

Chapter # 22

DIGITAL AND ANALOGUE GAMING IN THE DAILY LIVES OF PEOPLE WITH INTELLECTUAL DISABILITY **A Case Study in the Portuguese Context**

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ABSTRACT

The role of games in promoting cognitive and social development for People with Intellectual Disability (PwID) is increasingly recognised, yet the specific impacts of digital versus analogue games remain underexplored. This study explores the cognitive, social, and emotional influence of digital and analogue games on PwID in Portuguese institutions. Using a participatory design approach, four games – two digital and two analogue – were developed collaboratively between academia and self-advocacy institutions. Semi-structured interviews were conducted with support workers from two institutions in the North of Portugal, who provided feedback based on their experiences of using these games with PwID. Thematic analysis of these interviews identified key themes such as cognitive skills development, social interaction, accessibility challenges, and game design preferences. Results indicate that both digital and analogue games can promote cognitive stimulation and social engagement, though analogue games tend to foster richer peer interaction, while digital games are associated with maturity and autonomy by the participants. The study highlights the importance of customisation and accessibility in game design and suggests future research should focus on longer-term effects.

Keywords: intellectual disability, digital games, analogue games, cognitive development, social inclusion, participatory design.

1. INTRODUCTION

The role of games in fostering cognitive and social development has garnered increasing attention in scientific research, particularly concerning neurodivergent populations, as People with Intellectual Disability (PwID; Derks, Willems, & Sterkenburg, 2022; Sousa, Neves, & Damásio, 2020). The potential benefits of both digital and analogue games have been extensively documented, highlighting their capacity to enhance learning, social interaction, and overall well-being (Barz, Benick, Dörrenbächer-Ulrich, & Perels, 2023; Gallud et al., 2023). However, the comparative impact of digital versus analogue gaming remains a debated issue, particularly in contexts involving individuals with specific cognitive accessibility needs (Atherton & Cross, 2021).

This study aims to contribute to this ongoing discussion by examining the impacts of both digital and analogue games on adult PwID within the Portuguese context. Focusing on four accessible games – two digital and two analogue – developed through a collaborative approach between academia and self-advocacy institutions, this research explores how these games can serve as part of the occupational plans of PwID. By conducting semi-structured interviews with support workers who tested these games with PwID, we seek to critically assess the barriers, challenges, and opportunities presented by both forms of gaming in daily life.

This study is particularly relevant in the Portuguese context due to the unique socio-economic and cultural factors that influence the daily lives of PwID in the country. Portugal, like many other nations, has been gradually improving its policies and practices regarding the inclusion of PwID in various aspects of society. However, significant challenges remain, particularly in the accessibility and availability of tailored educational and recreational resources (Campos Pinto, Fontes, Neca, Bento, & Alves, 2023; Moura & Fontes, 2023). The integration of digital and analogue gaming as tools for cognitive and social development is still in its nascent stages within the Portuguese framework, where resources are often limited, and digital literacy varies widely across different regions and institutions (Sousa, Neves, & Damásio, 2022a; Tymoshchuk, Martins, Almeida, Cartaxo, & Albuquerque, 2022). Moreover, the collaborative approach between academia and self-advocacy institutions in Portugal, as highlighted in this study, reflects an emerging but crucial effort to bridge these gaps (Sousa & Neves, 2023).

1.1. Gaming as Social Inclusion for People with Intellectual Disability

The use of games as tools for social inclusion among PwID has gained significant attention in recent years. This approach provides recreational opportunities and fosters social interaction, enhances communication skills, and promotes a sense of belonging within broader communities (Sousa et al., 2020; Terras, Boyle, Ramsay, & Jarrett, 2018). The potential of gaming to act as a bridge for social inclusion is particularly evident in the way it can support PwID in overcoming barriers to social interaction, which are often exacerbated by their cognitive challenges (Alkahtani, 2024).

Intellectual Disability (ID) is a neurodevelopmental condition characterised by significant limitations in intellectual functioning and adaptive behaviour, including a range of everyday social and practical skills (American Psychiatric Association [APA], 2023). From a neurodiversity perspective, ID is seen as part of the natural variation in human cognition, with a focus on recognising and accommodating diverse strengths and ways of functioning (Robertson, 2009). This approach shifts the focus from “fixing” deficits to fostering environments that support the inclusion of individuals with different cognitive profiles, such as those with ID (Chapman, 2020).

