



Development and Validation of the General-Purpose PlayfulQuest Scale: Investigating Playfulness in Dating App Use

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Abstract

Play and playfulness are usually considered inherent characteristics of an exploring and self-actualizing human being. Although play and its forms of manifestation in human activity and development have been studied for decades, measuring instruments regarding playfulness are still rare. The existing instruments mainly focus on trait-based approach while playfulness in the dynamic processes of contextual engagement has remained largely unaddressed. In this study, a novel psychometric scale *PlayfulQuest* was developed and validated with Finnish survey data (N=2,278). The scale measures perceived playfulness of contextual engagement in three factors: *Immersive Focus*, *Autotelic Priority*, and *Non-Real Framing*. The scale development was carried out in the context of dating activities, with a particular focus on dating app use. Autotelic Priority appeared as a strongest predictor of playful approach, while Non-Real Framing was identified as the main predictor of perceiving the app use in terms of game-like experience. It was also revealed that the non-users of dating apps demonstrated higher scores in the all three factors of playfulness in comparison to the group of dating app users. Although the validation of the scale is done in the dating context, it is designed to function as a general-purpose instrument for studying playful engagement across varying contextual activities, regardless of whether they are considered gaming, play, or something else.

CCS Concepts

• **Human-centered computing** → **Empirical studies in HCI**; *HCI theory, concepts and models*.

Keywords

playfulness, playful experience, contextual engagement, inventory development, scale validation, dating apps

ACM Reference Format:

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1 Introduction

According to Miguel Sicart [32], play is a mode of being human and being in the world. This statement describes how, in the academic world, play is deemed as an essential human characteristic [16] and is considered to be an example of intrinsically motivated human activity, where spontaneous curiosity, explorative attitude towards the environment, and search for challenges are emphasized [28]. It is widely accepted that play has an important role in the human development process, especially in childhood [6, 8, 12, 22, 37]. However, a growing number of studies have shown that play can have numerous positive effects on adults as well. Such positive implications of play have been identified in many fields of human life, including psychiatry (e.g., [4]), work (e.g., [1, 23]), creativity (e.g., [24]), and learning (e.g., [35, 36]).

In his book 'Play Matters', Sicart [32] has defined play as being inevitably contextual activity, and describes it as follows: Playful activity can be considered carnivalesque (in that sensemaking through play manages between creation and destruction), appropriative (in that it takes on the context in which it situates), disruptive (in that it breaks the preceding state of affairs), autotelic (in that its purpose is the activity of play itself), creative (in that it affords self-expression), and personal (in that it essentially is a subjective mode of being).

Although play is inherent in humans, we do not always act playfully. According to Apter's [2, 3] theory of psychological reversals, the metamotivational states of either being serious minded or playful constantly fluctuate in individuals. The former mode refers to a motivational orientation with a commitment to long-term goals (i.e., *telic* orientation) while the latter mode denotes an orientation that prioritizes spontaneity and excitement seeking in the present engagement with a context (i.e., *paratelic* orientation). This approach can be considered as a lens for understanding the fundamental psychological mechanism of applying playfulness in a given situation. Being playful thus denotes a psychological potential of individuals to transform a playful attitude, incorporating a need to seek fun and excitement, into the ways they encounter different contexts and how they engage with them [3, 32].

How playfulness is embedded in the dynamic processes of situated engagement within adult individuals is severely understudied area of research [31]. Currently, there are psychometric instruments that can assess adult playfulness as a stable personality trait, either as a single global score (e.g. [25]) or as a multidimensional construct (e.g. [26, 27]). However, if we are to accept the idea that the states of playfulness fluctuate constantly, and people's potential to act playfully and experience playfulness vary in different contexts, places and times, it is important to develop means to measure and assess playfulness with an orientation towards contextual engagement

and the related experience. Hence, rather than addressing playfulness as personality traits, there is also need for an instrument that treats playfulness and its experiential dimensions explicitly in terms of contextual engagement, in a manner that is applicable to varying contexts of activity regardless of whether the activity is deemed as gameplay, play, or some other kind of activity. However, such psychometric instruments for assessing different dimensions of playful engagement in context are scarce (if any). To our knowledge, so far only one previous study [31] has preliminarily explored the situational functioning of playfulness.

Development and validation of survey instruments is valuable not only in regard to its potential applications in studying the role of playfulness in different contexts (e.g., learning and wellbeing), but also in general empirically reorganizing the conceptual understanding of play. Dating applications provide a compelling context for studying playfulness because they merge goal-oriented social interaction with design features that can be appropriated for entertainment and self-expression. As Garda and Karhulahti [10] argue, many dating apps incorporate mechanics and aesthetics reminiscent of digital games which can invite users to approach the experience as “a game.” This aligns with a notion [19] that playfulness is realized through playful organization of both the context and the engagement, arising from the interplay between the design’s affordances and the user’s playful framing of the activity. Given the hybrid nature of dating apps simultaneously facilitating serious relational objectives and enabling spontaneous, imaginative engagement, these apps represent an intriguing setting for examining how contextual factors shape the expression of playful orientations in technology use.

The goals of this study are twofold: Firstly, we develop and validate a general-purpose inventory that measures perceived playful experiences in a particular contextual engagement. In terms of playfulness, this scale development task complements an existing measure for assessing perceived gameful experiences of a system use [15]. This new instrument fills a research gap by focusing on an open ended territory of playful experiences instead of a more structured and confined field of game-like experiences. Secondly, the scale development task is conducted in the context of dating activities, in order to investigate the potential role of playful entertainment in the use of dating apps.

