significantly challenging to cooperate with four other players, who may be from different cultural backgrounds or age groups and may even have different skill levels, especially since players only see one another's avatars (rather than their real faces) and also do not hear the other players' real voices. As a result, misunderstandings, in-game frustration, and TB have become particularly rampant in MOBAs [36].

2.2 Unified Theory of Toxic Behavior

As TB is embedded in theories of aggressive behavior, such as bullying (e.g., intentionally harassing, offending, socially excluding, or negatively affecting someone [14]) and cyberbullying (e.g., carrying out intentional aggressive behavior as a group or an individual electronically [50]), the term is used here as an umbrella term that describes various forms of negative behavior during MOBA gameplay (e.g., criticizing, harassing, flaming, trolling, and cheating) that impedes teamwork and harms the game's ambiance [2, 41]. We follow the definition of TB provided by Neto et al. [57], who proposed that TB is a behavior that occurs during a game when a player experiences a negative event that generates anger and frustration and leads to a harmful, contagious, and pervasive type of toxic communication. TB is regularly initiated by one or two players within a team, stems from criticism made regarding the skills of team members, can be elevated by frustration with game elements and hardware, and can turn into personal clashes [66]. However, in contrast to older, better-understood constructs, such as cyberbullying and typical bullying, TB is much more temporary [2, 41], is often less intentional [34], and can be viewed as a form of coping with negative in-game scenarios (see Table 1) [2]. One of the unique features related to the occurrence of TB is the combination of team competition and multiplayer exchange in real time. As a result, players often attribute failure to others, even in cases in which the primary fault lies with the player themself [38]. The MOBA industry has already attempted to curb anti-social behavior by using instruments such as the Tribunal [39] and/or different reporting features after a game.

Recently, the UTTB was proposed as a method for understanding the occurrence of TB specifically in MOBA games [36]. The theory was created by testing the explanatory potential of three widespread theories that are used to better understand TB in the context of negative behavior on the Internet (i.e., Social Cognitive Theory [5], the Theory of Planned Behavior [3], and the Online Disinhibition Effect [74]). From this analysis, the following variables emerged as the most relevant predictors of TB: attitude (i.e., the positive or negative evaluation of TB), TB victimization (i.e., the frequency with which a player has been the target of TB in the past), behavioral control (i.e., the perceived difficulty of performing a behavior of interest), and toxic disinhibition (i.e., negative behavior, such as hostile expressions and inappropriate behavior due to the perceived lack of restraint that an individual

feels when communicating online) [36]. In terms of content, the above-described study consulted perpetrators of TB regarding their self-reported TB. In so doing, the study built on preliminary work that had holistically derived a measurement instrument consisting of a one-dimensional short scale [37], which was validated by showing that self-reported and behavioral TB data significantly overlap [36].

Table 1: Classification of negative behavior (adapted from [37])

Construct	Definition	Duration
Bullying	…intentionally harassing, offending, socially excluding, or negatively affecting someone [14].	Repeating
Cyberbullying	… carrying out intentional aggressive behavior as a group or an individual electronically [50].	Repeating
Toxic behavior	…behavior that leads to anger and frustration among players, damages communication, and contributes to negative morale [57].	(More) temporary

2.3 Hofstede's theory of cultural differences, and its relevance to MOGs

One widely cited approach to capturing cultural differences between multiple nations is Hofstede's Cultural Dimension Framework [26]. The framework identifies the patterns of a nation's culture as (1) power distance (e.g., the culture's attitude toward inequality and hierarchical order), (2) individualism or collectivism (e.g., the degree of independence or commitment to the member "group"), (3) masculinity (e.g., the culture's attitude toward achievement, winners/losers, heroism, and dominance versus solidarity, values, compromise, and negotiation), (4) uncertainty avoidance (e.g., the extent to which members of a society strive to follow and uphold rigid codes, rules, and institutions in order to avoid uncertainty and ambiguity), (5) short- or long-term orientation (e.g., a culture's attitudes toward the past, present, and future in terms of whether it favors traditions and norms over prioritizing change and constant intervention for growth), and (6) indulgence or restraint (e.g., the tendency toward cynicism and pessimism or the free gratification of basic and natural human drives related to enjoying life and having fun) [27].

