University of HUDDERSFIELD
University of Huddersfield Press

Journal of Play in Adulthood
Available open access at: www.journalofplayinadulthood.org.uk

Journal of Play in Adulthood

Empathy-Driven Serious Board Game Design: A Case Study of *Social Prism*

***Chenhui Gu*[1], *Daisy Abbott*[2], *Amy Webster*[3]**

[1]Independent researcher, [2]Glasgow School of Art, [3]Glasgow Caledonian University

KEYWORDS

Board games

Game-based learning

Empathy

Serious games

Cognitive empathy

Affective empathy

ABSTRACT

Can a serious board game can foster empathy and understanding of social inequality? Building on empathy theory and game-based learning, we propose a "Mechanism–Empathy–Cognition" model, hypothesizing that game mechanics shape learning outcomes by eliciting cognitive and affective empathy. "Social Prism," a board game simulating real-world resource allocation, aimed to stimulate players' perspective-taking and reflection on social groups. A mixed-methods study used questionnaires and interviews to evaluate the design model and impact. Results suggest increases in cognitive and affective empathy, particularly in perspective-taking, alongside indications of enhanced cooperative attitudes and social responsibility. Connecting psychology and game design, this article analyses how serious games might evoke empathy and how design affects cognition, offering a model to guide future development. We conclude that serious board games can support empathy education.

Introduction

Empathy is considered vital for social cohesion and healthy relationships (Waal, 2008). In educational contexts, cultivating cognitive and affective empathy has been shown to encourage prosocial behavior and positive peer interactions (Eisenberg & Miller, 1987). However, traditional classroom approaches are often abstract and fail to fully immerse students in others' experiences, a limitation noted in recent research (Karn, 2024; Liman-Kaban et al., 2024). However, the rise of serious games provides a new opportunity to engage learners through role-play and simulation and studies suggest that role-playing scenarios can foster empathic responses and attitude shifts (Barab et al., 2010; Gee, 2003; Schrier, 2020). Nevertheless, empirical research on how serious games foster empathy and social awareness remains limited. Most existing studies focus on individual game cases or isolated techniques and use only short-term pre/post surveys, lacking a systematic model of how game mechanics induce empathic learning (Derks et al., 2019). To address this gap, we propose a 'Mechanism–Empathy–Cognition' (MEC) model. This framework is illustrated through the design and exploratory evaluation of a serious board game, *Social Prism*. This study's primary aim is the elucidation of the Mechanism–

Published under Creative Commons License 4.0

Empathy–Cognition (MEC) model as a design-oriented framework.

To explore this question, we conducted a small-scale case study in which concepts of empathy and structural inequality were translated into mechanics for a serious board game, *Social Prism*, and analysed whether and how the game stimulated players' empathy and raised awareness of social inequality. The following sections describe the design rationale, evaluation approach, and findings.

Research context

This section synthesizes literature on empathy theory, game-based learning, social simulation design, and empathy in serious games.

Empathy

Cognitive empathy refers to understanding others' perspectives, while **affective** empathy involves resonating with others' feelings (Schrier, 2020; Shamay-Tsoory, 2011). Both are crucial for prosocial behaviour and connectedness. Higher empathy predicts more cooperative behaviour (Eisenberg & Miller, 1987), and empathy-focused curricula have been shown to improve classroom relations and socio-emotional development (McAllister & Irvine, 2002; Schonert-Reichl & Lawlor, 2010). Healthcare education especially emphasizes empathy, with evidence linking it to better patient satisfaction, adherence, and outcomes (Hojat et al., 2020; Nembhard et al., 2023).

Game-based learning

For game-based approaches to empathy education, we must consider gamification versus game-based learning (GBL). Gamification refers to adding game elements (points, badges, rewards, etc.) to non-game activities, whereas GBL uses fully-fledged games as the learning experience. Some propose that simplistic gamification can undermine intrinsic motivation—students may chase rewards rather than truly engage with content (Deci et al., 1999; Hon, 2022; Morgan, 1997). On the other hand, well-designed educational games can enhance motivation and engagement (Hamari et al., 2014). Unlike isolated gamified elements, serious games can provide immersive narratives, roles, and challenges that align with learning goals, which can encourage deep engagement and even develop social-emotional skills (Barab et al., 2010; Gee, 2003). In short, superficial gamification risks distraction whereas meaningful game-based experiences that integrate content with engaging mechanics can promote sustained interest and learning (Nicholson, 2015).

Games for empathy

A growing body of work suggests that serious games can cultivate empathy by immersing players in asymmetric roles and ethically challenging situations (Schrier & Farber, 2021). Both analogue and digital games have demonstrated this approach, from *Life Cycle* (Chaisson, 1980) and *Blacks & Whites* (Schild, 1971; Sommer et

al., 2023), which simulate structural inequality, to titles such as *Papers, Please* (Pope, 2013) *Depression Quest* (Quinn, 2013) and *Dog Eat Dog* (Liwanag Burke, 2012; Mir, 2013) , which foreground moral tensions and power imbalance. These designs place players in constrained decision-making contexts that can evoke both perspective-taking and emotional resonance. Previous studies further suggest that confronting players with ethical dilemmas or role reversals can unsettle assumptions and foster reflection. (Belman & Flanagan, 2010; Schrier, 2016; Whitby et al., 2019). Empirical evaluations, such as a randomized control trial evaluating psychology students playing an empathy driven game, have reported short-term increases in measured empathy following gameplay (Olivier et al., 2019). Likewise, repeated play in immersive serious games has been linked to increases in empathic responses and prosocial attitudes (Wulansari et al., 2020). These findings suggest that incorporating authentic social contexts, challenging choices, and opportunities for collaboration into game design can effectively elicit both cognitive and affective empathy.

Social simulation games, which model real-world social systems, must strike a balance between playability and authenticity. Designers need to define the key social processes and roles to simulate, incorporate interactions like cooperation and competition, and provide feedback that shows players the consequences of their actions in the system (Gloria et al., 2014; Kiili, 2005). These elements help ensure meaningful, realistic gameplay while allowing players to explore complex social dynamics in a simplified, experiential way. Immediate feedback and clearly defined goals can guide players' exploration and reflection on societal issues (Mochizuki et al., 2021).

Board games offer a unique medium for social learning. Their face-to-face format encourages dialogue and collaboration between players, aligning with social constructivist ideas that learning is enhanced by active peer interaction (Abbott, 2020). Board game play often involves discussion, negotiation, and collective problem-solving in a physical space, which can make the experience highly immersive. For example, *Hopetown* (a training board game used in community development programs, https://socialudo.org/play/hopetown) divides players into roles (e.g., policymakers, social workers, and urban planners) who must allocate resources to solve community problems such as an aging population or housing shortage. Similar games have been used to build awareness of social issues in professional training settings, particularly in contexts such as community development and healthcare education (Bayeck, 2020; Sousa et al., 2023). By grounding players in real-time interpersonal interactions, the tactile and social nature of board games can deliver an experience which is particularly suitable for games that seek to develop empathy. Furthermore, board games are of increasing interest to educators due to their relevance to real-world scenarios, lower barrier to entry, accessibility, and relatively low cost to implement (*cf.* Allcoat & Evans, 2024; Maratou et al., 2023).

In summary, previous research highlights that well-designed games — especially those that simulate social situations and require role-play and cooperation — can promote empathy and deeper understanding of social issues. Key mechanisms include perspective-taking opportunities, emotional feedback for decisions, and collaborative goals that align players toward common causes. However, prior research often notes short-term outcomes and lacks a unifying framework explaining how game mechanics translate into empathy and learning gains. This paper builds on the above insights by proposing the MEC pathway model and applying it in the design of a new board game to systematically examine how specific game features.

