



"My Lockdown Escape": A Data Collection Approach based on Gamification and Crowdsourcing for Subjective Perspectives, Self-Empathy, and Memories about Past Experiences

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ABSTRACT

In this article, we propose a hybrid, gamified, story-driven data collection approach to spark self-empathy, resurfacing people's perceptions and feelings about past experiences. The game is designed around the well-known paradigm of an escape room and includes a physical board, some card decks, and a mobile application. We designed our concept around a very impactful experience that most people have experienced in recent years, namely the COVID-19 pandemic. The game aims to collect and understand people's behaviour and feelings and to study and tackle the long-term effects of the pandemic. As the player plays through the game, they customize and escape from their lockdown room by completing statements and answering a series of questions that define their story. The decoration of the lockdown room and the storytelling-driven approach are targeted at sparking people's emotions and self-empathy towards their past selves. Ultimately, the proposed approach was proven effective in collecting data about perceptions, opinions, and feelings related to the event.

CCS CONCEPTS

• **Human-centered computing;**

KEYWORDS

Empathy, Gamification, Crowdsourcing, Hybrid Approach, Data Collection, Past Experiences

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1 INTRODUCTION

The recent COVID-19 pandemic and its consequences affected our lives unprecedentedly, changing our daily habits whilst disrupting our emotional and psychological health [25]. Among these consequences, the lockdown enforced by the local governments caused some of the most devastating ones, including depression, anxiety, and stress [2, 9, 10]. Although the pandemic's consequences are slowly fading, the research community's interest in understanding people's emotions over that period is still alive [40]. Improving the psychological understanding of such a complex scenario would contribute towards reducing the consequences of future occurrences and developing tailored approaches to tackle them. Furthermore, it is essential to collect accurate and complete data as people's thoughts and feelings may vary significantly. Researchers with different backgrounds have been shaping data collection processes and developing methodologies to involve people in sharing their feelings by designing approaches combining gamification techniques with the most commonly employed survey approach [35, 43]. While these methods may still be effective regardless of time, people are slowly starting to forget how they felt over these rough times, hindering the effectiveness of such simple approaches. Hence, collecting people's feelings requires designing methods capable of sparking these emotions.

This article proposes a gamified approach to collect people's feelings during the COVID-19 pandemic named "My Lockdown Escape". The proposed methodology makes people empathise with their past selves – a concept we call *self-empathy* – by combining different gamified design techniques. The proposed design follows a hybrid approach involving a board game and a digital application. The digital application implements a storytelling-driven activity that supports an escape room-like board game. In this article, we validate the effectiveness of the proposed methodology in collecting people's feelings by sparking their empathy towards their past selves. Furthermore, we assess the application's usability and the system's hybrid design. Research questions can be summarised as follows

- **RQ1:** Does the system successfully spark participants' self-empathy?
- **RQ2:** Does the hybrid design contribute towards making the activity enjoyable and engaging?
- **RQ3:** Is the digital application intuitive to use and navigate for its users?

- **RQ4:** Was the gamified approach effective toward making the data collection experience enjoyable and complete compared to a more traditional survey approach?

The remainder of this article is organized as follows. Section 2 describes empathy and gamification in the context of interest. Section 3 describes the design and implementation of the proposed method, focusing on the first. Section 4 reports on the experiments' structure and the participants' profiles. Section 5 discusses the research questions and the collected feedback. Section 6 summarises the work and provides insights into future works and design improvements.

2 RELATED WORKS & BACKGROUND

2.1 Empathy & Self-Empathy

Empathy can be described as *the capability of a human to put themselves in someone else's shoes* [18]. An extensive definition characterises empathy as *an emotional response, dependent upon the interaction between trait capacities and state influences, whose resulting emotion is similar to one's perception (directly experienced or imagined) and understanding (cognitive empathy) of the stimulus emotion, with the recognition that the source of the emotion is not one's own* [8]. Regardless of the difference in complexity, these definitions imply a social relation between two people: the one who feels and expresses an emotion and the one who experiences the consequent emotional response. We stray from such a standard model of empathy, focusing on sparking and assessing people's empathy compared to their past selves rather than someone else, resulting in a so-called one-state model [15]. Such a change of perspective should drive the person towards a better understanding of the experienced emotions since they were the ones feeling them in the first place.