In the empirical part of the present work, we focus on the comparison that Hofstede's model makes between six core patterns of national culture in North America (NA) and India. Although NA comprises the countries of the United States and Canada, we argue that both countries can be treated as a singular nation and culture in the context of Hofstede's model due both to their substantial similarities and to the fact that players from both countries use the same server, which leads to shared socialization experiences. According to Hofstede's Cultural Dimension Framework, substantial differences between India and NA can be seen in terms of (a) power distance, (b) individualism, and (c) indulgence (see Figure 1). In addition to these three key differences in regional cultural environments, notable distinctions also exist in the two regions' preferences for gaming platforms. NA is a dominant exporter of video games with a long history of console games [58, 60] and is also one of the earliest consumers of MOGs and the MOBA genre. In comparison, the Indian gaming landscape is oriented toward PC and especially toward mobile gaming [85], with a significant portion of gaming revenue in India being generated through mobile games [81]. Interestingly, despite these differences in cultural dimensions and gaming platform preferences, the same MOGs under the same game rules are enjoyed by players in both regions. These MOGs include LoL and Dota 2, which are the focus our research efforts in the present study.

Scholars from the field of game studies have discovered among players various in-game and out-of-game behavioral patterns that pertain to specific countries and cultures (e.g., [25, 82]). Such patterns include preferences for certain gaming platforms (e.g., mobile, console, and PC), genres (e.g., shooters, role playing, and strategy), purchasing habits (and the consumer logic that lies behind these habits) (e.g., subscriptions and micro-transactions), and social engagements between players (e.g., solo-playing, social play, and out-of-game conventions). Such player patterns are also known to correspond with the emergence and facilitation of unique local identities among gamers [15, 68] and game developers alike [44, 59, 62]. At the other end of the spectrum,

however, today's digital gaming landscape is highly pluralistic and multinational, and it is governed by global game distribution platforms and services (e.g., Google Play, Apple App Store, Steam, and BattleNet) that enable online spaces to be created that expose gamers to cross-cultural encounters (e.g., gamer forums and live streaming) on a regular basis [32, 63]. Therefore, in order to understand the gaming industry's contradictory nature of being simultaneously local and global [71, 76], it is essential to understand the complexity of cultural dimensions of digital game consumption in addition to the MOGs themselves. While Hofstede's theory has yet to be applied to the study of innovative multiplayer games because it is best-suited to organizational studies that describe the general cultural environment within nations [26, 27], we argue that the approach can nevertheless offer insights into the comparative analysis of cultural studies on gaming as well as – in this specific paper – into the relevance of online and offline player cultures in MOGs.

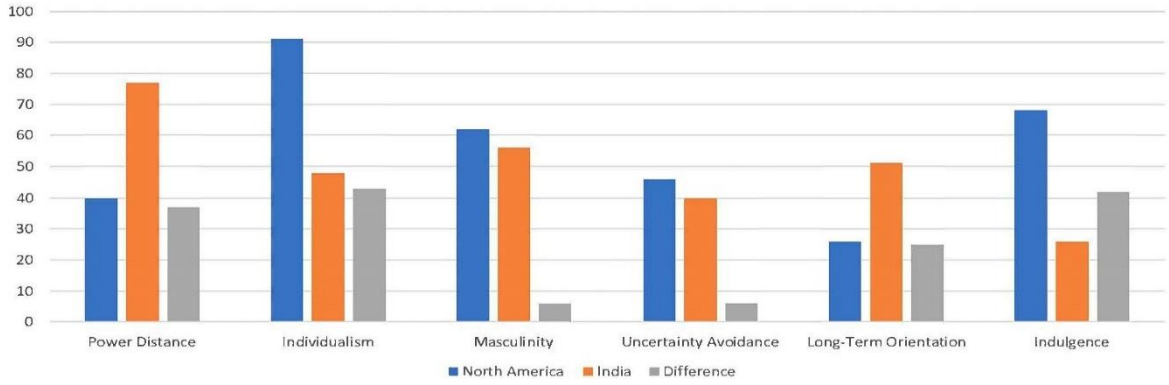

Figure 1: Comparison of cultural dimensions in NA and India using Hofstede's framework

3 Materials and methods

3.1 Research design

In order to gain relevant insights into our research question (i.e., *How does a player's offline cultural environment influence their own toxic behavior and its antecedents in MOBAs?*), we used a cross-sectional survey approach and collected psychometric data from players via an online questionnaire. Subsequently, we analyzed the data with covariance-based and non-parametric statistics with SPSS 27 software in order to further our understanding of the influence that offline cultural settings have on TB. Regarding the procedure, we applied four steps: We (1) validated the measurement instrument, (2) checked the validity of the UTTB, (3) tested the influences of offline culture on the UTTB, and (4) carried out some additional analyses (i.e., testing the relevance of age and game culture as criterions of differentiation).

3.2 Constructs and measurement items

Following the best practices of psychometric research, we used empirically validated scales and measurement items, which in our case were taken from the UTTB [36]. More specifically, we used a seven-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). We used the mean sum scores of the factors of the relevant items because they can be averaged to reflect the scale, they are easy to interpret, and they preserve the initial variation in the data [16]. All constructs and related measurement items, their exact wording, and the original sources used in this study are provided in Table 7 of Appendix A. Additionally, we collected demographic variables (e.g., age, gender, and education) and control variables (e.g., hours of play, play experience, platform, and game) in order to prevent unwanted confounding effects on the results.

