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The Purpose of Play: How HCI Games Research Fails Neurodivergent Populations

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The Purpose of Play: How Games Research Fails Neurodivergent Populations

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Context: games for health is a thing and it's also a thing for neurodivergent populations more and more. Question: what are the populations of interest in this area, how is this research conducted, what kind of play is supported and what is the overall purpose of play in this context. Method: critical literature analysis on 66 papers from ACM & IEEE key findings: mostly children, mostly top down and exploratory, mostly single player in out of home settings, medical and social/medical purpose driven What does this mean: there is a space for genuine play for neurodivergent populations (particularly for adults) that is attending to different needs and preferences without articulating them as a deficit. Contribution: larger scale investigation into the state of a budding field that gains traction; allowing researchers to reflect; identifying gaps in current research that can then be addressed

CCS Concepts: • **Social and professional topics** → **People with disabilities**; • **Applied computing** → **Computer games**; • **Human-centered computing** → *HCI theory, concepts and models*; *Interaction design theory, concepts and paradigms*; • **Software and its engineering** → Interactive games.

Additional Key Words and Phrases: games, play, neurodiversity, neurodivergence, critical review, disability, children, adults, research priorities

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1 INTRODUCTION

Motivation and also, what other reviews there are, timeliness and contribution

2 BACKGROUND

Several theories influence our review. We now illustrate our understanding of disability and the concepts we draw from in our work particularly as they relate to neurodivergence before we explore a range of approaches that have aimed to define games and play. Finally, we focus on Self-Determination Theory (SDT), a popular theory employed in games research, and how it relates to neurodivergence.

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2.1 Modelling Disability

Within Disability Studies, researchers differentiate a range of approaches to defining disability as a concept categorising people and their identities. Marks provided an overview of three models, namely the *medical*, the *psychological* and the *social* model of disability [84]. These (together with other ones following) are presented as an overview in Table 1.

Model	Attribution	Individual	Technologies
Medical	Individual	Pathologised	Assistive/Corrective/Diagnostic
Psychological	Individual	Pathologised	Assistive/Corrective
Social	Environmental	Difference	Accessibility/Awareness
Identity	Complex	Difference	Self-Determination

Table 1. Models of Disability, how disability is attributed, how the individual is understood and how technologies operate within this model.

The “medical model focuses on individual pathology and attempts to find ways of preventing, curing or (failing these) caring for disabled people” [84, p86]. Technologies operating from this model are focused on supporting the appropriate identification of characteristics in an individual leading to diagnosis, correcting medically defined ‘symptoms’ and assisting with living in an able-normative environment.

“[P]sychology also tends to locate disability within an individual person who has failed to adjust to, and ‘overcome’, an impairment” [84, p87]. The main difference to the medical model above stems from an assumption that bodies and minds can be thought of as separate¹ and identified limitations within a physical bodies require solely enough ‘willpower’ to be addressed. Hence, this model combines neoliberal individualism with medical fixatedness. Subsequently, technologies embody similarly assistive and corrective notions, though more focused on a narrative of ‘overcoming’.

“In contrast to individualizing approaches, the social model locates disability not in an impaired or malfunctioning body, but in an excluding and oppressive social environment” [84, p88]. Embodiments are then seen as differences that need accommodation be they temporary or permanent. Accordingly, technologies aim then at digital accessibility and increasing awareness about the way ‘minority bodies’ [6] experience environments designed with only majority bodies in mind (see also, [62]). However, this model has been critiqued as erasing the embodied difference as meaningful [30], though others again caution against essentialising this difference [50].

Within the subarea of critical disability studies, the boundaries of dis/ability are systematically troubled and that troubling used as a lens to think through aspects of humanity more generally [61]. Disability can then become part of one’s *identity* [119] not just in the form of self-identification, but also in the form of other-identification [19]. Self-identification constitutes a political move [99], even if the category remains unstable [37]. Such a move is often also prohibited by ableism in two forms: (1) external, as a lack of safety and increased vulnerability attached to someone openly assuming an identity largely associated with weakness and failure and (2) internalised as a consequence of repeated exposure to such societal paradigms [24]. Subsequently, many people shy away from actively identifying themselves as disabled [133]. Attribution in this context is seen as a complex interplay between embodied difference and societal exclusion [120]. Technological

¹Within Disability Studies, researchers often speak of the notion of a bodymind that does not separate thinking from being and feeling (cf., e.g., [31]).

artifacts under this model would follow a notion of self-determination in identifying needs and desires of disabled people.

2.1.1 Neurodiversity. While these models have been developed with disability as a larger concept in mind, the concept of neurodiversity particularly addresses the notion of neurological difference. It operates from within the identity model of disability² but also refuses to subscribe to a clear demarcation of dis/ability [123]. The concept is most popular within the autism community and particularly there has been deemed unsuccessful so far, to move away from a rhetorics and praxis of relating to binary dichotomies of belonging [111].

