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Gamification: Explaining Brand Loyalty in Mobile Applications

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Abstract:

Gamification is one specific way to increase mobile app users' brand loyalty. We propose that the frequency with which one uses immersion-, achievement- and social-related features relates to brand loyalty. To provide empirical evidence for this proposal, we obtained quantitative data from surveying 243 users on the mobile application Duolingo and conducted a fuzzy-set qualitative comparative analysis (fsQCA). We found that users need to frequently use immersion- and achievement-related features to result in high brand loyalty. On the contrary, we found users who infrequently use at least two gamification features have low brand loyalty. These findings extend the gamification literature by revealing an interaction between multiple gamification features and extend mobile application research by showing how gamification features relate to high and low brand loyalty. We also guide practitioners on how to identify users at risk to discontinue and reduce customer churn.

Keywords: Gamification, Brand Loyalty, Fuzzy-set Qualitative Comparative Analysis (fsQCA), Duolingo, Mobile Application.

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1 Introduction

After individuals install a mobile application, only a small number continue to use it over a long period. Recent statistics show that, on average, around 77 percent of new users uninstall a mobile application in the first three days and 90 percent do so in the first month (Bonnie, 2017). At the same time, mobile application providers need a large user base to generate profit through in-application advertising or in-game purchases (Mattke, 2019). Therefore, many providers focus on increasing and strengthening their brand loyalty to reduce customer churn rates.

Gamification constitutes one of the latest and innovative possibilities that companies have used to establish high brand loyalty (Hsu & Chen, 2018; Wolf, Weiger, & Hammerschmidt, 2020). Gamification refers to using features that video games use (e.g., avatars, level progression systems, or awards) in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011) to improve the user experience. Typically, one can divide gamification features into three categories (Koivisto & Hamari, 2019): immersion, achievement, and social-related features. These features offer users various possibilities such as the ability to customize their user profile, collect experience points, and compete with their friends.

Previous research has considered gamification as one entity and not the interaction effects between its three primary categories (Hassan & Hamari, 2019; Koivisto & Hamari, 2019). While extant research offers valuable insights, it does not sufficiently explain how features from all three categories influence users in general and their brand loyalty in particular. Also, most mobile applications integrate features from all three categories so that they interact with one another. For instance, when mobile applications offer users the chance to collect experience points (i.e., achievement-related feature), they typically also offer users the opportunity to compare their experience points with others (i.e., social-related feature). Both features enhance the overall experience so that users will more likely stay loyal to the mobile application in question. This logic implies that one has to focus on the interaction between the categories to understand their influence on users.

To advance our knowledge about how the different categories of gamification features interact, we align with IS use research that has recommended that studying the frequency with which users use features offers more insights than just focusing on whether they use specific ones (Sun, 2012; Tarafdar, Maier, Laumer, & Weitzel, 2020). Accordingly, we focus on how the use frequency of immersion-, achievement-, and social-related features influences brand loyalty. Specifically, we consider the following research question (RQ):

> **RQ**: How do the patterns in which users use immersion-, achievement- and social-related gamification features relate to brand loyalty?

The literature has indicated that gamification improves one's overall experience with mobile apps and, in turn, results in higher brand loyalty (Berger, Schlager, Sprott, & Herrmann, 2018; Hsu & Chen, 2018). We collected data from 243 individuals who actively used Duolingo, a mobile application for learning languages that implements all three categories of gamification features. To understand the interaction between use frequency and the three categories, one cannot apply a general linear regression analysis since such an analysis does not lend itself well to capture the interaction between more than two variables. Thus, we decided to use fuzzy-set qualitative comparative analysis (fsQCA) for our analysis.

With this paper, we contribute to the literature by showing that the frequency with which users use gamification features can explain high and low brand loyalty. We show that different patterns in which users use the three categories of gamification features contribute to explaining high and low brand loyalty. Specifically, we found that users need to use immersion- and achievement-related gamification features frequently to develop high brand loyalty. We also found that users who frequently use only one category of gamification feature or even no category develop low brand loyalty.

The paper proceeds as follows: in Section 2, we summarize research that illustrates the importance of brand loyalty for mobile application providers and outline gamification research's foundations and current state. In Section 3, we identify gaps in previous research and discuss how we developed our research model. In Section 4, we describe the quantitative study we conducted and highlight the need to use a set theoretical configurational approach to answer our research question. In Section 5, we present the results from our quantitative study. In Section 6, we discuss our study's theoretical and practical implications. Finally, in Section 7, we conclude the paper.

2 Theoretical Background

2.1 Importance of Brand Loyalty for Mobile Application Providers

To deal with high customer-churn rates (Bonnie, 2017), mobile application providers focus on increasing their users' brand loyalty because individuals who exhibit high brand loyalty will not likely switch to a competitor with similar products and price changes affect their happiness with the product less (Keller, 2001). Thus, high brand loyalty offers mobile application providers greater flexibility in setting prices and the opportunity to implement effective marketing strategies, such as cross- or upselling.