The role of gaming in social inclusion is closely linked to the dichotomy between recreation and more structured activities such as occupational health and inclusive education. On one hand, games offer a recreational outlet that allows PwID to engage in playful, low-pressure interactions that reduce social anxiety and foster enjoyment (Dratsiou et al., 2021; Eldeniz Cetin & Cay, 2020). On the other hand, when integrated into educational and occupational health frameworks, games become powerful tools for developing specific skills, enhancing cognitive abilities, and promoting social inclusion in a more structured manner. This dichotomy reflects the dual potential of games to serve as both leisure activities and therapeutic or educational tools, depending on their context and objectives (Sousa et al., 2022a; Suárez-Iglesias, Martínez-de-Quel, Marin Moldes, & Ayan Perez, 2021; Terras et al., 2018).

1.2. Analogue and Digital Games: Is it Really a Dilemma?

The question of whether to prioritise analogue or digital games in educational and intervention settings is often framed as a dilemma, yet a closer analysis suggests that this dichotomy may be overstated. Both analogue and digital games offer distinct advantages and limitations, and understanding their differences is crucial for educators, game designers, and caregivers when selecting or creating games tailored to the specific needs of learners (Pomichal, 2023; Sousa, Neves, & Luz, 2023), particularly those with ID. The choice

between these two formats depends on the desired learning outcomes and factors such as resource availability, individual preferences, and the cognitive or social needs of the players (Sousa et al., 2023).

One of the key distinctions between analogue and digital games lies in their impact on peer interactions. While digital media can influence the quality of ongoing interactions, it does not necessarily foster subsequent prosocial behaviour. Research by Von Steinkeller and Grosse (2022) found that children tend to be more socially engaged when playing analogue games compared to digital ones. Specifically, children interact less frequently and have fewer verbal exchanges when engaging in cooperative digital games than in analogue counterparts. This suggests that digital games can provide immersive and engaging experiences but they may not promote the same level of cooperative behaviour as analogue games.

However, the influence of digital games on learning and cognitive enhancement is undeniable. Digital games can enhance cognitive engagement through highly personalised learning experiences, adaptive difficulty levels, and immediate feedback. Research has shown that well-designed digital games can improve problem-solving skills, memory, and attention, particularly when integrated into educational curricula (Reynaldo, Christian, Hosea, & Gunawan, 2021).

On the other hand, analogue games provide a tactile, real-world interaction that enhances spatial awareness, fine motor skills, and face-to-face communication. For instance, when comparing the digital and analogue versions of the Memory game, Nilsen, Lundin, Wallerstedt, and Pramling (2021) found that the experience differed significantly in terms of how players interacted with the game. Children, especially those who are more used to digital versions, may apply strategies from digital play when engaging with the physical game, indicating that the line between digital and analogue gaming is becoming increasingly blurred.

Given this context, this exploratory study aims to address the research question ‘How do digital and analogue games contribute to the cognitive, social, and emotional experiences of PwID in Portuguese institutions?’ (RQ1). In order to make it more objective, we have also listed a series of sub-questions:

- RQ2: How do support workers perceive the cognitive benefits of digital and analogue games for PwID?
- RQ3: What are the observed social interactions and behaviours of PwID when engaging with digital versus analogue games?
- RQ4: What challenges do support workers and PwID encounter in using digital and analogue games, and how are these addressed?

2. ADOPTED APPROACH

The methodology adopted in this study was divided into two key phases. The first phase focused on a participatory and inclusive design process, engaging PwID, support workers, and students to collaboratively develop games tailored to the needs and preferences of the target population. The second phase applied thematic analysis to assess the outcomes of this collaboration, ensuring the diverse representation of voices and experiences.