The research field on empathy found fertile ground in computer science [46], resulting in the development and assessment of various approaches leveraging gameful design elements to drive empathy [12, 26, 28]. Such approaches make it necessary to highlight a fundamental difference between the empathy experienced by humans through their peers, and the one conveyed through digital technologies. The first is a human reaction sparked by our perception and understanding of the feelings of another human being through our senses. The second must leverage the features of digital technologies to spark it, relying on images [30], videos [11, 32], and sound [7], to convey emotions, feelings, and perceptions since digital technologies lack the ability to convey them through the senses. Hence, it is necessary to design approaches that deal with such a gap, driving people to empathise when digital environments are employed.

2.2 Gamification

Gamification is the application of game design elements in non-game contexts to invoke gameful experiences and behavioural outcomes from users to support the value of the content they provide or create [17, 21]. The effects of such approaches have been studied for a very long time by the research community. For example, classic gamification elements (e.g., avatars, animations, challenges, etc.) were proven to be effective in improving user attention and enjoyment [43], improving participation rate and reliability of the

answers in data collection tasks [38], as well as improving user engagement and driving behaviours [1].

The COVID-19 outbreak's consequences heavily impacted people's emotional and psychological health, sparking research to analyse the pandemic's scale and impact [5, 20, 23, 27, 34]. In that regard, researchers developed gamified strategies to achieve better coverage and user involvement whilst delivering an interesting and enjoyable experience [30, 41, 42]. While understanding people's emotional and psychological conditions has been fundamental to comprehending the impacts of the pandemic, some researchers focused on tackling its consequences, demonstrating the effectiveness of gamified approaches in motivating and enhancing students' learning [13, 44], approaching elderly people with healthcare initiatives [45], improving the population's awareness about disinformation [29, 37], etc. Some of these gamified activities applied specific design elements. In particular, escape room-like experiences were proven effective in springing cooperation [13] and motivation [13, 16, 39, 44] among participants, especially when applied in remote digital environments. On the other hand, digital storytelling (e.g., narratives, interactive stories, etc.) was shown to improve the application's appealing [14], user engagement [31], and rising emotions and sparking imagination [6] as they engage the user on a personal level in novel or familiar experiences. Despite its demonstrated effectiveness, the research community still acknowledged the need to apply gamification carefully (e.g., avoid biasing the user with the narrative [19], or avoid using reward-based mechanisms in surveys [38]) to prevent undesired behaviours.

3 METHOD

Acknowledged the advantages and weaknesses of the previously discussed gamified techniques, we designed an activity called "My Lockdown Escape" to spark emotions and drive people to self-empathise with their past selves, finally moving them to describe and share the feelings they experienced during the COVID-19 pandemic. The approach is designed to be hybrid, i.e., it includes both digital and physical entities, tackling the drawbacks of a fully digital design in sparking empathy whilst acknowledging its advantages (e.g., ease of use, process automation, etc.). The activity is designed as a story-driven escape room experience through which the player describes the room they spent their lockdown in and interacts with some pandemic-related items to leave their room. An interactive digital application guides the player throughout the activity through a storytelling-based approach that provides them with a series of situations they (most likely) experienced during the pandemic. Combining these elements leads the player to describe the mental and emotional conditions they experienced during the lockdown. In particular, we argue that having the player remember the room they lived in would spark memories and feelings from their lockdown experience. Furthermore, the similarity between the context and the considered design elements (i.e., the escape room design and the lockdown, and the storytelling-driven design and the people's experience) makes the final activity very close to the real experience, hence contributing to sparking emotions and stimulating self-empathy.