Mobile application providers find high brand loyalty important because it means users will continue to use their applications. High brand loyalty benefits mobile application providers throughout all stages of the IT lifecycle (Maier, 2020) and solves challenges that mobile application providers currently face, such as user acquisition and user retention. To establish high brand loyalty, mobile application providers can use gamification (Hsu & Chen, 2018), which discuss in Section 2.2.

2.2 Gamification

Gamification refers to using features from video games, such as avatars, level-progression systems, or awards, in a non-game context (Deterding et al., 2011; Seaborn & Fels, 2015) to harness the motivational power that games evoke (Deterding et al., 2011). Noteworthy, mobile applications with gamification, such as Duolingo, differ from "real" mobile gaming applications, such as Candy Crush. Intrinsic motivations typically drive users to use mobile gaming applications: they play them to have fun. In contrast, external motivations typically drive users to use mobile applications with gamification elements: they use them to achieve a certain goal (Koivisto & Hamari, 2019). For instance, users typically use the Duolingo mobile application to learn a foreign language, and the application uses gamification elements to increase users' motivation and improve their overall user experience.

As we state in Section 1, three categories of gamification features (Koivisto & Hamari, 2019) that all address intrinsically motivational needs exist (see Table 1).

Table 1. Categories of Gamification Features and Examples for the Mobile Application Duolingo

Category of gamification features	**Definition** (based on Koivisto & Hamari, 2019)	**Gamification features used in Duolingo**
Immersion-related features	Gamification features that fulfill the user's need for autonomy.	Learner's profile, platform's mascot "Duo" (avatar)
Achievement-related features	Gamification features that fulfill the user's need for competence.	Language crowns, achievements, lingots (in-game currency), experience points (XP), progress bar, combos, daily goal language level, language leagues, challenge with a difficult learning task
Social-related features	Gamification features that fulfill the user's need for social relatedness.	Comparison and competition among friends, discussion boards

Mobile application developers primarily use **immersion-related features** to drive users into self-directed, curious activities and to make them identify themselves more with a mobile application. They fulfill the motivational need for autonomy, which refers to the assessed freedom to fulfill a certain task (Koivisto & Hamari, 2019; Sailer, Hense, Mayr, & Mandl, 2017). Typical immersion-related features include avatars, virtual identities, storytelling, or narrative structures.

Mobile application developers primarily use **achievement-related features** to give users a sense of achievement when they make progress in a mobile application. These features satisfy users' motivational need for competence and, thus, the feeling that they have mastered a challenge (Koivisto & Hamari, 2019; Sailer et al., 2017). Example features include a level system, experience points, and challenges.

Mobile application developers primarily use **social-related features** to give users a sense of community and the ability to contact with like-minded people. These features satisfy users' motivational need for social relatedness, which refers to the feeling that they belong to a group and that the group accepts them (Koivisto & Hamari, 2019; Sailer et al., 2017). Commonly used social-related features include groups, a friend system, peer ratings, and collaborative or competitive events.

2.3 Previous Research on Gamification

Previous research on gamification has considered gamification as one entity in various contexts, such as education, social networks, health, crowdsourcing, sustainability, orientation, computer science, research, marketing, and cooperative work (for recent reviews, see Hassan & Hamari, 2019; Koivisto & Hamari, 2019). Researchers have assumed that gamification leads to flow (Berger et al., 2018; Seaborn & Fels, 2015), which refers to a state in which users feel highly involved in an activity such that nothing else matters (Csikszentmihalyi & LeFevre, 1989).

When users experience flow through gamification, it has several positive effects, such as increased participation (Sigala, 2015), increased engagement with the product/service (Hofacker, de Ruyter, Lurie, Manchanda, & Donaldson, 2016; Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016), continued use (Hamari, 2013), and increased purchase intention (Jung, Min, & Kellaris, 2011). Researchers have also found some initial indications that gamification has a positive influence on a user's relationship with a brand (see Table 2). For instance, gamification has a positive influence on strengthening brand engagement (Robson et al., 2016), can cause a positive attitude towards a brand (Yang, Asaad, & Dwivedi, 2017), and makes users feel more connected to a brand (Berger et al., 2018). Other studies show that gamification increases brand involvement (Nobre & Ferreira, 2017) and brand loyalty (Lucassen & Jansen, 2014; Wolf et al., 2020).

Table 2. Summary of Gamification Research Focusing on a User's Relationship with a Brand

Authors	Studied variable	Key findings
Berger et al. (2018)	Brand connection	Challenging and interactive gamification features are interrelated and associated with a high connection to the brand.
Hsu & Chen(2018)	Brand loyalty, association and trust	Gamification features increase the user experience and, thereby, brand loyalty, association, and trust positively.
Lucassen & Jansen (2014)	Brand engagement, loyalty, and awareness	Marketers see gamification as a means to increase brand engagement, brand loyalty, and brand awareness.
Nobre & Ferreira (2017)	Brand involvement	Gamification constitutes a means for increasing brand engagement through increased user experience.
Robson et al. (2016)	Brand engagement	Gamification can increase brand engagement.
Yang et al. (2017)	Brand attitude	Gamification increases the attitude towards the brand.
Wolf et al. (2020)	Brand commitment/loyalty	Gamification in mobile applications increases users' commitment. Gamification features have an interaction effect on users' brand commitment and loyalty.

