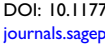
Research Article

Your Move: An Open Access Dataset of Over 1500 Board Gamer's Demographics, Preferences and Motivations

Simulation & Gaming
2023, Vol. 54(5) 554–575

DOI: 10.1177/10468781231189493
journals.sagepub.com/home/sag


Liam Cross[1], Andrea Piovesan[1], Micael Sousa[2], Peter Wright[3], and Gray Atherton[1]

Abstract

Intro. This paper reports the demographics of a large sample of board gamers and their in-game motivations and preferences.

Methods. We report the specific preferences of 1603 board gamers (i.e. preferred platform, mechanics, style, theme, player count and game length) and player demographics, i.e. age, gender, education level as well as neurodivergence in this population. Participants were sampled via board game groups and game distributor mailing lists.

Results. Findings confirmed previous assumptions that board gamers are primarily middle-aged, university/college-educated, white males. We show that most gamers identify as mid-core/core with a preference for shorter, competitive Euro games. They tend to prefer in-person play with 3-4 players. However, a sizeable portion of the sample did not fit this description, showing a more complex picture.

Discussion. Results describe the population's demographics and detailed description of gamers preferred, mechanics, themes, components, preferences and motivations. An anonymised version of this data set is provided alongside this work

[1]Department of Psychology, Edge Hill University, Liverpool, UK
[2]CITTA, Department of Civil Engineering, University of Coimbra, Portugal
[3]Department of English and Creative Arts, Edge Hill University, Liverpool, UK

Corresponding Author:
Liam Cross, Department of Psychology, Edge Hill Univeristy, St Helens Rd, Ormskirk L39 4QP, UK.
Email: drliamcross@gmail.com

for game designers and academics to explore further and cross-reference relationships between demographics and preferences/motivations. Considering that a quarter of the sample were neurodivergent (i.e. reported at least one mental health or neurodevelopmental condition) the dataset could also help clinicians who use board games as interventional tools. We hope this dataset (https://osf.io/tu8yq) will be helpful to board game designers, clinicians, educators, teachers, therapists and researchers interested in utilising board games to make informed choices about which games they use.

Keywords
board games, analog games, players, demographics, mental health, game play, game style, game mechanics, hobby

Over the last twenty years, board games have achieved unparalleled popularity and commercial success. In 2016, *The Guardian* reported on 'The Rise and Rise of Tabletop Gaming', citing related social and design factors underpinning this surge in interest. Aritzon's market study predicts an annual growth rate of more than 9%, with an excess of $12 billion. Scholars such as Booth (2015) and Arnaudo (2018) suggest that we are in a period of board game revival and that we are living in a golden age of board gaming (Konieczny 2019). A trend that has grown even more since the covid-19 pandemic, as the world has looked for other forms of entertainment (Tighe, 2022). This increase in popularity may also be due to a broader range of available games and the internet providing individuals with greater access to board gaming resources (Sargeantson, 2022). Sites such as *BoardGameGeek,* an extensive database and forum for gaming, have 18 million users visiting annually (Similarweb, 2023). The flagship boardgame conference, Essen Spiel, boasts around a quarter of a million attendees yearly (Spiel Messe, 2023), again showing the growing importance of boardgames in the cultural zeitgeist (see Sousa & Bernardo, 2019).

We should state that this movement is not a revival of older or mass-market board games. Different design elements characterise these "modern" games, mainly their mechanics but also intricate physical components, as well as the way the narratives emerge and how they allow players to interact with each other and the game system (Rogerson et a1., 2016; Sousa et al., 2021b). In recent years games have moved from a leisure activity into the 'serious' domain of intervention. For example, Spiel now hosts Educator's Day, where academics, educators, designers and clinicians who work with or do research using modern board games present their experiences and findings. Some argue that games have a long and rich history of being used for purposes beyond entertainment (Wilkinson, 2016). A recent meta-analysis by Zhonggen (2019) indicates that games are being used to improve educational outcomes more than ever. Another by Lau et al. (2017) found that serious games can lead to a moderate improvement in mental health symptoms. See Atherton & Cross (2021) for a review of research

exploring the uses of games for various neurodevelopmental conditions, such as autism or attention deficit hyperactivity disorder (ADHD)

Analogue versions of games may offer specific benefits for improving the lives of players when compared to other activities (Estrada-Plana et al., 2021; Vi ta-Barrul et al., 2022). However, it is essential to define these practices. One of the first steps to achieve this is to understand this population, both the demographics of board gamers and individuals' motivations for and preferences in this hobby. Currently, there is very little research on this topic. This paper fills this gap by surveying over 1600 board gamers on these facets and making the data freely available to researchers, educators, clinicians and designers of serious games.

Serious games can be created or adapted from commercial games (Sousa, 2021; Rosa et al., 2021). Games that aim to deliver serious objectives (Dörner et al., 2016) demand serious evaluation. For one, the physicality of an analogue game allows for a tactile experience that may be therapeutic by its very nature (Rogerson et al., 2016). That said, Yuan et al. (2021) found that digitising board games, including remote play necessitated by the pandemic, preserved many of the social benefits inherent to board game play. Perhaps this is because the 'form of conversation' that occurs not only through the player's actions but also interactions with opponents and the changing state of the game board and other artefacts can be primarily preserved in online settings (Rogerson et al., 2018). When choosing a game format or between various mechanics or themes for a specific population, having access to a large data set of individual preferences for given elements allows for more personalised and therefore optimal choices.

Linking mechanics to outcomes is vital so that 'game designers can predict and understand the process by which players interact with the game system and what is experienced by players (Sousa et al., 2021a). This can be seen as a bottom-up approach in the game design process and follows from the Mechanics, Dynamics and Aesthetics influences (Hunicke et al., 2004; Walk et al., 2017), where the designers combine mechanics to deliver dynamic experiences to players and collect their feedback. In the particular case of analogue games, the importance of mechanics is even higher due to the lack of automation, users must manually activate all the game mechanics for the game to function (Duarte & Battaiola, 2017). Suppose we desire to detail analogue games even more. In that case, we can consider the mechanisms as subparts of the mechanics (Sousa et al., 2021b). The mechanisms may be the smallest mechanical elements of the game system, but they are the building blocks of game design (Englestein & Shalev, 2022). Indeed, *BoardGameGeek* is now using game mechanisms instead of mechanics to characterise a game's mechanical system. Players and designers are starting to adopt this terminology, although, despite this, both the literature and most users still refer to mechanics. In this paper, we will use the term mechanics and mechanisms as synonymous and follow the definitions on the *BoardGameGeek* website.