Generally, neurological differences are all seen as an expression of variety that human brains can take on. The majority of human brains then is *neurotypical* while some brains are diverging from these norms, hence, referred to as *neurodivergent*³. Dalton has illustrated how this relates to HCI and how designers might take a notion of neurodiversity into their practice [35]. This work operates from within the understanding of neurodiversity and analyses works according to the models of disability above while positioning disability politically.

2.1.2 Example conditions. While neurodiversity is most commonly referred to in the context of autism (and has been developed there as well), it can be seen as a general approach to neurological difference (e.g., [3] speaks of autism, ADHD, dyslexia and ‘other brain differences’). To illustrate the range of neurodivergent conditions referred to in our corpus, we now define those that occur for context (even though our initial search went broader than that).

- *Autism* is characterised by differences in sensory processing and communication [38]. Autistic sociality expresses itself in ways neurotypical people often find difficult to engage in and expect to be altered to fit to their style [92].
- *Dyslexia* is a condition of which individuals “[report] the most frequent challenge [as] learning to decode text” [76, p.12]. Commonly, this is relayed to a neurological dysfunction, though social model analysis identifies a normative primate of conveying information predominantly as text [80].
- *Attention Deficit Hyperactivity Disorder*⁴ (ADHD), as many other conditions here, “is situational: in the same individual its expression may vary greatly from one circumstance to another” [89, p.14]. It is often exhibited through distractability, impulsiveness and hyperactivity, though individuals experience their being in the world often as ‘soupy’, ‘made to fail’ and ‘overwhelming’ (cf. [127]).
- *Dysgraphia* is expressed through difficulties in handwriting including personal names and drawing [72], though the condition often remains undetected due to individuals developing “clever compensations” [100].
- *Fetal Alcohol Syndrom Disorder* (FASD) describes a range of effects stemming alcohol exposure in the womb and subsequently the condition comes with a range of (usually negative) stereotypes towards individuals and their parents [4]. However, organisations as well as individuals are aiming to paint a more nuanced picture of the disability as one comprising of challenges as well as strengths [20].

²It should be acknowledged that within a binary understanding of disability models as either medical or social, the concept of neurodiversity is often attributed to the latter.

³Note please, that no single person can be ‘diverse’ and, subsequently, no single person can be ‘neurodiverse’. Instead, neurodiversity relates to a multitude of brain differences, similar to biodiversity (which also does not refer to a single plant or organism, for example).

⁴While there is tension between the notion of neurodivergent conditions as diagnosed ‘disorder’, due to the lack of an otherwise shared language, we use the medical terms to describe conditions.

- *Cerebral Palsy* (CP) is a condition usually acquired as a result of brain injury during birth resulting, commonly, in frequent spasms and associated motor difficulties [2]. Associated stigmas and stereotypes are often experienced as exclusions from school and other social occasions [79].
- *Dyspraxia* (often co-occurring with autism [44]) is the diagnostic term for differences and difficulties in motor coordination for everyday tasks. Resulting challenges in academic performance are related to a systemic mismatch not attending to these differences [47].
- *Trisomy 21* (also known as Down Syndrome) is a genetic variation where the 21st chromosome pair is a triplet. As it can be established before birth, children exhibiting the effect are often not carried to term, inciting hefty criticism of prenatal diagnostics by disability activists [124]. Differences in learning that can co-occur to a higher or lesser degree, can be accommodated using approaches from strength based pedagogy [73].

In many cases, individual diagnostics play less of a role and researchers look at specific instances of difference that their technologies could address. Hence, group labels such as cognitive, intellectual and/or learning disability are often used as general sweeps of identification. Such a move can be appropriate if stemming from an understanding of common characteristics that result in shared experiences and structurally equivalent assemblages, i.e. mutually dependant differences in embodiment and societal judgement [32].

The list of conditions above illustrates examples of neurodivergence and is by no means intended to be an absolute enumerations. Shared characteristics lie in differences regarding the processing of external stimuli and subsequent atypical expressions, mannerisms and/or movements. Hence, conditions such as Epilepsy, Obsessive Compulsive Disorder (OCD), (Post) Traumatic Stress Disorder ((P)TSD), Tourette's Syndrome or Dyscalculia could be equally considered neurodivergent (and have been included in our search terms). However, they are not part of our final corpus which means they are not within a technologically driven research focus of games and/or play.

2.2 Generalised Definitions of Games & Play

The English language distinguishes between *games* and *play* both as nouns and words. Cultural analyses of these pastimes have challenged assumptions of play as seemingly mundane [21], attempted to structure different aspects [23], traced histories and influences between physical and digital play [42], and attended to the specificity of digital play [97].

Ludic aspects of games are also used to make everyday experiences more enjoyable and particularly supposed to support digital learning [43, 90]. However, such uses of games as purposeful have been criticised as prioritising extrinsic goals over the freedom and fun of play [10]. Particularly for children, play is an activity they *get* to do compared to activities they *have* to do [136]. In this context, previous work on technological artefacts decidedly enabling *social play* has found out that this marker is often used with neurodivergent populations [116] even though play is also deemed an inherently social human activity [22].