3 Towards a Configurational Gamification Model

Research shows that gamification improves the user experience and that using gamification features has a positive effect on users (Hassan & Hamari, 2019; Koivisto & Hamari, 2019). Additionally, gamification benefits a user's relationship with a brand (see Table 2), such as brand loyalty. However, this knowledge has several limitations.

Most research has dealt with gamification on a general level (i.e., as one unit) or merely considered gamification as a research context (Hassan & Hamari, 2019; Koivisto & Hamari, 2019). While a valuable first step, such an approach brings limited knowledge to what categories of gamification features, which fulfill different user needs (see Table 1), mobile application providers should implement Therefore, more detailed and in-depth research on the influence that these different categories have on brand loyalty would more deeply explain what features one needs to implement to increase brand loyalty.

Furthermore, it remains unclear how the frequency with which users use immersion-, achievement-, or social-related gamification features relates to brand loyalty (Hassan & Hamari, 2019; Koivisto & Hamari, 2019). In line with previous research (de Guinea & Webster, 2013), we categorize use frequency into two patterns: infrequent use and frequent use. Studying the use frequency of specific features offers more insights than just focusing on whether users use a specific feature at all (Sun, 2012; Tarafdar et al., 2020), but research in the gamification context has thus far neglected to examine use frequency. Such knowledge would enable mobile application providers to better understand which gamification features they need to present to users more dominantly to enhance user acquisition and user retention.

Recent studies have found that different gamification features interact and that the interaction influences how users perceive a brand (Berger et al., 2018; Wolf et al., 2020). Research has also highlighted that only adding one type of gamification feature to an information system rarely leads to positive outcomes and that mobile application developers need to consider the interaction between multiple gamification developers (Khan, Boroomand, Webster, & Minocher, 2020). We do not know how using immersion-, achievement and social-related features interact with each other to relate to high brand loyalty. We need to understand this interaction because mobile applications typically implement gamification features from different categories. For instance, mobile applications that offer users the chance to collect experience points (i.e., achievement-related feature) often also offer the possibility to compare the collected experience points with other users (i.e., social-related feature).

To advance gamification research, we examine how the frequency with which users use all three categories of gamification features and the interaction between them relates to brand loyalty (see Figure 1). To differentiate between infrequent and frequent use, we use a set-theoretical method. Set-theoretical methods represent condition as set memberships (in this study, fuzzy-set memberships) to study the phenomena (Ragin & Fiss, 2008). In this study, we consider three such condition— frequent/infrequent use of immersion-related features, frequent/infrequent use of social-related features, and frequent/infrequent use of achievement-related features—to examine how they interact and relate to high/low brand loyalty. To analyze the interaction between the three categories, we apply a fuzzy-set qualitative comparative analysis (fsQCA) (Ragin, 2000), which performs better than other methods when one analyzes how more than two conditions interact (Maier, Laumer, Joseph, Mattke, & Weitzel, forthcoming; Mattke, Maier, Reis, & Weitzel, 2020). With this methodology, we can reveal patterns in the frequency with which users use gamification features that consistently relate to high and low brand loyalty. In Section 4, we outline our methodological approach and describe how we applied the set-theoretical configurational approach using fsQCA.

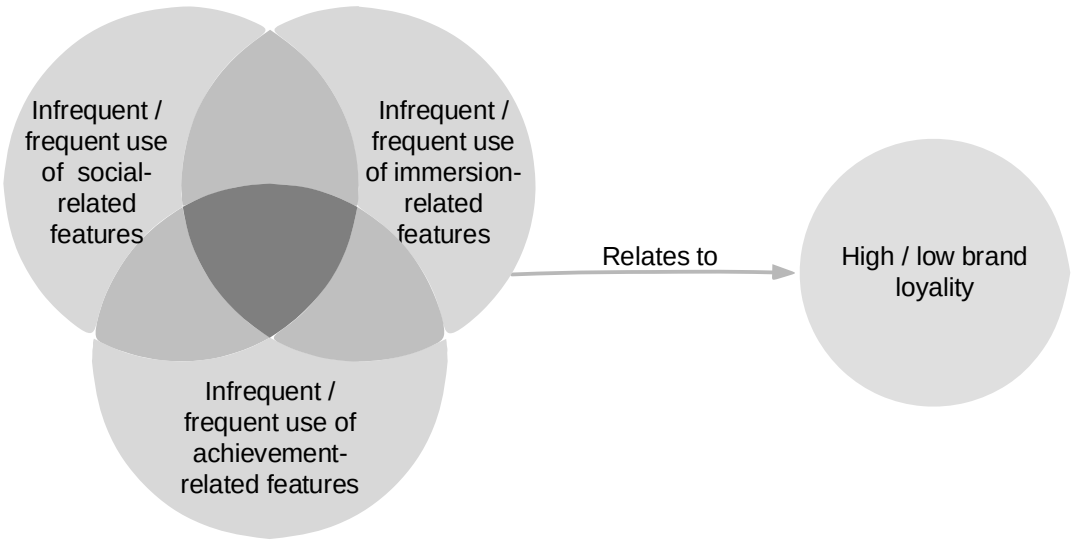

Figure 1. Configurational Model

4 Methodology

In this section, we describe the process we followed to collect data, how we operationalized the measurement items, how we validated the measurement model, and how we conducted our data analysis with fsQCA.