2 Theoretical Background

2.1 Constitutive Elements of Playful Engagement

Previous research has proposed varying definitions of playfulness as well as approaches to identify its constitutive elements. For the purposes of laying a conceptual foundation for developing a general-purpose scale for identifying manifestations of playfulness in engagement, we needed a coherent conceptual construct of playfulness that would broadly integrate the earlier accounts (i.e., how playful engagement appears in academic discussions of different disciplines) and thus be widely applicable to different contexts.

A recent systematic literature review, by Masek and Stenros [19], offered a cross-disciplinary and integrative take on the definitions of playfulness and characterizations of the constitutive elements of playful engagement. As this review highlights engagement and

playful organization of context in its synthesis [19, p. 23], it aligned well with the scale development task that has its focus on contextual dynamics of playful engagement. Furthermore, the rigorous and broad scope of the review allows for very good possibilities for their model to maintain conceptual relevance to discipline-specific established accounts on playfulness, such as trait-based psychological approaches [25–27] as this field of literature was also included in the review. For these reasons we decided to adopt the resulting thematization of the Masek and Stenros’s study [19] as a basis for defining hypothetical dimensions of playfulness. These six themes are presented below. The first three of them emphasize different ways of structuring engagement as more important (i.e., higher priority) than its context. The latter three themes describe structural characteristics of playfully prioritized engagement.

The first theme, resulted in the review [19], is called *Focused*. It depicts playfulness as “a degree of engagement with a single context”, with the focus on the attentional fullness of an individual. The second theme is called *Openness*, and it defines playfulness in terms of a general willingness and exploratory curiosity to engage with any context. The third theme, called *Framing*, is about how an individual changes one’s perceived context (i.e., re-frames and thus appropriates the context) in order to further engage with it. The fourth theme, *Non-Consequential*, defines playfulness as “engaging in an activity without an expected outcome”. This theme relates with paratelic and autotelic orientations in the ways of prioritizing means (i.e., the engagement) over ends (i.e., external consequences). The fifth theme, called *Non-Real Reality*, describes playful engaging with the contextual reality “in a way that is knowingly false”. It relates heavily with the use of imagination and imagined realities in prioritizing engagement over external reality within the playful framing of the context. And finally, the sixth theme is called *Unconventional*, in which playfulness is defined as prioritizing engagement over conventionality and therefore deliberately/creatively choosing unconventional patterns (i.e., new ways of doing activities) while engaging with the context.

2.2 Playful Entertainment Potential in Dating Apps

In their recent analysis of Tinder, a mobile dating app, Garda and Karhulahti [10] argue that such apps can be equated to games as they invite people to a system of interaction mechanics that include game-like features. In interactional terms (see [11]), dating app environments incorporate affordances and incentives to engage with activities of dating as game play – and vice versa. In Tinder, these features include, for example, mandatory profile construction, in which the self-presentation’s correspondence to actual personal data may be playfully tweaked (thus prioritizing the non-real in managing “strategic authenticity”), and the swiping activity – the core mechanic of the app – that involves cognitive-kinaesthetic play on seemingly endless chain of stimuli and the related binary choices of being-interested-or-not [10].

However, game-like organization of features in dating apps does not alone explain the potential playful experiences in the user. Playfulness is essentially a subjective feature, which can appropriate (i.e., playfully frame) various types of contexts, including dating activities [10]. Masek and Stenros [19] have discussed the so-called

organizing principle of playfulness, which means that it is basically a synthesis of playfully organized engagement of a subject (by conscious or unconscious choice) and playful organization of the context (by design). Therefore, in line with Apter’s [3] reversal theory, dating app users may occasionally, either consciously or unconsciously, choose to focus on the engagement of the present and its playful potential (i.e., paratelic orientation) over more “serious” long-term consequences (i.e., telic orientation) in their activities.

Dating apps can serve different parallel purposes to their users that go beyond their intended long-term goals, such as, seeking a relationship [29, 34]. On the basis of the argument of Garda and Karhulahti, we may hypothesize that dating apps may offer features that invite at least some of their users to frame the engagement with these apps as fun and non-serious entertainment, thus subjectively constituting a ludic environment where “emotionally and sexually exciting social interaction can (but need not) be ‘just a game’” [10, p. 255]. Such playful framing should prominently constitute characteristics of playful engagement [19], reflecting a paratelic excitement-seeking attitude on the dating activities [3].

3 Research Questions

The research questions (RQs) of the current study are as follows: (1) What kind of dimensions of playfulness can be identified with Exploratory Factor Analysis (EFA) and confirmed with Confirmatory Factor Analysis (CFA)? Hypothetical six dimensions of playfulness are based on a literature review [19] integrating several fields of research. (2) What kind of playful qualities are involved in dating app use? How do they differ from dating experiences not involving dating apps? For the second RQ, it is hypothesized that dating apps provide mechanisms and incentives of gameful entertainment that would show as increased levels of playfulness and playful/paratelic framing of engagement in comparison to dating experiences outside dating app uses.

4 Methods

4.1 Survey Participants and Procedure

Two large-scale survey samples were collected in Finland to study the dimensionality and structure of the initial *PlayfulQuest* inventory (RQ1). The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Participants for the first survey were recruited through the market research company Bilendi Ltd. Bilendi holds a large panel of over four million panelists in 37 countries. The survey targeted Finnish adults (ages 18-80). A nationally representative sample (N=1,000) according to age groups and gender identity was then collected. All participants were asked to carefully read through the data privacy policy document prior to taking the survey. After reading the data privacy policy statement, all survey participants provided their written informed consent in which they agreed to participate in the study.