2.1. Phase One: Participatory and Inclusive Design

The development of games for PwID in this study emerged from a collaborative, participatory design approach involving specialised NGOs, scholars, and university students, driven by the professional experience and research background of one of the project’s researchers, alongside input from the community. The design process followed a structured,

iterative model where PwID and support staff were involved at key stages, to develop both analogue and digital games in response to the limited availability of suitable resources in the partner institutions. These games addressed the need for low-cost, durable, and reproducible materials, aiming to replace children's games with more appropriate themes for adult users with ID. Previous research mostly on the extensive catalogue of developed digital games highlights their potential to enhance empowerment, well-being, and inclusion (Sousa et al., 2022a), while also fostering inclusive attitudes among the students involved in their creation (Sousa, Neves, & Damásio, 2022b).

2.2. Phase Two: Thematic Analysis

Braun and Clarke's (2006) thematic analysis is a flexible, qualitative method for identifying, analysing, and reporting patterns – here called themes – within data. It is particularly well-suited to research with a participatory and inclusive focus, making it an ideal choice for the second phase of this study. In this phase, the collaboratively designed digital and analogue games were tested through interviews with support workers from community institutions supporting PwID. Thematic analysis was used to examine these interviews, allowing for a deep exploration of participants' experiences with the games. Therefore, it aligns with the study's inclusive-driven approach, as it prioritises the insights of those directly involved in PwID support, enabling a thorough understanding of the perceived impacts of the games, nuances and complexities of these experiences.

3. MATERIALS AND METHODS

3.1. Developed Games

The games developed in this context are a consequence of the participatory design adopted and the design methodology in partnership with social institutions and the community, previously researched by the authors (Sousa & Neves, 2023) and others such as Léste, Sousa, Farbiarz, Dias, and Farbiarz (2023). In addition, they obey the principles of economic accessibility, in addition to cognitive and/or motor accessibility, focusing on their dissemination in Open Access (OA) – through the OPERAT platform (<https://operat.ulusofona.pt>) – and low-cost reproducibility.

3.1.1. *Jogo da Glória*

Jogo da Glória (Figure 1) is a board game based on the traditional Goose game, where players roll dice to advance along a series of squares, aiming to reach the final square first. Some squares trigger special actions, like moving backwards or repeating turns. This version is designed for adults with ID, avoiding childish designs that often lead to rejection by this group. The rules have been simplified, and thematic content has been introduced to encourage cultural and informational engagement. Themes include basic geometric shapes, fast food items, professions, and famous landmarks. The game pieces are laser-cut for easy, low-cost, OA reproduction, and the game's layout and themes can be adapted based on players' interests, fostering group interaction and decision-making.

Figure 1.
Example of game session with Jogo da Glória. Photo by the authors.



3.1.2. Seasonal Dominoes

Seasonal Dominoes (Figure 2) are an adaptation of the traditional domino, where the quantity circles have been replaced by illustrations of winter and summer clothing and symbols. The Winter Domino has images associated with each season, such as a scarf, hat, umbrella, rubber boots, a puddle of water and a cloud with drops representing rain, while the Summer Domino has a swimsuit, T-shirt, shorts, sun hat, flip-flops and the sun. Each piece has 2 images and the list is combined to make 28 different pieces. As with Jogo da Glória, it was decided to avoid childish illustrations in order to keep the puzzles suitable for teenagers and adults. As far as the game dynamics is concerned, it is supposed to follow the model of traditional dominoes.

Figure 2.
Example of game session with Seasonal Dominoes. Photo by the authors.



3.1.3. Endless Runner

This game is a two-lane endless runner with a twist of humour, in which an older woman in a tracksuit runs through city, forest and beach scenes, holding an umbrella to protect an unfinished curly perm. The player controlling this unusual character will have to

avoid the various obstacles along the way by changing lanes or jumping, and pick up umbrellas to protect the old lady's hairstyle from the rain. If the character hits an obstacle or fails to pick up one an umbrellas before the 'umbrella bar' runs out, the character will return to the start of the course. Endless Runner has a free play option for training purposes and allows the speed of the character to be adjusted in order to adapt the gameplay to the reaction and motor skills of the player.

Figure 3.
Screenshot of Endless Runner. Image by the authors.



3.1.4. Futebolástico!

This is a maze-type videogame set on a football pitch (Figure 4), in which the aim is to get the ball to the goal along paths defined by elements of these imagery, starting with the traditional conical pins used in training, then moving on to players from two teams that gradually increase in number. The difficulty of the levels is determined by the increasing complexity of the paths, with no time limit and no possibility of conceding goals in order to keep the game as simple as possible.