3.3 Data collection and participants

After crafting the survey and ensuring that it was free of grammatical mistakes, we collected data from MOBA players of LoL or DOTA 2 from both NA and India using the crowd-sourcing marketplace Mechanical Turk (MTurk). All participants received USD 1.89 as a reward for participating in the study. While conceptualizing our study, we had to decide between a clearly defined framework that used either a few similar games on the one hand and a framework that used a rather wide field of games on the other hand. We chose the former option in order to avoid unnecessary confounds and a homogenous starting point on the level of game design. In order to ensure that participants were in fact players of one of the two relevant games in our study (i.e., LoL or Dota 2), we asked them to indicate their three favorite game characters, and we excluded participants with spurious answers (15 cases) as well as participants who had reported incomprehensible demographic answers (16 cases). Furthermore, we excluded answers that failed our attention-check questions as well as inconclusive answers. In the end, 305 respondents completed the survey in full; however, after removing specific cases based on the above-mentioned criteria, our final sample consisted of 274 players from either NA or India (all participants of the NA group reported their ethnicity as "not Indian," whereas all participants of the Indian group reported their ethnicity as "Indian"). In the combined sample, most participants were male (n = 185). The mean age was roughly 29 years (M = 29.26; SD = 6.95), and most participants held a bachelor's degree (62%). In addition, participants reported both playing video games for just under approximately 8 hours per week (M = 7.95; SD = 7.51) and having a little more than 3 years of playing experience on average (M = 3.19; SD = 2.00). One hundred seventeen participants reported primarily playing League of Legends, and 157 reported primarily playing Dota 2. For a breakdown of the two regions (i.e., NA and India) and of how the two cultures differed from each other in relation to these variables, see Table 2.

Table 2: Demographic information based on culture

Variable	Sample 1: NA (n = 155)	Sample 2: India (n = 119)
Age	M = 31.0, SD = 8.10	M = 27.0, SD = 4.11
Playtime (hours/week)	M = 6.74, SD = 5.63	M = 9.51, SD = 9.20
Has played for xp (years)	M = 4.80, SD = 7.64	M = 2.91, SD = 1.94
Gender		
Male	100	85
Female	55	34
Total	155	119
Education		
Some high school	1	
High-school graduate	7	1
Some college credit	18	2
Technical training	3	
Associate degree	21	
Bachelor's degree	78	93
Master's degree	25	23
Doctoral degree	2	
Total	155	119

4 Results

4.1 Validation of the measurement instrument

In order to test our measurement model, we carried out a principal component analysis with a varimax rotation on all scales of the UTTB (i.e., TB, toxic disinhibition, attitude, TB victimization, and behavioral control). To do so, we specified the extraction of five factors and postulated that the five TB items, the four toxic disinhibition items, the six attitude items, the five TB victimization items, and the four behavioral control items would load on a single factor each. After our first inspection, we excluded two of the items from the toxic disinhibition scale (TD_1 ("I don't mind writing insulting things about other players because it's anonymous.") and TD_4 ("Writing insulting things online is not toxic behavior.")) because these items showed ambiguous loading patterns. After excluding both items, all composite reliabilities exceeded the recommended threshold of .6 (≥ .79), the AVE of each construct was greater than .5 (≥ .51), and all items loaded on the intended factors as postulated, as Table 3 demonstrates (see Table 8 in Appendix B). Accordingly, we concluded that all test results met the recommended thresholds and that the convergent validity of the constructs was appropriate [14]. Additionally, the square root of the AVE of each construct (≥ .71) was greater than the correlations between each construct and the other constructs (≥ .68), and only one meaningful cross-loading (BC_2) was found (≥ .30) that satisfied the conditions for discriminant validity [11].

Table 3: Descriptive statistics, CRs, AVEs, and construct correlations

No	Construct	CR	AVE	Mean	SD	1	2	3	4	5
1	Toxic behavior	.91	.66	3.87	1.76	.81				
2	Toxic disinhibition	.79	.66	4.38	1.67	.63***	.81			
3	Attitude	.94	.75	3.86	2.03	.68***	.17***	.87		
4	TB victimization	.88	.60	5.00	1.21	.39***	.42***	.32***	.77	
5	Behavioral control	.80	.51	4.72	1.35	–.43***	–.19***	–.28***	–.07	.71