In this work, we take an agnostic definition of games and play. This means, we do not concern ourselves with ontological questions around the nature of these activities, but rather draw on the discursive meanings of what these mean for neurodivergent populations. In this, we contrast our analysis with prior works on generalised definitions of play and its social [22], enjoyable [21] and self-determined [136] character for majority populations.

2.3 Self-Determination Theory and Neurodivergence

Self-Determination Theory (SDT) is a psychological theory that “begins by embracing the assumption that all individuals have natural, innate, and constructive tendencies to develop an ever more

laborate and unified sense of self” [40, p5]. The psychological theory discusses different types of motivation, namely *intrinsic* motivation, the self-regulatory measures involved in *extrinsic* motivation and *amotivation* (the absence of any motivation) [112]. Ryan and Deci identify *autonomy* as a “critical element for a regulation to be integrated” [112, p73], though autonomy is not conceptualised as something asocial, but rather a means to exert control over one’s well-being, as in, living one’s life self-determined. Hence, this concept does not stand in opposition to *relatedness*, another core aspect of the theory referring to the notion of social belonging and community. Finally, to be assumed and to dare to walk through life with self-determination, people (and their environment) need to acknowledge their own and others *competence* to do so. The three core concepts (autonomy, relatedness and competence) fulfil “basic psychological needs” [40, p7]. Individuals’ strength for each of these three needs might differ; however, “[b]ecause SDT maintains that the needs for competence, relatedness, and autonomy are basic and universal, the individual differences within the theory do not focus on the varying strength of needs but instead focus on concepts resulting from the degree to which the needs have been satisfied versus thwarted” [41, p183]. Hence, the focus is not on individual differences but rather systemic factors enabling or hindering them.

Within HCI games research, SDT has seen increasing popularity [131], most prominently in the form of the Intrinsic Motivation Inventory (IMI) and the Player Experience of Need Satisfaction (PENS) [113] questionnaires. While the IMI is concerned with motivation in immersive experiences more generally, the PENS has been specifically developed, tested and confirmed [70] in the context of digital games. Through the PENS, players can assess games according to how these are conducive to supporting the above mentioned needs. Additionally, the questionnaire factors in notions of presence as well as ease of use. Both of them are conceptualising games as a generally positive experience leaving little room for transformative experiences in play [5] or bouts of frustration as enjoyable encounter [71] in games. Additionally, Tyack and Mekler critique how HCI games research tends to treat the theory behind SDT in a shallow way leading to potentially damaging consequences. “Indeed, the prevalence of incorrect or specious interpretations of SDT concepts and propositions is concerning – at worst, a tenuous grasp of SDT could produce misleading implications for the design and evaluation of games, play, and game-adjacent systems, with potentially adverse effects on player motivation and wellbeing” [131, p9].

We illustrate this context to make readers aware with the intersection of HCI Games research and SDT that in our analysis, we do not use specific games as the environment interesting to SDT but instead use the triplet of basic needs – autonomy, relatedness and competence – to productively engage with the overall space of games for neurodivergent people. For this demographic, SDT provides a powerful argument for dependence. According to Williams, “[d]isability is not the lack of intrinsic motivations for autonomy, competence, and relatedness – it is what happens when the environment assumes a particular way of supporting these needs that is not, in fact, universal. The needs are universal. The means of support are not” [135].

3 METHOD

Our aim is to understand how game research around neurodivergent populations is shaped: Who are the target populations? How is the research conducted? Which play scenarios are envisioned? What is the purpose of play? Given the qualitative characteristics of these questions, we operate from a position of providing situated knowledges [64]. We now detail further how we constructed and analysed the corpus that builds the basis for our investigations.

3.1 Corpus Selection

As our focus was on games research coming from a Human-Computer Interaction perspective and therefore being influential on the design of games for neurodivergent people more generally,

we limited our search to the Database provided by the ACM Digital Library Guide to Computing literature⁵, which includes a broad range of publishers and outlets. In June 2019, we allocated publications that were displayed using the following keyword combinations.

(Autism "cognitive disability" "cognitive disabilities" "cognitive impairment" "cognitive impairments" "learning disability" "learning disabilities" "learning impairment" "learning impairments" "intellectual disability" "intellectual disabilities" "intellectual impairments" "intellectual impairment" "special needs" "developmental disability" "developmental disabilities" "developmental impairment" "developmental impairments" "complex needs" "complex disability" "complex disabilities" "complex impairment" "complex impairments" "down syndrome" "trisomy 21" "cerebral palsy" Asperger Dyslexia Dyscalculia Epilepsy Hyperlexia dyspraxia ADHD "obsessive compulsive disorder" tourette) AND (game games play)

Note that while some of this language is not positively received within the disabled community, we chose to include them as to not exclude publications using them and biasing our sample in that regard. Our search yielded 756 initial items. We then reviewed titles and abstracts in our first sorting rounds and excluded papers that

- did not discuss a specific game (for example, by using the phrase ‘play a role’ in the abstract in applications that were not games or presenting a review of several papers themselves)
- had a different target population such as general populations or older adults with acquired conditions (e.g., dementia, stroke, gait or parkinson’s)
- were focused on different disabilities (e.g., Deaf people, physical disabilities, blindness)
- were concerned with analogue games without any digital components or
- were not in English or German (the languages the authors had sufficient comprehension of⁶).