Alongside designers of board games, those utilising games for educational and interventional purposes would also benefit from access to information relating to board

gamer demographics and preferences. For example, board games are used in educational and therapeutic settings for people who are neurodiverse, such as those with autism and ADHD (Atherton & Cross, 2021). Board games are used to improve mental health (Baker et al., 2022), social interactions (Fang et al., 2016), and skills such as reading and numeracy (Hu et al., 2018). Despite the proliferation of board games in the broader sector, there is a shortage of information available to practitioners, therapists, educators, and researchers that may help professionals tailor their choice of games to a specific audience (Noda et al., 2019), a gap this paper and the accompanying data set aims to fill.

The objectives of the current study were to first explore and detail the demographics and preferences of this population and compile and make openly available a comprehensive dataset of 1) gamer demographics (age, gender, educational level and neurodiversity) and 2) gamers' motivations for and preferences in (preferred play style, game length, game type, mechanics, themes) games. We were particularly interested in capturing the proportion of the population that regularly plays board games and is involved in the board gaming community. For this reason, we specifically recruited using board gaming social media sites and mailing lists and offered as compensation a free Steam key for an online board game, which would be an incentive that would be particularly attractive to board gamers. This data is freely available alongside this paper to all interested parties at https://osf.io/nfr7d/. This data set will be helpful to those who wish to design games for specific populations or tailor gamified interventions or educational tools for said populations. With this data, teachers and clinicians can search for games in databases like *BoardGameGeek* , choosing games to adapt or be inspired by implementing the mechanisms to build their own games or game-based approaches (e.g., gamification, serious games). Game designers may also use this data when making game design choices for specific populations.

Methods

Participants & Sampling

A total of 1603 individuals completed the questionnaire via Qualtrics after consenting to participate. The sample included 1242 males and 361 females aged between 18 and 73 (mean age = 32.38; SD = 9.21). Edge Hill University's ethics committee granted full ethical approval, and all participants gave full informed consent. Participants were recruited from special interest groups for board gamers on social media to capture active participants in this hobby. Board gaming-specific sub Reddits, board gaming forums, and board gaming Facebook groups were targeted. All identified groups were approached, and those moderators who approved the post were utilised. The link was also advertised via a large game distributor (Asmodee) on social media and company mailing lists. This call was explicitly addressed to those already involved in the hobby. Due to the incentive (a free online board game), posts shared initially by the researchers were likely cross-shared on different platforms (considering the size of the

sample). Though no specific geographic region was targeted, efforts were made to capture as broad and representative geographic regions as possible.

Measures & Procedure

This study utilised a survey design. A target sample of 1500 board gamers was aimed at, and data collection was left open for two months. Each participant was given a digital copy of a board game through Steam in return for participation. Respondents were surveyed on their demographics and their gaming preferences. All measures and response formats are reported briefly below. A full copy of all questions and answers can be found in the Supplementary Materials. All questions were presented in English.

This survey was designed in consultation with board game players, designers and distributors, as well as academics and clinicians who use games in their work. This initial consultation was done online, in person, individually, and in small focus groups (2-6 people). Individuals involved came from the UK, Europe and the USA, individual consultation sessions lasted 30-60 minutes, and a total of around 15 hours were spent in consultation. These sessions focused on what individuals would find helpful in such a data repository and which relevant game types, distinctions, mechanics, themes and motivations should be included in the survey. In addition to these primary consultations, the findings of a Delphi panel (Manera et al., 2022) of academics and clinicians were also consulted and incorporated into the design. This consultation informed the types of information gathered and the terms and classifications used. The most popular classifications, terminology, typologies, taxonomies and examples from BoardGameGeek were used where available. Although there is literature about board game mechanisms and typologies (Englestein & Shalev, 2022), game designers and players still follow *BoardGameGeek* definitions because they emerge from the collective crowdsourcing dynamics of that platform (Calleja, 2022).

Respondents were first asked to report gender, biological sex assigned at birth, age, ethnicity, nationality, educational level, and whether they had a medical diagnosis of both mental health and neurodevelopmental conditions. These were answered using drop-down sections using the standard Qualtrics pre-sets. After this, respondents were asked about their general experiences playing board games. These questions included their experience and expertise (novice – hardcore/expert), average hours played per month, and their preferred platform (online, in person). For these responses, participants were asked to choose their preferred or favoured choice from the available options (see results).

Then participants were asked to rate their enjoyment of several gaming elements such as preferred: player counts; game length, pieces (i.e., cards, dice etc.), style (competitive, cooperative etc.), classification (Euro, Ameri, Hybrid), and type (gateway, party, heavy, etc), on a slider scale from not at all – very much. Next, respondents were asked to rate their preferences on how much they enjoyed specific board game mechanics (i.e., worker placement, player elimination, etc.) again from not at all – very

much. Twenty-eight mechanics were listed, five per page, alongside definitions and example games. Following this, respondents rated their enjoyment of the 14 most popular board gaming themes (as indicated by *BoardGameGeek*, i.e., war, crime, farming) on the same slider scale. Respondents then indicated (via similar sliding scales) how important (not important – very important) several aspects were when choosing a game (i.e., theme, components, mechanics etc) and what motivates them to play a game (competition, socialising, escapism, etc.). We included role-playing board games (inspired by classic TTRPG) since they are becoming popular among modern board games, like Tainted Grail, Etherfields, Gloomhaven, etc. Respondents then indicated how important gaming was for their social life and how important it was to feel like a part of the board gaming community. The information gathered, examples and terminology used were all designed on the recommendations of the consultations of players, industry professionals, and researchers described above.

All slider scales regardless of anchor points displayed, generated a number from 0-100, which was not visible to participants and were presented with the starting position centred in the middle of the scale, which needed to be moved before the page could be progressed. Definitions of all relevant terms and example games were provided alongside each question. These can all be found in the supplementary materials and examples of each category.

Results

This section details the pattern of board gamer demographics alongside gamer motivations and preferences. Further breakdowns and comparisons amongst specific populations on the various dimensions (i.e. preferences of gamers with various conditions or backgrounds) can be utilised from this large dataset to understand specific gamer preferences.

Demographics

As indicated in Table 1, the sample mainly consisted of three groups: an Anglo-Saxon group (38.5% between UK and USA), a Chinese group (25.5%) and a French group (18.3%). Just under 75% reported their gender as men, just under 25% as women, and just over 1% as other. Almost 40% of participants were between 26 and 35 years old, 27% were within the 18-25 range, and 24% were within the 36-45 range. Table 1 also clearly indicates that board game players are most likely to be highly educated, with more than 50% of our sample having at least an undergraduate degree in higher education and almost 21% having a postgraduate qualification.