4.2 Validity checks of the Unified Theory of Toxic Behavior

In order to check whether the relationships between the variables of the UTTB were also present in our data, we inserted them into a structural equation (path) model. The results of the path model showed little room for improvement ($X2$ (2,274) = 7.73; p = 0.01). As the model test is no longer relied upon as a single basis for accepting or rejecting a model [64, 80], we assessed additional fit indices, which consistently indicated an excellent fit between the theoretical model and the empirical model (CFI = 0.98; GFI = 0.99; SRMR = 0.04), and all predictors accounted for 60% of the variance of the dependent variable of TB. Specifically, attitude (β = .41; p < 0.001), behavioral control (β = –.25; p < 0.001), and toxic disinhibition (β = .35; p < 0.001) predicted TB. Additionally, attitude (β = .46; p < .001) and TB victimization (β = .27; p < .001) predicted toxic disinhibition, whereas behavioral control (β = –.04; p = .42) did not show a significant relationship. Except for the nonsignificant influence of behavioral control on toxic disinhibition, all relationships specified in our SEM showed similar direction and significance to the SEM from the original UTTB study (see Table 4). Thus, we assumed that the determinants of the UTTB accurately predict TB and provide a solid basis for cultural comparison.

Table 4: Validity check

Key measure	Independent variable	Dependent variable	Original (SEM)	Present (SEM)
β	Attitude	Toxic behavior	.26***	.41***
β	Behavioral control	Toxic behavior	–.18***	–.25***
β	Toxic disinhibition	Toxic behavior	.50***	.35***
β	Attitude	Toxic disinhibition	.63***	.46***
β	Toxic behavior victimization	Toxic disinhibition	.21***	.27***
β	Behavioral control	Toxic disinhibition	–.15***	–.04
R^2			.61	.60
$R^{2(adjusted)}$			.61	.37

4.3 Constructs across cultures

In order to test differences between the two cultural settings, we applied a one-way multivariate analysis of variance (MANOVA) with TB, toxic disinhibition, attitude, TB victimization, and behavioral control as dependent variables and with the binary variable of cultural setting (India vs. NA) as an independent variable. Prior to conducting the MANOVA, we explored whether the necessary preconditions for applying a MANOVA were met. First, as portrayed in Table 3, the dependent variables met the condition to be correlated with one another in the moderate range [20], which suggested that a MANOVA was appropriate. Additionally, the Box's M value of 58.09 was associated with a p-value of less than .001, and the Levene's test of equality of covariances showed significant results for the dependent variables of attitude, toxic behavior victimization, and behavioral control ($p < .05$). Thus, the covariance matrices between the groups were assumed to be unequal for the purposes of the MANOVA. Consequently, we decided to use non-parametric tests (i.e., Mann–Whitney U tests that compared medians between both groups) to explore differences between both cultures for the variables of TB, toxic disinhibition, attitude, TB victimization, and behavioral control. Table 5 summarizes the results of all five Mann–Whitney U tests.

Table 5: Cultural differences in TB and its antecedents (higher values marked in bold)

Construct	Group	N	M	SD	Mean rank	U	p	Z	r
Toxic behavior	India	119	**4.75**	1.54	177.61	4,449	< .001	–7.35	.44
	NA	155	3.20	1.62	106.70				
Toxic disinhibition	India	119	**5.03**	1.48	170.29	5,320	< .001	–6.04	.36
	NA	155	3.88	1.64	112.32				
Attitude	India	119	**4.90**	1.60	177.17	4,502	< .001	–7.28	.44
	NA	155	3.05	1.97	107.50				

Toxic behavior victimization	India	119	**5.40**	1.06	164.83	5,970	< .001	–5.01	.30
	NA	155	4.70	1.23	116.52				
Behavioral control	India	119	4.39	1.07	117.20	6,807	< .001	3.73	.23
	NA	155	**4.98**	1.49	153.08				

First, in the case of TB, players from India (median = 5.20) reported significantly (< .001) higher levels of toxicity than players from NA (median = 3.00), with results indicating a medium-sized effect (r = .44). Second, in the case of toxic disinhibition, players from India (m = 5.50) reported significantly (< .001) higher levels of toxic disinhibition than players from NA (m = 4.00; r = .36). Third, in the case of attitude, players from India (m = 5.17) reported significantly (< .001) more positive evaluations of toxicity than players from NA (m = 2.17; r = .44). Fourth, in the case of TB victimization, players from India (m = 5.80) reported significantly (< .001) higher levels of TB victimization than players from NA (m = 4.60; r = .30). Finally, in the case of behavioral control, players from India (m = 4.00) reported significantly (< .001) lower levels of behavioral control than players from NA (m = 5.00; r = .23). Additionally, except for behavioral control, all effect sizes of the tests were at least medium (r ≥ .30). Figure 2 below illustrates the differences across cultures in relation to toxic behavior, attitude, and toxic behavior victimization.