After the first sorting round, we had 207 papers remaining in our corpus, which we then gave a cursory read. In a second elimination phase, we excluded papers that

- were too short (less than five pages) to expect sufficient depth of treatment or explicit work in progress (including research proposals)
- discussed physical rehabilitation⁷
- were not available to us in full text (two papers in total) or
- any aspects from the first sorting rounds that became clear only in reading the full paper.

This left us with 87 papers, which we then read closely and started analysis with. However, we still excluded papers in this step that

- turned out to be explicitly preliminary
- discussed very early development stages only (i.e., pre-prototype)
- systems that were presented using language around games and play without actually presenting a game (e.g., platforms for games, simulations without any game features)

In the end, the corpus then contained 66 papers (see Tables 4, 5, 6 and 7 for an overview of the papers in the corpus along different categories of analysis). These were read in detail and analysed using our questions and the following approach.

3.2 Analysis

In reading all papers closely, we had established a set of lenses that could answer our research questions around the notions of *Population*, *Research*, *Play* and *Purpose*. In that we conducted an approach to thematic analysis that is simultaneously deductive and inductive [51]. Please note, that this is a substantially different approach than that developed by Braun and Clarke [15]. Deductively, as we were already sensitised and interested in answering specific research questions and deductively as below, following the overall steps as layed out by Boyatzis [11]:

⁵<https://dl.acm.org>

⁶Though, all papers within the final corpus happened to be in English.

⁷This was often the case for papers concerning themselves with Cerebral Palsy.

- *Sensing themes* refers to the first author reading most of the work in depth jotting down notes that allowed them to identified commonalities and contrasts between papers on a surface level.
- *Doing it reliably* was ensured by having set up a template within a spreadsheet which had to be filled for every paper and gave an additional opportunity to add overall notes.
- *Developing codes* was conducted using the codebook approach by Crabtree and Miller [33], which we detail further below (see also, Figure 1).
- *Interpreting the information and themes in the context of a theory or conceptual framework* comprises the final step. We have decided to rely on theories stemming from Critical Disability Studies and Self Determination Theory (see above). This larger scale interpretation happens largely in the Discussion section.

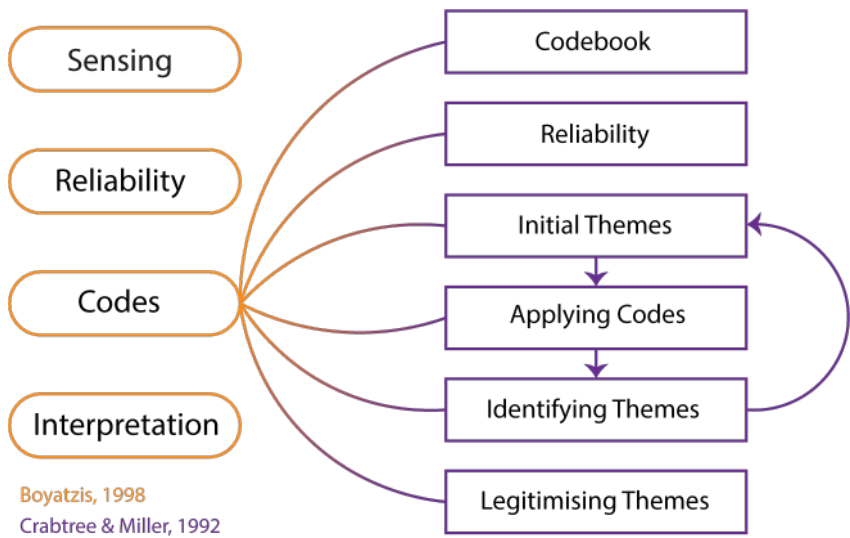


Fig. 1. Inductive and deductive thematic analysis process as conducted in this literature review

To develop a codebook and code our data reliably while being open for changes to the codebook as they might inductively constructed, we used the flexible abbroach offered by Crabtree and Miller [33]. It consists of the following steps:

- (1) *Developing a codebook*: Starting with our four research question, we developed initial codes around *populations of interest* (diagnosis, age group and gender), *research methods* (design and evaluation), *play scenarios* (location, context) as well as *purpose of play* (medical, social or self-determined).
- (2) *Testing the reliability of codes*: We tested our codes with a subset of six papers and refined them further. In this stage, we added the code *language* to the population category as we noted that the papers even within this limited sample had fundamentally different ways in which they would discuss neurodivergence.
- (3) *Summarizing Data and identifying initial themes**: Step 3, 4 and 5 were iterated as a loop over patches of six papers to ensure systematic check-ins with the reliability of our coding. Initial themes were labelled *dispassionate positioning to the other* and *predominantly medicalised play*.