Game Assets – The methodology includes digital and physical assets. The web-based application is the only digital tool involved

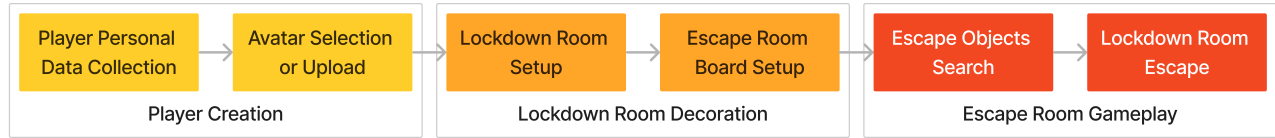


Figure 1: A high-level representation of the three steps of the game and their sub-steps.

in the method, requiring a mobile phone with a camera to perform the activity. Physical assets include decks of cards and a board. Each deck is identified by a unique colour and name. Every card has a symbol printed on its front, and a unique QR code and the name of the deck it belongs to on its back. Examples of cards are depicted in Figure 2, on the left. Cards can be classified based on their role in the activity

- **Avatar Card**, *i.e.*, a card with a simple outline of a stylized person or a drawing of a pre-made avatar. These allow the player to customize their avatar before the beginning of the activity. The corresponding deck includes 10 pre-made and one customizable card.
- **Decoration Card**, *i.e.*, a card representing furniture and items used to decorate the room. Each card is a possible phrase or word the player can use to complete an associated statement in the first part of the story. The seven corresponding decks include a variable number of cards.
- **Object Card**, *i.e.*, a card representing the different pandemic-related items a person may have interacted with during the lockdown. Each card is a question asked to the player in the second part of the story. The corresponding deck includes 12 cards.
- **Container Card**, *i.e.*, a card representing the furniture in which items may be stashed. Each card is a question asked to the player in the second part of the story. The corresponding deck includes 6 cards.

The questions, statements, and answers associated with the cards were pre-defined when designing the application to make the interaction as controlled and simple as possible. The board includes two parts. The top part of the board represents the lockdown room, *i.e.*, an abstraction of a real room where the player experienced the pandemic. It has a dedicated card slot for each Decoration Card deck involved (see Figure 3). The bottom part represents the spot (*e.g.*, a carpet) where the player places the items they uncover when playing the game (represented in Figure 2 on the right). It includes three slots for the piles obtained from the Object and Container decks and a slot to place the discovered items.

The proposed activity can be divided into three main steps (represented in Figure 1):

- **Player Creation**, *i.e.*, collecting the player’s personal data and customising their avatar,
- **Lockdown Room Decoration**, *i.e.*, decorating the lockdown room by placing Decoration Cards on the board and setting up the next step of the activity,



Figure 2: At the top, examples of cards from the decks involved in the Escape Room Gameplay step (*i.e.*, *Container* on the left and *Object* on the right). At the bottom is a representation of the part of the board to support the Escape Room Gameplay step.

- **Escape Room Gameplay**, *i.e.*, escaping from the lockdown room by uncovering Objects and Container Cards placed on the board.

Player Creation – The player is asked to provide personal data through the digital application. They provide a nickname, age, country, gender, ethnicity, and education level. They also create a physical avatar or pick a digital one. In the first case, they customize the Avatar Card by drawing on it using coloured markers, uploading it into the system by taking a picture, and placing it in the corresponding slot on the board. Alternatively, the player can pick one of the pre-made avatars available on the digital application and position the corresponding physical Avatar Card on the board.

Lockdown Room Decoration – In the first part of the story, the player decorates their lockdown room by completing statements in the story narrated through the digital application. For each statement, the player inspects and picks a card of choice from the associated deck to complete the story, scans the QR code on its back using their mobile phone through the application, and places