As shown in Table 2, most participants (73%) reported that they had not been diagnosed with a mental health or neurodevelopmental condition. Meanwhile, over one-quarter of participants stated they had at least one such condition. The most commonly reported were depression (13.2%) and anxiety (12.2%), followed by autism (4.7%), dyslexia (4.2%) and ADHD (4.1%).

Table 1. Participants Demographics.

Demographic	Options	Frequency (%)
Age	18-25	432 (26.9%)
	26-35	635 (39.6%)
	36-45	382 (23.8%)
	46+	147 (9.2%)
	Unknown	7 (0.4%)
Gender	Men	1189 (74.2%)
	Women	394 (24.6%)
	Other	20 (1.2%)
Biological sex	Male	1242 (77.5%)
	Female	361 (22.5%)
Ethnicity	Black	22 (1.4%)
	White	971 (60.6%)
	Asian	546 (34.1%)
	Hispanic	18 (1.1%)
	Middle Eastern	10 (0.6%)
	Other	36 (2.2%)
Country	UK	439 (27.4%)
	China	408 (25.5%)
	France	293 (18.3%)
	USA	179 (11.2%)
	Other[a]	284 (17.6%)
Education	Some high school	44 (2.7%)
	High school graduate	99 (6.2%)
	Some university	295 (18.4%)
	University graduate	831(51.9%)
	Postgraduate degree	332 (20.7%)

[a]59 countries with less than 2%.

Gamers' experiences

Table 3 shows the players' experience, the number of hours participants played on average monthly, and which platform they preferred. Most participants considered themselves casual or mid-core players (69%) who play between 5 to 29 hours per month (63%). Most gamers (58%) also preferred to play in person over online.

Game preferences

Table 4 reports the player's median ratings regarding game length, number of players, game elements, style, classification, and types. Table 4 also includes Friedman tests and Durbin-Conover pairwise comparisons within each category. These are the non-parametric equivalent of the repeated measures ANOVA and post-hoc tests, which were not used because multiple variables were not normally distributed. The Friedman

Table 2. Neurodivergence.

Condition	Frequency (%)
None	1157 (72.2%)
Depression	210 (13.1%)
Anxiety	196 (12.2%)
Autism	75 (4.7%)
Dyslexia	67 (4.2%)
ADHD	62 (3.9%)
Not specified	18 (1.1%)
Unofficial diagnosis	6 (0.4%)
Dyspraxia	5 (0.3%)
PTSD	3 (0.2%)
Bipolar	3 (0.2%)
Psychosis	2 (0.1%)
Borderline	2 (0.1%)
Dysorthographie	1 (0.1%)
EUPD	1 (0.1%)
Fibromyalgia	1 (0.1%)
Muscular dystrophy	1 (0.1%)
OCD	1 (0.1%)
Restless legs syndrome	1 (0.1%)
Stress	1 (0.1%)

NB: some participants indicated more than one condition.

Table 3. Participants' Experience as Board Gamers.

Gamer demographic	Option	Frequency (%)
Player experience	Newbie/Novice	149 (9.3%)
	Casual	468 (29.2%)
	Midcore/core	638 (39.8%)
	Hardcore/Expert	348 (21.7%)
Hours played per month	<1hr	123 (7.7%)
	1-4hr	230 (14.3%)
	5-9hr	323 (20.1%)
	10-19hr	422 (26.3%)
	20-29hr	271 (16.9%)
	30-39hr	102 (6.4%)
	40^{+}hr	132 (8.2%)
Preferred platform	Online	233 (14.5%)
	In person	935 (58.3%)
	Both equally	435 (27.1%)

Table 4. Participants' Rating for Game Details, Including the Friedman Test and Durbin-Conover Pairwise Comparisons.

Category	Sub-category	Median[a]	Friedman test	Pairwise comparisons				
				Index	b	c	d	e
Number of Players	3-4 players	86	760.5***	a	***	***	***	
	2 players	75		b		***	***	
	5+ players	68		c			***	
	1 player	52		d				
Game length	30-60min:	79	493.0***	a	***	***	***	
	1-2hr:	78		b		***	***	
	<30min:	71		c			***	
	2+hr:	63		d				
Game elements	Cards	79	785.8***	a		***	***	
	Boards	79		b		***	***	
	Dice	66		c			***	
	Hybrid (with app or web)	56		d				
Game style	Competitive (all vs all)	81	654.3***	a		***	***	***
	Cooperative	79		b		***	***	***
	Cooperative (with traitor)	70		c			***	***
	Team	69		d				***
	Competitive (1 vs all)	60		e				
Game classification	European	80	285.7***	a		***		
	Hybrid	77		b		***		
	American	68		c				
Game types	Heavy	75	146.3***	a	*	***	***	
	Gateway	71		b		***	***	
	Party	67		c			**	
	Abstract	65		d				

*$p < .05$; **$p < .01$; ***$p < .001$.
[a]Minimum and maximum ratings were always 0 and 100.

test investigated whether participants gave ratings significantly different across sub-categories, and the Durbin-Conover comparisons indicated where this difference lay by comparing all possible sub-category pairings.

Regarding the number of players, participants indicated that they preferred games with 3-4 players the most, followed by games with two players, 5+ players and one player, which was the least preferred (all differences were significant: ps < .001). Regarding the game length, they also preferred games lasting 30-60 minutes the most, followed by those lasting 1-2 hours, less than 30 minutes and 2+ hours, which was the least preferred (all differences were significant: ps < .001). Regarding the game elements, participants equally preferred games that include cards and boards the most, followed by dice and then hybrid games (all differences were significant: ps < .001,

except cards-boards p >.05). Regarding the game style, participants equally preferred competitive (all vs all) and then fully cooperative games the most, followed by traitor games, team games and one vs all games (all differences were significant except competitive (all vs all-cooperative: *p*s < .001). Regarding the game classification, European and hybrid games were preferred over American ones (*p*s < .001). There was no significant difference between preferences for European and hybrid games (p >.05). Regarding the game types, heavy games were preferred the most, followed by gateway games, party games, and abstract games, which were least preferred (all differences were significant: *p*s < .05).