We needed data about how users use immersion-, achievement- and social-related features in mobile applications. Accordingly, we needed to examine an application that used all three features. We chose Duolingo for our study since, in addition to offering features from all three categories, it had attracted more downloads than any other mobile education application in the United States and, as at March, 2021, offered 99 different language courses in 39 languages and had more 300 million registered users.

4.1 Categorization of Gamification Features

To categorize the gamification features into immersion-, achievement-, and social-related features, we followed a two-step approach. First, we both independently identified all gamification features in Duolingo and discussed the findings. We identified the same gamification features. Second, we both independently categorized the features into the three categories of gamification features. We based our categorization on how gamification research has previously defined the features (see Table 1). For instance, we categorized all gamification features related to any form of challenge, quest, mission, or task into the achievement-related feature category. We compared our findings and calculated the initial agreement score. We obtained an initial agreement score of 91.57 percent with a free-marginal kappa of 0.87 (Randolph, 2005). One author classified the feature "comparison and competition among friends" as an achievement-related feature and the other classified it as a social-related feature. To solve this discrepancy, we interviewed five individuals who actively used Duolingo to find out whether they perceived the feature as addressing the need for competence (achievement-related feature) or social relatedness (social-relatedness feature). The interviewees stated that they used the feature for social purposes and that they did not see the feature as a challenge, which concurs with recent gamification literature (Koivisto & Hamari, 2019) that states that competition dominantly fulfills one's need for social relatedness. In summary, we identified two immersion-, nine achievement-, and two social-related features (see Table 1).

4.2 Data Collection and Measurement Items

To answer our research question, we followed a quantitative approach and implemented an online survey. To do so, we decided to use Amazon Mechanical Turk. In total, 500 participants participated in our survey. We implemented two attention tests that we randomly integrated into the survey to increase the data's overall quality. In both attention tests, we instructed participants to select a specific value (e.g., "Please select 'strongly agree'"). We removed participants who failed at least one attention test from the sample as the failed attention tests indicated that they did not properly read the questions. As a result, we removed 104 participants, which left 396 participants who passed the attention tests. We implemented two screening questions (Lowry, D'Arcy, Hammer, & Moody, 2016; Mattke, Maier, Reis, & Weitzel, 2020b) to ensure that we dropped people who did not know about Duolingo or had not used it from the sample and, thus, that we could adequately answer our research question (Maier, 2020). As a result, we removed 153 participants from the sample because they indicated that they did not know about or had not used Duolingo, which left 243 participants. We show their demographic information in Table 3. The participants reported that they used Duolingo 5.88 times per week, which means that the average participant used Duolingo nearly every day.

Table 3. Survey Participants' Demographics

Age		Gender		Highest education level	
< 21	6.18%	Male	55.35%	High school / GED	3.94%
21-30	57.09%	Female	43.65%	Some college	10.39%
31-40	26.18%			Two-year college degree	3.58%
> 40	10.55%			Four-year college degree	54.84%
Mean: 30.47 Standard deviation: 8.78				Master's degree	27.25%

In this study, we relied on self-reported data; therefore, we tested for common method bias (CMB) by examining the bivariate correlations (Pavlou, Liang, & Xue, 2007). We examined the correlations that we present in Table 4 for very high correlations ($r > 0.90$) and found that all correlations were below this threshold. Thus, we found that CMB did not present an issue in this study. Additionally, we followed Lindell and Whitney's (2001) recommendations and conducted the "marker variable" approach to test for CMB. We additionally included a theoretical unrelated construct ("I prefer pizza over pasta") in the bivariate correlation matrix. The highest correlation was 0.16, which indicates that CMB did not distort the results.

To measure how frequently the participants used immersion-, achievement-, and social-related features, we asked them how frequently they used each feature from each category. We used a Likert-type scale to measure their responses with anchors that ranged from very infrequently (1) to very frequently (7). For

brand loyalty, we adapted three items from a general brand loyalty perspective to the mobile application loyalty context (see Table A1 in the Appendix).

4.3 Measurement Model

Before analyzing the data, we tested brand loyalty, which we measured with reflective items, for indicator and construct reliability (Bagozzi, 1979). All items loaded above 0.707, which means that each item explained at least 50 percent of the variance of the brand loyalty construct (Carmines & Zeller, 2008). Thus, we found support for indicator reliability. The composite reliability (CR) of brand loyalty was 0.86—higher than the 0.70 threshold. The average variance extracted (AVE) of the brand loyalty construct was 0.61—higher than the 0.50 threshold. Thus, we also found support for construct reliability (Fornell & Larcker, 1981).