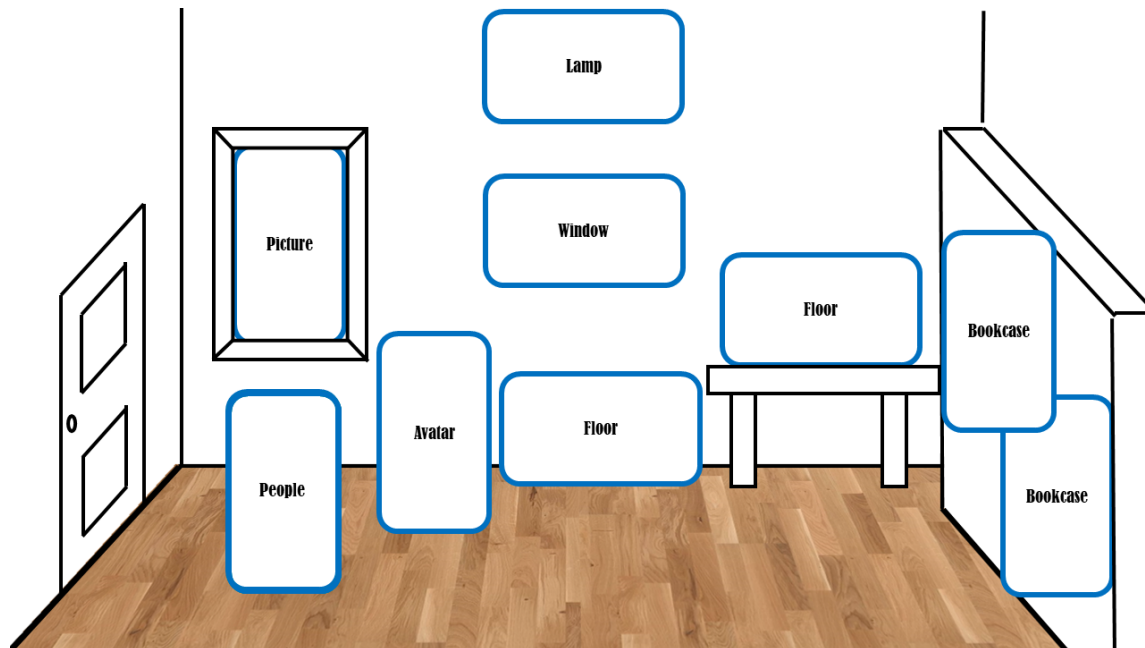


Figure 3: A representation of the part of the board to support the Lockdown Room Decoration step. Each slot has an associated name representing the deck to which the card to be placed belongs. An avatar slot where players can place their Avatar card is also featured.

it face-up in the corresponding board slot. Scanning the QR code stores the choice in the system. Whenever a statement is completed, the corresponding part of the story is updated and displayed alongside the next one. This process is repeated until a card is placed in all the slots, hence having players answer all the questions asked. An example of a statement and the corresponding list of completions are provided below.

Statement: *Our story begins in early 2020, and not long ago, the COVID-19 pandemic broke out in your country and the whole world. You are at home watching the news. The titles are scary and doubtful. Take a look around you, and you will see that you are surrounded by ...*

Possible Completions (Cards): *Family, Parents, Friends, Strangers, No one, Roommates, and Animals*

Then, the player sets the board for the second part of the story. They shuffle the Object deck and create three face-down piles to be placed on three dedicated slots by evenly distributing the cards. Then, one randomly selected Container card is placed atop each pile.

Escape Room Gameplay – In the second part of the story, the player must find three core Object cards, *i.e.*, the mask, hand sanitiser, and green pass cards, to escape their lockdown room. They scan the QR code on the back of the card on top of a pile of choices and answer the corresponding question in the digital application. An example of a question and the corresponding list of answers are provided below.

Question (Cards): *Think back at your lockdown experience. If it was a movie, what title would it have?*

Answers: *The Never-ending Story, The Social Network, Home Alone, Life is Beautiful, Back to the Future, Eat Pray Love, A Good Year, Cast Away*

When a question is successfully answered, the player flips the card and uncovers the item on its front. Then, the card is placed in the dedicated area of the board, and its corresponding digital icon is displayed in the application. The process is the same regardless of whether the item belongs to the Object or Container deck. This process is repeated until all the core Object cards are found. Then, the player can escape the room or keep playing to uncover all the objects, potentially answering all the questions. When they successfully escape their lockdown room, the player is shown their story, which can be shared with their peers. It includes the player's avatar, the textual description of the decorated room, and the items they uncovered.

"My Lockdown Escape" implements physical and digital assets. The physical assets (*i.e.*, the cards and the board) were designed using digital tools, printed on cardboard, cut, and coated with plastic. The digital asset (*i.e.*, the web application) was developed as a three-layer architecture. The front end was implemented using HTML, CSS, Javascript, and Thymeleaf. The middle layer was developed using Java, Spring Boot, and the Model-View-Controller framework. The back end implements MySQL relational database. The application was deployed on a web server to make it accessible to multiple players simultaneously.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Strongly Disagree	0	1	1	0	0	0	0	0	0
Disagree	3	10	3	3	0	0	1	0	1
Neither Agree nor Disagree	8	2	2	6	3	6	4	1	1
Agree	7	8	13	9	13	10	12	11	13
Strongly Agree	3	0	2	3	5	5	4	9	6

Table 1: A table representing the frequencies for each answer and each custom-made question.