Mechanics

Figure 1 shows the participants' median ratings for game mechanics. Friedman tests indicated that participants' ratings were significantly different across game mechanics ($X^2_F(27) = 3554$, $p < .001$). Participants preferred board games with action point

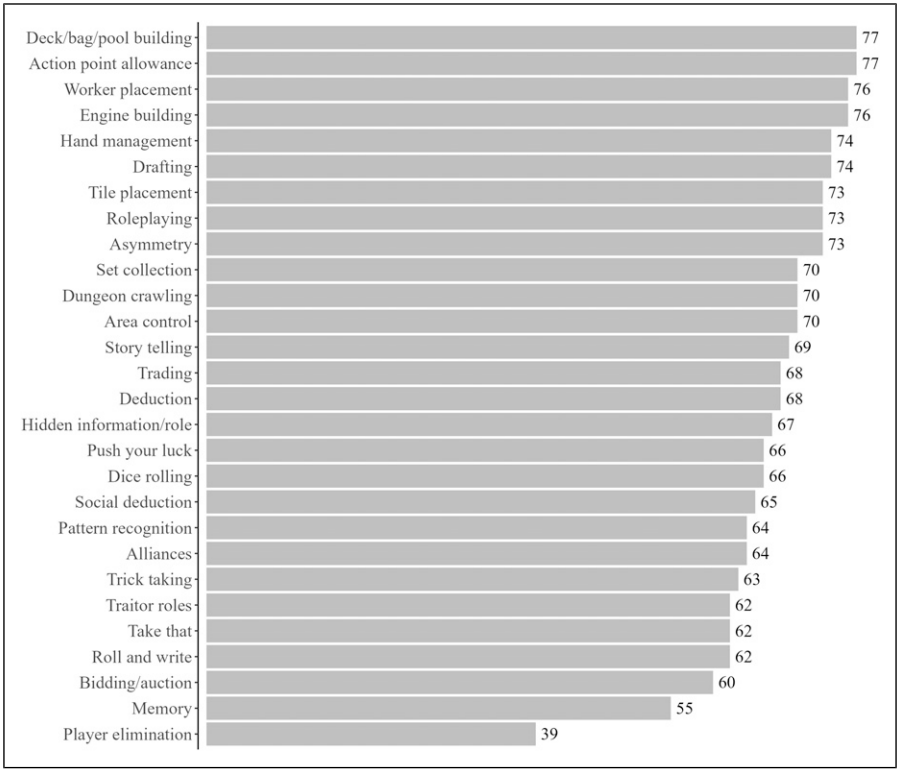


Figure 1. Median ratings for board game mechanics.

allowance, deck, bag and pool building and worker placement the most. In contrast, player elimination was the least desired game mechanic, and memory was the second to last.

Themes

Figure 2 shows participants' median ratings for board game themes. Friedman tests indicated that participants' ratings were significantly different across game themes ($X^2_F(13) = 1784$, $p < .001$). The fantasy theme had the highest ratings, and the sci-fi and adventure themes had similar ratings in the second position. In contrast, the war theme had the lowest ratings, and the horror and train transport themes were in the second to last position.

Game choice and motivation

Table 5 indicates the importance of gameplay, mechanics, theme, style and components in board game choice. Table 4 also shows what motivated participants to play and how important gaming was for their social life. Table 4 also includes Friedman tests and Durbin-Conover pairwise comparisons within each category to test whether participants gave ratings significantly different across sub-categories.

Regarding the game choice criteria, participants indicated that for the game choice, the gameplay is the most important aspect, followed by its mechanics, theme, style, and finally, its components, which were the least important aspect for the game selection (all differences were significant: $ps < .05$). Regarding what motivates participants to play

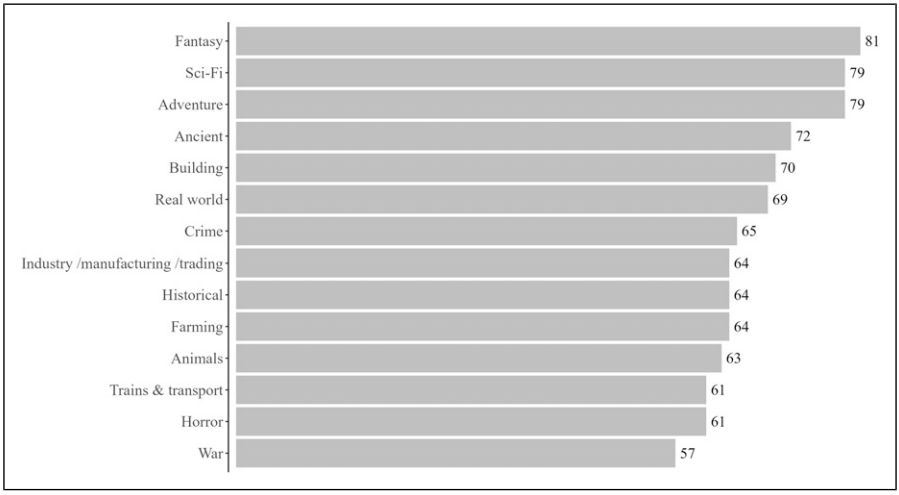


Figure 2. Median ratings for board game themes.

Table 5. Participants Rating for Game Choice Criteria, Game Motivation and Social Aspects of Board Games, Including Friedman Test and Durbin-Conover Pairwise Comparisons.

Category	Field	Median[a]	Friedman test	Pairwise comparisons				
				Index	b	c	d	e
Game choice criteria	Gameplay	91	1303.0***	a	***	***	***	***
	Mechanics	84		b		***	***	***
	Theme	73		c			*	***
	Style	71		d				***
	Components	68		e				
Motivations	Social interaction	80	571.5***	a		***	***	***
	Strategising	78		b		***	***	***
	Escapism	69		c			**	***
	Skill building	67		d				***
	Competition	64		e				
Social importance	Gaming for social life	71	165.1***	a	***			
	Importance of community	63		b				

[a]Minimum and maximum ratings were always 0 and 100.

board games, they indicated that social interaction and strategising were the most important motivations, followed by escapism, skill building, and competition, which was the least important motivation (all differences were significant except social interaction- strategising: $ps < .01$). The importance of having an engaging game system that fosters face-to-face socialisation, supported by physical game components, is reflected in the literature (Booth, 2019; Kosa & Spronck, 2019). Although significant groups of players enjoy conflict in board games (Martinho & Sousa, 2023), our survey show that player elimination is the least enjoyed game mechanism (Figure 1), and War is the least enjoyed game theme and narrative (Figure 2). These specific game features and typologies fit Eurogames: board game design where conflicts are indirect, and player elimination is avoided. These types of modern board games have influenced the state of the art of game releases.

Cooperative games where all players play to overcome a common challenge are notorious in the top BGG ranks (see Table 6). In the current top 12: four are fully cooperative, and three only allow indirect conflict (the most efficient player is the winner). Twilight Imperium 45th ed simulates a war, still even here, alliances emerge during the game (situational cooperation), while War of the Wing and Star Wars: Rebellion deliver team-based experiences (team cooperation). None of these games are focused on player elimination and have mechanisms to control player conflict directly or indirectly. Players can choose to play them in less aggressive modes.

Table 6. Top 12 Board Games According to Board Game Geek (BGG) Overall Rank (May 2023).