Since the survey’s objective was to inquire about individuals’ experiences using dating apps, we did not know prior to the data collection which proportion of the sample of 1,000 participants would have firsthand experiences with these apps. This posed a risk in data collection, as it was possible that only a handful participants

Table 1: Descriptive statistics of the two samples. Reporting demographics, proportions of dating app users, and expenditure on primary dating app.

	Sample 1	Sample 2
Total number of respondents	1000	1178
Dating app users	537	1139
Male gender identity	260	426
Female gender identity	277	670
Non-binary gender identity	0	36
Mean age	41.3	34.0
Mean expenditure in euros on their primary dating app	19.4	40.2
Users who have not used money on their primary dating app	70.7%	62.6%
Non-users	463	39
Male gender identity	232	22
Female gender identity	229	13
Non-binary gender identity	2	4
Mean age	49.4	33.7

from the representative sample would have firsthand dating app experiences to report. Because of this, we organized another data collection process in collaboration with The Finnish Public Service Media Company Yle. This process was organized as a convenience sample collection, in which Yle communicated about the survey opportunity to their viewers, listeners, and social media followers who had firsthand dating app user experiences. Yle communicated widely about the survey across their media channels. As a result, a total of 1,179 survey responses were submitted in this convenience sample collection.

The two datasets were kept separate from each other as they were evidently collected using different criteria and as the first sample was collected in a way that represented the age group and gender distribution of the Finnish adult population. The questionnaires in the two data collection processes were identical. In both processes, it took approximately 22 minutes for a survey participant to complete the survey and submit their responses. Table 1 reports the descriptive statistics of the two samples.

From Table 1, it can be concluded that using dating apps is rather common within the Finnish adult population, as 53.7 % of the Sample 1 had first-hand experience using at least one dating app, regardless of whether they currently considered themselves to be active dating app users or not. The second data collection, which was targeted specifically at dating app users, also managed to reach them efficiently, as 96.7 % of the respondents of the second survey had first-hand experiences of being a user of such an app.

4.2 *PlayfulQuest* Inventory Development

We adhered to a scale development procedure as outlined by Phan et al. [21]. This process included the initial creation of an item pool, expert review of the pool, conducting at least one exploratory factor analysis, and performing a theory-driven confirmatory factor analysis.

In constructing the initial *PlayfulQuest* inventory, we maintained a principle of including at least four items per hypothesized dimension to ensure robust factor identification in the exploratory factor analysis. This approach was informed by best practices in psychometrics, which recommend a minimum of three items per factor for reliable representation [5]. However, to increase the robustness of our analysis and address the preliminary nature of our categorization, we decided to include one additional item per factor.

We developed four items to assess each of the six proposed dimensions of individuals' playful orientation toward engaging with their experiences. These items were based on the general categories of playful orientation as identified by Masek and Stenros [19]. Specifically, four items each were crafted to evaluate the dimensions of Focused, Openness, Framing, Non-Consequential, Non-Real Reality, and Unconventional. The 24 items underwent review by four experts in a focus group meeting—an essential step for ensuring content validity in scale development studies, as noted by Jensen [17] and Cabrera-Nguyen [7]. The focus group suggested minor revisions to the wording of the items.

Two versions of the PlayfulQuest question prompt were formed, one for dating app users and one for non-users. This was justified as the PlayfulQuest inventory was developed as a measurement tool for assessing the general playful orientations of individuals. Therefore, based on the theory, we considered the items to be valid indicators of both dating app use and dating as a more general cultural practice.

In the questionnaire, dating app users (N=537 in Sample 1, N=1,137 in Sample 2) responded to the PlayfulQuest inventory framed by the following prompt: "Reflect on the dating app you use the most. Consider the statements below from the perspective of your own experiences using the service, and indicate for each statement how much you agree or disagree with it. Answer by continuing the sentence: 'When I use this dating service, it is characteristic of me...'" In contrast, survey participants (N=463) who had no firsthand experience using dating apps responded to the inventory with the following prompt: "Reflect on your own dating experiences and how you typically behave in dating situations. Respond to the statements below by choosing how much you agree or disagree with each statement. 'When I am dating, it is characteristic of me to...'" Respondents in both subgroups answered identically worded inventory items using a 7-point Likert-type ordinal scale (1=Completely disagree, 7=Completely agree).

5 Results

5.1 Exploratory Factor Analysis

An exploratory factor analysis was carried out using Stata/SE 17.1. Before conducting the EFA, we investigated the suitability of the PlayfulQuest inventory for factor analysis using the representative Finnish subsample of dating app users (N=537). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the dating app users was 0.962, and the Bartlett's test of sphericity yielded a Chi-square of 7003.476, $df = 276$, $p < 0.001$. These results indicated that the inventory was suitable for factor analysis. Therefore, we proceeded to determine the number of factors to be extracted from the 24-item PlayfulQuest inventory.

Next we conducted the EFA with the subsample of dating app users (N=537). The number of factors was identified through a parallel analysis (PA) test [14], which suggested a three-factor solution after 200 iterations. Consequently, an EFA with three factors was performed using oblimin rotation. We chose oblimin over orthogonal methods like varimax because it allows for correlations between factors [20]. Given there was no theory-based reason to assume the dimensions of the PlayfulQuest inventory would be independent of each other, using oblimin rotation was justified.