We used formative items to measure the frequency with which the participants used gamification features (Jarvis, MacKenzie, & Podsakoff, 2003). To assess the three formative constructs' validity, we assessed the weights and variance inflation factors (VIF). We found that almost all weights of the three formative constructs were significant. The test we conducted to examine multicollinearity revealed that the VIF-values ranged from 1.2 to 2.6—below the conservative 3.3 threshold (Petter, Straub, & Rai, 2007). Thus, multicollinearity did not pose an issue for three constructs. In summary, the tests we performed established our measurement model as reliable and valid. We show the constructs' descriptive statistics, which includes their mean and standard deviation, in Table 4.

Table 4. Descriptive Statistics and Discriminant Validity

	Construct	M	SD	(1)	(2)	(3)	(4)
(1)	Use of immersion-related features	5.14	1.16	-			
(2)	Use of achievement-related features	5.06	1.08	0.69	-		
(3)	Use of social-related features	4.22	1.82	0.57	0.65	-	
(4)	Brand loyalty	4.37	1.49	0.47	0.57	0.63	-

Note: M = mean; SD = standard deviation.

4.4 Set-theoretical Configurational Approach with a fsQCA

To examine our data, we used a set-theoretical configurational approach and fuzzy-set qualitative comparative analysis (fsQCA) (Ragin, 2000), which represents most common method for set-theoretical configurational approaches (Liu, Mezei, Kostakos, & Li, 2017; Maier et al., forthcoming). Based on set theory, a fsQCA empirically examines the relationship between a configuration of causal conditions (in our study, whether users infrequently or frequently used the three categories of gamification features) and an outcome condition (in our study, a user's brand loyalty) (Fiss, 2011; Ragin, 2000). A fsQCA does not focus on causal conditions in isolation. Accordingly, a fsQCA can identify sufficient configurations that always lead to a high or low outcome condition (Ragin, 2009). Furthermore, it can identify the distinct causal conditions that always exist for the low or high outcome condition.

A fsQCA represents casual conditions and the outcome conditions as fuzzy sets. Fuzzy sets can have any numeric value from 0 to 1 and express the extent to which an observation belongs to a set (Ragin, 2000). For instance, a user who exhibited high loyalty to Duolingo would belong to the set "high brand loyalty". A fuzzy set membership of 1 would represent a perfectly loyal user. In contrast, a fuzzy set membership of 0 would represent a user who exhibited no loyalty to Duolingo. Note that fuzzy sets can express any partial membership in a set. Thus, fuzzy sets can represent a user who has rather high (but not perfect) brand loyalty (e.g., 0.75) or rather low (but not no) brand loyalty (e.g., 0.2).

4.5 Data Analysis using fsQCA

We analyzed the data with fsQCA in three steps: 1) we calibrated the survey data into fuzzy sets, 2) analyzed the sufficient configurations that related to high or low brand loyalty, and 3) analyzed the necessary causal conditions in the sufficient configurations.

4.5.1 Calibration

To transform the constructs, which we measured on interval scales, into fuzzy sets, we applied the direct calibration method whereby one uses the defined anchors and transforms the interval scale into fuzzy-set memberships. In line with QCA literature (Liu et al., 2017), we defined three qualitative anchors for processing the calibration. The first anchor defines the threshold for full membership in a set (fuzzy-set value of 1), the second anchor defines the threshold for full non-membership in a set (fuzzy-set value of 0), and the third anchor defines the crossover point or the point of maximum ambiguity (fuzzy-set value of 0.50). As we measured the quantitative data about the frequency with which participants used the categories of gamification features on a seven-point scale, we set the first anchor for full membership to 7, the threshold for full non-membership to 1, and the crossover point to 4. As fuzzy-set mechanism make it difficult to analyze fuzzy sets that score exactly 0.50, we followed recommendations from the literature (Ragin & Fiss, 2008) to avoid using 0.50 set memberships. Therefore, we added a constant of 0.001 to causal conditions and outcome conditions with a fuzzy set value of 0.50. This process, which QCA studies often apply, assured that we dropped no observations from the fuzzy-set analysis (Maier et al., forthcoming; Mattke, Maier, Reis, & Weitzel, 2020a).

4.5.2 Analysis of Sufficient Configurations

Next, we analyzed the data to determine whether we could identify sufficient configurations for both high and low brand loyalty. We analyzed high and low brand loyalty separately. The process involved two steps. First, we constructed a truth table by listing all possible configurations of the three causal conditions (i.e., 2^k configurations with k being the number of causal conditions). Since we considered three categories in this study (i.e., k = 3), our truth table comprised eight rows with each row displaying a specific configuration. Thus, we covered all possible configurations.

