How are gameful experience dimensions associated with intrinsic and extrinsic motivation? Results from an online vignette study

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Abstract

Gamification is one of the leading behavioral change strategies whose central premise is to afford experiences that resemble those present in games to provide intrinsic motivation. At the same time, gamification has an underlying utilitarian purpose and therefore its use is additionally driven by expected benefits. However, while gamification designs can afford a wide range of experiences, the corpus needs studies that examine which of these experiences induce intrinsic motivation, and which are associated with extrinsic motivation related to the utilitarian outcomes. Therefore, this study deploys a vignette-based online study (n=937) to examine the relationships between gameful experience dimensions (i.e., accomplishment, challenge, social experience, immersion, competition, guided, playfulness), and intrinsic and extrinsic motivation in a case study related to social distancing during the COVID-19 pandemic. Based on the results, accomplishment, social experience, competition, and playfulness are positively associated with intrinsic motivation. Moreover, accomplishment, social experience, guided, and playfulness are positively associated with extrinsic motivation.

Keywords

Gamification, gameful experience, intrinsic motivation, extrinsic motivation

1. Introduction

During the last decade, gamification has become a prominent type of motivational technology, whose purpose is to induce behavioral change that serves user goals or benefits a larger collective of individuals [1]. To achieve a change in individual behavior, gamification uses game design in contexts and environments that are not normally considered to be games and has received substantial attention among practitioners and academia since its outset [1]. Some of the domains where gamification has been demonstrated to induce positive behavioral change include health, exercise, safety, and security, among others [1–4].

Gamification builds on the notion of gameplay being an activity in which people are willing to invest effort despite receiving no tangible benefits or experiencing external pressure to do so [5]. Accordingly, central premise of gamification is to promote behavioral change by providing experiences that resemble those that are experienced when playing games, including competition, a sense of achievement, or becoming immersed in the game environment, among others [6,7]. Ideally, by affording one or more gameful experiences, gamification can induce intrinsic motivation, transforming the activity that is being gamified so that individuals derive pleasure from

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engaging in it, while leading to sustained behavior change [8]. Gamification, therefore, is a type of hedonic-utilitarian system design, whose use is driven by the pleasures and expected utilitarian benefits it affords [9].

While gamification draws inspiration from game design, and the experiences games and gamified systems provide resemble one another, the underlying utilitarian purpose of gamification clearly distinguishes it from games, which are usually exclusively autotelic systems [1,6,10]. Therefore, the experiences gamification provides do not solely serve towards enjoyment and intrinsic motivation but may relate to the expected benefits or other goals external to the gamified system or activity - i.e., extrinsic motivation [6]. Prior research has also found that in some cases gamification can work similarly to extrinsic incentives [11,12]. In such cases, gamification poses a risk of hampering intrinsic need satisfaction and intrinsic motivation [13]. Although extrinsically motivating gamification can indeed lead to behavioral change it might only be effective in the short term, and deteriorate performance quality [11,14].

Despite the ability of gamification to foster intrinsic motivation is one of the central reasons for why it works, and studies have examined how different gamification designs foster intrinsic motivation [15], no existing studies have comprehensively examined which of the various experiences afforded by gamification can transform behaviors to become intrinsically motivated. On the other hand, we also lack an understanding of the experiential qualities of gamification that relate to extrinsic motivation. To address these gaps, we examine the relationships between the seven gameful experience dimensions of accomplishment, challenge, social experience, immersion, competition, guided and playfulness as identified by [6], and intrinsic and extrinsic motivation [16]. We use gamified social distancing (i.e., maintaining a physical distance from other individuals to keep themselves and others safe) during the COVID-19 pandemic as a case study, while deploying data from a vignette-based online survey.

2. Background

2.1. Intrinsic and extrinsic motivation

Self-Determination Theory (SDT) is one of the prominent theories explaining the human motivation to engage in various activities [17]. SDT is also the most widely used theory in the corpus of gamification research, although applying it to explain the motivation stemming from games and gamification is not without criticism [18,19].