4 EXPERIMENTS

A series of experiments aimed at assessing different aspects of the proposed approach were performed. The first experiment involved 21 students and researchers (9 women and 12 men) from an Italian university, mainly aged between 21 and 27 years old (26,7 years old on average) recruited through the university network, in individual experiments in Milan. The second one involved 28 people (17 women and 11 men) from various European organizations, mainly aged between 22 and 66 years old (28,4 years old on average), recruited through a presentation at a public event in Bruxelles. Participants were previously informed about the nature of the experience and voluntarily agreed to partake. Furthermore, they could opt out at any time. Whilst the first experiment mainly collected feedback about the approach and the user experience, the second one contributed to testing the methodology in an open environment and collecting feedback about possible improvements. In these experiments, participants were given an initial description of the application. Then, they performed the activity without receiving any suggestions. Each participant brought their mobile phone to play, allowing testing on different mobile operating systems and web browsers.

The first experiment’s participants were asked to answer a questionnaire including all the questions from the System Usability Scale (SUS) [4], *i.e.*, a questionnaire including 10 questions on a 5-point Likert scale (ranging from 1 - "Strongly Disagree" to 5 - "Strongly Agree") to measure the system’s usability [3], and a set of 5-point Likert scale questions to evaluate the empathetic capabilities of participants, the tool’s effectiveness in sparking self-empathy, and the hybrid approach. These were mainly inspired by the literature [22, 24, 33] as none of the questionnaires from the considered literature were properly addressing self-empathy and hybrid approaches. These questions are reported below.

- (Q1) I would describe myself as a pretty tender-hearted person.
- (Q2) When I think about sad past events of my life, I feel the same sadness.
- (Q3) I am often quite touched by things I see happen.
- (Q4) The game helped me empathise with my past self.
- (Q5) The game helped me remember my lockdown experience.
- (Q6) The escape-room style helped me remember my lockdown experience.
- (Q7) The storytelling style helped me remember my lockdown experience.
- (Q8) I found the hybrid method more engaging than digital-only methods.

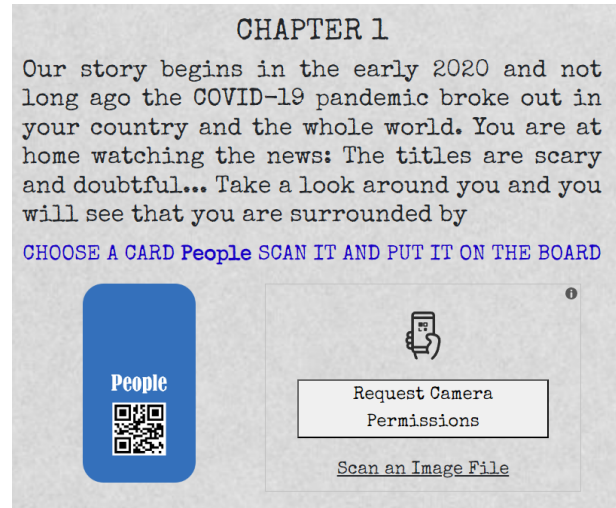


Figure 4: A screenshot of the Lockdown Room Setup step.

- (Q9) I feel the hybrid method is better than full-digital or full-physical.

The collected answers are reported in Table 1. Moreover, we collected open feedback from participants regarding the gamified application design in both experiments.

5 DISCUSSION

RQ1 - Empathy. We validated the method through a series of questions to assess participants’ capability to empathise (Q1-Q3, Table 1) and the application’s capability to make them empathise and remember their lockdown experience (Q4-Q7, Table 1). Overall, most participants (70%) describe themselves as capable of empathising with others (Q3), even though only 50% state they are capable of feeling the same intense emotions from the past (Q2). Moreover, the method allowed most participants (60%) to empathise with their past selves (Q4). It was even more successful (85%) in making them remember their lockdown experience (Q5). The storytelling and escape room designs were proven effective towards such objectives (Q6-Q7), with the first being slightly better than the second (75% and 70%, respectively).