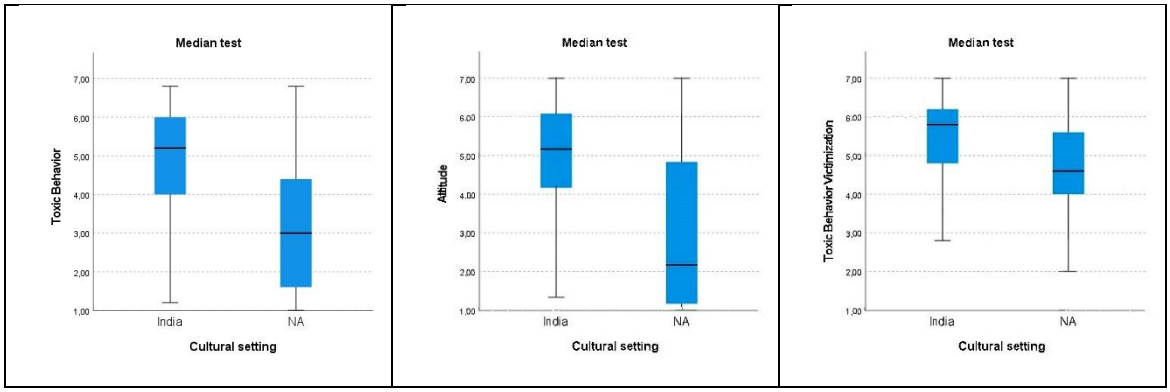

Figure 2: Cultural dimensions for NA and India

4.4 Additional analyses

In order to be able to evaluate the relevance of both cultures in terms of demographic and game-related influences, we carried out some additional analyses. In so doing, we followed the procedure of the previous section by using age (i.e., young vs. old), gender (i.e., female vs. male), and game (i.e., LoL vs. DOTA 2) as independent variables to test differences in the UTTB variables. In the case of the variable of age, we calculated a median split in order to differentiate participants into an old group (M ≥ 29.26) and a young group (M < 29.26). Table 6 below illustrates the results for the variables of age and game.[1]

First, regarding age-related differences (i.e., young vs. old), younger players reported significantly higher levels (< .001) of TB (median young = 4.40 > median old = 2.80), toxic disinhibition (median young = 5.00 > median = old 4.00), and attitude (median young = 4.83 > median old = 2.00) compared with older players, with results indicating small to medium effect sizes (r ≥ .27). Additionally, older players reported significantly higher levels

1 Since gender-related tests (i.e., female vs. male) showed no significant differences, the corresponding results can be found in Appendix C.

(median = 4.75) of behavioral control (< .05) compared with younger players (median = 4.25), and the comparison of TB victimization showed no significant differences (p = .36). Taken together, we found empirical evidence of age-related differences in the UTTB variables.

Second, regarding differences between the two games from our sample (i.e., LoL vs. DOTA 2), DOTA 2 players indicated significantly higher levels (p ≤ .05) of TB (median DOTA 2 = 4.20 > median LoL = 3.40), TB victimization (median DOTA 2 = 5.00 > median LoL = 4.00), and attitude (median DOTA 2 = 4.67 > median LoL = 3.17) compared with LoL players, but the other two comparisons did not reach significance (p ≥ .06). In summary, a substantial portion of the UTTB variables differed in relation to the game that players played.

Third, in order to put the additional findings into perspective in relation to cultural differences, we compared the effect sizes of the cultural, age-related, and game-related UTTB variables. Upon consulting Tables 5, 6, and 9, we can see that culture shows the largest effect sizes for all five UTTB variables. Accordingly, cultural differences are the most relevant variable, followed by the influences of both age-related- and game-related differences.

Table 6: Age-related and game-related variables in relation to UTTB variables

Construct	Group	N	M	SD	Mean rank	U	p	Z	r
Age									
Toxic behavior	Young	176	**4.32**	1.67	157.70	5,069	< .001	−5.66	.34
	Old	98	3.07	1.64	101.22				
Toxic disinhibition	Young	176	**4.72**	1.51	153.27	5,848	< .001	−4.44	.27
	Old	98	3.77	1.77	109.18				
Attitude	Young	176	**4.34**	1.87	155.21	5,507	< .001	−4.97	.30
	Old	98	2.99	2.03	105.69				
Toxic behavior victimization	Young	176	**5.05**	1.16	140.78	8,046	.357	−.92	.05
	Old	98	4.91	1.30	131.60				
Behavioral control	Young	176	4.58	1.19	129.08	10,106	< .05	2.37	.14
	Old	98	**4.97**	1.58	152.62				
Game									
Toxic behavior	LoL	117	3.53	1.71	122.10	10,987	< .01	2.78	.17
	DOTA 2	157	**4.12**	1.76	148.98				
Toxic disinhibition	LoL	117	3.98	1.81	120.18	11,212	< .01	3.14	.19
	DOTA 2	157	**4.68**	1.49	150.41				
Attitude	LoL	117	3.47	1.96	123.56	10,816	< .05	2.52	.15
	DOTA 2	157	**4.14**	2.04	147.89				
Toxic behavior victimization	LoL	117	4.83	1.30	127.19	10,391	.06	1.86	.11
	DOTA 2	157	**5.13**	1.12	145.18				