Second, we reduced the truth table based on how frequently the configurations appeared. To do so, we followed previous QCA research (Maier et al., 2020) and set the minimum acceptable frequency of cases to three and, thus, considered configurations only with at least three empirical instances for subsequent analysis. Thus, we dropped all configurations with less than three observations from the analysis. For the remaining configurations, we applied a minimum acceptable level of raw consistency that they needed to exceed. Raw consistency measures the degree to which the same configurations display the same outcome (Ragin, 2000). We followed recommendations from the literature to use a raw consistency threshold of 0.85 (Mattke et al., 2020b; Ragin, 2009). Because we used fuzzy-set memberships, we additionally considered proportional reduction in inconsistency (PRI). We set the threshold of the PRI score to 0.60—a value well above the minimum threshold that depicts a clear cut in the PRI scores (Schneider & Wagemann, 2012). We regarded configurations that exceeded the frequency threshold, the raw consistency threshold, and the PRI threshold as sufficient configurations. We show the results from this analysis for both high and low brand loyalty in Tables A2 and A3, respectively, in the Appendix.

4.5.3 Analysis of Necessary Causal Conditions

Next, we analyzed necessary causal conditions. Again, we separately analyzed high and low brand loyalty (see Table A4 in the Appendix). In analyzing necessary causal conditions, consistency, which indicates degree to which cases with the same causal conditions display the same outcome, constituted the decisive indicator. In line with thresholds recommended in QCA literature, we set the consistency threshold to 0.90 (Schneider & Wagemann, 2012). To avoid type 1 errors, we also considered the raw coverage and the relevance of necessity score (RoN), which both need to exceed the threshold of 0.60 (Mattke et al., 2020a).

5 Results

As the fsQCA literature recommends (Ragin & Fiss, 2008), we graphically display the sufficient configurations in Figure 2. In the figure, a crossed-out circle indicates an infrequently used category of gamification features. A black filled-out circle indicates a frequently used category of gamification features. Finally, a black star indicates the necessary casual conditions.

We identified two sufficient configurations for high brand loyalty. The first configuration (C1) comprised users who frequently used immersion-, achievement-related, and social-related features, which we call “the loyal multiple feature user”, while the second configuration (C2) comprised users who frequently used

immersion- and achievement-related features but infrequently used social-related features, which we call "the loyal immersion- and achievement-related feature user". In both sufficient configurations, we identified immersion- and achievement-related gamification features as necessary causal conditions (consistency > 0.94, coverage > 0.81, RoN > 0.70).

	High brand loyality		Low brand loyality			
Configuration / Gamification feature	The loyal multiple feature user	The loyal immersion- and achievement-related feature user	The disloyal, rarely feature-using user	The disloyal social-related features user	The disloyal immersion-related features user	The disloyal achievement-related features user
	C1	C2	C3	C4	C5	C6
Immersion-related features	★	★	⊗	⊗	●	⊗
Achievement-related features	★	★	⊗	⊗	⊗	●
Social-related features	●	⊗	⊗	●	⊗	⊗
Raw coverage	0.80	0.26	0.40	0.27	0.36	0.35
Consistency	0.87	0.87	0.84	0.89	0.85	0.86
Solution coverage	0.91		0.60			
Solution consistency	0.86		0.82			

Key:
Frequently used feature: ●
Infrequently used feature: ⊗
C: configuration
Presence of necessary feature ★

Figure 2. The Sufficient Configurations

We identified four sufficient configurations for low brand loyalty. The first sufficient configuration (C3) comprised users who infrequently used immersion-related, achievement- and social-related features, which we call "the disloyal, rarely feature-using user". The second sufficient configuration (C4) comprised users who used immersion- and achievement-related features infrequently but social-related features frequently, which we call "the disloyal social-related features user". The third sufficient configuration (C5) comprised users who used immersion-related features frequently but achievement- and social-related features infrequently, which we call "the disloyal immersion-related features user". Finally, the fourth sufficient configuration (C6) comprised users who used achievement-related features frequently but used immersion-related and social-related features infrequently, which we call "the disloyal achievement-related features user". We identified no necessary causal conditions for low brand loyalty.

The solution coverage values for high brand loyalty (0.91) and low brand loyalty (0.60) indicate the degree to which the three configurations covered the outcome. These results evidence our model's high explanatory power and show that gamification better explains high brand loyalty than low brand loyalty. The solution consistency values (0.86 and 0.82) and the consistency of the six sufficient configurations exceeded the minimum value that the QCA literature recommends (0.75) (Ragin, 2000; Ragin & Fiss, 2008). The raw coverage of the two sufficient configurations for high brand loyalty ranged from 0.26 to 0.80. We found that C1 was the most common sufficient configuration relating to high brand loyalty in our dataset. The raw coverage of the four sufficient configurations relating to low brand loyalty ranged from 0.27 to 0.40, which shows that these sufficient configurations occurred at a similar frequency in our dataset.

6 Discussion

Mobile application providers rely on high brand loyalty to reduce customer churn rates (Bonnie, 2017). We propose that using gamification constitutes one specific path to increase a user's brand loyalty. Based on gamification research (Berger et al., 2018; Hsu & Chen, 2018), we collected data about the frequency with which 243 active Duolingo users used immersion-, achievement, and social-related gamification features to identify how such use relates to brand loyalty. We provide detailed insights into the interaction between three categories of gamification features and how they relate to brand loyalty.