Learning design

The Mechanism — Empathy — Cognition model

The Mechanism–Empathy–Cognition (MEC) model (Figure 1) outlines how game design can elicit empathy and support learning. Drawing on the literature explored above, within the MEC framework, randomness functions as a contextual amplifier rather than as an independent empathic mechanic. By introducing unpredictability, random events can intensify emotional responses or exacerbate existing inequalities, thereby reinforcing perspective-taking and reflection triggered by other mechanics. Role substitution and collaboration encourage perspective-taking; structural unfairness and chance can induce frustration, simulating social unpredictability. Feedback reinforces awareness of progress or decline. Together, these principles foster cognitive (perspective-taking) and affective (sympathy or concern) empathy. Such responses underpin cognitive change, including understanding structural inequality, valuing social resources, and recognizing institutional barriers. Finally, the model builds on educational psychology perspectives, particularly those emphasizing how experiential and socio-emotional learning can foster cognitive shifts in understanding structural inequality and social responsibility (Segal et al., 2012). The MEC framework therefore synthesises insights from empathy theory, serious games scholarship, and social learning research to propose a pathway from mechanics design to empathic engagement and cognitive change. In this study, cognitive empathy is operationalised primarily as perspective-taking, consistent with the Interpersonal Reactivity Index (IRI) framework. Other forms of cognitive understanding are represented within the ‘Cognition’ outcome stage of the model, rather than within the empathy construct itself.

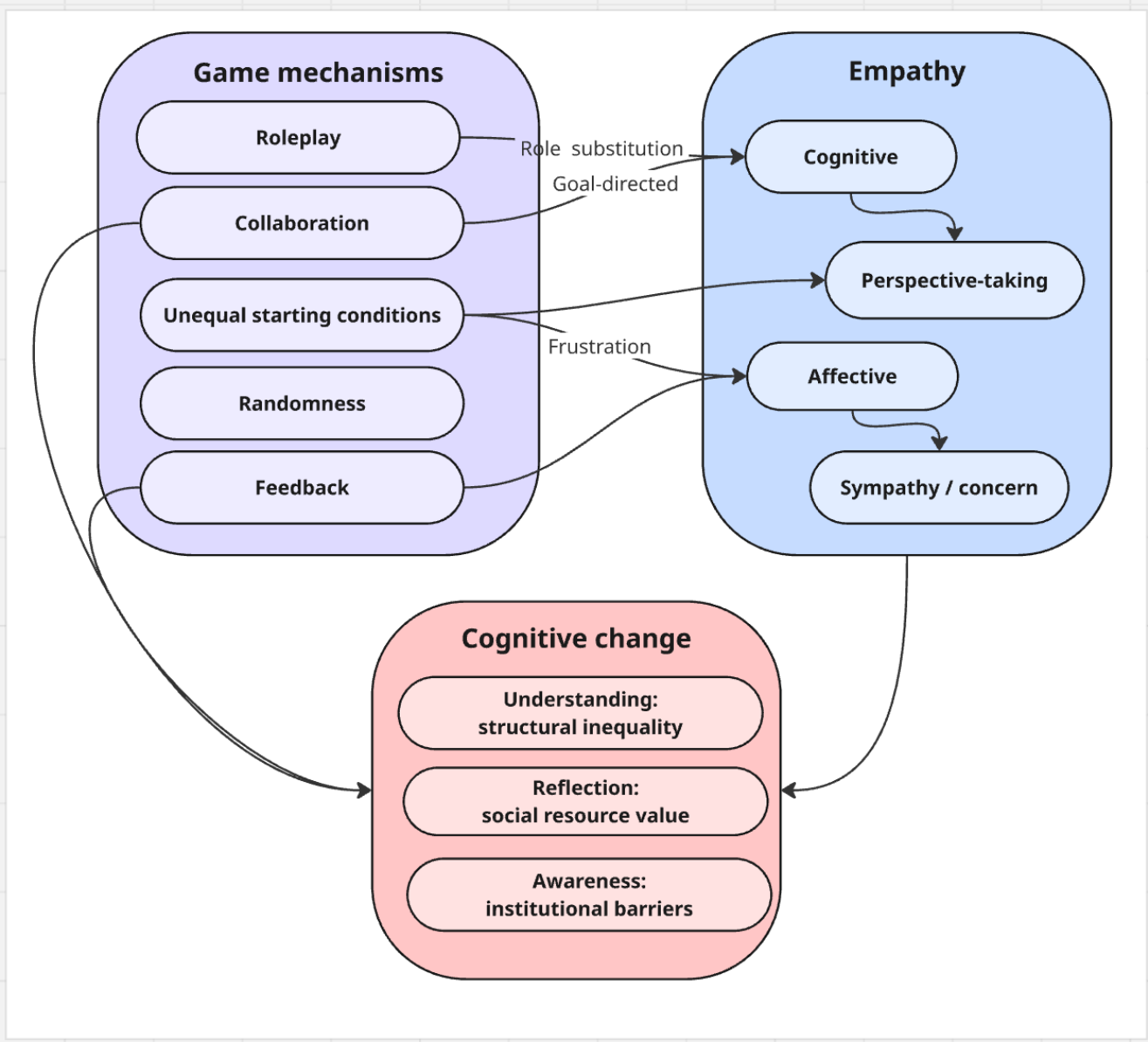


Figure 1 - Mechanics-Empathy-Cognition model. Arrows show the proposed outcomes of game design using the specified mechanics, with specific key emotional and behavioural concepts labelled.

Game design for empathy

In the design of *Social Prism*, the abstract principles of the MEC model were operationalized through differentiated starting resources, the dynamics of individual and collective event cards, and a "Spirit Point" system—representing players' emotional resilience—which collectively demonstrate how empathic mechanisms can be embedded in concrete learning design. *Social Prism* is a board game designed explicitly to

elicit empathy and reflection on social inequality. This goal requires players to experience social issues through the key overall concepts of character-based immersion, resource allocation/interaction based on game environment, and teamwork. These parts work in coordination with each other to create a meaningful gaming experience where players not only reflect on their own characters but also begin to understand the experiences of other people. In this case, 'empathy' is not only a theory, but also is produced through choices, consequences, and interactions. The game aims to stimulate cognitive and affective empathy through multiple narrative and interactive methods (*cf.* Tan & Tan, 2022). Development followed an iterative, theory-driven process and incorporated feedback from pilot trials to refine the mechanics.