The football imagery is reinforced by a fan waiting for the player to bring her a flower. This is not a mandatory challenge, but adds a thematic factor and complexity that can stimulate attention and motor coordination in people with difficulties in this domain.

Figure 4.
Screenshot of Futebolástico!. Image by the authors.



3.2. Participants and Interviews

The participants in this study – here considering only the Phase Two of the described approach – were nine professionals, referred to as "support workers" throughout the research, from two institutions in the field of disability located in the North of Portugal. These support workers participated in two group feedback interviews (one online and one written), guided by a semi-structured set of questions focused on the role of games in the daily lives and occupational activities of PwID. Their feedback was based on the use of the games with 36 PwID, who will be referred to as "users" or "clients" in this study, following the terminology used in the participating institutions.

4. RESULTS

4.1. Overall Impressions

In both institutions, the games were seen as having a positive impact on the players' well-being, promoting social interaction, healthy competition and cognitive stimulation (attention, memory and reasoning). *Seasonal Dominoes* helped train vocabulary, logical reasoning, attention, memory and visual perception, while also promoting interaction and tolerance of frustration. *Jogo da Glória*, although initially confusing due to the lack of guidance such as a rulebook, generated greater enthusiasm and moments of sharing after a few instructions.

In the second institution, analogue games were more popular with younger participants and those with motor difficulties. Digital games, such as *Futebolástico!*, were favoured by adults due to their simplicity and ease of use. These games were seen to increase the perception of maturity among players, as they are often associated with adult life, while analogue games sometimes carry a more childish connotation. Nonetheless, analogue games free of cartoonish elements, were well received by adults, highlighting the importance of avoiding infantilisation in content design.

4.2. Emerging Themes

The thematic analysis – developed according to the approach of Braun and Clark (2006) – of the two institutional feedbacks, obtained in the form of interviews, made it possible to identify six emerging themes, explaining the potential and constraints that arise from the use of games, both analogue and digital, in the daily lives of people with disabilities. These include: (1) cognitive skills development; (2) social interaction and competence; (3) accessibility and usability challenges; (4) perception and engagement with digital vs. analogue games; (5) need for personalisation and adaptation; and (6) technical challenges and improvements.

4.2.1. Cognitive Skills Development

Both digital and analogue games were perceived as valuable tools for stimulating cognitive processes such as attention, concentration, memory, and reasoning. For example, one of the professionals noted that the games promoted "attention and concentration, memory, and reasoning, planning and execution", especially with games like *Seasonal Dominoes*, which also contributed to vocabulary enrichment and logical reasoning. However, certain games were noted to be challenging due to the complex motor skills and planning required.

4.2.2. Social Interaction and Competence

The games were also seen as beneficial for fostering social interaction and collaboration. Games like *Jogo da Glória* and *Seasonal Dominoes* were particularly relevant in promoting healthy competition and peer interaction. One support worker shared that *Jogo da Glória* eventually became a source of social engagement, stating that it provided "satisfaction, enthusiasm, and moments of socialising and sharing between the PwID". However, in some cases, and in the same game, clients required one-on-one guidance, limiting group-based social interactions.

4.2.3. Accessibility and Usability Challenges

Support workers frequently raised concerns about the usability of certain games. *Jogo da Glória*, for example, was initially poorly received due to unclear instructions, as noted by a participant: "Initially, this game was not well received because there were no instructions, making it very confusing".

Customisation of game content emerged as a critical factor in ensuring the accessibility of the games. Support workers suggested that simpler and more relatable themes would better suit the cognitive levels of PwID. One participant proposed, "simpler themes like transport, fruits and vegetables, or animals would work better for our group of users". This insight highlights the importance of adapting game complexity to the abilities and needs of the players to facilitate engagement.

Moreover, some games posed motor challenges for clients with physical difficulties. For instance, the ones with smaller pieces were difficult for those with fine motor issues. One support worker suggested that adding pins to the pieces would improve accessibility for those players: "For users who have more difficulty with motor skills, the pieces could have pins".