According to the SDT, activities can be extrinsically or intrinsically motivated [17]. Whereas the former is predominantly performed for consequences that are separable from the activity, such as expected benefits, punishment avoidance or social recognition, the latter is pursued for the satisfaction inherent to the activity itself. In other words, if a behavior is extrinsically motivated, individuals do it for an outcome that is external. However, if behaviors are intrinsically motivated, they become something individuals 'want to do' for the sake of doing it [20]. Although both intrinsic and extrinsic motivation drive human behavior, prior studies have shown that intrinsic motivation is a more prominent predictor of sustained behavioral change [21].

SDT posits that the satisfaction of innate psychological needs explains why some activities are intrinsically motivated. These basic needs include relatedness (i.e., feeling connected to other people, and caring for them), competence (i.e., feeling of mastery), and autonomy (i.e., feeling of volition and freedom) [17]. The satisfaction of these three needs during an activity is likely to make that given activity become enjoyable, consequently supporting individual well-being and sustained engagement [17,20]. For example, gameplay is likely to offer the player choices over actions and tasks (i.e., autonomy), provide challenges and positive feedback (i.e., competence), and facilitate interactions with other players in multiplayer environments (i.e., relatedness), therefore providing an intrinsically motivating experience [5].

2.2. Gameful experience

Researchers have increasingly pursued to understand the unique characteristics of the experiences that stem from playing games [22]. However, within gamification research, the gameful experience has remained an underdeveloped concept [6]. Moreover, despite the gameful experiences being subjective, and dependent on the characteristics of the individual as well as the gameful system, only a few attempts

have been made to develop instruments for measuring the gameful experience [6,23].

Due to the diversity in different types of games and gamified systems alike, it has been argued that the gameful experience is not a single type of experience but comprises multiple dimensions. In [6], the authors built on prior research on game studies and insights from an empirical inquiry into the experiences of gamification users. The authors identified seven dimensions comprising the gameful experience and developed an instrument for measuring each dimension. Although the seven-dimensional model of the gameful experience still lacks validation in different contexts and across different types of gamification designs, to date it remains the most comprehensive inquiry that aims to holistically capture these different dimensions, while also providing an instrument for measuring each dimension. Therefore, we decided to adopt the model and instrument from [6] for the purposes of this study.

Social experience relates to creating and maintaining social relations through gameplay [6]. One of the characteristics of games that make them appealing is that gameplay is, in many cases, a predominantly social activity, whether related to collaborating with other players to achieve a common goal or maintaining existing and creating new social relations through chatting and networking [24]. Accordingly, social experiences induced by gamification can take a variety of different forms, including for example, teamwork, socializing, and other ways to foster connectedness with others [6]. Social experience is, therefore, likely to tap into the need for relatedness of the SDT and induce intrinsic motivation, but the collaboration and teamwork associated with social experience might also increase social pressure to behave in a desired manner, and therefore serve a mainly utilitarian function [17].

Competition can stem from competitiveness against others or the gamified system [6]. In many cases, competition emerges because of a social situation where the user aims to overcome their opponents. Competition can be induced using gamification elements, such as leaderboards or ranking that enable individuals to compare their performance with other users and strive for outperforming them. Competition can be seen as a social activity, which can be expected to tap into the relatedness need of the SDT. However, existing studies in other domains have shown that competition can also foster extrinsic motivation, depending on the characteristics of the individual [25]. Moreover, some studies have argued that the requisite for motivational benefits is that competition ought to be fair and that those competing should be at a relatively even performance level, and that its main motivational mechanism might be social pressure [25,26].

Immersion is an experience that is characterized by being absorbed into the game environment or alternate reality [6]. Immersive experiences might cause a feeling of detachment from the "real world", losing the sense of self, and the time passing quickly as it consumes the user's attention [27]. Immersion can be facilitated by creating a compelling storyline, game characters, and a game world that enable the user to feel that they are being involved in a self-directed activity, while their actions have consequences – i.e. "being part of the story" [5,28]. Prior studies have shown that immersion-oriented gamification is associated with autonomy need satisfaction [28].