Behavioral control	LoL	117	4.68	1.50	136.76	9,271	.89	.13	.00
	DOTA 2	157	**4.75**	1.23	138.05				

5 Discussion

5.1 Key findings

Our study yielded three main findings. First, as an answer to our research question (i.e., *How does a player's offline cultural environment influence their own toxic behavior and its antecedents in MOBAs?*), we derived insights showing that players' offline culture has a significant impact on TB in MOBAs. Specifically, we found that players from a nation that has a greater power distance, lower levels of individualism, and lower levels of indulgence in Hofstede's Cultural Dimension Framework – that is, players from India [27] – were more likely to exhibit greater TB, perceived having higher levels of toxic disinhibition, had experienced more TB victimization, and had more positive attitudes toward TB than did players from the NA sample. Simultaneously, players from India tended to show lower behavioral control than players from NA, which has lower levels of power distance, individualism, and indulgence. These results suggest that offline culture has a considerable influence on (undesirable) online behavior in the context of MOBAs.

Second, the relationships between the variables of the UTTB [36] can also be found in our data. Thus, the three antecedent variables – that is, toxic disinhibition, attitude, and behavioral control – predicted TB, and TB victimization showed a fully mediated effect on TB. Moreover, all relationships between the UTTB variables showed similar characteristics regarding directions and effect sizes compared with in the original study [36]. Accordingly, we view our findings as an indicator of the validity of the UTTB.

Third, additional analyses revealed age-related differences regarding TB as well as higher levels of toxic disinhibition, attitude, and TB victimization among younger players, with older players having reported higher levels of behavioral control. Additionally, DOTA 2 players indicated significantly higher levels of TB, toxic disinhibition, and attitude compared with LoL players. Gender did not show any significant differences between females and males. However, our comparison of the effect sizes of culture, age, game, and gender as criteria of distinction for all five UTTB variables indicated that offline culture was the most relevant variable.

5.2 Theoretical implications

At a theoretical level, our study revealed several relevant factors that must be considered in studies that examine (negative) online behavior in general as well as TB in particular. First, specifically, our results indicate that Hofstede's framework is relevant for conducting comparative analyses between multiple regions (i.e., in the present research context, between India and NA) but may be further used in future studies that examine regional differences along cultural dimensions. This research path is in line with that used in previous studies on related topics, such as studies on cultural differences in mobile phone usage [see also 55]. However, we also recognize that Hofstede's framework comes with certain limitations (e.g., it postulates rather homogenous cultures). Since MOBA players consist of a specific group of individuals within a society, this group might indeed be quite similar on a cultural level, which would mitigate the limitations of the research framework. We additionally wish to clarify that there are also many other classification systems and ways of capturing offline culture beyond Hofstede's framework, and we call on future studies to examine the role of culture by applying different conceptualizations in order to compare the status of worldwide TB in MOBAs. For example, a tool such as the Inglehart–Welzel Cultural Map could be used [48]. Moreover, techniques and practicalities that can be used both inside and outside the game to discourage anti-social behavior among players could be further investigated as an important topic in the online management of digital communities in an increasingly connected global network [12]. The results of our study complement and extend existing research [67] with additional data points for two innovative and popular regions within the entertainment field.

Second, based on our results in the context of MOGs, we argue that the UTTB [36] is a suitable starting point for better understanding cultural differences in TB at a more granular level because it can be used to indicate differences between cultures. However, we strongly recommend that subsequent work empirically capture and measure cultural dimensions in order to attribute differences to the specific sample. Furthermore, our findings contribute to the growing number of studies that have examined the role of dispositional TB determinants in MOGs [1, 46] rather than focusing only on situational conditions [22, 39, 69, 78], and we revealed that culture has an influence on both TB and important psychological TB determinants with substantial effect sizes, even outside the game. However, we urge further research to put greater effort into understanding the personal dispositions of TB occurrence and to identify the correlations between certain cultural behavioral patterns and norms with in-game behavior. Additionally, beyond the context of MOGs, our study supports previous studies by indicating that nations' offline culture can influence the perception and occurrence of (undesirable) online behavior in other contexts, such as cyberbullying on social networks [47, 70]. Given the strong influence of offline culture that we found in our study, we urge further studies of negative online behavior to simultaneously consider the role of participants' surrounding cultural environments in their investigations when selecting samples and field sites for qualitative and quantitative settings.