We set a factor loading threshold of 0.4 as the criterion for an item's inclusion on a factor [20, 33]. In the rotated solution for the playful orientations of dating app users, five items exhibited loadings below 0.4. We report the complete factor loadings for the 24-item scale with the app users' subsample in Table 2.

The results of the EFA reveal that the four items devised to measure the hypothesized dimension of Focused (items 1-4) all converged on the third factor. This factor also includes one item from the Openness dimension (item 6) and one from the Framing dimension (item 10). We have named this factor *Immersive Focus*, highlighting a playful orientation that involves fully dedicating one's attention to ongoing experiences by immersing deeply in its interactions. Contrary to the initial hypotheses, the dimensions of Openness and Framing largely merged within this three-factor structure, indicating a more integrated approach to these aspects of playful engagement.

The items developed for assessing the Non-Consequential dimension of playful orientation (items 13-16) all loaded on the second factor. In addition to these items, an item developed to measure Openness (item 7) also loaded on this factor. We have named this factor *Autotelic Priority* as the items with the highest loadings on this dimension refer to the immediate experience itself, without external goals attached to that experience.

Items 17-20 all loaded on the first factor. These items were developed to measure the hypothesized dimension of Non-Real Reality. In addition, three items designed to assess the Unconventional dimension, along with item 11, which was devised to measure the Framing dimension, also loaded on this factor. We have named this factor *Non-Real Framing*, as the items that describe the act of make-believe and imagining a situation to be different from what they are showed the highest loadings on this factor.

5.2 Confirmatory Factor Analysis

The empirical evidence from the exploratory factor analysis conducted with the Sample 1 dating app users (N=537) supported the design of a confirmatory factor analysis on the three-factor PlayfulQuest model. Our aim with the CFA was to address the identified research gap in the current literature regarding the assessment of playful orientation in engaging with contextual experiences.

The objective of the CFA process was to validate a shortened version of the three-factor PlayfulQuest instrument. Since it has been argued that at least three items per factor should be included for a reliable representation of each dimension [5], we decided to reduce the EFA-based scale to a nine-item version before conducting the CFA.

Following the methodologies outlined by Matsunaga [20] and Hair et al. [13], we implemented three specific criteria to select items for the CFA. Initially, only items that demonstrated a factor loading greater than 0.5 during the EFA (Table 2) were carried forward to the subsequent evaluation phase, ensuring each met the necessary threshold for factorial validity. Next, we assessed the gaps between the highest and second highest factor loadings for each item, choosing to keep only those where the discrepancy was at least 0.20. This was essential to verify that each item predominantly associated with one distinct factor, thereby reducing cross-loading

Table 2: EFA, dating app users, N=537. Reporting factor loadings and uniqueness for each item. Hypothesized dimensions: Focused (items 1-4), Openness (items 5-8), Framing (items 9-12), Non-Consequential (items 13-16), Non-Real Reality (items 17-20), Unconventional (items 21-24). Factor loadings over 0.4 are bolded.

	Factor 1	Factor 2	Factor 3	Uniqn.	
	Non-real Framing	Autotelic Priority	Immersive Focus		
1	-0.034	0.018	0.753	0.445	To focus my full attention on the ongoing situation.
2	-0.123	0.019	0.768	0.475	To be observant of what is happening in the situation.
3	0.268	0.006	0.531	0.507	To be fully immersed in what I am doing.
4	0.026	0.118	0.687	0.420	To concentrate entirely on the experience at hand.
5	0.349	0.084	0.336	0.581	To be curious to find out what effects my actions have.
6	0.185	0.048	0.579	0.490	To be excited about exploring the situation.
7	0.125	0.492	0.228	0.477	To want to act freely and spontaneously in the situation.
8	0.385	0.153	0.303	0.501	To be excited about the opportunity to try different things.
9	0.348	0.127	0.357	0.515	To mold the situation into my own.
10	0.207	0.115	0.507	0.503	To create situations in which I can express myself.
11	0.615	-0.056	0.288	0.431	To give myself new meanings to the things or actors I encounter.
12	0.142	0.270	0.378	0.567	To take the situation in any way I want.
13	0.035	0.724	0.040	0.411	To be interested in the immediate experience offered by the situation without other goals.
14	-0.075	0.820	-0.007	0.413	To not think about whether the situation has any meaning other than the experience itself.
15	0.192	0.591	0.017	0.441	To consider the experience itself important without thinking about its possible consequences.
16	0.033	0.550	0.234	0.494	To value the present moment more than any specific goal.
17	0.681	-0.070	0.084	0.543	To throw myself into thinking, what if things were something completely different than they are.
18	0.536	0.166	0.116	0.470	To let my imagination run wild.
19	0.705	-0.070	0.093	0.503	To imagine everyday things being different.
20	0.724	0.154	-0.205	0.421	To act as if I were in a completely different world.
21	0.380	0.337	0.122	0.465	To do things in a new way without regard for established habits.
22	0.584	0.292	-0.182	0.449	To behave in a way that deviates from the norm.
23	0.425	0.347	-0.027	0.510	To not let ordinary rules and expectations of behavior dictate my actions.
24	0.590	0.115	0.151	0.420	To try how things would work differently.

concerns and enhancing the clarity of the factor structure and construct validity of the *PlayfulQuest* model. Following these criteria, 17 items were retained for potential inclusion in the CFA.