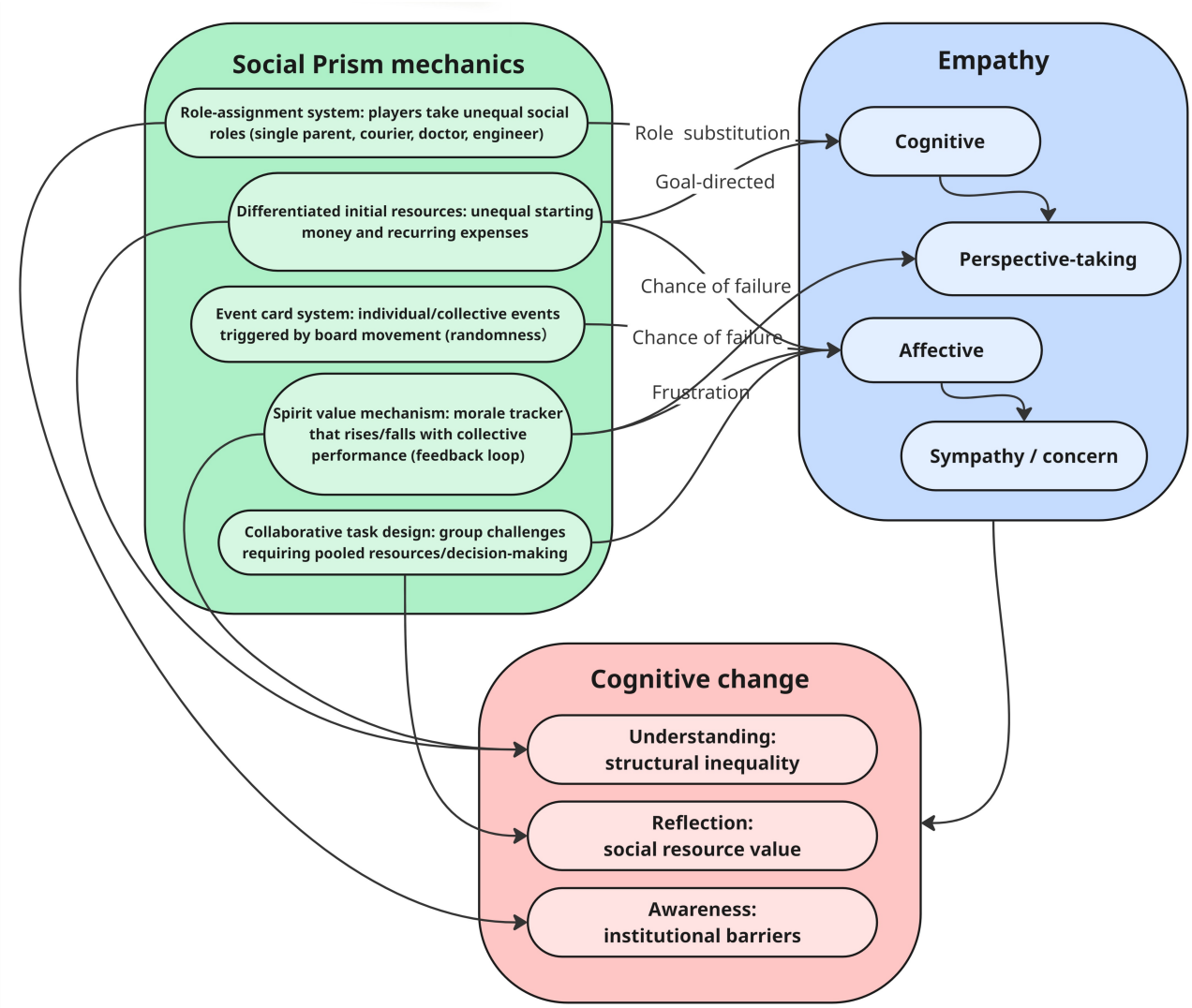


Figure 2 - *Social Prism* game mechanic interactions with MEC model. Arrows represent directional relationships between layers: from game mechanics to empathic activation (both cognitive and affective), and from empathic responses to broader cognitive reflection on structural inequality. The arrows therefore indicate hypothesized pathways of influence rather than linear causality.

Figure 2 illustrates how the overall game mechanisms align with the MEC model, while Table 1 (below) maps specific design elements to their intended empathic and cognitive outcomes.

To simulate real-life social structures, a circular board (Figure 4) presents different domains of life (e.g., work, rest, community), and players assume distinct social roles (e.g., single parent, delivery courier, doctor), selected to represent contrasting positions in social hierarchies and to reflect real-world challenges such as caregiving burdens, precarious labor, and unequal access to healthcare (. Each role is assigned unique abilities and starting resources. Crucially, these roles are not balanced: some characters begin with disadvantages (such as less money or higher recurring expenses) while others have certain privileges (like a special skill or more savings). This imbalance is intentional, reflecting real-world inequality and setting the stage for empathic understanding —players in disadvantaged roles immediately feel the pressure of scarce resources compared to their peers. Role-playing and situational experiences have been shown to enhance players' identification with and immersion in character identities, thereby stimulating empathy for those roles (Barab et al., 2010).

The core game mechanic is repeated problem solving throughout game rounds. This provides goal-directed behaviors that require each player to gain an understanding of the different social roles; their advantages, disadvantages, and barriers. Gameplay unfolds in rounds where each player takes turns drawing (random) event cards and making decisions. Character Event Cards introduce personal dilemmas tailored to each role. For instance, the single parent might draw an event like "Child Falls Ill," forcing a choice between paying for medicine (losing a large sum of money) or saving money but allowing the child's condition to worsen (incurring a penalty such as loss of morale). There are no easy, "correct" choices—each option has consequences, compelling the player to consider the dilemma that people in that role might face. Several Character Event Cards include moral dilemma scenarios to directly trigger emotional resonance. For example, "Lend Money to a Friend in Need": players are given the choice to offer financial assistance—lending 100 money to exchange for a boost in Spirit Points—or to decline, at the cost of losing one Spirit Point, reflecting guilt or regret. Situations like this place players in difficult moral positions, where they need to weigh their own gain against the needs of others. In these times, they may consider how their actions or inactions may affect the people around them. These dilemmas are designed to trigger cognitive empathy by having players think from their character's constrained perspective, and to evoke affective empathy through the emotions of frustration or guilt that accompany the decisions.

In addition to individual challenges, players encounter Event Cards when landing on designated board spaces. There are two types: Individual Event Cards, which create role-specific challenges, and Social Event Cards,

which introduce collective dilemmas such as establishing a community fund. Whenever a player lands on an event square, the indicated card is drawn and resolved, with Social Event Cards requiring all players to negotiate and act together. A successful group effort yields a reward for everyone, whereas failure imposes a penalty on everyone. For example, a "Community Fundraiser" card might require a total of $500 to be donated across all players; if the group fails to gather enough funds, every character loses 1 Spirit Point (a measure of morale or mental stamina). Such mechanics force players to weigh personal interests against the common good. A player with very scarce resources might hesitate to contribute, yet if they refuse, the entire group (including themselves) suffers. These decisions were designed to provoke negotiation, dialogue, and perspective-taking: players with more resources might empathize with a struggling teammate's predicament, or conversely, those in need might experience moral conflict when deciding whether to ask for help. By incorporating shared risks and rewards, the game's cooperative elements aim to foster a sense of shared responsibility and highlight interdependence—key aspects of social empathy (Belman & Flanagan, 2010; Segal et al., 2012). Furthermore, many Social Event Cards are designed to reflect the strengths and limitations of each role. For example, repairing a damaged power generator requires an engineer, while treating a medical emergency requires a doctor. In groups with fewer players, individuals may assume multiple roles so that critical tasks can still be addressed collaboratively. Differences are designed to make teamwork pivotal and encourage players to think about how people from different backgrounds face different, unique pressures.

To instigate reflection on the value of social empathy, a system of Spirit Points—introduced earlier as a measure of emotional resilience—was designed to model players' mental well-being. Each character starts with three Spirit Points representing their psychological state. Certain high-stress scenarios—triggered by specific Event Cards such as job loss, health crises, or community conflicts—can reduce a player's Spirit Points. If a character's total drops to zero, they are considered to have "burned out," meaning they can no longer participate effectively in collective decision-making until supported by other players. However, players can recover Spirit Points through certain positive events or by using a support resource (e.g., Doctor's help card) if available. This mechanic simulates stress and relief, showing how setbacks wear people down and how support becomes critical.

Several other mechanics reinforce the empathy-learning goals. Players have access to limited Prop Cards (usable once per round) which can mitigate some negative events (for example, a "Counseling" prop to regain Spirit Points or a tool that prevents a particular crisis). Another notable feature is the game's dual win conditions: one condition for individual victory (each role has a personal goal, such as saving a certain amount

of money or completing a personal mission) and another for group victory (e.g., completing a set number of Social Event tasks successfully as a team). This dual goal structure intentionally creates tension between self-interest and collective well-being. To truly 'win' in the fullest sense, players must recognize that prioritizing only personal success can jeopardize the group outcome—and vice versa. The design goal of this mechanic was to encourage players to adopt a broader perspective, realizing that collective success often requires personal compromises. Table 1 summarizes how each mechanic developed from the Mechanism–Empathy–Cognition model. See also Figure 2 (above).