Third, our results underline the relevance of offline culture in relation to other variables on the dispositional level of players. Accordingly, both age-related- and gender-related classifications were found to be less relevant in terms of explaining UTTB-related variables. However, recent studies have suggested that cross-cultural encounters in online spaces [32, 63] correspond to cultural trans-locality – that is, to a cultural identification shared with more than one location [71, 76]. As such, in the specific case of MOGs, where players frequently tend to play and communicate with one another beyond geographical borders (i.e., via a shared server or in online gaming communities), researchers should be aware of both the relevance of online and offline culture as well as the interplay between the two cultural components when studying game players. We thus invite future studies to investigate players who have more complex (e.g., pluralistic) cultural identities. Additionally, the variable of age should also be used as a point of reference for exploring other classification schemes, such as the generational cohorts theory [4, 18, 35].

5.3 Implications for game design

The results of our study also have practical implications for game designers who promise to better handle negative behavior in virtual environments.

First, insights from our study suggest that the cultural environment surrounding players should be considered when choosing strategies to control TB, which is a measure that is not currently being holistically utilized by game developers. For example, reporting functions [2, 39] may be more effective in more individualist cultures than in more collectivist cultures. Since collectivist cultures have a special concern for maintaining relationships and their members are interdependent within their individual groups [28], game players from these cultures likely have lower chances of reporting misbehavior among their own teammates. However, the main concern of players from more individualistic cultures is autonomy, independence, and the desire to influence their social group [77], and they are therefore more likely to report their own teammates. Furthermore, such measures could be easily implemented due to the presence of server differentiation.

Second, by confirming the relationships between the UTTB variables, several innovative measures can be derived. For example, the important role of culture in both toxic disinhibition and behavioral control as main predictors of TB suggests that some strategies for curbing TB – such as punishments [2] – may not have the desired effects in cultures with low indulgence because players may view the anonymous online game – in contrast to the restricted offline cultural environment – as a suitable space to behave freely (and they may value this freedom, even at the expense of others' negative behavior). Furthermore, our insights add value to existing work on the mitigation of TB. For example, a recent study based on the assumptions of the online disinhibition effect derived a heuristic prototype that promises to buffer TB by using the design feature of real-time interventions during MOG gameplay [38]. The knowledge derived from our study regarding cultural differences

and the UTTB indicates that it would be beneficial to use the variable of national culture to individualize games in order to better deal with toxicity in an empirically guided manner.

Third, our insights indicate that strategies for curbing TB should have the greatest efficacy if they use variables related to players' dispositions and game-specific cultures to develop solutions that are tailored to specific target groups. Despite showing the relevance of players' offline cultural differences, the characteristics of a given game-related culture promise to add further value. This finding is in line with previous research that has shown game-related specifics regarding the underlying culture [67]. For example, in collectivist cultures, attitudes toward TB as an important predictor of TB have been rather positive, and in-game nudging toward collaboration [2] may be more effective when appealing to the positive influence of teamwork. In individualistic cultures, on the other hand, it might be more effective when explaining the negative consequences of TB on individuals' feelings. Taken together, we encourage game designers to always consider aspects related to players' dispositions – such as players' cultural background and age – in addition to considering specifics of the given social and technological environment.

5.4 Limitations and future work

There are several limitations of this study that need to be addressed in order to adequately classify the derived knowledge. First, it must be noted that the evidence is insufficient to argue for causal conclusions and that our comparative data between regions cannot determine whether influences are caused by the disparity between the two regions or by other variables. However, we encourage future research to use methods and approaches such as experiments and vignette studies to work toward causality. Second, our study relied on psychometric, self-reported data gathered from MOBA players from two different national culture environments. We wish to highlight the observation that although the research samples appeared representative of the gamer populations in the respective countries, they may not have represented the entire respective national populations. Nonetheless, future research should examine the relationship between national cultures and video game communities in greater detail. Third, we explored the broader research problem of the role that two offline cultural environments (i.e., India and NA) play in online behavior in the specific context of TB in MOGs, and we additionally investigated similarities and differences between these two specific regions. The generalizability of the effects of offline culture in other online contexts is thus questionable. Therefore, our work should be viewed as a contribution to this broader field of research rather than as a form of generalizable research. Indeed, we wish to emphasize the great need for further work on the topic. For example, one of the implications of our findings is that TB is a subjective and relative concept that could be perceived differently by people from different offline cultures, and behavior that is considered unacceptable in one culture could be perceived as less unacceptable in another culture. Future work could therefore investigate how policies designed to curb certain undesirable forms of online behavior are perceived by users of online platforms. Accordingly, we wish to emphasize the added value of bringing together perspectives from different cultures to create a more holistic approach to TB. An important starting point for future research could also lie in convergence and cross-cultural encounters in gaming environments as well as in whether the role of regional cultures [26, 27] is diminishing as a result of increasing global online interaction or whether this interaction is more likely to reinforce further locally distinct behavioral patterns and value conflicts, both of which could have implications for game players [13] and developers alike [62, 72]. Finally, based on our results, we cannot evaluate the sincerity of TB because we only investigated the likelihood of the frequency of carrying out TB. This aspect could also be examined in greater detail by future research.