Game	Conflict
Brass	Indirect
Gloomhaven	Cooperative
Pandemic Legacy: Season 1	Cooperative
Ark Nova	Indirect
Twilight Imperium: 4th ed	Direct
Terraforming Mars	Indirect
Gloomhaven: Jaws of the Lion	Cooperative
War of the Ring	Direct /Teams
Star Wars: Rebelion	Direct /Teams
Dune Imperium	Indirect
Spirit Island	Cooperative

Discussion

The range of data collected here offers a valuable resource for academics, educators, clinicians, and game designers and developers. While the results section summarises the global population demographics and their motivations and preferences in the hobby, the level of granularity available in the data is much greater, affording opportunities for interested parties to cross-reference via various facets to explore relationships between individuals' demographics and game preferences, we have highlighted a few key comparisons below to stimulate uses for this data, broadly split into two sections, gamer characterisation and health findings.

Gamer Characterisation

In summary, most gamers categorised themselves as midcore, followed by casual, hardcore, and newbie. Most gamers tended to play between 5-29 hours per month, strongly favouring in-person gaming over online. Social interaction was the strongest motivation for gaming, with competition being the least important. This suggests that a primary purpose for gaming may be as a vehicle for social interaction and a social outlet. Participants provided the highest ratings for board games with 3-4 players that lasted from 30 to 60 minutes. Cards and boards were the game elements with the highest ratings.

Meanwhile, games using a website or app had the lowest rating. The least liked game type was abstract (such as Azul, Sagrada, and Santorini). Highest rated mechanics included deck building, action point allowance, worker placement and engine building, with player elimination rated least favoured, followed by memory and auction. Fantasy, sci-fi and adventure themes were rated the highest, while war was the lowest, followed by horror and transport. This data can be surprising because we could expect heavier

games to be preferred when analysing the top-ranked games on *BoardGameGeek*. There seems to be a distortion towards heavier games when users classify them. Complex games have a high correlation with higher *BoardGameGeek* ranks (Samarasinghe et al., 2021). These games tend to have durations above 60 minutes, some reaching 3 hours plus. The gamers in our sample fit into the mid-weight hobby gamers, enjoying games with innovative mechanisms, a combination of components like cards, boards and dice, strategy, and defined themes, although avoiding the longest and most complex games available in the market. This might mean that the users recognise these complex games as the best products but prefer to play more straightforward games in their daily play habits. By separating and comparing these data points, this information can help choose the complexity when choosing and developing games for the introductory public, more seasoned players or specific populations.

The most important aspect for gamers was gameplay, and the least so, components, although the most successful games on Kickstarter are those that deliver high-quality components (Booth, 2019). The game styles with the highest ratings were all vs all and cooperative. Meanwhile, the game style with the lowest ratings was one vs all. Participants also provided higher ratings for the European or mixed style than the American style. This was somewhat predictable since Eurogames contributed to the revival of board game activities outside the heavier game communities, with games like *Catan*, *Carcassone*, and *Ticket to Ride* being among the most popular mass-marketed games in the main shops. Though it should also be noted that 40% of our respondents were from Europe and the UK compared to 11% from the USA, which may also explain this finding, although separate analysis indicated that although American games were the least preferred by both Americans (median 74) and Europeans (71), Americans rated European style lower (83) than Europeans (87.5).

Finally, board gamers preferred heavy games, which involve significant time and energy investment, compared to more relaxed types, such as party and gateway games. A preference for heavier games is typical of the modern board game hobby movement, where players seek constant novelty, new experiences, new game mechanisms and narrative development (Arnaudo, 2018; Booth, 2019; Woods, 2012). As mentioned, this tendency to play heavier games might represent the easier and most played modern board games. Players may recognise that heavier games deliver the best experiences; however, getting these to the table is more difficult due to the learning curve, preparation and duration (Rogerson & Gibbs, 2018).

Participants' demographics mirrored widely held Western assumptions regarding most board gamers, notably that they are male, identify as men, and are ethnically white with a university-level education. The predominance of highly educated white males in the North American board game community is the subject of contemporary research made available on Kotaku and The Conversation (Pobuda, 2022). This work mirrors these findings in a much larger and more representative dataset. This work extends these findings to other cultures; notably, our sample contains 25% Chinese board gamers. This enables further investigations into whether board game demographics

regarding gender and age in East Asia mirror those demographics obtained in the West. Chinese gamers seem to be younger (Chinese mean age: 25.29, British, Americans and French mean age: 35.87) and more predominantly identify as men (Chinese men: 93.9%, British, Americans and French men: 69.7%) compared to Western countries.

Next Moves

Population and experiential demographics can now be mapped against the preferred number of players, game length, elements, style, classification and types. For example, to explore a game length, style and theme that would suit a population over 50. For example, the data shows that over 50 's particularly dislike 1-player games (median >50: 28.5, median <50: 52) and seem to be motivated more by competition (>50: 74, <50: 63). This population also particularly like themes such as Sci-Fi (>50: 91, <50: 78), fantasy (>50: 88.5, <50: 80), ancient (>50: 82.5, <50: 72) and industry (>50: 79, <50: 64). Select game mechanics and themes can be mapped similarly. This data can be charted alongside choice criteria, motivations, and social importance. For example, by using this dataset, it is possible to see that, compared to those identifying as women, compared to men particularly like gateway (women: 80, men: 68) and abstract (women: 72, men: 63) games with animal themes (women: 72, men: 60) and with tile placement (women: 79, men: 71), pattern recognition (women: 70, men: 62), roll and write (women: 67, men: 60), and memory (women: 62, men: 54) mechanics. A better understanding of these questions will allow a deeper understanding of the variances between gamers from different backgrounds.

This dataset allows users that wish to utilise analogue games to cross-reference the information with the available game database like *BoardGameGeek*. In this specific case, they can follow Mechanics, Dynamics and Aesthetics principles or similar game design frameworks (Sousa et al., 2021a), starting by identifying the mechanisms they wish to use in a game based on previous recommendations. The *BoardGameGeek* website uses links games by mechanisms and themes, classifying them by many other characteristics like themes, types of components, duration, complexity, etc. This allows users to find games, analyse them through informed play and then decide if or what they need to modify in the original game for clinical usage. In this case, if the users wish to build a new game, for example, by following serious game design principles, they can be inspired by the identified game elements to create new games, following the standard design processes of creating, playtesting and correcting the game through continuous design interactions. This design sequence fits the literature on game design courses (Brathwaite & Schreiber, 2009; Fullerton, 2014; Ham, 2015). Cross-referencing with this dataset will allow users to target and identify whatever elements of a game are preferred by specific subpopulations.