Table 1 - mapping game mechanics to Mechanism-Empathy-Cognition model

Game mechanic	**Example**	**Design intention**
Role-specific abilities	Delivery Courier gets +2 movement	Externalize occupational advantages/constraints so that opportunities and burdens are unequally distributed by role. Empathy pathway makes players observe how mobility changes access to income/events and must negotiate support, which fosters cognitive perspective-taking about others' constraints.
Event system	landing on marked spaces triggers Character Event Cards or Social Event Cards	pair personally costly incidents with shared public goods. Empathy pathway can individual crises evoke affective resonance, whereas shared thresholds and penalties/rewards in Social Events require deliberation and joint action, strengthening social responsibility and perspective-taking.
Resource economy: money	"Medical Assistance" requires 200 money (reduced to 100 with doctor participation)	Deciding whether to spend on oneself or to enable another player's task surfaces ethical tension and interdependence.
Resource economy: Spirit Points	At Spirit Points=0 the character fails	Keep risks salient yet bounded. Empathy pathway can become cycles of strain and recovery, and the need to ask/offer help, elicit affective empathy while preserving psychological safety.
Props	"Counseling" prop card regains Spirit Points	Props mitigate crises, requiring strategic decision-making around resource allocation for self and others.
Dual victory conditions	Individual win conditions and team wins by completing five Social Events	Forces tension between self-interest and collective goals. Empathy pathway: negotiation over whose needs is prioritized encourages perspective-taking and prosocial reasoning consistent with the study's learning outcomes.

When designing the game content, the focus was on creating institutionally-informed events that reflect the complexities of social systems. Each round introduces events such as policy changes, social regulations, and resource allocations, requiring players to decide in line with their character identities. To simulate structural inequality, disadvantaged roles encounter higher risks (e.g., reduced Spirit Points or limited access to

resources), while privileged roles retain advantages. This deliberate asymmetry—following earlier examples of 'unbalanced' board games—aims to evoke empathy and encourage reflection on how systemic rules shape unequal social experiences (Liwanag Burke, 2012; Sommer et al., 2023).

Throughout the design process, the difficulty was calibrated to maintain a balance between authenticity and playability. Challenges need to be realistic enough to provoke empathy and reflection grounded in real-world systems and values, but not so punishing that players became disengaged.

In summary every major element of *Social Prism*, from role asymmetries and event cards to cooperative challenges and win conditions, was deliberately crafted to activate empathy, prompt discussion about fairness and social structures, and provide a rich shared learning experience for the players.



Figure 3. *Social Prism* printed board game

Case Study: implementation and evaluation of *Social Prism*

In order to assess the practical value of the MEC framework and the associated design principles, this study implemented *Social Prism* with a small cohort of young adults and conducted a focused evaluation. The research question can be broken into two parts: 1) Can a serious board game effectively stimulate adult players' empathy (both cognitive perspective-taking and affective concern)? And 2) Can the game enhance understanding of structural social inequality?

Methods

Game design, development and evaluation took a mixed-methods approach. The design process involved multiple iterations of the prototype. Whilst only one round of participant playtesting was feasible within the project timeframe, the insights gained were integrated into the final version of the game (*cf.* Ball et al., 2021). A one-session multiplayer playtest of the final game was conducted to evaluate its immediate impact on empathy and subjective experience of the players. This single-session format, while limited in capturing long-term effects, offered a practical and ecologically valid snapshot of outcomes within a short time frame. The lead researcher was also the designer of *Social Prism* and facilitated the playtest session. This dual role was taken into account during data interpretation, with findings presented cautiously as exploratory reflections rather than objective measures of impact. During gameplay, the researcher facilitated the session and monitored participants' responses, intervening if distress arose. A short debrief was conducted after gameplay to allow participants to reflect on their experiences and emotions, and to contextualize the game's scenarios as simulations rather than representations of individual moral failure.

Participant Recruitment

A small pilot sample was targeted, resulting in the recruitment of six volunteers (aged 18+) via convenience sampling (e.g., social issue groups, gaming forums). The study received ethical approval from The Glasgow School of Art in July 2025. Given that the game includes scenarios involving stress, inequality, and moral dilemmas, several measures were taken to manage potential emotional discomfort. Participants were informed in advance about the nature of the game content using a a Participant Information Sheet were made aware of their right to withdraw at any time without penalty. Although demographic comparisons were outside the scope of this study, we note that participants had varied levels of education and familiarity with board games.

Gameplay and Data Collection

All data were collected in a single session. Each participant was assigned an anonymized code and all personal data were kept confidential. The gameplay session was conducted in a public board game café with appropriate risk assessments in place to ensure a safe environment. Before gameplay, participants completed a 31-item empathy questionnaire adapted from selected subscales of the IRI (Davis, 1983). Given the exploratory scope of the study, the questionnaire was adapted to focus on items most directly related to perspective-taking and empathic concern in the context of social inequality. During the game, the lead researcher observed and noted each player's key decisions, interactions (cooperative or competitive behavior), and notable emotional reactions (e.g., signs of frustration or sympathy). Immediately after playing, all participants completed the same questionnaire again to measure any changes in perspective-taking and

empathic concern. Additionally, two participants volunteered to be interviewed, providing qualitative insights into their experiences and perceptions of the game.

Data Analysis

Questionnaire responses were compared pre- and post-game to assess empathy changes, guided by the research questions, i.e., focusing on changes in cognitive empathy (perspective-taking) and affective empathy (empathic concern). Within the small sample, quantitative analysis was descriptive, focusing on direction and magnitude of change rather than statistical tests. A 5-point Likert scale was used (1 = least agreement, 5 = most). For analysis, a subset of questionnaire items was selected for pre- and post-game comparison. The pre-game questionnaire included 14 core items, while the post-game questionnaire repeated these items and included one additional question capturing participants' reflections on the gameplay experience. Covering empathy toward social roles, awareness of resource inequality, collaboration, and gameplay feedback. Following previous work, responses were categorized according to cognitive, affective, and behavioral learning outcomes (Abbott et al., 2022; Anderson & Krathwohl, 2001). All six participants completed both questionnaires, providing paired samples. To summarize responses, descriptive statistics (means and standard deviations) were calculated. Although medians are often used for Likert-type data, means were reported here to allow easier comparison of relative change magnitudes across items. Percentage change values (post-game minus pre-game, relative to pre-game means) were also calculated to visualize response shifts. Although questionnaire items were presented in a different order post-game to mitigate order effects, core items were repeated to enable descriptive comparison. Reported changes therefore reflect perceived shifts rather than statistically measured effects.

Interview and observation data were analysed using a thematic approach informed by Braun and Clarke's (2006) six-phase framework. Given the small number of interviews and the exploratory purpose of the study, thematic analysis was used to identify illustrative patterns rather than to generate fully saturated themes. Coding and theme identification were conducted by a single researcher. Interview recordings were transcribed and coded to identify recurring themes (e.g., "role immersion," "realization of inequality") showing how the game influenced participants' thinking and emotions.

Playtest

Playtesting took place in a board game café setting and lasted around 2.5 hours in total. Participants (2 male, 4 female) were orientated to the rules and context of *Social Prism* before completing the pre-game questionnaire. Participants then played two full rounds of *Social Prism* together (with the researcher facilitating as needed and quietly observing). Immediately after gameplay, all six participants completed the post-game questionnaire.

Two participants were interviewed in a semi-structured format, each for about 10 minutes, to provide deeper reflections on their experience.



Figure 4 - playtest in progress

Results

Pre- and post- test results and discussion

Table 2 presents the descriptive statistics for all questionnaire items. Questions based on cognitive awareness or depth of understanding of social inequality (Qs1, 3, 4, 5, 9, 10, 11) show strong recognition with a range of means from 3.50 – 4.83 and an overall mean for the Cognitive category of 3.76. Questions based on emotional resonance (Qs2, 6, 7, 8) range from 3.50 – 4.83 with the Affective category having an overall mean of 3.88. Questions around willingness to take practical action (Qs 12, 13, 14) range from 2.33 – 4.83 with a Behavioral overall mean of 3.89. The highest scoring items are around sympathy for others (Q7) and personal hope to reduce social inequalities (Q14), whilst the lowest scoring item is based on helping people in need (Q12).