To determine the final selection of three items per dimension, we conducted a qualitative and theory-driven review of the remaining 17 items. This theory-driven evaluation was applied from the perspective of the original theory framework. We decided to adhere to the theory framework in the item-screening process as the data collected from this study was only from a single cultural environment and only Finnish version of the *PlayfulQuest* inventory was applied. Based on the theory framework, we prioritized those items that aligned with the hypothesized dimensions of playfulness (see Table 2 and the caption). Consequently, items numbered 17, 18, and 19 in Table 2 were selected for the *Non-Real Framing* dimension as all these items were originally developed for assessing the Non-Real Reality dimension. Item 20 was not included in the CFA model as it described acting, rather than the cognitive process of imagination, similar to items 17–19. Items 13, 14, and 15 were selected for the *Autotelic Priority* dimension as all of these items were originally developed for assessing the hypothesized Non-Consequential dimension. Item 16 was excluded from the model because it had a lower loading than the other three items. For the *Immersive Focus* factor, we selected items 1, 3, and 4, all of which were originally developed for assessing the hypothesized Focused dimension. Item 2, also developed for assessing the Focused dimension, was excluded

from the CFA model because it took a different stance on the ongoing experience compared to the other three items of this dimension. The item 2 described an individual's orientation to focus on the situation at hand, whereas items 1, 3, and 4 denoted the first-person experience of the individual. In other words, the excluded item did not specifically describe the active participation of the individual in contrast to the three items that were accepted into the CFA model.

CFA calculations for the nine-item and three-factor *PlayfulQuest* model were next conducted with the dating app users subsample of the convenience sample (N=1,137) using maximum likelihood estimation without missing values. The CFA model is reported in Figure 1.

Next we evaluated the validity of the 9-item *PlayfulQuest* model. To assess the construct validity of the model, we calculated the root mean squared error of approximation (RMSEA), the comparative fit index (CFI), the Tucker Lewis Index (TLI), and the standardized root mean square residual (SRMR) fit indices, in line with recommendations from the confirmatory factor analysis literature [5, 18]. The RMSEA evaluates model fit per degree of freedom, suggesting how well the model fits population data. Values under 0.05 indicate a close fit, and up to 0.08 an acceptable fit. The CFI and TLI compare the model to a baseline model, adjusting for complexity, with values above 0.90 indicating acceptable fit. The SRMR measures the average discrepancy between observed and predicted correlations, where values below 0.08 are preferred. Due to the known limitations of the chi-square test in CFA studies in the context of large

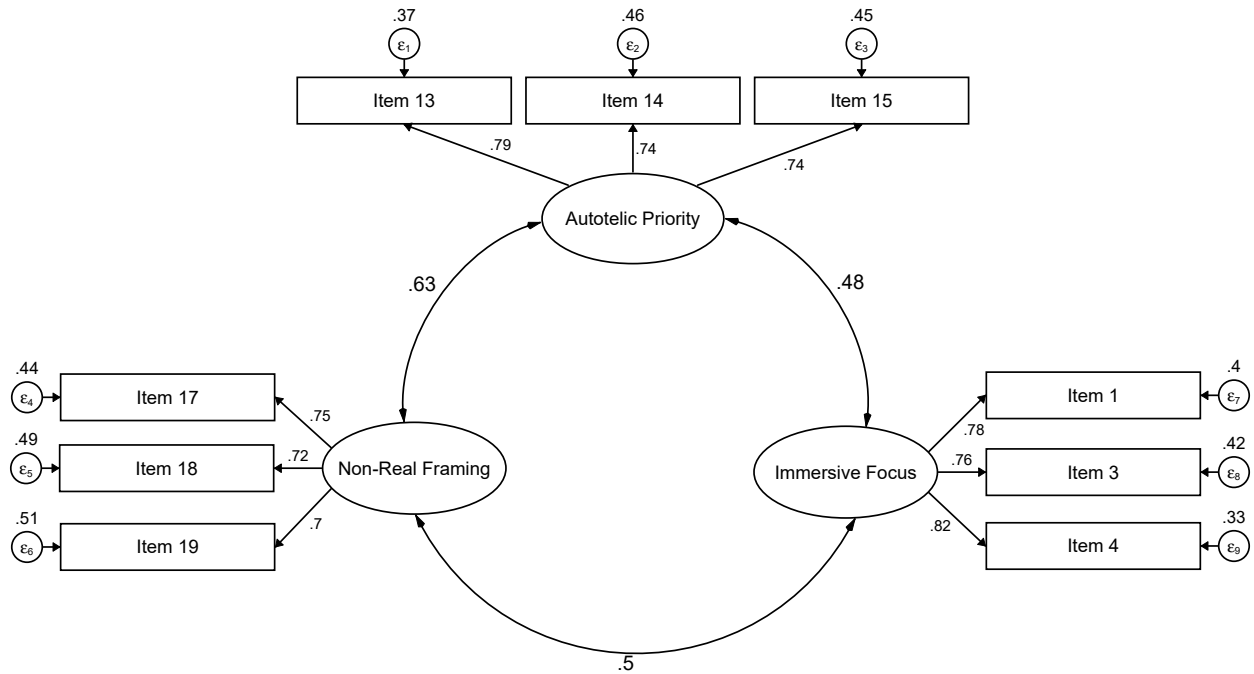


Figure 1: The CFA measurement model for the nine item PlayfulQuest inventory, using the convenience sample (N=1,139). All item loadings and factor covariances are significant on the level of $p < 0.001$. The item numbers correspond with those reported in Table 2 and Table 3.

sample sizes similar to our study [20, 30], we opted not to use this test.

The CFA model reported in Figure 1 had the following fit indice values to the data of 1,137 dating app users: RMSEA 0.059, CFI 0.976, TLI 0.964, and SRMR 0.037. Taken together, these indices suggested a good fit for the 9-item and three factor model. These tests established construct validity for the PlayfulQuest model.