Moving to a Health Focus

Currently, there is little detailed knowledge of the landscape of gamers' mental health beyond anecdotal evidence that board games can contribute, in vague ways, to

improving psychological well-being (Kinne, 2022a). Although 72.9% of board gamers surveyed here reported no mental health or neurodevelopmental condition, with 0.4% indicating an unspecified condition, over 25% were neuro-diverse. The most commonly reported were Depression (13.1%), Anxiety (12.2%), Autism (4.7%), Dyslexia (4.2%) and ADHD (3.9%). The prevalence of depression, dyslexia and ADHD is consistent with that found in the general population (Lim et al., 2018; Polanczyk et al., 2007; Shaywitz & Shaywitz, 2005). However, the prevalence of anxiety and autism is significantly higher than the estimated global prevalence, which is 7.3% for anxiety (Baxter et al., 2013) and 1% for autism (Zeidan et al., 2022).

These findings enable researchers to trace the distribution of responses for neurodiverse board gamers and map these against gamer experiences, motivations and preferences. This granularity provides essential information for academics researching practices of board game consumption, clinicians determining population-appropriate games, and game designers' intent on developing games for specific populations or to appeal to a particular demographic. For example, by separating participants with and without depression, we can see that people with depression are more motivated to play for escapism (depression: 80, no-depression: 67) rather than competition (depression: 59, no-depression: 64). People with depression also dislike war-themed games (depression: 48.5, no-depression: 58) with player elimination (depression: 29, no-depression: 40) mechanics, but they prefer horror games (depression: 66.5, no-depression: 60) and games with worker placement (depression: 82, no-depression: 75) and storytelling (depression: 76, no-depression: 68) mechanics.

The results enable clinicians and game designers to select or design games with an understanding of how long players with different diagnoses prefer to engage in gaming activity. By cross-referencing data obtained regarding mental health and neurodevelopmental conditions, clinicians and designers can also determine the level of engagement in populations with specific needs. In this context, a clinician – for example – will be able to identify the relationship between players reporting autism, their level of experience, and their preferred playing time across a month. The dataset enables clinicians to make informed choices regarding how and how long populations can be engaged through board games as part of any therapeutic approach to improving quality of life. Data concerning gamer preferences can, in turn, be mapped onto participant demographics, mental health conditions and participants' experiences resulting in a high degree of specificity obtainable from the dataset.

Limitations

Though it is important to note that this method will have only captured those formally diagnosed, a relevant point considering the growing number of undiagnosed cases, especially in older adults (Atherton et al., 2022). It is also worth noting that caution should be applied when generalising findings made from this data; although we present a sufficiently large dataset, it is not without its limitations and restrictions. Respondents

will have been skewed by various factors, including online presence and competency in English, to name two.

Another point of note is the unequal split of genders in our sample, it is interesting to note that the male-skewed sample here contrasts the typical female-skewed samples seen in online research and surveys (for a review, see Keusch, 2015). Indeed some research suggests an unequal split between the genders in the hobby, with men being overrepresented compared to women and non those with non-binary genders (Booth, 2019; Pobuda, 2018). Using data about preferences based on a predominantly male population may bias game designers to continue producing games favoured by men over women or non-binary people, thus reinforcing this uneven split in the hobby. Although adding this data set will allow those interested in portioning out the data of their targeted population, though we had a higher men-to-women ratio, our data still provides information about the preferences of 361 gamers who identify as women. This generous sample allows for meaningful statistical analysis. This dataset will offer valuable insight to choosing or designing games for a female audience. Future work may want to explore how well the preferences of female gamers map onto existing games and how to use these preferences to design games that would interest female gamers and perhaps market these games to female consumers. Notably, non-binary gamers only accounted for 1% of our sample. Future work will want also to understand the experiences of non-binary gamers and how to improve inclusion in gaming spaces for such individual. Therefore future research may want to focus exclusively on non-binary board gamer preferences and gather data to understand how nonmales can be more included in the hobby, both through the game design process and, more broadly, in gaming communities.

Conclusion

In conclusion, this dataset can help clinicians and educators to tailor game selections to the preferences of relevant populations (such as those with depression). The dataset will save game developers considerable research and development time when making decisions about games designed for specific subpopulations. This is especially pertinent for those small or independent developers who wish to appeal to audiences different from the largest perceived market. Developing games with a more focused, specific appeal is now possible. While this will likely lead to smaller market returns for the developer, its cultural and reputational effects and consequences on player experience and well-being can only be positive. Our findings provide game design relevant information, like the type of mechanism, themes, and experiences that are useful to develop and choose when applying therapeutic tabletop games (Bean et al., 2020; Eladhari, 2018; Vita-Barrull et al., 2022). With readily available crowdfunding opportunities to mitigate financial risk, the use of social media to target specific markets, and the possibilities offered by electronic distribution and/or print-on-demand, games companies can confidently diversify their portfolios and target their games, especially now there is a dataset freely available to inform creative and commercial choices. The dataset may also draw together scholars,

clinicians, and designers, facilitating a free-flowing exchange of ideas regarding clinical approaches, interventions and game design, producing hitherto unexplored potentialities in treatment and game development.

Acknowledgements

The authors would like to thank the editor and the 7 reviewers for their thoughtful and constructive comments and critiques in refining this work, all of the individuals who took part in initial consultation, GameInLab (especially Micha) for funding this work and donating steam keys, and all 1603 people who took the time to complete this survey.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by a Game in Lab grant awarded to LC & GA.

ORCID iDs

Liam Cross https://orcid.org/0000-0002-5122-1650
Andrea Piovesean https://orcid.org/0000-0002-0260-6255
Micael Sousa https://orcid.org/0000-0003-0283-778X

Supplemental Material

Supplemental material for this article is available online.

References

Arnaudo, M. (2018). *Storytelling in the modern board game: Narrative trends from the late 1960s to today*. McFarland.

Atherton, G., & Cross, L. (2021). Gamification in autism: A review of the uses of analog and digital games in autism interventions. *Frontiers in Psychology*, *12*, 3049. https://doi.org/10.3389/fpsyg.2021.669734

Atherton, G., Edisbury, E., Piovesan, A., & Cros, S. L. (2022). Autism through the ages: A mixed methods approach to understanding how age and age of diagnosis affect quality of life. *Journal of Autism and Developmental Disorders*, *52*, 3639–3654. https://doi.org/10.1007/s10803-021-05235-x

Baker, I. S., Turner, I. J., & Kotera, Y. (2022). Role-play games (RPGs) for Mental Health (why not?): Roll for initiative. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-022-00832-y

Baxter, A. J., Scott, K. M., Vos, T., & Whiteford, H. A. (2013). Global prevalence of anxiety disorders: a systematic review and meta-regression. *Psychological Medicine*, *43*(5), 897–910. https://doi.org/10.1017/s003329171200147x

Bean, A. M., Daniel, E. S., & Hays, S. A. (Eds.). (2020). *Integrating geek culture into therapeutic practice: The clinician's guide to geek therapy*. Leyline Publishing, Incorporated.