Playfulness refers to a non-serious, carefree approach toward activities and not being confined by goals or rules [29]. It relates to being involved in voluntary and pleasurable settings while leaving room for exploration, spontaneity, and behaviors driven by imagination [6]. The autonomous nature of playfulness resonates with the autonomy need satisfaction of the SDT, while its rule-free nature can be seen to contrast with extrinsic regulation and motivations driven by utility [17].

Challenge, referring to the effort players need to invest to achieve the gameplay goals, has been argued to be one of the characteristics that define, and make games enjoyable [30]. The experience of the challenge stems from overcoming obstacles and skill-building related to a progressing difficulty level [6]. Challenge, therefore, resonates with the competence need satisfaction of intrinsic motivation [6]. Prior research has, however, shown that for example gamification that uses level-based progression to challenge the user might lead to extrinsic motivation, while challenges can become demotivating if they require too much effort or are disproportionately difficult to overcome [11,31].

Accomplishment relates to goals and completing tasks that are imposed by the gamified system [6]. Accomplishment stems from skill-progression, advancement and successfully overcoming obstacles imposed by the gameful system or those present in the real-world [6]. Similar to challenge, accomplishment resonates with the need for competence, while tasks and

goals being induced by a gamified system can serve as external motivators.

Guided relates to the experience of being helped by the gamification design in structuring one's tasks and sticking to plans [6]. Hence, guided mainly relates to the user goals outside of the gameful system and differs from the other dimensions of the gameful experience as it does not relate to hedonic aspects of using gamified systems, but instead has a utilitarian focus, allowing users to better achieve their goals that are external to the activity [6]. However, prior studies have shown that providing clear structure and expectations regarding an activity supports autonomy and, consequently, intrinsic motivation [32]. Conversely, if the guidance stemming from a gameful system is perceived as coercive, or if the behaviors that are being promoted are not aligned with individual goals, being guided poses a risk of hampering autonomy and, consequently, intrinsic motivation.

While the literature supports the argument that gamification designs can foster intrinsic and extrinsic motivation [11–13,28], prior research has not comprehensively investigated which dimensions of the gameful experience lead to each type of motivation. Different individuals may experience gamification designs differently, and therefore prior studies examining the relationships between different types of gamification and motivation do not provide direct evidence of the relationships between different types of gameful experiences and motivations per se. Therefore, this study explores the associations between each gameful experience dimension and both intrinsic and extrinsic motivation.

3. Materials and methods

3.1. Procedure

We conducted a vignette-based online study to explore the relationships between the different dimensions of the gameful experience, and intrinsic and extrinsic motivation. In a vignette study, the participants are presented with a hypothetical situation to elicit their perceptions and beliefs. This method allows effective manipulation of the study stimulus, and data collection from a large number of participants [33]. We chose the vignette method as it allows using distinct gamification designs to create distinct gameful experiences in the chosen context, which might not be easily achieved using other methods such as surveys.

We used social distancing as the context for our study. During the COVID–19 pandemic, many countries opted to limit and reshape individual mobility patterns, most notably by encouraging engagement in social distancing, i.e., keeping a distance from others in day-to-day life to contain the spread of the virus and keep individuals safe. We created five interactive user interfaces to represent different ways to gamify such social distancing behavior, each based on the idea of tracking 'contacts' (i.e., situations where the user comes within a 2-meter distance of another user, thus causing a risk of infection) that serve as input for gamification (see appendices 1-5).

Gamification implementations are commonly categorized into achievement and progression-based, social (including competitive) and immersive designs, and the types of gamification applied in this study were designed to correspond to these categories to comprehensively create distinct gameful experiences [1]. Version 1 uses achievement and progression-based gamification features, allowing users to gain badges and levels for reaching social distancing goals they set themselves while visualizing their social distancing behaviors using a progress bar and statistics in terms of e.g., contactless days, and the average number of contacts. Version 2 allows the user to compete with friends in having the least contacts each day, week, and month, while using a leaderboard. The version also displays a podium of the top three social distancers for each period with awards. Version 3 allows users to form a virtual city with their friends and keep this city safe by social distancing and sending others social support in the form of emojis. Version 4 immerses the user into an alternate storyline from Lord of the Rings with the purpose of reframing social distancing behavior as an adventure, allowing the user to role-play as Frodo. The interface reveals a new part of the storyline to the user at the end of each day and whether Frodo stayed safe on his journey to Mount Doom depended on whether the user reached the social distancing goal they set themselves. The gameful motivational affordances implemented in each version are depicted in Table 1. Version 5 is the non-gamified version that displays the number of daily contacts to the user without employing gamification.