- (4) *Applying templates of codes and additional coding**: We now applied codes as we identified them previously on batches of papers. Whenever we identified a new code (e.g., *single/multiplayer* in play scenarios), we retroactively coded all previous papers as well.
- (5) *Connecting the codes and identifying themes**: In a rolling procedure, we identified further themes as we connected codes. For example, in this stage, we developed the theme of *playing (alone) for neurotypicals*. Please note, that the higher level themes are presented as part of the discussion as they cut across categories and individual research questions.
- (6) *Corroborating and legitimating coded themes*: During the write-up stage of this research, we revisited all papers and connected the prior coding with quotes to solidify our analysis.

As *interpretative* approach, quality and rigour of our analysis relies on more qualitative aspects. *Fereday and Muir-Cochrane* refer to [118] in their assessment of reliability [51]. Relevant quality parameters are *logical consistence* as it relates to a clearly delineated presentation of the work and approach. Further, the argument should be presented coherently, in a stringent manner that can be logically followed. In that, the *subjective authorial position* also shapes the quality of analysis. Hence, we disclose to our readers that one of the authors is neurodivergent and conducts their reading from a point of lived experience. Finally, the work needs to be *adequate*; categories should be applied consistently and sensibly following a coherent scheme where deviance is appropriately traced and explained. We deem these quality characteristics to be relevant to all steps of the research and writing processes, starting with the presentation of the source material.

4 CORPUS DESCRIPTION

The final corpus consists of 66 papers overall. The papers span across 14 years starting from 2005 until 2019, when we conducted our search. In Figure 2, we illustrate how there is an overall trend in more and more papers being published surrounding notions of neurodivergent play. Given that our search took place in June 2019 and the high number of extended abstracts and short papers within our search results, we expect this development to continue for the foreseeable time. Hence, a closer look at the trends and implications of this somewhat nascent but steadily growing research field is not only timely but of pivotal importance at this point.

Within our corpus, we deem it relevant to point out that neither *play* nor *neurodivergence* are popular as keywords. As illustrated in Table 2, authors instead choose to refer to specific diagnoses (most prominently *autism*) or prefer medical groupings (i.e., *developmental disabilities*). The only age group mentioned often enough to be specifically relevant within the corpus are *children*. In addition to identifying their target population, authors also tend to refer to games as relevant for their publications; with *serious games* playing a much more prominent role than *games* even though the former could be understood as a subset of the latter. Hence, author keywords already allow us to identify a purpose-driven understanding of play, also supported by the keyword *social interaction*, which is the only one occurring at least five times within the corpus that is not related to games or populations.

The games in our corpus are predominantly ($n=21$, 31.8%) played on desktop computers, followed by mobile (including smartphone and tablet games) and tangible approaches (each $n=10$, 15.2%). Less than ten times, games are based on web related technologies, played on multitouch surfaces, explicitly use virtual reality, or are positioned within multisensory immersive environments. Game consoles such as the Kinect or Playstation are, to our surprise, less common than we thought given the context of our search; only three out of the 66 papers (4.5%) use them explicitly as a platform. Even considering the sum of game console and virtual reality games ($n=8$, 12.1%), dedicated game environments play a comparatively small role in research on games for neurodivergent people. Figure 3 illustrates the distribution visually.

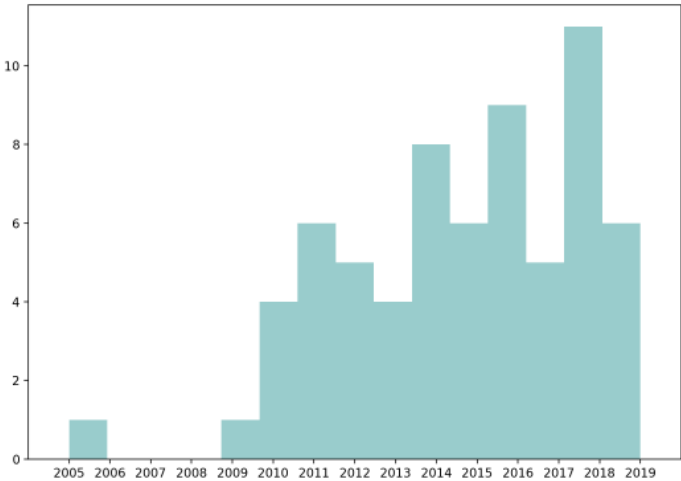


Fig. 2. Histogram for papers in the corpus along the years on which they have been published

Keyword	#	%	Keyword	#	%
autism	29	43.9%	games	6	9.1%
serious games	15	22.7%	developmental disabilities	5	7.6%
children	8	12.1%	ADHD	5	7.6%
dyslexia	7	10.6%	social interaction	5	7.6%

Table 2. Keyword categories that occurred at least five times within the paper corpus.

Within our corpus we find 39 (59.1%) conference publications and 27 (40.9%) journal papers. Most prominently represented are ACM SIGCHI conference venues ($n=19$, 28.8%) followed by Springer ($n=11$, 16.7%) and Elsevier ($n=8$, 12.1%) journals and ACM SIGACCESS outlets ($n=5$, 7.6%). For an overview of publication venues that occurred more than once within our corpus, please consult Table 3. Notably, the most prominent venue is one that is not directly associated with notions of accessibility or disability, but rather one focused on children.