4.2.4. Perception and Engagement with Digital vs. Analogue Games

Digital games were particularly well-received by adult clients, who associated them with maturity and a sense of independence. One support worker explained, "I think the videogames are more impactful...because it's on a computer, it's not something infantilised like a box". Digital games, such as *Futebolástico!*, were noted as favourites.

Analogue games, while appreciated for their tactile nature, were sometimes seen as childish by older clients. However, when the design avoided cartoonish elements, these games could be appealing to a broader audience.

4.2.5. Need for Personalisation and Adaptation

Customisation was a recurring theme throughout the interviews. Support stressed the need to tailor games to meet the varying cognitive and motor abilities of clients. This included the need for visual aids to help PwID understand game mechanics as a key finding.

Flexibility in how games were played was highlighted as a factor in promoting engagement and creativity. One participant described how a client turned the *Jogo da Glória* into a free play session: "He wanted to make a racetrack for cars to play with; it was very funny".

4.2.6. Technical Challenges and Improvements

While digital games were popular, some technical issues, such as software bugs, impacted their usability. For example, one participant reported, "The *Endless Runner* game freezes when moving to another level", indicating a need for further testing and optimisation of the digital games used. Aligned with this, several recommendations were made to improve the design of both digital and analogue games.

5. CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

The findings from this study provide relevant insights into the impact of digital and analogue games on the cognitive, social, and emotional experiences of PwID in Portuguese institutions, exploring their daily and occupational relationship with both digital and analogue games.

Regarding RQ1, the study found that both types of games have significant potential to enhance well-being, stimulate cognitive processes, and foster social interaction among PwID. Games like *Seasonal Dominoes* were specifically noted for fostering cognitive skills such as attention, memory, and logical reasoning. Support workers highlighted the ability of these games to create structured learning opportunities, which align with the existing literature on the cognitive benefits of game-based learning (Sousa et al., 2022a; Terras et al., 2018).

In response to RQ2, support workers perceived both digital and analogue games as feasible tools for cognitive stimulation. Digital games were associated with the ability to personalise learning experiences and adapt gameplay to the player's cognitive needs. For example, *Endless Runner* and *Futebolástico!* were noted for providing immediate feedback and allowing adjustable difficulty levels. These findings are consistent with existing research indicating the role of digital games in enhancing problem-solving and memory (Reynaldo et al., 2021). However, games requiring more advanced and/or fine motor skills posed challenges for players, highlighting the need for accessible game design.

Regarding the observed social interactions and behaviours of PwID when engaging with digital versus analogue games (RQ3), support workers observed that analogue games, such as *Jogo da Glória*, fostered more frequent social interaction and peer collaboration compared to digital games. However, they also reported that digital games offered a sense of autonomy and maturity, particularly for older adults. This aligns with findings by Von Steinkeller and Grosse (2022), who noted that analogue games tend to encourage richer verbal exchanges and cooperation, while digital games may offer more individualised experiences.

The challenges encountered by support workers and PwID in using digital and analogue games (RQ4) were addressed by several key observations related to usability and accessibility. The absence of clear instructions for some games, particularly *Jogo da Glória*, initially led to confusion among players. Additionally, games with small or intricate components posed difficulties for clients with motor disabilities. Recommendations from support workers to include visual aids, simplified themes, or physical modifications (e.g., adding pins to pieces) reflect the need to design games that account for both cognitive and motor challenges – the so-called intersectional accessibility (Heron, Belford, Reid, & Crabb, 2018).

Overall, the study suggests that both digital and analogue games can play a valuable role in the daily lives of PwID, offering opportunities for cognitive development, social engagement, and emotional well-being. However, the findings also highlight the importance of customisation, accessibility, and flexibility in game design to meet their diverse needs.

Future studies should involve a larger sample across multiple institutions to enhance the generalisability of the results. Including direct feedback from PwID would provide a more comprehensive understanding of their experiences with both digital and analogue games. Additionally, future research could investigate the long-term cognitive and social effects of gaming on PwID, particularly how consistent use influences their overall development. Finally, further exploration of customisation and adaptive game design is necessary, focusing on creating games that are both engaging and suitably challenging for individuals with varying cognitive and motor abilities.

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