Table 1
Implemented affordances.

Version 1	Levels, progress visualization, badges, performance statistics, goals
Version 2	Competition, leaderboard, in-game rewards
Version 3	Networking, common goals, cooperation
Version 4	Narrative, role-play, goals
Non-gamified	None

Each participant was randomly assigned one version of the interactive interface and a video that described how the corresponding application would work in everyday life (i.e., at work, in the park, at the bus stop) during a pandemic. After familiarizing themselves with the application through the interface and the video, the participants were asked to imagine themselves using the application during a pandemic and evaluate it in terms of gameful experience, intrinsic motivation, and extrinsic motivation. Thus, gameful experience and intrinsic and extrinsic motivation were solely based on these different designs presented to the participants.

The data analysis was conducted using SmartPLS 4, where a factor weighing scheme was used to assess the reliability and validity measures, and a path weighing scheme with 5000 subsamples bootstrapping for assessing the path model. Gameful experiences are subjective, and the premise is that different gameful and even non-gamified designs can in some cases induce overlapping experiences. Therefore, we analyzed the responses based on all gamification versions (including non-gamified) together.

3.2. Measurement

Expected intrinsic motivation was measured using a four-item scale adapted from [16]. We used the perceived benefits as a proxy for extrinsic motivation, which was measured using four items adapted from [16]. To measure the expected gameful experience, we used the instrument adapted from [6]. The adaptations focused on transforming the items to fit the social distancing context. Participants evaluated all items on a 7-point Likert scale (1 strongly disagree - 7 strongly agree). The measurement tool is presented in the appendix 6.

3.3. Participants

The participants were recruited through the Prolific crowdsourcing platform. Each participant who completed the study received monetary compensation (2.77 £). A total of 937 valid responses were received, while incomplete, non-engaged responses and those that failed to pass the implemented attention checks were removed (n=187 - 39 in Version 1, 39 in Version 2, 36 in Version 3, 38 in Version 4 and 35 in non-gamified version). Of the participants, 184 were assigned the gamification Version 1, 176 the Version 2, 182 the Version 3, 170 the Version 4, and 225 were assigned the non-gamified version. The participants represented 59 different nationalities, the most predominant being British (205 respondents, 21.9 %), Polish (144 respondents, 15.4 %), and South African (133, 14.2 %). The participants were between 18 and 78 years of age, 30.0 on average (SD=10.5, Mdn=27). Of the participants, 508 identified as men, 420 women, 6 non-binary, 1 queer, and 2 preferred not to disclose. 391 participants were employed full-time, 276 students, 86 self-employed, 84 employed part-time, 67 unemployed, 33 others (e.g., homemakers, retired, long-term sick leave, disabled).

3.4. Reliability and validity

Reliability and validity measures for the reflective constructs are depicted in Table 3. Cronbach's alpha exceeded the threshold of 0.7 for all constructs, implying an acceptable level of reliability [34]. AVE values exceeded 0.5 for all constructs, while composite reliability values were more than 0.7, indicating that convergent validity was obtained [35].

Table 3
Reliability and validity

	Cronbach's alpha	CR	AVE
Accomplishment	0.880	0.885	0.807
Challenge	0.787	0.789	0.701
Competition	0.865	0.867	0.787
Extrinsic	0.936	0.936	0.839
Guided	0.807	0.813	0.722
Immersion	0.847	0.881	0.764
Intrinsic	0.945	0.945	0.857
Playful	0.864	0.864	0.786
Social	0.918	0.922	0.710