Geographically, games research surrounding neurodivergent people occurs—as per our corpus—predominantly within European countries (including the United Kingdom). Of all papers that are part of our corpus, 34 (51.5%) are European based projects, 11 of which were conducted in Spain followed by 8 in the United Kingdom. Note that authors on a paper might be located in more than one of these geographical areas; in such cases, we coded the location in which the research was conducted even if authors themselves might not come from the area. Figure 4 illustrates the spread according to world regions.

Across the 66 papers in our corpus, we, hence, have collated a diverse set of publications covering a range of different technological approaches as well as quite a spread regarding publication

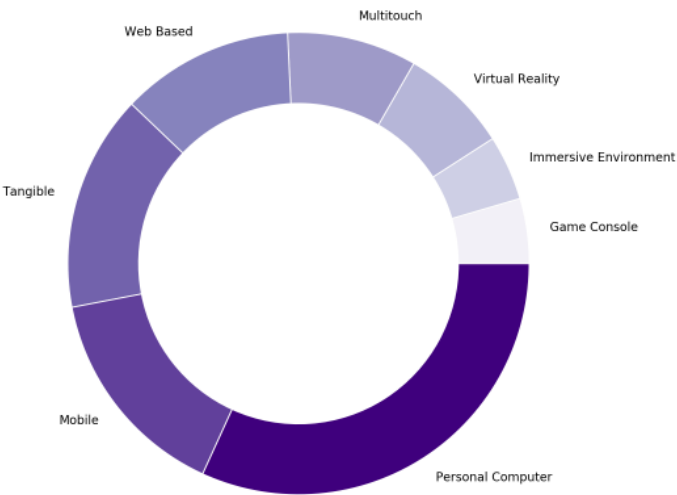


Fig. 3. Technologies used throughout papers in the corpus

Publication	Name	#	%
Conference	ACM Interaction Design and Children (IDC) Conference	5	7.6%
Conference	ACM SIGACCESS Conference on Computers and Accessibility (ASSETS)	4	6.1%
Conference	ACM CHI Conference on Human Factors in Computing Systems	4	6.1%
Journal	The Computer Games Journal (Springer)	2	3.0%
Conference	ACM CHI PLAY Conference	2	3.0%
Journal	Personal and Ubiquitous Computing	2	3.0%
Conference	Pervasive Technologies Related to Assistive Environments (PETRA) conference	2	3.0%
Conference	ACM Conference on Computer-Supported Cooperative Work and Social Computing	2	3.0%
Journal	Computers & Education (Elsevier)	2	3.0%
Conference	EAI International Conference on Pervasive Computing Technologies for Healthcare	2	3.0%
Journal	Entertainment Computing (Elsevier)	2	3.0%
Conference	Web for All Conference	2	3.0%
Conference	Conference on Serious Games and Applications for Health, IEEE SeGAH	2	3.0%
Conference	Brazilian Symposium on Computer Games and Digital Engagement	2	3.0%

Table 3. Publication venues occurring more than once in the corpus

venues. While a big set of studies was conducted within European countries, the works additionally originate from all over the world albeit notably with absence from African entries within the southern hemisphere. We now more deeply investigate the implications the current state of the art

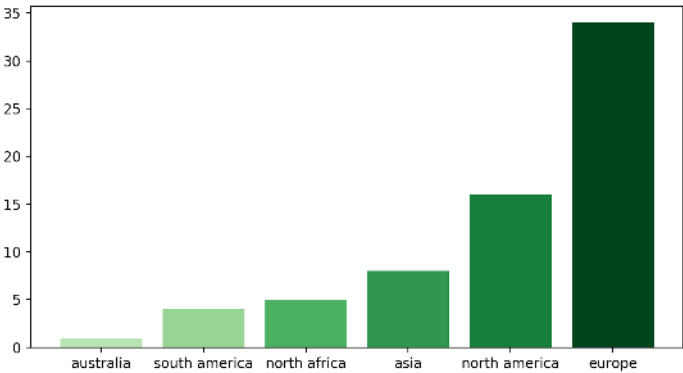


Fig. 4. Geographical spread of works on neurodivergent play

in researching play for neurodivergent populations has particularly pertaining target populations, game design, notions of play and purpose thereof.

5 RESULTS/ANALYSIS

Drawing on prior work and critical lenses surrounding disability and neurodivergence, we chose to analyse the implications of a range of parameters on how the field across the 66 papers in the corpus, conceptualises play for neurodivergent players. Specifically, we look at demographic parameters that make up the target *population*, look at the design and evaluation methods that drive the associated games *research*, take a closer look on the context of *play* and then try and understand the *purpose* of the games and how they relate to different models of disability.

5.1 Population

While our search terms contained a range of different neurodivergent conditions, we illustrate here which conditions are specifically prominent within our corpus. We then augment this by a brief discussion on which age groups are present and how gender is represented. All population relevant data is captured in Table 4 as well.