In addition to the construct validity tests, CFA studies should investigate also convergent validity and discriminant validity. Convergent validity, checked through Composite Reliability (CR) and Average Variance Extracted (AVE) tests, confirms that theoretically related items correlate in practice, with CR values above 0.7 and AVE values above 0.5 indicating strong validity. Discriminant validity ensures constructs are distinct, ideally showing that squared correlations between factors are less than the AVEs, confirming the constructs' uniqueness [9, 38]. Table 3 reports the corresponding convergent validity and discriminant validity tests for the PlayfulQuest model (Figure 1). The CR values exceeded the threshold of 0.70 and the AVE values the threshold of 0.50. Furthermore, the squared correlations between factors were smaller than the AVE values. These results provided support for the convergent and discriminant validity of the model.

Table 3: The Composite Reliability (CR) values and the Average Variance Extracted (AVE) values for the three PlayfulQuest factors, and the squared correlations between the factors in the CFA model.

	CR	AVE	Immersive Focus	Autotelic Priority	Non-Real Framing
Immersive Focus	0.830	0.619	1		
Autotelic Priority	0.801	0.573	0.232	1	
Non-Real Framing	0.764	0.520	0.251	0.398	1

5.3 Playful Qualities in Dating App Use

We hypothesized that dating apps provide incentives, mechanics, and features that support gameful modes of interaction, thus enhancing the level of playfulness in app usage (RQ2). To investigate this hypothesis and explore the research question regarding playful qualities in the dating app user experience, we constructed factor sum scores for the three *PlayfulQuest* factors. For this purpose, we first pooled data from dating app users across two samples, and then did the same for non-users (see Table 1). This resulted in two groups of respondents: Group 1, consisting of 1,676 dating app users; and Group 2, comprising 502 non-users.

Before conducting analyses on the PlayfulQuest inventory with these two groups of participants, we calculated scale reliabilities for the three factors for both of the groups. The factors had the following Cronbach's alphas (α) and alpha's confidence intervals (CIs). App users (N=1,676): *Autotelic Priority* $\alpha=0.81$ (CI from 0.79 to

Table 4: Linear regressions between the three factor sum scores of the *PlayfulQuest* inventory and the dependent variables of perceived playfulness and game-like quality of the dating app use. Reporting beta coefficients and explained proportion of variation in outcomes (R²).

	I approach the use of this service playfully'	Using this service feels like I'm playing some kind of game.
Autotelic priority	0.410***	0.019
Non-Real framing	0.054*	0.148***
Immersive focus	-0.161***	-0.069*
Age	-0.028	-0.189***
Female gender	0.130***	0.035
R-squared	0.17	0.07

0.81), *Non-Real Framing* $\alpha=0.77$ (CI from 0.75 to 0.79), and *Immersive Focus* $\alpha=0.83$ (CI from 0.82 to 0.84). Non-users (N=502): *Autotelic Priority* $\alpha=0.72$ (CI from 0.67 to 0.76), *Non-Real Framing* $\alpha=0.70$ (CI from 0.65 to 0.74), and *Immersive Focus* $\alpha=0.82$ (CI from 0.79 to 0.85).

As delineated in RQ2, we aimed to (1) explore the playful characteristics of dating app user experiences and (2) compare them to the playful aspects of traditional dating experiences not involving apps. To study RQ2, we first explored how the three dimensions of the *PlayfulQuest* inventory were associated with experienced playfulness and the game-like quality of dating app use. For this purpose, we calculated linear regressions between the three *PlayfulQuest* factor sum scores, age, and female gender, and the outcome variables of approaching the primary dating app playfully, and experiencing its use as a kind of game.

To assess whether the primary dating app was approached playfully, we utilized a single-item, 7-point Likert scale question specifically developed for this purpose (1=Completely disagree, and 7=Completely agree). A similar method was applied to evaluate the experienced game-like quality of the dating app. The mean value for assessing the playfulness of the dating app approach was 4.19 (20.7% agreed or completely agreed that they approached the dating app playfully), while the perceived game-like quality of the dating app user experience scored 5.03 (44.6% agreed or completely agreed that the app felt like some kind of game). Table 4 reports the results of the regressions and the exact wordings of the outcome variables.

The results of Table 4 indicate that *Autotelic Priority* was the primary predictor of approaching the app in a playful manner. Additionally, female gender, and to a lesser extent, *Non-Real Framing*, were associated with a higher level of playfulness in app use. However, *Immersive Focus* was negatively associated with a playful approach to using dating apps. In contrast to the effects on playful use of dating apps, *Non-Real Framing* was identified as the main predictor of perceiving dating app use as similar to playing a game. *Immersive Focus* also negatively predicted this outcome, as did younger age—with a notably significant effect. The model explained 17% of the variance in the playful approach to dating app use, and 7% of the variance in perceiving the app use as game-like.

To study the prevalence of different dimensions of playfulness in relation to dating app use in comparison to dating practices outside app use, a series of mean comparisons with sum score variables was made. From the Table 5 we can note that dating app users' reported playfulness factor mean values were all clearly statistically lower than those of dating app non-users. The effect sizes of these

Table 5: Pairwise t-test and Effect size tests (Cohen's d) of the three *PlayfulQuest* factors between dating app users and non-users.