Table 4
Fornell-Larcker criterion

	1	2	3	4	5	6	7	8
1. Accomplishment	**0.898**							
2. Challenge	0.777	**0.837**						
3. Competition	0.751	0.738	**0.887**					
4. Extrinsic	0.707	0.598	0.624	**0.916**				
5. Guided	0.748	0.694	0.598	0.635	**0.849**			
6. Immersion	0.777	0.740	0.709	0.621	0.696	**0.874**		
7. Intrinsic	0.730	0.663	0.725	0.843	0.631	0.661	**0.926**	
8. Playful	0.751	0.714	0.752	0.673	0.657	0.724	0.762	**0.886**
9. Social	0.686	0.627	0.680	0.649	0.667	0.686	0.718	0.774

Table 5
Heterotrait-Monotrait ratio

	Acc	Ch	Comp	Ext	G	Imm	Int	P
Challenge (Ch)	0.934							
Competition (Comp)	0.860	0.894						
Extrinsic (Ext)	0.777	0.695	0.692					
Guided (G)	0.886	0.869	0.712	0.727				
Immersion (Imm)	0.889	0.898	0.816	0.681	0.831			
Intrinsic (Int)	0.800	0.767	0.801	0.897	0.720	0.724		
Playful (P)	0.860	0.864	0.868	0.749	0.785	0.834	0.843	
Social	0.759	0.733	0.759	0.697	0.773	0.761	0.767	0.866

We assessed discriminant validity using the Fornell-Larcker criterion (Table 4) and heterotrait-monotrait ratio (HTMT) (Table 5). Fornell-Larcker criterion, which states that the square root of AVE of a construct (bolded) should be higher than its correlation between other latent constructs was satisfied for all cases [35]. The HTMT criteria, which states that each value should be less than 0.9 [36] was satisfied for all cases, except challenge-accomplishment, for which it was 0.934. However, the value of 1 did not fall into the 10% confidence interval for the HTMT criterion ([0.904, 0.961]), suggesting that discriminant validity was established [36].

4. Results

The model accounted for 67.5% of the variance for intrinsic motivation and 57.2% for extrinsic motivation, therefore gameful experiences explained a substantial amount of the variances in motivations [37]. Social experience was positively associated with intrinsic (β=0.204, p<.001) and extrinsic motivation (β=0.161, p<.001) (Table 6). Competition was associated with intrinsic motivation (β=0.208, p<.001), but not with extrinsic at the p<0.05 level, although some evidence for this association was found. Immersion was not associated with intrinsic or extrinsic motivations, similar to challenge. Accomplishment was positively associated with intrinsic (β=0.200, p<.001) and extrinsic (β=0.324, p<.001) motivation. Similarly, playfulness was positively associated with intrinsic (β=0.270, p<.001) motivation and with extrinsic (β=0.177, p<.001) motivation. Guided was associated with extrinsic (β=0.152, p<.001) motivation, but not intrinsic. The results show that the strongest contributor to intrinsic motivation was playfulness followed by competition, and the strongest for extrinsic was accomplishment, followed by playfulness. Overall, four dimensions were associated with intrinsic motivation, and four with extrinsic.

Table 6.
Paths between gameful experiences and motivations (significant associations at p<.05 level bolded)

	β	*p*	CI 2.5%	CI 97.5%
Social -> Intrinsic	**0.204**	**0.000**	**0.127**	**0.278**
Social -> Extrinsic	**0.161**	**0.000**	**0.079**	**0.242**
Competition -> Intrinsic	**0.208**	**0.000**	**0.134**	**0.281**
Competition -> Extrinsic	0.081	0.056	-0.003	0.163
Immersion -> Intrinsic	-0.024	0.508	-0.095	0.047
Immersion -> Extrinsic	0.002	0.955	-0.079	0.090
Challenge -> Intrinsic	0.018	0.630	-0.056	0.095
Challenge -> Extrinsic	-0.048	0.285	-0.136	0.042
Accomplishment -> Intrinsic	**0.200**	**0.000**	**0.119**	**0.282**
Accomplishment -> Extrinsic	**0.324**	**0.000**	**0.221**	**0.426**
Playful -> Intrinsic	**0.270**	**0.000**	**0.190**	**0.353**
Playful -> Extrinsic	**0.177**	**0.000**	**0.079**	**0.273**
Guided -> Intrinsic	0.048	0.152	-0.017	0.113
Guided -> Extrinsic	**0.152**	**0.000**	**0.076**	**0.231**