Papers	Condition	Language	Age Group	Gender
[26]	autism	deficit	children	more women
[1, 29, 49, 60, 65, 69, 78, 105, 134]				more men
[9, 17, 54, 56, 77, 98]				not recorded
[8]				only men
[25, 91]			adolescents	only men
[130]			adults	not recorded
[82, 94, 96]		individual	children	not recorded
[122]				more men

[106–108]		neurodiversity		not recorded
[75]	cognitive	deficit	adolescents	more women
[18, 87]				not recorded
[36, 83]			children	more men
[128]				not recorded
[86]		social		more women
[137]			all	not recorded
[28]	learning	deficit	children	more women
[67]			undisclosed	more men
[16]		social		balanced
[7, 48, 55]	dyslexia	deficit	children	not recorded
[101, 103]				more women
[132]		individual		balanced
[13]				more men
[102]			children and adults	more women
[104]				balanced
[110, 115]	ADHD	deficit	children	not recorded
[125]				more men
[138]			young adults	more women
[95]			all	more men
[34]		individual	children	not recorded
[59]		social		
[58]	dysgraphia	deficit	children	not recorded
[81]	FASD	deficit	children	more men
[57]	Cerebral Palsy	deficit	children	not recorded
[129]	dyspraxia	deficit	children	only men
[14]	Trisomy 21	deficit	children	not recorded
[45]	unspecified	deficit	children	not recorded
[27]			adults	more women
[46, 52]				more men
[12, 121]		individual	children	not recorded
[53]		neurodiversity	all	more women

Table 4. Population parameters around disability age group and gender for papers in the corpus.

5.1.1 *Neurodivergence*. Even though we aimed at a broad search, 40.9% of papers (27) are around a context of autism. Dyslexia (9, 13.6%) and ADHD (7, 10.6%) garnered larger interest as well, whereas Trisomy 21, Cerebral Palsy, FASD, Dyspraxia and Dysgraphia are only in the focus of one paper

each (1.5%). 18 papers (27.3%) did not provide a specific diagnosis; instead 11 talked about cognitive or learning disabilities without concrete reference as to which they discussed and seven noted down otherwise unspecified ‘mental illness’. Figure 5 illustrates the spread of conditions mentioned in the corpus further.

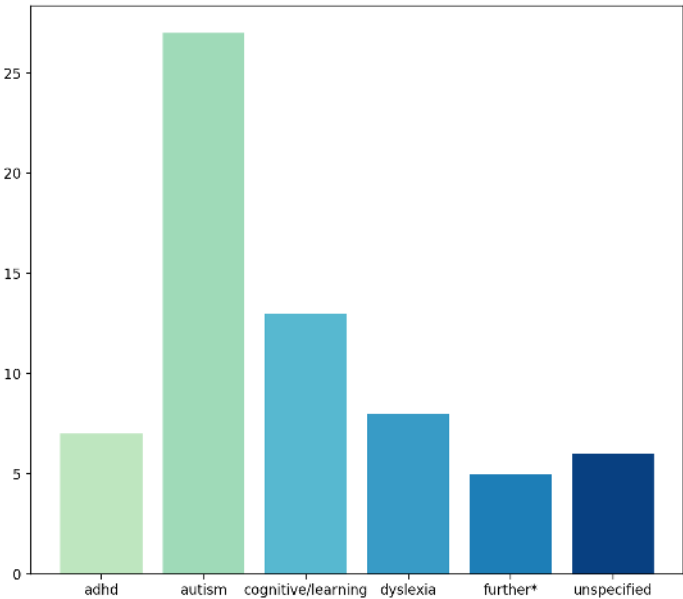


Fig. 5. Representation of different neurodivergent conditions across the corpus. Further* includes one instance for each: Trisomy 21, Cerebral Palsy, FASD, Dyspraxia and Dysgraphia

The high prevalence of autism within the corpus indicates that play for different forms of neurodivergence is of less interest to the research community so far and that understanding of neurodiversity so far remains shallowly attributed to autism [35]. In that regard, though, it should be noted that there exist quite a number of games for Cerebral Palsy, albeit most of them target motor skills and have been excluded from this specific corpus. However, the complete absence of, for example, Dyscalculia, Epilepsy, Hyperlexia, OCD or Tourette’s Syndrome indicates that there is a limited understanding of the range of neurodivergent conditions that could be catered to in play as well as a clear gap for future research opportunities.

5.1.2 Description of Conditions. The language used to describe neurodivergence places the understanding largely within a medical model of disability. 58 of the papers (87.9%) use medicalised language to refer to specific conditions. Of those 47 (81.0%) papers use deficit oriented language and 11 (19.0%) describe conditions as being largely an individual responsibility to address. Papers we classified as using a deficit approach, largely used the term themselves; for example, [27, p183] state s that “Deficits in visual-motor coordination can hinder an individual’s ability to perform activities of daily living (e.g., getting dressed) and physical or leisure activities (e.g., playing ball

sports) (...)” (emphasis in the original). While this might be the case, exclusively focusing on a deficit understanding of disability hinders research to go beyond recognising disabled lives as anything but broken and an opportunity to insert technology (and games) as a matter of a quick solution. An individualised medicalised reference to neurodivergence considers, for example, that “(...) many children with autism may find it difficult to self-regulate, self-express, self-organize and to process the many sensory inputs that we receive from social and environmental interactions” [96, p2]. This understanding is still driven by a medical notion that places disability within an individual pathology; however, it also opens up the notion of difference without strictly qualifying it as deficit.