6.1 Contribution to Theory

Gamification research has mainly examined the influence of single gamification features, such as experience points (Hassan & Hamari, 2019; Sailer et al., 2017). So far, research has not considered gamification features at an aggregated level (e.g. by summarizing all gamification features that belong to a category such as achievement-related features). By categorizing gamification features into the three categories immersion-, achievement- and social-related features, we depart from explaining how one specific gamification feature influences users. However, not all features will prove effective in all cases, so mobile application developers need to address different features to a different degree in their applications.

We contribute to gamification research by revealing that the frequency with which users use gamification features can improve user experience and—in this research context—explain high and low brand loyalty. Extant research has mainly examined whether implementing gamification features in general relates to a positive outcome. For instance, studies have tested whether an application with a gamification feature performs better than the same application without a gamification feature (Hassan & Hamari, 2019; Koivisto & Hamari, 2019). We found that the frequent use of immersion- and achievement-related features related to high brand loyalty (see C1 and C2). In contrast, we found that the frequent and infrequent use of social-related features related to high brand loyalty (see C1 and C2). Finally, we found that the frequent and infrequent use of all three categories of gamification features related to low brand loyalty. In summary, our study suggests that researchers need to focus on the gamification features that users frequently and infrequently use.

Also, we contribute to the literature by showing that one needs to understand how three categories of gamification features interact to understand brand loyalty. Rather than focusing only on one category of gamification features, we focus on all three and how they lead to high and low brand loyalty since most mobile applications use gamification features from more than one category. With this approach, we reveal new insights and better explain how gamification features interact (Berger et al., 2018; Hsu & Chen, 2018). Indeed, we found that users can use some categories of gamification features infrequently or frequently and still have high brand loyalty. For instance, users can use social-related features either infrequently or frequently as long as the users frequently use immersion- and achievement-related features. Additionally, we show that only frequently using one category of gamification features cannot result in high brand loyalty. This finding supports extant assumptions in gamification research that adding only single gamification features does not necessarily relate to a positive outcome (Khan, Boroomand, Webster, & Minocher, 2020).

With our results, we show that the frequency with which users use immersion-, achievement-related, and social-related features relates to high brand loyalty in two different configurations. We found four such configurations for low brand loyalty. Furthermore, we found that the configurations that relate to low brand loyalty do not simply constitute the inverse configurations that relate to high brand loyalty.

Finally, our results reveal that high brand loyalty requires users to frequently use achievement-related features. However, we see that achievement-related features do not constitute the most important gamification feature because high brand loyalty also requires users to use immersion-related features. We found that frequent achievement-related feature use did not relate to high brand loyalty.

6.2 Implications for Practice

We found that, when users frequently use at least two categories of gamification features, they are not likely to churn but to continue the use the mobile application. Additionally, we found that, when users frequently use only one category of gamification feature or even no category, they show low brand loyalty. These findings benefit mobile application providers because they can match new users' use patterns with our results and, if they do not find a match, know that they risk losing the users. As a result, they can take specific interventions to increase users' loyalty and prevent them from leaving. For instance, they could offer specific discounts or gifts. Furthermore, mobile application providers could try to change the frequency with which the user uses specific gamification features. For instance, they could offer some incentives to use the gamification features. That is, by using guidance design features, a mobile application provider could suggest to a user in its application that the user connects to some friends, which may motivate the user to use the application's social-related features more frequently and, thus, prevent the user from leaving. Our results also reveal insights into how mobile application developers should design mobile applications. Specifically, they suggest that mobile application providers should implement immersion- and achievement-related features if they want to foster high brand loyalty.

In summary, our results indicate that high brand loyalty requires users to use immersion- and achievement-related features and that low brand loyalty results when users use gamification features from only one category. Therefore, mobile application providers need to implement at least immersion- and achievement-related features for users to exhibit high brand loyalty.

6.3 Limitations

As with any study, this one has several limitations. First, we focused on Duolingo because it uses a wide range of different gamification features. However, as a result, we cannot generalize our results and cannot make statements about other mobile applications that do not show gamification features from all three categories. Therefore, we encourage future research to test our results for different mobile applications with different gamification features on a category level and an instance level. Furthermore, Duolingo comes from the educational context; however, one can also use gamification in other contexts such as personal health or crowdsourcing. Thus, we encourage future research to consider whether the context influences how users use how different categories of gamification features. For instance, other configurations than the ones we identified might result in high brand loyalty in the personal health context.

6.4 Future Research

In this study, we sampled data only at one time and users who already used Duolingo. From the perspective of the IS lifecycle (Maier, 2020), our results pertain only to active Duolingo users. Future gamification research should differentiate and compare how gamification influences non-users, active users, and previous users.

6.4.1 Gamification and Non-users

We know from the expectation confirmation (ECT) theory (Oliver, 1980) that users have certain expectations about a mobile application when they download it and that how they perceive it depends on whether it meets, exceeds, or do not meet those expectations. Thus, for our study, ECT theory implies that users' initial expectations about gamification and how they perceive it might shape how they perceive and how frequently they use a mobile application. Thus, future research should examine whether users' expectations influence brand loyalty and whether a reinforcing effect when the application meets those expectations exists.