We also examined how the associations differ across gamification types (Table 7). Among those assigned to Version 1 (achievement & progression-based gamification), competition was associated with intrinsic motivation (β=0.184, *p*=0.028), accomplishment with intrinsic motivation (β=0.184, *p*=0.019), and playful with both intrinsic (β=0.418, *p*<.001) and extrinsic (β=0.405, *p*=0.001) motivation. Among those assigned to Version 2 (competitive gamification), playful was associated with intrinsic (β=0.433, *p*<.001) and extrinsic (β=0.345, *p*<.001) motivation, accomplishment with extrinsic motivation (β=0.201, *p*=0.028) and guided with extrinsic motivation (β=0.262, *p*<.001). Among respondents assigned to Version 3 (social gamification), social experience was associated with intrinsic (β=0.198, *p*=0.016) and extrinsic (β=0.237, *p*=0.017) motivation, competition with intrinsic motivation (β=0.294, *p*=0.001), accomplishment with extrinsic motivation (β=0.397, *p*=0.003), and playful with intrinsic motivation (β=0.319, *p*=0.001). Finally, among those assigned to Version 4 (immersive gamification), social experience was associated with intrinsic (β=0.176, *p*=0.034) and extrinsic (β=0.260, *p*=0.005) motivation, competition with intrinsic motivation (β=0.239, *p*=0.011), immersion with intrinsic motivation (β=0.225, *p*=0.008), and accomplishment with extrinsic motivation (β=0.296, *p*=0.011).

5. Discussion

This study used data from an online vignette-based study to explore the relationships between the different gameful experience dimensions and intrinsic and extrinsic motivation, using social distancing to keep individuals safe during pandemics as the context. While prior studies have examined how different gamification designs provide intrinsic and extrinsic motivation [11,28], the corpus lacked studies to examine the specific subjective experiences stemming from using gamification that transform activities to become intrinsically or extrinsically motivated. Therefore, this study provides a unique contribution to the existing corpus of gamification research by addressing this gap.

Table 7
Paths between gameful experience dimension and motivations across gamification types (significant associations at p<.05 level bolded)

	Version 1		Version 2		Version 3		Version 4	
	β	*p*	β	*p*	β	*p*	β	*p*
Social -> Intrinsic	.161	.102	.151	.102	**.198**	**.016**	**.176**	**.034**
Social -> Extrinsic	.077	.420	.074	.395	**.237**	**.017**	**.260**	**.005**
Competition -> Intrinsic	**.184**	**.028**	.152	.069	**.294**	**.001**	**.239**	**.011**
Competition -> Extrinsic	.155	.084	.009	.914	.145	.169	.139	.175
Immersion -> Intrinsic	-.010	.902	-.047	.609	-.121	.088	**.225**	**.008**
Immersion -> Extrinsic	-.012	.907	.113	.260	-.107	.223	.078	.473
Challenge -> Intrinsic	-.031	.698	-.007	.938	-.053	.584	.050	.468
Challenge -> Extrinsic	-.014	.870	-.119	.216	-.045	.708	.050	.567
Accomplishment -> Intrinsic	**.204**	**.019**	.157	.114	.188	.070	.088	.363
Accomplishment -> Extrinsic	.152	.169	**.201**	**.028**	**.397**	**.003**	**.296**	**.011**
Playful -> Intrinsic	**.418**	**.000**	**.433**	**.000**	**.319**	**.001**	.104	.237

Based on the results, the gameful experience dimensions stemming from using gamified systems are associated with both intrinsic and extrinsic motivation. One of the central premises of gamification is that it transforms activities to provide similar positive experiences as games do, generally making them intrinsically motivated and therefore direct users towards desirable behaviors [8,22]. Our results support this central argument for why gamification can bring about a sustained behavioral change as four of the seven dimensions of the gameful experience were associated with intrinsic motivation. Moreover, while our results reveal that four gameful experience dimensions are also associated with extrinsic motivation, only one (guided) was solely associated with extrinsic motivation, without providing intrinsic motivation.