Table 2 - pre-test questionnaire results

Questionnaire item	Category	Responses	Mean
Q1 Social resource allocation is significantly unequal	Cognitive	4,4,5,4,3,5	4.17
Q2 Unfair social resource allocation concerns me	Affective	3,3,4,3,4,4	3.50
Q3 Addressing inequality is important for social development	Cognitive	4,4,5,4,5,4	4.33
Q4 Vulnerable groups' hardships are influenced by social structures	Cognitive	4,5,4,5,4,4	4.33
Q5 Understanding difficulties faced by vulnerable groups	Cognitive	4,3,4,3,4,3	3.50
Q6 Feeling sad/angry about unfair treatment of vulnerable groups	Affective	5,4,5,4,5,4	4.50
Q7 Feeling sympathy when hearing about vulnerable groups' hardships	Affective	5,5,5,4,5,5	4.83
Q8 Considering others' perspectives before judging	Affective	3,2,3,2,4,2	2.67
Q9 Often attempting to see issues from others' viewpoints	Cognitive	2,4,4,3,3,3	3.17
Q10 Viewing social issues from multiple perspectives	Cognitive	3,4,4,3,4,4	3.67
Q11 Paying close attention to social injustice and seeking to understand	Cognitive	3,2,4,3,4,3	3.17

Q12 Helping people in need	Behavioral	4,1,3,2,3,1	2.33
Q13 Willing to assist vulnerable groups through volunteer work	Behavioral	4,4,5,4,5,5	4.50
Q14 Hoping to reduce social inequality through personal efforts	Behavioral	5,5,5,5,4,5	4.83

Table 3 shows results for the post-test. The overall means for each category have increased: Cognitive rose from 3.76 to 4.53 (increase to 120% of former value), Affective from 3.88 to 4.54 (increased to 117%), and Behavioral from 3.89 to 4.13 (increase to 106%) (see Figure 5). The highest score is for item 15, showing an increased ability in perspective-taking, whilst the lowest score is around the motivation to participate in social justice (Q10) with a value of 3.83(Q10), so above average for the Likert scale.

Table 3 - post-test questionnaire results

Questionnaire item	**Category**	**Responses**	**Mean**
Q1 Deeper understanding of unequal social resource allocation	Cognitive	4,5,5,5,4,4	4.50
Q2 Recognizing significant impact of resource inequality on personal life	Cognitive	5,3,5,4,5,3	4.17
Q3 Better understanding of pressures from resource scarcity on different social roles	Affective	5,4,5,5,5,4	4.67
Q4 Ability to empathize with vulnerable groups	Affective	5,5,5,4,5,4	4.67
Q5 Gameplay enhanced empathy	Affective	5,4,5,4,5,4	4.50
Q6 Feeling stronger social responsibility	Behavioral	5,4,4,3,5,4	4.17
Q7 Increased awareness of structural causes behind social issues	Cognitive	5,5,5,5,5,4	4.83
Q8 Recognizing personal circumstances are influenced by social environment	Cognitive	5,3,5,4,5,3	4.17
Q9 Greater willingness to understand and help people in need	Behavioral	5,4,5,3,4,4	4.17
Q10 Motivated to participate in social justice	Behavioral	4,4,4,2,4,5	3.83
Q11 More likely to take action against social injustice compared to pre-game	Behavioral	5,4,4,2,4,5	4.00
Q12 Stronger sympathy and understanding for disadvantaged groups:	Affective	5,3,5,4,5,4	4.33
Q13 Recognizing many hardships stem from structural social factors	Cognitive	4,5,5,5,5,4	4.67
Q14 Helping vulnerable groups is my responsibility	Behavioral	5,4,5,4,5,4	4.50
Q15 Learned to view issues from different social perspectives	Cognitive	5,5,5,5,5,4	4.83

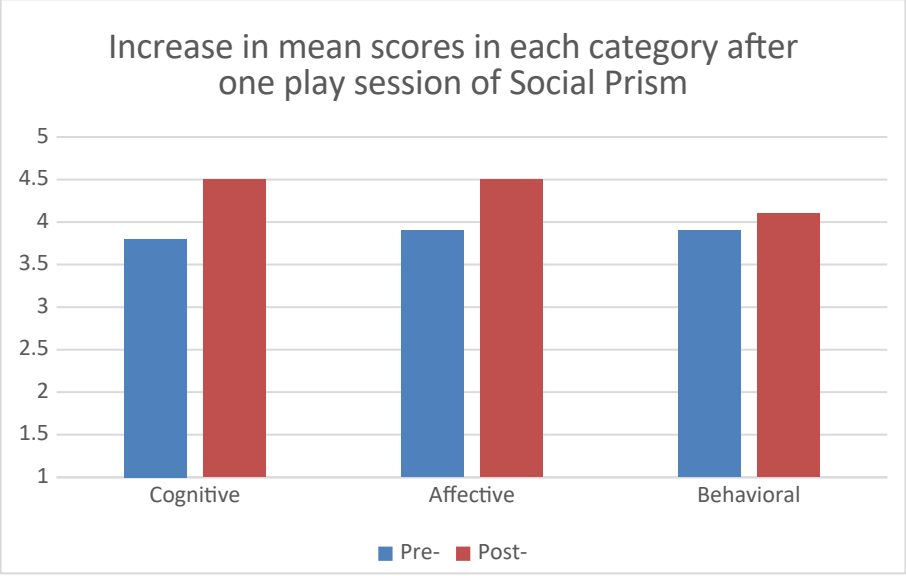


Figure 5 - overall score increases in each category after playing *Social Prism*

Across participants, questionnaire responses showed consistent upward trends in perspective-taking and empathic concern. Most players reported greater awareness of resource dilemmas faced by disadvantaged roles and a stronger willingness to take socially responsible actions. Descriptive results showed increases across most affective and cognitive empathy items. Average ratings of awareness of inequality in resource allocation rose by 20% from pre-game responses. Willingness to collaborate also increased, though behavioural outcomes showed smaller changes.

In order to gain further insights whilst preventing bias from order effects, some items were directly mapped into paired samples in a different order in the post-test. These are shown in Table 4, with values that have an increase of >1 (i.e., one entire Likert scale band) highlighted in bold. There are three items with such an increase, the cognitive and affective aspects of taking on another's perspective (increased to 152% and 175% respectively) and the willingness to help those in need (increase to 179%).

Table 4 - conceptual mapping from pre- to post-test and change in mean

Item description	**Pre-test item**	**Post-test item**	**Category**	**Change in mean**
Understanding of social inequality	Q1	Q1	Cognitive	0.33
Awareness of structural factors	Q4	Q13	Cognitive	0.34
Multi-perspective thinking	Q9	Q15	Cognitive	**1.66**
Understanding difficulties faced by disadvantaged groups	Q5	Q8	Cognitive	0.67
Perspective-taking intention/ability	Q8	Q4	Affective	**2.00**

Sympathy for disadvantaged groups	Q7	Q12	Affective	-0.50
Attention paid to social justice mapped to intention to participate	Q11	Q11	Behavioral	0.83
Willingness to help those in need	Q12	Q9	Behavioral	**1.84**
Participation in social justice efforts	Q14	Q10	Behavioral	-1.00

Interestingly two items showed a decrease. The first theme identified was sympathy for disadvantaged groups. The willingness to participate in social justice item has also declined in the post-test results. This could be a side-effect of the increased understanding of systemic and structural factors that could demotivate due to being 'too large' for one person to influence. However, as no game feedback explicitly addressed these points, this is speculation.

Overall, this evaluation shows that *Social Prism* was associated with increases in participants' cognitive awareness participants' cognitive level regarding social inequality issues, strengthened empathy and social responsibility, and, in particular, cultivated perspective-taking abilities. However, there remains room for improvement in translating cognitive and affective outcomes into practical actions as the increase in the Behavioral category is small (Figure 5).