Booth, P. (2015). *Game play: Paratextuality in contemporary board games*. Bloomsbury Publishing USA.

Booth, P. (2019). *Who's at the Table? Board Game Players and Communities*. Meeple Mountain, Aug, 27. https://www.meeplemountain.com/articls/whos-at-the-table-board-game-players-and-communities/

Brathwaite, B., & Schreiber, I. (2009). *Challenges for Game Designers*. Boston, Massachusetts: Course Technology/Cengage Learning.

Calleja, G. (2022). *Unboxed: Board Game Experience and Design*. MIT Press.

Cross, L. (2022). Dataset. *OSF*. https://doi.org/10.17605/OSF.IO/NFR7D

Dörner, R., Göbel, S., Effelsberg, W., & Wiemeyer, J. (2016). *Serious games*. Cham: Springer.

Duarte, L. C. S., & Battaiola, A. L. (2017). Distinctive features and game design. *Entertainment Computing*, *21*, 83–93. https://doi.org/10.1016/j.entcom.2017.03.002

Eladhari, M. P. (2018). Bleed-in, Bleed-out A Design Case in Board Game Therapy. In DiGRA Conference.

Engelstein, G., & Shalev, I. (2022). *Building Blocks of tabletop game design: An encyclopedia of mechanisms*. CRC Press.

Estrada-Plana, V., Montanera, R., Ibarz-Estruga, A., March-Llanes, J., Vita-Barrull, N., Guzmán, N., Guzmán, N., Ros-Morente, A., Ayesa-Arriola, R., & Moya-Higueras, J. (2021). Cognitive training with modern board and card games in healthy older adults: Two randomised controlled trials. *International Journal of Geriatric Psychiatry*, *36*(6), 839–850. https://doi.org/10.1002/gps.5484

Fang, Y.-M., Chen, K.-M., & Huang, Y.-J. (2016). Emotional reactions of different interface formats: Comparing digital and traditional board games. *Advances in Mechanical Engineering*, *8*(3). https://doi.org/10.1177/1687814016641902

Fullerton, T. (2014). *Game design workshop: A playcentric approach to creating innovative games*. CRC press.

Ham, E. (2015). *Tabletop game design for video game designers*. Routledge.

Hu, S., Ethredge, H., Cates, D., & Samuel, E. (2018, May 15). *Using Educational Board Games adjunct to traditional lectures for pharmacy students in learning infectious disease*. DigitalCommons@PCOM. Retrieved August 21, 2022. https://digitalcommons.pcom.edu/research_day/research_day_GA_2018/researchGA2018/9/

Hunicke, R., LeBlanc, M., & Zubek, R. (2004, July). MDA: A formal approach to game design and game research. In Proceedings of the AAAI Workshop on Challenges in Game AI (Vol. *4*, No. 1, p. 1722).

Keusch, F. (2015). Why do people participate in Web surveys? Applying survey participation theory to Internet survey data collection. *Management Review Quarterly*, *65*(3), 183–216. https://doi.org/10.1007/s11301-014-0111-y

Kinne, O. (2022a, June 1). *Home is where the board games are*. There Will Be Games. Retrieved August 21, 2022. https://therewillbe.games/articles-essays/9010-home-is-where-the-board-games-are

Konieczny, P. (2019). Golden Age of Tabletop Gaming. *Polish Sociological Review*, (206), 199–216. https://doi.org/10.26412/psr206.05

Kosa, M., & Spronck, P. (2019, November). Towards a tabletop gaming motivations inventory (TGMI). In *International Conference on Videogame Sciences and Arts* (pp. 59–71). Springer, Cham. https://doi.org/10.1007/978-3-030-37983-4_5

Lau, H. M., Smit, J. H., Fleming, T. M., & Riper, H. (2017). Serious games for mental health: Are they accessible, feasible, and effective? a systematic review and meta-analysis. *Frontiers in Psychiatry*, *7*. https://doi.org/10.3389/fpsyt.2016.00209

Lim, G. Y., Tam, W. W., Lu, Y., Ho, C. S., Zhang, M. W., & Ho, R. C. (2018). Prevalence of depression in the community from 30 countries between 1994 and 2014. *Scientific Reports*, *8*(1), 1–10. https://doi.org/10.1038/s41598-018-21243-x

Manera, V., et al (2022) In-person and remote workshops for people with neurocognitive disorders: Recommendations from a Delphi panel. *Frontiers in Ageing Neuroscience*, *13*, 931. https://doi.org/10.3389/fnagi.2021.747804

Martinho, C., & Sousa, M. (2023, April). CSSII: A Player Motivation Model for Tabletop Games. In *Proceedings of the 18th International Conference on the Foundations of Digital Games* (pp. 1–10). https://doi.org/10.1145/3582437.3582477

Noda, S., Shirotsuki, K., & Nakao, M. (2019). The effectiveness of intervention with board games: A systematic review. *BioPsychoSocial Medicine*, *13*(1). https://doi.org/10.1186/s13030-019-0164-1

Pobuda, T. A. (2022, March 27). *Why is board gaming so white and male? I'm trying to figure that out*. The Conversation. Retrieved July 18, 2022. https://theconversation.com/why-is-board-gaming-so-white-and-male-im-trying-to-figure-that-out-179048

Pobuda, T. (2018). Assessing gender and racial representation in the board game industry. *Analog Game Studies*, *5*(4).

Polanczyk, G., De Lima, M. S., Horta, B. L., Biederman, J., & Rohde, L. A. (2007). The worldwide prevalence of ADHD: A systematic review and metaregression analysis. *The American Journal of Psychiatry*, *164*(6), 942–948. https://pubmed.ncbi.nlm.nih.gov/17541055/

Rogerson, M. J., Gibbs, M., & Smith, W. (2016). "I love all the bits:" The materiality of boardgames. In: Proceedings of the 2016 CHI conference on human factors in computing systems. https://doi.org/10.1145/2858036.2858433

Rogerson, M. J., Gibbs, M. R., & Smith, W. (2018). Cooperating to compete: The mutuality of cooperation and competition in boardgame play. Proceedings of the 2018 CHI conference on human factors in computing systems. https://doi.org/10.1145/3173574.3173767

Rogerson, M. J., & Gibbs, M. (2018). Finding time for tabletop: Board game play and parenting. *Games and Culture*, *13*(3), 280–300. https://doi.org/10.1177/1555412016656324