The gameful experience dimensions associated with intrinsic motivation were social experience, competition, accomplishment, and playfulness. These dimensions of the gameful experience can be seen to reflect the three basic needs that are associated with intrinsic motivation according to the SDT [17]. Whereas social experience is likely to tap into the need for relatedness by fostering connectedness to other gamification users, competition and accomplishment can be expected to satisfy the need for competence as they provide feedback on the user's behavior, either based on individual goals imposed by the gamified system or in relation to other users [6,17]. Playfulness, on the other hand, is likely to satisfy the need for autonomy as it is associated with exploration and spontaneity [6]. Moreover, these results resonate with prior research which has demonstrated that social and achievement-based gamification are associated with autonomy, competence and relatedness need satisfaction, contributing to intrinsic motivation [28].

Somewhat unexpectedly, immersion, challenge and guided were not associated with intrinsic motivation. The non-significant associations between immersion and intrinsic motivation and challenge and intrinsic motivation were especially surprising as overcoming challenges and being immersed are some of the defining characteristics of games and qualities that make games motivating and enjoyable [24,30]. A possible explanation is that in the social distancing setting that entails factors that are uncontrollable by the individual, yet affect social distancing behavior, challenge and immersion fail to support the basic needs of autonomy and competence, and therefore provide intrinsic motivation. For example, even if the individual is challenged to social distance, they might not be able to meet the demands due to the circumstances in their daily lives (e.g., working and family arrangements), which hinders the sense of autonomy and competence. Additionally, the utilitarian focus of guided that is targeted toward fulfilling goals that are external to the gamified system is likely to explain why guided was not associated with intrinsic motivation but only the perceived benefits [6].

Besides guided, social experience, accomplishment and playfulness were positively associated with extrinsic motivation, implying that these dimensions are perceived to serve a utilitarian goal in addition to providing an intrinsically motivating experience. The association between playfulness and extrinsic motivation was surprising, as playfulness is characterized by being carefree, while engaging in free exploration that is not confined by rules. One possible explanation relates to the context of this study, as social distancing can be mentally straining, and injecting such activity with a sense of carefree playfulness might be perceived as providing extrinsic benefits to individual well-being.

However, the associations between different gameful experience dimensions and motivations were not completely consistent across gamification types. For example, the sense of accomplishment that stems from using achievement & progression -based gamification features (Version 1) induced intrinsic motivation, whereas the sense of achievement stemming from using competitive (Version 2), social (Version 3) or immersive (Version 4) gamification were associated with extrinsic motivation. This implies that the gameful experiences cannot be thought of as separate from the gamification designs that induce them. Instead, how the gameful experiences are induced affect their overall motivational qualities.

6. Limitations

This study has four main limitations. First, while the vignette methodology allows creating situations that resemble real-life and easily manipulate the stimulus that is presented to each participant [33], studies conducted in real-world contexts might yield different results regarding the associations between gameful experience

dimensions and types of motivation. Second, the study was conducted in the social distancing context, which might hinder the generalizability of the results. During COVID-19, the pressure to social distance imposed by social settings was prominent, and therefore the relationships between gameful experience dimensions and motivations might differ when targeting different safety or other prosocial behaviors that are perceived as 'voluntary' or charitable. Third, while the discriminant validity measures satisfied the laxer criteria, some gameful experience dimensions were highly related [36]. Fourth, we combined different commonly used gamification elements in the versions that were presented to the participants, potentially hampering understanding of the granular effects of considering individual affordances in isolation that might have yielded different results in terms of the relationships between different gameful experiences and motivations.