Qualitative results and discussion

The results above were triangulated by comparing patterns across questionnaires, interviews, and observational notes. Three main themes were identified: (a) emotional conflict in resource sacrifice, (b) feelings of helplessness in response to systemic barriers, and (c) moral tension and guilt in collective punishment events. The post-game questionnaire included an optional free-text comment box, where participants noted, for example, *"Felt conflicted when drawing cards that required sacrificing resources to help others"*; *"Experienced a sense of helplessness during robbery or water/power outage events"*; and *"Felt somewhat guilty when collective punishment occurred due to team failure."* These responses indicate that the game mechanics elicited marked emotional reactions.

Observations and interviews provided rich insights into how the game experience influenced players. A key theme was emotional immersion and role identification. Players often became deeply absorbed in their characters' situations. Both interviewees remarked that during the game they, at times, forgot they were 'just' playing. One participant who played as the Single Parent described a moment of crisis in the game: *"I ran out of money and ran out of Spirit Points. I felt stuck, like there was no way forward. And that's when it hit me—this kind of*

pressure probably isn't rare for real single parents. It made me feel what that cornered kind of life might be like." Similarly, the player who took on the Delivery Courier role initially enjoyed the character's mobility advantage, but later, after experiencing consecutive setbacks, said: *"Playing this game truly helped me understand other social groups... maybe real deliverymen's speeding or breaking traffic rules stem from desperation, not greed."* Such reflections show that the gameplay evoked not only sympathy for the characters' struggles but also new understanding of why real people in similar positions might behave in certain ways. These powerful experiences of identification led to experiential learning, supporting the learning design to game design choices described above. A supporting insight from observation was that different character roles tended to rely on the helpful Prop Cards in different ways; disadvantaged roles often had to use their Props immediately to cope with crises, whereas better-off roles could save them for strategic advantages later in the game. This difference in play style (forced by the intentionally asymmetric game mechanics) further highlighted how people with fewer resources have less flexibility when coping with problems.

Another key outcome was a shift in attitudes toward cooperation and shared responsibility. During the game, players quickly discovered that individualistic strategies were insufficient—winning required teamwork. Several participants mentioned that the shared challenges (like the group event cards) made them realize how interdependent their fates were. For instance, one observed that *"when other players couldn't complete their quests, I couldn't get the resources I needed either"* recognizing that everyone's well-being in the game was connected. The cooperative tasks often sparked moments of tension followed by reflection. In one case, a resource-poor player hesitated to contribute money to a collective goal, causing some friction in the group. After the game, players pointed to this scenario as eye-opening: it led them to discuss how people who are struggling might feel reluctant or unable to contribute in real life, and how those better off might need to show more understanding. What began as an in-game negotiation turned into a lesson about empathy and mutual support. As the game progressed, even players who started out focusing only on their personal objectives recognized the necessity of helping each other. Interviewees noted that the game effectively demonstrated the value of solidarity; one remarked that cooperation in the game *"was not optional, but a survival strategy"* highlighting a realization that resonated with how real-world communities must work together.

Finally, the experience of *Social Prism* prompted real-world reflections and attitude changes regarding social inequality. After the session, participants expressed a stronger awareness of systemic inequities, and some indicated they would engage more with these issues going forward. One interviewee (the Single Parent player) shared that the game made online stories of people in poverty feel *"far more real—almost as if they were happening*

to me or someone close to me," leading her to feel greater empathy toward individuals in such situations. The other interviewee (the Delivery Courier player) admitted that before playing, he *"hadn't thought much about how resources are distributed,"* but after the game, he began paying more attention to how social policies affect those with fewer advantages. These comments suggest that the game not only elicited momentary empathy during play but also encouraged players to reconsider their perspectives beyond the game. Several participants described the game as a *"mind-opening"* experience that made them more conscious of social justice issues. Some also reported feeling motivated to discuss what they learned with friends or to be more supportive when they encounter people facing hardships in real life. Players also appeared to experientially grasp structural disparities through resource allocation dynamics within the game that reflect real-world systems. However, it is important to note that the intervention was brief; while it clearly influenced players' immediate feelings and thoughts, deeper behavioral changes (such as long-term volunteering or activism) were not observed in this short-term setting.

In summary, three themes emerged: (1) stronger emotional resonance with others' difficulties, (2) greater recognition of structural inequalities, and (3) stronger cooperative, prosocial orientation. Together, these suggest that *Social Prism* fostered short-term empathy and awareness.

Discussion of future directions for empathy-driven game design

The primary contribution of this paper is conceptual and design-oriented rather than evaluative. Specifically, the Mechanism – Empathy – Cognition (MEC) model offers a structured way for designers and educators to reason about how specific game mechanics may support empathic engagement and cognitive reflection. The case study of Social Prism serves as an illustrative example demonstrating how this framework can be operationalized in practice, rather than as a comprehensive validation of the model. Given that only two interviews were conducted, qualitative findings are presented as illustrative insights rather than as a reflexive thematic analysis in the fullest methodological sense.

In this case study all participants demonstrated increases in their empathy scores from pre- to post-game. Scores related to perspective-taking (a measure of cognitive empathy) and empathic concern (a measure of affective empathy) tended to be higher after playing *Social Prism*. Furthermore, several players' post-game surveys reflected a heightened awareness of social inequality issues. In open-ended responses and discussions, some noted that the game made them more cognizant of how factors like income or social status can drastically

affect a person's opportunities and challenges. Given the small sample in this case study evaluation, these improvements are described qualitatively rather than with formal statistical analysis nonetheless, this trend was consistent.

While Spirit Points offer a tangible way to represent emotional pressure within gameplay, they necessarily simplify complex psychological processes and should not be interpreted as indicators of mental health. *Social Prism* functions as a structural inequality simulation to achieve its key outcome of social empathy stimulation. Most players gained deeper understanding of underprivileged roles' dilemmas, particularly when facing resource scarcity, event stacking, and cooperation challenges. High emotional engagement validated the role-immersion mechanism's effectiveness in fostering affective resonance. Additionally, Social Event Cards' collaborative mechanisms partially overcame individualistic tendencies, enabling short-term experiences of group symbiosis and shared responsibility with high levels of negotiation and resource pooling resulting. Whilst core mechanics are considered to have functioned well in translating the MEC model into a playable game, five key potentials for development or further research were identified:

Reward/penalty systems

In the case of *Social Prism*, the Spirit Points system gives players direct game feedback as a metaphor for mental resilience and psychological safety. Quantitative rewards or punishments impact game strategy, and are based around individual characters within the game. Consideration could be given to how to reinforce cooperative behaviors and stabilize game rhythm using phased mechanisms such as group Spirit Point rewards upon completing Social tasks. These reflections resonate with prior studies: Kirkley et al. (2011) highlighted that immediate feedback is essential but warned of reduced authenticity when oversimplified, while Belman and Flanagan (2010) similarly argued that empathy games must combine point systems with perspective-taking opportunities. Our results reflect this tension—while the Spirit Point system engaged players, its translation of empathic actions into numbers risks undermining deeper affective learning. In real-world applications such as healthcare or social work training, reward/penalty systems could be reframed around collaborative rather than individual performance. Evidence from nursing education suggests that structured empathy interventions improve professional outcomes (Hojat et al., 2020); integrating serious games like *Social Prism* may thus extend such effects by embedding learners in simulated, socially complex scenarios.

Random elements

Social Prism uses dice rolls to generate randomness in both content and pacing. Players usually encounter either general or Character Event Cards every two to three turns, with occasional back-to-back event triggers. These can be mitigated by Prop Cards, as described above. Whilst unfairness, stress, and difficult decisions are

intentional outcomes of many empathy games, designers should consider the pacing, strategic tension, and emotional balance of games with random elements and may wish to implement mechanisms such as cooldown periods or usage costs for high impact game events (beneficial or detrimental). Board layout and movement mechanics can also increase or decrease random elements to the desired level.