6.4.2 Gamification and Active Users

Most gamification research has focused on how gamification improves users' overall experience (Hassan & Hamari, 2019; Koivisto & Hamari, 2019). However, we know little about gamification's dark side (i.e., its negative consequences). For instance, the rewarding nature of achievement-related features may constitute an antecedent to technology addiction. Thus, future research should examine the relationship between different categories of gamification features and addiction. Users could also perceive mobile applications with a wide range of gamification features as overwhelming. We know from techno-stress research that specific technology characteristics influence how users perceive techno-stressors, which, in turn, can relate to strain, such as exhaustion (Pflügner, Maier, Mattke, & Weitzel, 2020). Therefore, future research should consider under what conditions users perceive gamification features as stressors and whether "gamification stress" exists. Studying gamification stress might be a promising way to understand and examine why so many users quit mobile applications. New users may possibly feel stressed by gamification and, therefore, decide to discontinue using them. Therefore, we suggest that researchers study why users discontinue mobile applications and examine gamification's role in such discontinuance. Using ECT might also represent a promising path to study high customer churn rates in mobile markets.

6.4.3 Gamification and Previous Users

Due to mobile applications' high churn rates, we need to understand how individuals who previously used such applications with gamification behave. We need to understand how the way in which users perceive a brand changes after they stop using a mobile application. Additionally, we encourage future research to study how previous mobile application users' behavior app. For instance, it seems promising to study how the experience with a gamified mobile application shapes a user's future choices. Therefore, we encourage future research to examine whether a previous user will choose a mobile application with or without gamification features after quitting a gamified mobile app.

7 Conclusion

In this paper, we explain how mobile application providers can use gamification features to increase brand loyalty in their users. We found that users have low brand loyalty when they use at least two of the three gamification features infrequently. On the contrary, users need to frequently use the immersion- and achievement-related feature to have high brand loyalty.

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Appendix

Table A1. Measurement Items

Construct	Adapted item
Immersion-related gamification features	How often do you check your learner profile?
	How often do you notice the avatar Duo?
Achievement-related gamification features	How often do you work on gaining more language crowns or check on them?
	How often do you work on your achievements or check on them?
	How often do you buy something with your Lingots?
	How often do you check your current XP of a language?
	How often do you check the progress bars during lessons?
	How often do you try to get combos during lessons?
	How often do you try to fulfill your daily goal?
	How often do you check your language levels?
	How often do you actively participate in language leagues (i.e., trying to get promoted)?
	How often do you challenge yourself with harder learning tasks?
Social-related gamification features	How often do you compare your progress with your friends?
	How often do you interact with the discussion board?
Brand loyalty adapted from Washburn and Plank (2002) and Chaudhuri and Holbrook (2001)	I will not use other language learning applications if they are promoted to me
	I am committed to Duolingo
	I will likely use Duolingo the next time I want to learn a new language
	I would be willing to pay for using Duolingo if it would not be free / pay more for Duolingo Plus before using another language learning application

Table A2. Reduced Truth Table for High Brand Loyalty

Immersion-related gamification features	Achievement-related gamification features	Social-related gamification features	Number	High brand loyalty	Raw consistency	PRI consistency
1	1	1	169	1	0.874548	0.842106
1	1	0	21	1	0.871841	0.742044
1	0	1	5	0	0.851067	0.528359
0	1	1	4	0	0.832575	0.471587
0	1	0	6	0	0.774526	0.376332
1	0	0	9	0	0.755643	0.37626
0	0	1	5	0	0.788101	0.332432
0	0	0	15	0	0.672012	0.308499

Table A3. Reduced Truth Table for Low Brand Loyalty

Immersion-related gamification features	Achievement-related gamification features	Social-related gamification features	Number	Low brand loyalty	Raw consistency	PRI consistency
0	0	1	5	1	0.89448	0.66757
0	0	0	15	1	0.837385	0.657158
1	0	0	9	1	0.852595	0.623739
0	1	0	6	1	0.862659	0.620109
0	1	1	4	0	0.850581	0.528414
1	0	1	5	0	0.833158	0.471643
1	1	0	21	0	0.621831	0.238832
1	1	1	169	0	0.29679	0.114936

Table A4. Results of Necessary Causal Condition Analysis

Condition	High brand loyalty		Low brand loyalty	
	Con.	Cov.	Con.	Cov.
Frequent use of immersion-related features	0.94	0.81	0.72	0.30
Infrequent use of immersion-related features	0.20	0.59	0.56	0.81
Frequent use of achievement-related features	0.94	0.82	0.73	0.31
Infrequent use of achievement-related features	0.21	0.61	0.57	0.82
Frequent use of social-related features	0.83	0.82	0.65	0.31
Infrequent use of social-related features	0.31	0.65	0.63	0.64
Note: con. = consistency, cov. = coverage.				

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