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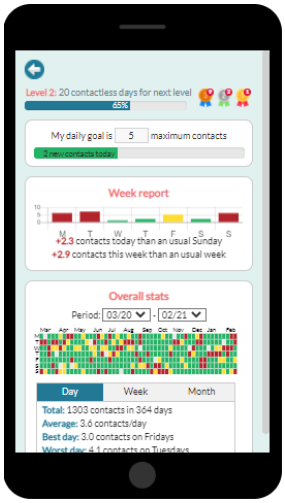
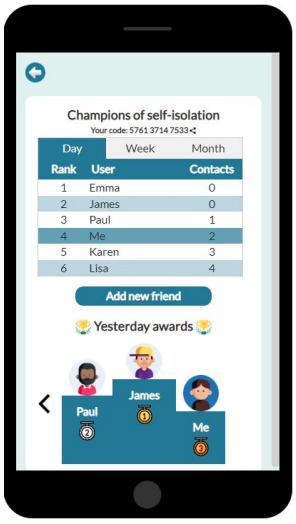
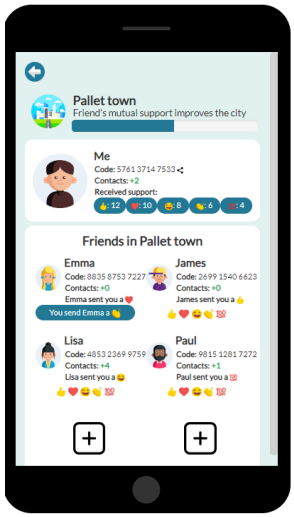
Appendix 1. Version 1



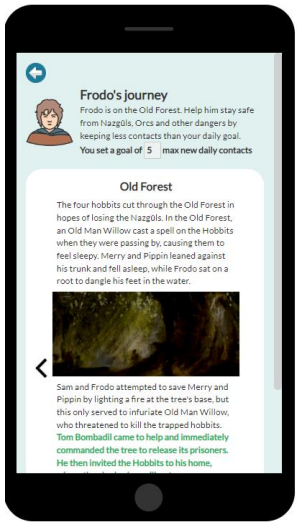
Appendix 2. Version 2



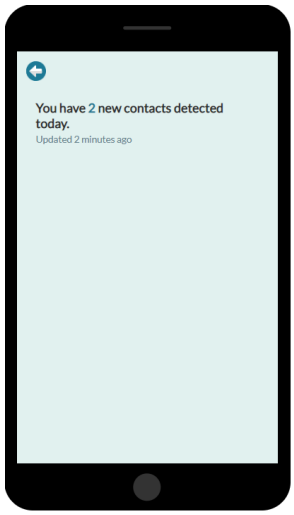
Appendix 3. Version 3



Appendix 4. Version 4



Appendix 5. Non-gamified version



Appendix 6. The measurement instrument

Construct	Item	Factor loading
Accomplishment	*Overall, the application would…*	
	...inspire me to maintain my standards of social distancing performance.	0.908
	…motivate me to progress and get better at social distancing	0.914
	…give me the feeling that I need to reach social distancing goals	0.872
Challenge	…make me push my limits in social distancing	0.857
	…challenge me	0.816
	…motivate me to do things related to social distancing that feel demanding	0.838
Competition	…inspire me to compete in social distancing	0.886
	…make me want to be in first place	0.880
	…makes victory feel important	0.894
Guided	…give me a sense of being directed in my social distancing endeavors	0.845
	…give me a sense of knowing what I need to do to …do better in social distancing	0.860
	…give me feedback for adapting my social distancing behavior	0.844
Immersion	…make me feel absorbed in social distancing	0.818
	…make me feel deeply involved in social distancing	0.899
	…cause me to feel deeply engaged in social distancing	0.905
Playful	…make social distancing feel like an adventure	0.892
	…give me a sense of discovery through social distancing	0.875
	…make social distancing appeal to my curiosity	0.892
Social	…give me the feeling that I'm not on my own while social distancing	0.777
	…give me a sense of social support while social distancing	0.875
	…give me a feeling of being connected to others while social distancing	0.858
	…make me feel like I am socially involved with others while social distancing	0.876
	…give me a sense of having someone to share my social distancing endeavors with	0.821
	…make social distancing feel like it has a social aspect	0.846
Intrinsic motivation	I think that during the COVID-19 pandemic...	0.927
	...using this application would make me feel content	
	...using this application would make me feel accomplished	0.923
	...using this application would make me feel fullfilled	0.926
	...using this application would make me feel satisfied	0.928
Extrinsic motivation	I think that during the COVID-19 pandemic...	
	...using this application would be advantageous to me.	0.921
	…using this application would provide gains to me.	0.898
	…using this application would result in benefits to me.	0.918
	...using this application would be favorable to me.	0.928