Enhancing distinctions in roles and abilities

The character roles within *Social Prism* (Engineer, Doctor, Delivery Man, and Single Parent) included differing start conditions and skill-based variations (e.g., reduced repair costs for the Engineer). This was intended to amplify strategy and interest while strengthening "structural role disparities" social metaphors. However, we observed that some of these advantages were not consistently activated during gameplay. Again, injustice by design was intentional, however, the uneven application of game advantages in actual gameplay highlights that some players are more likely to be able to identify and optimize strategic game benefits whilst others are more likely to immerse themselves in roleplaying the character, for example. As with all games, an analysis of the intended audience is crucial, however, in games for empathy it is particularly important to consider what may happen in the event of an uneven application of rules by players, and whether this may lead to emergent or undesired outcomes (*cf.* Grey et al., 2017). Individual character mechanics could be refined and deepened to support game balance, however, this would require a detailed consideration of the complex interplay between those abilities and the game's nondeterministic content (e.g., cards). Therefore, an equally valid strategy would be to simplify 'special powers' into one, easily-understood feature per character.

Stress vs. safety

Games are often recognized as 'safe' spaces for experiential learning (Abbott, 2019) allowing players to reflect on emotions and situations they might never encounter otherwise (or that would be unethical to provoke outside of the game-space.) This aligns with prior observations that role-play and narrative in games can mediate attitude change (Belman & Flanagan, 2010; Schrier, 2016). In *Social Prism* players recognized systemic unfairness first-hand, leading to feelings such as stress and helplessness, while also engaging in explicit discussion about how these challenges might be addressed. Importantly, these experiences were situated within a facilitated and time-limited game context, with opportunities for reflection built into the session to support emotional processing. Impacting not just interpersonal empathy (understanding someone's feelings in a given situation) but social empathy: an awareness of larger structural factors that shape people's lives (Segal et al., 2012; Whitby et al., 2019). The delicate balance between extremely intense or negative experiences from threats of failure/injustice with actual disengagement should be carefully considered, particularly when structural inequality is embedded directly into rules. Furthermore, debriefs or other out-of-game support

structures could be considered to ensure that players process emotions constructively.

Co-operation and collaboration through dialogue

Our evaluation also reinforces prior evidence that shared struggles/group penalties can promote a sense of collective responsibility (Gao et al., 2015) highlighting the importance of well-crafted cooperative mechanics in empathy-oriented games. Furthermore, the face-to-face format of a board game provides a social "magic circle" that can encourage open dialogue and collaborative sense-making among players which should be maximised wherever possible during (as opposed to after) gameplay (Abbott, 2020; Bayeck, 2020).

In the future, interdisciplinary collaboration and technological integration can help drive the application and development of similar projects in education and social innovation.

Conclusions

The findings of this exploratory case study suggest that a well-designed serious board game may foster short-term empathic engagement and increased awareness of structural inequality. Participants not only showed increased empathy scores after gameplay, but their narratives also indicated meaningful shifts in perspective and the internalization of in-game experiences in ways that influenced their real-world attitudes. Overall, this case study offers preliminary illustrative alignment with the proposed Mechanism–Empathy–Cognition (MEC) framework, suggesting that the mechanics mapped from the model activated patterns of empathic engagement and cognitive reflection.

Limitations

While the game intentionally incorporates stress and unfairness to mirror structural inequality, these elements were designed to remain within a psychologically safe range. Nevertheless, future implementations—particularly in educational or vulnerable contexts—would benefit from more structured facilitation and extended debriefing to ensure that emotional impacts are processed constructively. Empathy responses observed in this study should be understood as situational and short-term. Previous research suggests that sustained empathy development requires repeated exposure and longer interventions, which were beyond the scope of this pilot study.

The primary limitation is the very small sample size which limits generalizability of these results. Future studies with larger and more diverse samples are needed to further examine and refine the MEC framework, and to assess its applicability across different game types and contexts. Second, the intervention was a single session therefore longitudinal empathy gains and translation into real-world action were outside

the scope of this study. Third, the study lacked a control group, so changes cannot be definitively attributed to the gameplay itself (as opposed to exposure to empathy-driven content on game cards). Finally, because participants knew the study's focus was empathy, their responses may have been biased. These limitations warrant caution in inferring causality.

Contribution

This paper provides a theoretical contribution through the MEC model and empirical evaluation of a case study, bridging concepts from social psychology with game design and contributing to the emerging interdisciplinary framework for "empathy games." A practical contribution is the guidance for educators, game designers, and practitioners interested in using games for social-emotional learning. *Social Prism* itself, with further refinement, could be deployed in classroom settings, workshops, or community programs as a tool to engage learners in discussions about social justice and inequality. In an era where empathy and social awareness are increasingly seen as vital competencies, this study offers a proof-of-concept that game-based interventions can help nurture those qualities in a compelling, interactive format.

Acknowledgements/author contributions

The research discussed in this paper was originated and led by Chenhui Gu as part of a Master's programme at The Glasgow School of Art. Research design, implementation, and write-up were supervised by Dr Daisy Abbott and Dr Amy Webster who subsequently deepened the research context and added substantive contributions to the analysis and interpretation of the primary data. All three authors developed this paper into its current form. We wish to thank all the study participants.

References

Abbott, D. (2019). Game-based learning for postgraduates: An empirical study of an educational game to teach research skills. *Higher Education Pedagogies*, *4*(1), 80–104. https://doi.org/10.1080/23752696.2019.1629825

Abbott, D. (2020). *Beyond Vicarious Learning: Embedding Dialogic Learning into Educational Games* (P. Fotaris, Ed.; pp. 1–10). Academic Conferences International Limited. https://radar.gsa.ac.uk/7343/

Allcoat, D., & Evans, C. (2024). *Meaningful Game Design: The Methodology and Psychology of Tabletop Games* (1st edn). CRC Press. https://www.routledge.com/Meaningful-Game-Design-The-Methodology-and-Psychology-of-Tabletop-Games/Allcoat-Evans/p/book/9781032333076

Ball, K., Jalbert, K., & Test, L. (2021). Making the board: Participatory game design for environmental action. *Journal of Environmental Studies and Sciences*, *11*(1), 12–22. https://doi.org/10.1007/s13412-020-00645-2

Barab, S. A., Gresalfi, M., & Ingram-Goble, A. (2010). Transformational play: Using games to position person, content, and context. *Educational Researcher*, *39*(7), 525–536. https://doi.org/10.3102/0013189X10386593

Bayeck, R. Y. (2020). Examining board gameplay and learning: A multidisciplinary review of recent research. *Simulation & Gaming*, *51*(4), 411–431. https://doi.org/10.1177/1046878119901286

Belman, J., & Flanagan, M. (2010). Designing games to foster empathy. *International Journal of Cognitive Technology, 15(1), 11 – 19.*

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*. https://doi.org/10.1191/1478088706qp063oa

Chaisson, G. M. (1980). Life-cycle: A social-simulation game to improve attitudes and responses to the elderly. *Journal of Gerontological Nursing*, *6*(10), 587–592. https://doi.org/10.3928/0098-9134-19801001-06

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, *44*(1), 113–126. https://doi.org/10.1037/0022-3514.44.1.113

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, *125*(6), 627–668. https://doi.org/10.1037/0033-2909.125.6.627

Derks, S., van Wijngaarden, S., Wouda, M., Schuengel, C., & Sterkenburg, P. S. (2019). Effectiveness of the serious game 'you & I' in changing mentalizing abilities of adults with mild to borderline intellectual disabilities: A parallel superiority randomized controlled trial. *Trials*, *20*(1), 500. https://doi.org/10.1186/s13063-019-3608-9

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin*, *101*(1), 91–119. https://doi.org/10.1037/0033-2909.101.1.91

Gao, L., Wang, Z., Pansini, R., Li, Y.-T., & Wang, R.-W. (2015). Collective punishment is more effective than collective reward for promoting cooperation. *Scientific Reports*, *5*(1), 17752. https://doi.org/10.1038/srep17752

Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Comput. Entertain.*, *1*(1), 20. https://doi.org/10.1145/950566.950595

Gloria, A. D., Bellotti, F., & Berta, R. (2014). Serious games for education and training. *International Journal of Serious Games*, *1*(1), Article 1. https://doi.org/10.17083/ijsg.v1i1.11

Grey, S., Grey, D., Gordon, N., & Purdy, J. (2017). Using Formal Game Design Methods to Embed Learning Outcomes into Game Mechanics and Avoid Emergent Behaviour. *International Journal of Game-Based Learning (IJGBL)*, *7*(3), 63–73. https://doi.org/10.4018/IJGBL.2017070106

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? – A literature review of empirical studies on gamification. *2014 47th Hawaii International Conference on System Sciences*, 3025–3034. https://doi.org/10.1109/HICSS.2014.377

Hojat, M., Shannon, S. C., DeSantis, J., Speicher, M. R., Bragan, L., & Calabrese, L. H. (2020). Does empathy decline in the clinical phase of medical education? A nationwide, multi-institutional, cross-sectional study of students at DO-granting medical schools. *Academic Medicine*, *95*(6), 911–918. https://doi.org/10.1097/ACM.0000000000003175

Hon, A. (2022). *You've Been Played: How Corporations, Governments and Schools Use Games to Control Us All*. Swift Press.