	App users (N=1,676)	Non-users (N=502)	p value	Cohen's d
Autotelic Priority	3.76	4.52	<0.0001	-0.57 (CI from -0.47 to -0.68)
Non-Real Framing	3.76	4.18	<0.0001	-0.32 (CI from -0.23 to -0.42)
Immersive Focus	4.31	4.92	<0.0001	-0.50 (CI from -0.40 to -0.60)

differences were moderate in the cases of *Autotelic Priority* and *Immersive Focus*, and weak in the case of *Non-Real Framing*.

6 Discussion

6.1 Critical Reflection on Validating the *PlayfulQuest* Scale

The hypothesized model of playfulness [19] consisted of three orientational methods for structuring playfulness (Focused, Openness, and Framing) and three structural types of playfulness (Non-Consequential, Non-Real Reality, and Unconventional). It is important to notice that the three-factor model, identified in the EFA (see Table 2), retained this dual format, as one of the factors, labeled as *Immersive Focus*, denoted the hypothesized orientational characteristics, and the other two factors, labeled as *Non-Real Framing* and *Autotelic Priority*, corresponded with the structural dimensions. Therefore the main difference in the resulting model is that Openness, Framing, and Unconventional did not carry off as self-contained factors. This, however, does not mean that these dimensions are not important. The present research on *PlayfulQuest* instrument provides a starting point for putting this very promising theoretical construct into empirical testing.

The biggest limitation of the present study concerns the validation process, as the survey did not include additional measures that would have enabled tests of concurrent validity. While the study successfully established the structural and construct validity of the instrument, the absence of concurrent validity tests limits the extent to which its associations with related constructs can be empirically confirmed. This omission was intentional, given that the primary aim was exploratory and focused on developing and validating the first language version (Finnish) of the scale. Future research, and particularly studies aimed at validating the English version, should address this by including established instruments of diverse approaches (e.g., the traditional trait approach of Proyer [26] and the Shen's more interactionist work emphasizing playful states [31]) that allow for more extensive concurrent validity assessments.

Despite the successful validation of the three-factor model, future research instances on *PlayfulQuest* could still consider retaining both EFA and CFA elements for further exploring the original six dimensions and their potential inclusion and role in re-organized models. Such replication tests, preferably conducted in varying application contexts, are particularly important for understanding the collapse of dimensions in the present study, and ultimately for comprehensively validating the empirical operationalization of the Masek and Stenros's construct [19]. In addition, the more context-bound nature of scale development could be another potential subject of further exploration. Although a general-purpose instrument

was preferred here, the task of capturing the categories of playful engagement into context-independent questionnaire items is challenging, and it may be that some of the items/dimensions would have benefited from being more focused on a specific context.

6.2 Associations between Playfulness and Dating

The linear regressions suggested that the three PlayfulQuest dimensions predict a playful approach very differently from each other, at least in the case of dating app use. *Autotelic Priority* had a moderate, yet by far the strongest effect on the playful use of dating apps. This finding is supported by previous research that highlight has proposed an autotelic/paratelic orientation to be a defining quality of manifesting playfulness [3, 19]. In contrast, the negative effect of *Immersive Focus* suggests that a playful approach to dating app use does not require focusing one's full attention on the app use, but rather is reduced because of it.

It was also found that female gender had a positive effect on the playful orientation of app use. This opens up questions for possible future research: Is the more playful orientation of dating app use by females supported by the interactive qualities of these apps, or is it influenced more by the general dynamics of dating culture and how dating apps present these interactive cultural practices to the user?

Furthermore, it is worth noting that the perceived game-like qualities of dating app use were associated with *Non-Real Framing*. Future research could investigate whether the *Non-Real Framing* from the PlayfulQuest inventory is associated with perceived game-like quality in situations outside of dating apps. It would also be important to explore how the playfulness of dating app use and the perceived game-like qualities of the app use are associated with positive user experiences and with the desired outcomes of dating app use.

We hypothesized that, given the interactive qualities and the arguably game-like mechanics [10], dating apps would be experienced in a more playful manner than cultural dating practices outside of app use. Pairwise t-tests and effect size tests of the PlayfulQuest factor sum scores between dating app users and non-users did not support our hypothesis. Rather, it was found that dating app users reported significantly lower values for all three PlayfulQuest dimensions than those survey respondents who did not have user experiences with these apps and who thus responded to the survey based on their dating experiences and orientations outside of these digital services. One possible reason for this could be that non-app users reflected their dating experiences – along with the potential incorporation of playfulness – more broadly compared to dating app users. To better understand this observation, in the future, we need more comparative research data about playful experiences across other systems uses in comparison with non-system uses within a same context of activity.

Although dating applications often integrate game-like features such as swiping mechanics, achievement systems, and playful interface elements, these design intentions do not necessarily translate into users' lived experiences as playful. In-person encounters allow for rich social cues, spontaneity, and emergent humor, all of which can contribute to a stronger sense of playfulness than the more

structured and repetitive interaction loops typical of app use. While digital platforms may initially evoke a sense of novelty, repeated exposure can lead to fatigue and a shift toward efficiency-oriented engagement, reducing the perceived playfulness of the medium. Furthermore, offline dating often unfolds in socially and culturally embedded contexts that encourage low-stakes, exploratory interactions, whereas dating apps, despite their playful designs, can be framed by users as instrumental tools for achieving specific romantic or sexual outcomes. However, this results does not indicate that the dating app use would not be perceived as playful in comparison to the use of other apps. To explore this question, more research is needed.