Rosa, M., Gordo, S., Sousa, M., & Pocinho, R. (2021, October). Critical thinking, empathy and problem solving using a modern board game: A learning experience valued by physical therapy students. In *Ninth International Conference on Technological Ecosystems for Enhancing Multiculturality* (TEEM'21) (pp. 624–628). https://doi.org/10.1145/346011.3486526

Samarasinghe, D., Barlow, M., Lakshika, E., Lynar, T., Moustafa, N., Townsend, T., & Turnbull, B. (2021). A data driven review of board game design and interactions of their mechanics. *IEEE Access*, *9*, 114051–114069. https://doi.org/10.1109/ACCESS.2021.3103198

Sargeantson. (2022). *Why are board games so popular?* https://mykindofmeeple.com/why-are-board-games-popular/

Shaywitz, S. E., & Shaywitz, B. A. (2005). Dyslexia (specific reading disability). *Biological Psychiatry*, *57*(11), 1301–1309. https://doi.org/10.1016/j.biopsych.2005.01.043

Similarweb. (April 2023). *Boardgamegeek*. Similarweb.

Spiel Messe. (April 2023). *Spiel Messe*. www.spiel-messe.com/de

Sousa, M., & Bernardo, E. (2019). Back in the game. International Conference on Videogame Sciences and Arts, https://doi.org/10.1007/978-3-030-37983-4_6

Sousa, M. (2021). Serious board games: Modding existing games for collaborative ideation processes. *International Journal of Serious Games*, *8*(2), 129–146. https://doi.org/10.17083/ijsg.v812.405

Sousa, M., Oliveira, A. P., Cardoso, P., Zagalo, N., & Vairinhos, M. (2021a, October). Defining the mechanisms for engagement design protocol towards the development of analogue and hybrid serious games: Learning from FlavourGame. In *Joint International Conference on Serious Games* (pp. 31–46). Springer, Cham. https://doi.org/10.1007/978-3-030-88272-3_3

Sousa, M., Zagalo, N., & Oliveira, A. P. (2021b). Mechanics or Mechanisms: Defining differences in analog games to support game design. 2021 IEEE Conference on Games (CoG), Aug. 2021, 17–20. https://doi.org/10.1009/CoG52621.2021.9619055

Tighe, D. (2022). *Respondents who bought more board games than usual in the UK 2020*. https://www.statista.com

Vita-Barrull, N., March-Llanes, J., Guzmán, N., Estrada-Plana, V., Mayoral, M., & Moya-Higueras, J., Conectar Jugando Experts Committe. (2022). The cognitive processes behind commercialised board games for intervening in mental health and education: A committee of experts. *Games for Health Journal*, *11*(6), 414–424. https://doi.org/10.1089/g4h.2022.0109

Walk, W., Görlich, D., & Barrett, M. (2017). Design, dynamics, experience (DDE): An advancement of the MDA framework for game design. In *Game dynamics* (pp. 27–45). Springer, Cham. https://doi.org/10.1007/978-3-319-53088-8_3

Wilkinson, P. (2016). A brief history of serious games. *Entertainment Computing and Serious Games*, 17–41. https://doi.org/10.1007/978-3-319-46152-6_2

Yuan, Y., Cao, J., Wang, R., & Yarosh, S. (2021). Tabletop games in the age of remote collaboration: Design opportunities for a socially connected game experience. Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. https://doi.org/10.1145/3411764.3445512

Zeidan, J., Fombonne, E., Scorah, J., Ibrahim, A., Durkin, M. S., Saxena, S., Yusuf, A., Shih, A., & Elsabbagh, M. (2022). Global prevalence of autism: A systematic review update. *Autism Research*, *15*(5), 778–790. https://doi.org/10.1002/aur.2696

Zhonggen, Y. (2019). A meta-analysis of use of serious games in education over a decade. *International Journal of Computer Games Technology*, *2019*, 4797032. https://doi.org/10.1155/2019/4797032

Author Biographies

Micael Sousa Graduated in Civil Engineering and History. Master in Energy and Environment and Heritage Studies. PhD candidate in Spatial Planning (University of Coimbra). Research fellow at CITTA, focusing on serious analogue planning games. Research associate at University College Dublin, working on civic engagement for youth. Member of ISAGA and SPCV. Game design/Serious games lecturer and instructor in several institutions, including Lusófona University, Polytechnic of Leiria (Health School) and IADE – Creative University.

Dr Andrea Piovesan obtained his bachelor's and master's degrees in Psychology at the University of Padova (Italy) in 2012 and 2014 respectively. In 2013, he joined the Erasmus program collecting data for his Master dissertation at the University of Liverpool. He then moved to the UK obtaining a PhD in Psychology at Liverpool John Moores University in 2019. Since then, he has had multiple teaching and research contracts in the following universities: Liverpool John Moores University (UK), Edge Hill University (UK), and IUAV University of Venice (Italy). Currently, he is a lecturer in psychology at Edge Hill University (UK).

Dr Peter Wright is an award-winning tabletop roleplaying games writer and Senior Lecturer in Speculative Fictions. He specialises in writing and designing science fiction and fantasy tabletop roleplaying and skirmish games. He has written and designed games for Chaosium Inc., Cubicle 7, Crooked Dice Games Design Studio, and Modiphius Entertainment. He also writes critically on science fiction and fantasy. His interests include the work of Gene Wolfe, British sf film and television, and science fiction film adaptation He has a particular interests in the adaptation of novels, films and television shows into tabletop roleplaying games. To date, he has contributed creatively to adaptations of Edgar Rice Burroughs' Martian Tales, Frank Herbert's *Dune* and Bram Stoker's *Dracula*. He is currently researching articles on the practicalities and practices of TRPG adaptation.

Dr Gray Atherton received her BSc in Child Development from Vanderbilt University, her MEd in Counselling Psychology from the University of Houston and her PhD in Educational Psychology and Individual Differences also from the University of Houston. She is an associate professor in Psychology at Edge Hill University. Gray's main area of research involves exploring how neurodiverse people see the social world. She is particularly interested in understanding the strengths inherent to neurodiversity and how these strengths can be used to challenge stigma and misunderstandings about developmental conditions such as autism.Gray also investigates anthropomorphism, or seeing the human in the non-human, and how this relates to social processing in autism. To investigate this, she is developing virtual and augmented reality techniques that allow for anthropomorphic experiences. She is also interested in human-animal contact and how to understand its benefits in neurodiverse populations.Her other research interest lies more broadly in embodied social processing. She is particularly interested in how movement can affect how we see ourselves and our social partners and how this can be used to understand special populations. Some of her work in this area relates to modern board games and how joint action and attention during gaming can improve mental health.