Karn, S. (2024). Designing historical empathy learning experiences: A pedagogical tool for history teachers. *History Education Research Journal*, *21*(1). https://doi.org/10.14324/HERJ.21.1.06

Kiili, K. (2005). Digital game-based learning: Towards an experiential gaming model. *The Internet and Higher Education*, *8*(1), 13–24. https://doi.org/10.1016/j.iheduc.2004.12.001

Kirkley, J. R., Duffy, T. M., Kirkley, S. E., & Kremer, D. L. H. (2011). Implications of constructivism for the design and use of serious games. In S. Tobias & J. D. Fletcher (Eds), *Computer games and instruction* (pp. 371–394). Information Age Publishing. https://psycnet.apa.org/record/2011-11269-014

Liman-Kaban, A., Obae, C., Koscielniak, T., Stiefelbauer, C., Nakic, J., Moser, I., Cassidy, D., Otmanine, I., Foti, P., Bykova, A., Lorusso, L., Latronico, R., Pluktaite, J., Guzzon, S., Mica, S., OberHuemer, P., Miguel, F., Sarsar, F., & Toal, J. (2024). *Immersive learning: Innovative pedagogies, techniques, best practices, and future trends*. European Digital Education Hub.

Liwanag Burke, L. (2012). *Dog Eat Dog*. Liwanag Press. https://www.drivethrurpg.com/en/product/198050/dog-eat-dog

Maratou, V., Ennami, F., Luz, F., Abdullahi, Y., Medeisiene, R. A., Ščiukauskė, I., Chaliampalias, R., Kameas, A., Sousa, C., & Sara, S. (2023). Game-Based Learning in Higher Education Using Analogue Games. *International Journal of Film and Media Arts*, *8*(1), 63–83. https://doi.org/10.24140/ijfma.v8.n1.04

McAllister, G., & Irvine, J. J. (2002). The role of empathy in teaching culturally diverse students: A qualitative study of teachers' beliefs. *Journal of Teacher Education*, *53*(5), 433–443. https://doi.org/10.1177/002248702237397

Mir, R. (2013, April 24). Colonialism, privilege, and meaningful play in Dog Eat Dog. *Play the Past*. https://www.playthepast.org/?p=3675

Mochizuki, J., Magnuszewski, P., Pajak, M., Krolikowska, K., Jarzabek, L., & Kulakowska, M. (2021). Simulation games as a catalyst for social learning: The case of the water-food-energy nexus game. *Global Environmental Change*, *66*, 102204. https://doi.org/10.1016/j.gloenvcha.2020.102204

Morgan, D. L. (1997). Punished by rewards: The trouble with gold stars, incentive plans, a's, praise, and other bribes. *Journal of Teacher Education*, *48*(2), 150–155.

https://doi.org/10.1177/0022487197048002009

Nembhard, I. M., David, G., Ezzeddine, I., Betts, D., & Radin, J. (2023). A systematic review of research on empathy in health care. *Health Services Research*, *58*(2), 250–263. https://doi.org/10.1111/1475-6773.14016

Nicholson, S. (2015). A RECIPE for meaningful gamification. In T. Reiners & L. C. Wood (Eds), *Gamification in Education and Business* (pp. 1–20). Springer International Publishing. https://doi.org/10.1007/978-3-319-10208-5_1

Olivier, L., Sterkenburg, P., & van Rensburg, E. (2019). The effect of a serious game on empathy and prejudice of psychology students towards persons with disabilities. *African Journal of Disability*, *8*, 328. https://doi.org/10.4102/ajod.v8i0.328

Pope, L. (2013). *Papers, Please* [Computer software]. 3909 LLC. https://papersplea.se/

Quinn, Z. (2013). *Depression Quest* [Computer software]. https://store.steampowered.com/app/270170/Depression_Quest/

Schild, E. O. (1971). Simulation Review: Blacks and Whites, originated by Robert Sommer and Judy Tart, and published by Psychology Today Games, Clinton, Iowa 52732. *Simulation & Games*, *2*(1), 95–97. https://doi.org/10.1177/104687817100200106

Schonert-Reichl, K. A., & Lawlor, M. S. (2010). The effects of a mindfulness-based education program on pre- and early adolescents' well-being and social and emotional competence. *Mindfulness*, *1*(3), 137–151. https://doi.org/10.1007/s12671-010-0011-8

Schrier, K. (2016). *Knowledge games: How playing games can solve problems, create insight, and make change*. JHU Press.

Schrier, K. (2020). How Do We Teach Ethics and Empathy Through Games? In M. Groen, N. Kiel, A. Tillmann, & A. Weßel (Eds), *Games and Ethics: Theoretical and Empirical Approaches to Ethical Questions in Digital Game Cultures* (pp. 145–161). Springer Fachmedien. https://doi.org/10.1007/978-3-658-28175-5_10

Schrier, K., & Farber, M. (2021). A systematic literature review of 'empathy' and 'games'. *Journal of Gaming & Virtual Worlds*, *13*(2), 195–214. https://doi.org/10.1386/jgvw_00036_1

Segal, E. A., Wagaman, M. A., & Gerdes, K. E. (2012). Developing the social empathy index: An exploratory factor analysis. *Advances in Social Work*, *13*(3), Article 3. https://doi.org/10.18060/2042

Shamay-Tsoory, S. G. (2011). The neural bases for empathy. *The Neuroscientist*, *17*(1), 18–24. https://doi.org/10.1177/1073858410379268

Sommer, R., Tart, J., Markos, N., & Feiman, J. (2023). *Blacks & Whites: 50th Anniversary Edition Board Game*. https://www.neversadonline.com/blacks-whites

Sousa, C., Rye, S., Sousa, M., Torres, P. J., Perim, C., Mansuklal, S. A., & Ennami, F. (2023). Playing at the school table: Systematic literature review of board, tabletop, and other analog game-based learning approaches. *Frontiers in Psychology*, *14*, 1160591. https://doi.org/10.3389/fpsyg.2023.1160591

Tan, X., & Tan, C. I. (2022). Empathy in game design—Exploring a human-centric approach in designing engaging video game experiences. *Journal of ICT in Education*, *9*(2), Article 2. https://doi.org/10.37134/jictie.vol9.2.9.2022

Waal, F. B. M. de. (2008). Putting the altruism back into altruism: The evolution of empathy. *Annual Review of Psychology*, *59*(Volume 59, 2008), 279–300. https://doi.org/10.1146/annurev.psych.59.103006.093625

Whitby, M. A., Deterding, S., & Iacovides, I. (2019). 'one of the baddies all along': Moments that challenge a player's perspective. *Proceedings of the Annual Symposium on Computer-Human Interaction in Play*, 339–350. https://doi.org/10.1145/3311350.3347192

Wulansari, O. D. E., Pirker, J., Kopf, J., & Guetl, C. (2020). Video games and their correlation to empathy. *The Impact of the 4th Industrial Revolution on Engineering Education*, 151–163. https://doi.org/10.1007/978-3-030-40274-7_16