6.3 Concluding Statements

In this study we successfully validated the general-purpose PlayfulQuest inventory, which measures perceived playfulness of experiences in contextual engagement using three factors: *Immersive Focus*, *Autotelic Priority*, and *Non-Real Framing*. The inventory adheres to a model of playful engagement, based on the interdisciplinary, integrative review [19], and thus focuses on capturing playfully organized features of contextual engagement. There is novelty in this approach, with only rare examples in the existing literature that incorporate interest towards psychological dynamics of situational playfulness.

Despite the limitations discussed above, the validated measure offers a reliable and versatile tool for future research on playfulness across a wide range of contexts and disciplines. Developed with data representative of the Finnish population, it provides a strong foundation for further cross-cultural validation and application, supporting continued advances in the empirical study of playfulness.

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A 9-item PlayfulQuest Inventory

A.1 Original Finnish version (validated)

Pohdi alla esitettyjä väittämiä omien palvelun käyttökokemustesi näkökulmasta ja merkitse jokaisen väittämän kohdalle, miten samaa tai eri mieltä olet väittämän kanssa. "Kun käytän tätä palvelua, minulle on ominaista..."

Vastausvaihtoehdot: 1=Täysin eri mieltä, 2=Eri mieltä, 3=Osittain eri mieltä, 4=En osaa sanoa, 5=Osittain samaa mieltä, 6=Samaa mieltä, 7=Täysin samaa mieltä

- (1) Kiinnittää täysi huomioni käynnissä olevaan tilanteeseen.
- (2) Uppoutua tekemiseeni täysin.
- (3) Keskittyä kokonaan käsillä olevaan kokemukseen.
- (4) Kiinnostua tilanteen tarjoamasta välittömästä kokemuksesta ilman muita tavoitteita.
- (5) Olla miettimättä, onko tilanteella muuta merkitystä kuin kokemus sellaisenaan.
- (6) Pitää itse kokemusta tärkeänä asiana miettimättä sen mahdollisia seuraamuksia.
- (7) Heittäytyä ajattelemaan, mitä jos asiat olisivatkin jotakin aivan muuta kuin ne ovat.
- (8) Päästää mielikuvituksen valloilleen.
- (9) Kuvitella arkipäiväisten asioiden olevan toisenlaisia.

The items from 1 to 3 assess the factor of *Immersive Focus*, items from 4 to 6 measure the *Autotelic Priority*, and items from 7 to 9 measure the *Non-Real Framing*.

A.2 Translated English version

Consider the statements below from the perspective of your own experiences using the service, and indicate for each statement how much you agree or disagree with it. Answer by continuing the sentence: "When I use this service, it is characteristic of me..."

The answering scale: 1=Strongly disagree, 2=Disagree, 3=Somewhat disagree, 4=Neither agree nor disagree, 5=Somewhat agree, 6=Agree, 7=Strongly agree

- (1) To focus my full attention on the ongoing situation.
- (2) To be fully immersed in what I am doing.
- (3) To concentrate entirely on the experience at hand.
- (4) To be interested in the immediate experience offered by the situation without other goals.
- (5) To not think about whether the situation has any meaning other than the experience itself.
- (6) To consider the experience itself important without thinking about its possible consequences.
- (7) To throw myself into thinking, what if things were something completely different than they are.
- (8) To let my imagination run wild.
- (9) To imagine everyday things being different.

The items from 1 to 3 assess the factor of *Immersive Focus*, items from 4 to 6 measure the *Autotelic Priority*, and items from 7 to 9 measure the *Non-Real Framing*.

B 24-item PlayfulQuest Inventory (Finnish)

- (1) Kiinnittää täysi huomioni käynnissä olevaan tilanteeseen.
- (2) Olla tarkkaavainen siitä, mitä tilanteessa tapahtuu.
- (3) Uppoutua tekemiseeni täysin.
- (4) Keskittyä kokonaan käsillä olevaan kokemukseen.
- (5) Olla utelias selvittämään, mitä vaikutuksia toiminnallani on.
- (6) Olla innostunut tutkiskelemaan tilannetta.
- (7) Haluta toimia tilanteessa vapaasti ja spontaanisti.
- (8) Innostua mahdollisuudesta päästä kokeilemaan erilaisia asioita.
- (9) Muokata tilanteesta omanlaiseni.
- (10) Luoda tilanteita, joissa voin ilmaista itseäni.
- (11) Antaa kohtaamilleni asioille tai toimijoille itselleni sopivia uusia merkityksiä.
- (12) Ottaa tilanne haluamallani tavalla.
- (13) Kiinnostua tilanteen tarjoamasta välittömästä kokemuksesta ilman muita tavoitteita.
- (14) Olla miettimättä, onko tilanteella muuta merkitystä kuin kokemus sellaisenaan.
- (15) Pitää itse kokemuksesta tärkeänä asiana miettimättä sen mahdollisia seuraamuksia.
- (16) Arvostaa käsillä olevaa hetkeä enemmän kuin jotakin päämäärää.
- (17) Heittäytyä ajattelemaan, mitä jos asiat olisivatkin jotakin aivan muuta kuin ne ovat.
- (18) Päästää mielikuvituksen valloilleen.
- (19) Kuvitella arkipäiväisten asioiden olevan toisenlaisia.
- (20) Toimia kuin olisin täysin eri maailmassa.
- (21) Tehdä asioita uudella tavalla piittaamatta vakiintuneista tavoista.
- (22) Käyttäytyä tavanomaisuudesta poikkeavasti.
- (23) Olla antamatta tavallisten käyttäytymissääntöjen ja -odotusten rajoittaa toimintaani.
- (24) Kokeilla, miten asiat toimisivat erilaisella tavalla.