6 Conclusion

In the present study, we used the UTTB variables (i.e., toxic disinhibition, attitude, TB victimization, and behavioral control) with reference to Hofstede's cultural dimensions framework (i.e., power distance, individualism/collectivism, masculinity, uncertainty avoidance, long-term orientation, and indulgence) to examine the role that the cultural environment of two different nations (i.e., NA and India) plays in terms of

influencing players' behavior and perceptions. To that end, we examined two popular MOBAs: LoL and Dota 2. The results of our study indicate statistically significant differences between the two cultures for all UTTB variables. Specifically, we found that levels of toxic disinhibition, attitudes toward TB, the frequency of experiences of TB victimization, and levels of behavioral control may correspond to a culture's power distance, individualism, and indulgence level. Thus, we found that a player's offline culture has a significant impact on both the antecedents and the occurrence of TB in MOBAs. This finding paves the way for further research that incorporates both the online and offline environment of the player when investigating the case of individuals' (undesirable) online behavior. In summary, our findings add value to the broader research area of the interplay between offline cultural surroundings and socially shared online environments.

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Appendix

Appendix A

Table 7: Questionnaire items

Construct	Id	Wording	Reference
Toxic behavior		If I get mad during a game, I…	[37]
	TB_1	…intentionally interrupt others while they are writing.	
	TB_2	…hold others responsible making own mistakes	
	TB_3	…take away resources belonging to others.	
	TB_4	…insult others.	
	TB_5	…criticize others.	
Toxic disinhibition		Please indicate how much you agree with the statements regarding the play of League of Legends/Dota 2	[79]
	TD_1	I don't mind writing insulting things about others online because its anonymous	
	TD_2	It is easy to write insulting things online because there are no repercussions	
	TD_3	There are no rules online therefore you can do whatever you want.	
	TD_4	Writing insulting things online is not TB [R].	
Attitude		"I perceive TB as:"	[24]
	A_1	1 "bad – good"	
	A_2	A_2 "foolish – wise"	
	A_3	A_3 "dislike – like"	
	A_4	A_4 "unpleasant – pleasant"	
	A_5	A_5 "harmful – not harmful"	
Toxic behavior victimization		In the past other players frequently…	[37]
	TBV_1	…intentionally interrupted me while I was writing.	
	TBV_2	…held me responsible for making own mistakes.	
	TBV_3	…took away resources belonging to me.	
	TBV_4	…insulted me.	
	TBV_5	…criticized me.	
Behavioral control		When I want to prevent myself from exhibiting TB…	[10]
	BC_1	…it is very easy.	
	BC_2	…it is very difficult [R].	
	BC_3	…I am very likely to succeed.	
	BC_4	…I am very likely to fail [R].	
Demographics			

	Age	How old are you?	
	Gender	Please pick your gender?	
	Education	Please pick the highest academic degree you have completed?	
	Ethnicity	Please indicate your ethnicity?	

Appendix B

Table 8: Loadings of items on constructs (>.30).

Item	Toxic behavior	Toxic disinhibition	Attitude	Toxic behavior victimization	Behavioral control
TB_1	.898				
TB_2	.893				
TB_3	.799				
TB_4	.917				
TB_5	.801				
TD_1		excluded			
TD_2		–.751			
TD_3		–.897			
TD_4		excluded			
A_1			.898		
A_2			.893		
A_3			.799		
A_4			.917		
A_5			.801		
A_6			.876		
TBV_1				.657	
TBV_2				.818	
TBV_3				.798	
TBV_4				.815	
TBV_5				.773	
BC_1					.784
BC_2		.330			.613
BC_3					.828
BC_4					.576

Appendix C

Table 9: Gender differences in TB and its antecedents (higher values marked in bold)

Construct	Group	N	M	SD	Mean rank	U	p	Z	r
Toxic behavior	Female	89	3.87	1.82	137.76	8209	.97	– .04	.00
	Male	185	3.87	1.74	137.37				

Toxic disinhibition	Female	89	4.33	1.80	136.57	8316	.89	– .14	.01
	Male	185	**4.41**	1.61	137.95				
Attitude	Female	89	**3.**74	2.17	134.09	8536	.62	.50	.03
	Male	185	**3.91**	1.96	139.14				
Toxic behavior victimization	Female	89	4.85	1.35	130.47	8858	.31	1.02	.06
	Male	185	**5.07**	1.13	140.88				
Behavioral control	Female	89	**4.87**	1.31	144.79	7584	.29	–1.06	.06
	Male	185	4.64	1.37	133.99				