RQ2 - Hybrid Design. We asked participants whether they enjoyed the hybrid system compared to a fully digital or physical experience (Q8-Q9, Table 1). More than 95% of participants agreed that the hybrid design was more engaging than a potential full-digital or full-physical method (Q8). A similar statement is associated with the application design (Q9). We argue a hybrid approach is more

effective than the others as it allows better tracking of behaviours and answers (in a data-driven fashion) while also allowing better scalability and empathy-sparking capabilities. These preliminary statements require further investigation by implementing fully digital and physical versions for better validation.

RQ3 - System Usability. The first experiments contributed to validating the application’s usability. The application (screenshot in Figure 4) achieved a median SUS score of 75, representing good usability compared to the average SUS score of 68 [36], with a first quartile of 67.5 and a third quartile of 82.5 (as shown in Figure 5).

RQ4 - Gamification. Although most participants deemed the experience enjoyable and engaging, we acknowledge there’s room for improvement from the feedback we received and the behaviours we observed. First, the game’s instructions may benefit from clarifications and extra details. In particular, in the Lockdown Room Decoration step, some participants were misled to take their cards randomly instead of picking them. Such a misunderstanding also caused them to position their cards face-down on the board instead of face-up. Furthermore, when comparing the game steps, participants preferred the Lockdown Room Decoration step, stating the Escape Room Gameplay may benefit from a small re-design due to the randomness in finding the cards to meet the escape condition. Additionally, we noticed that most participants left the room when they met the conditions, resulting in nondeterministic data collection. Whilst it doesn’t affect the assessment, such a design choice may hinder the data collected. Future iterations of the application may require the user to uncover a pre-defined number of items (potentially all) to leave their room to address such a flaw. Regarding the data collection, a few participants stated that while the Lockdown Room Decoration step perfectly masked the data collection, they perceived it clearly in the Escape Room Gameplay step. Such feedback calls for improvements to better bind the approach with the data collection activity underneath, e.g., by aligning the cards and the associated questions. Furthermore, people’s motivation is fundamental to the system’s usage. Filling out a form may be quite straightforward and requires no motivation other than the people’s desire to contribute to their community or for research purposes. While such motivations still hold, our approach introduces little intricacy as it applies gamification to spark self-empathy and improve data quality, increasing the task’s time complexity. Such an additional complication may hinder people’s motivation towards the application, requiring further gamified expedients to keep the user motivated and engaged throughout the experience.

Limitations - While we deem the method effective overall, this research only focused on questions involving a pre-defined list of answers, requiring further research on its effectiveness when including open questions. Furthermore, we only address a specific (and complex) scenario (i.e., COVID-19), making future research on the generalizability of the approach essential. Validation could be extended by involving a more detailed list of questions, comparing the current implementation with a full-digital and a full-physical one, and involving a broader audience from well-known crowdsourcing platforms.

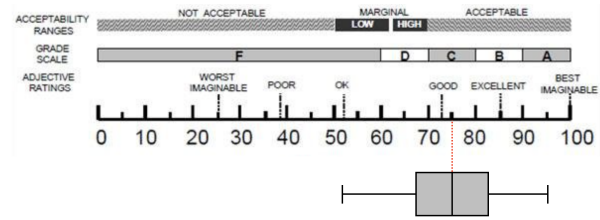


Figure 5: A boxplot of the SUS scores assigned by the participants.

6 CONCLUSIONS & FUTURE WORKS

This article described a hybrid, gamified, story-driven data collection approach to spark self-empathy in participants. As they play and build their own story, they are driven to self-empathise with their past selves and provide data to be analysed to understand their past behaviours and attitudes. Preliminary experiments validated the approach and highlighted the need for improvements. In future works, we plan to improve the proposed gamified approach by addressing the feedback we received and providing new decks of cards and room abstractions, allowing even more freedom and customizability of the gameplay and the data to be collected. Furthermore, we noticed that a small improvement could be factored into the game by shuffling the cards placed on the first part of the board with the *Object* cards used to build the piles for the second part. Such a change would improve the data collection while making the two parts of the game even more entwined.

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