Of the remaining eight papers, four (6.1%) reference a social model and another four (6.1%) refer to a notion of neurodivergence being part of neurodiversity more generally. Referencing a social model indicates placing the disabling factors in the social environment of a disabled person; for example by indicating that “[t]he limited availability of suitable toys that can engage [disabled children] in playful activities causes deficiencies in the children’s cognitive development as well as in their social relationships” [86, p216]. A paper we classified as following a notion of neurodivergence states that “[m]embers of the Autcraft community have created spaces within the virtual world and the other platforms to help even the youngest members learn to deal with these sensory needs” [107, p37]. Such phrasings acknowledge a difference without necessarily qualifying it as less than while also addressing specific needs and how they can be met individually but also as a matter of social environmental responsibility.

Seeing how dominant the medical model is within our corpus, there is a large potential in HCI related Games & Play research for work that comes from a perspective that acknowledges disability as a complex, lived difference and conceptualises play from that perspective. The field has here a unique opportunity to shift attitudes towards disability from the starting point of design, development and evaluation as progressively aligned with disabled people’s needs and perspectives.

5.1.3 Age Distribution of Participants. As age was not always reported, we roughly allocated the number of participants in each age group as part of Figure 6. In there, it then becomes apparent that the focus of games and play research around neurodivergence lies on children and young adults with older age groups (and larger brackets) being substantially less involved.

For general age groups represented not in number of involved participants, but across instances in the corpus, 53 (80.3%) of papers contextualised games and play for children (ages 2-14), 7 (10.6%) targeted teenagers and adolescents (15-25) or adults (26-70) respectively whereas only one (1.5%) specifically included older adults (70+). Such a distribution indicates an overall infantilisation of not only play as an ageless activity but also one of disability. Given that children (including disabled children) are in a state of constant change, adaption and learning per se, this age group is fundamentally rewarding to work with particularly when aiming at showing the effect of technological interventions. However, this comes with a systematic neglect of the perspectives of older generations who might be equally interested in having access to digital play that caters to their sensory processing and preferences. Here, we see a research opportunity exploring the potential of play for older groups of neurodivergent players.

5.1.4 Gender. None of the referenced studies indicated an understanding of gender that would be inclusive of nonbinary and/or trans identities, although (at least for autism) gender is often a more variable identity [68] than possible within a notion of strictly binary cisnormativity. Due to this circumstance, though, we can only report within a binary notion of gender. Overall, 30 papers (45.5%) did not report the gender of their participant, of which nine papers had not conducted a study with participants. Of the remaining 36 (54.5%) of papers in the corpus, 464 women participated compared to 652 men indicating roughly a 2:3 ratio (41.6% : 58.4%). Most of the studies with participants (22, 61.1%) involved more men than women, which is also shown in Figure 7. Given how diagnostic

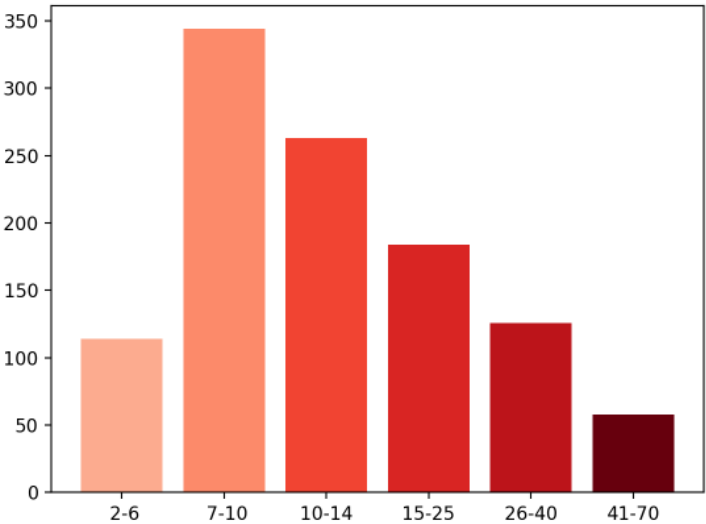


Fig. 6. Age distribution of participants across all studies within the corpus

criteria are often geared towards traditionally male-associated social expressiveness (see, e.g., for autism [63]), the overall gender ratio of participants is generally appropriate, even if still skewed in the context that gender is largely not a factor for occurrence (just for diagnosis).

Whereas gender and age are largely reported within our corpus, we see little explicit reflection on other, potentially intersecting markers of identity such as racialisation or class (see for a larger critique on this issue within HCI, for example, [117]). In an understanding of unmarkedness as that of the dominant group, we have to assume that most papers include mainly white and (upper) middle-class participants insofar as class relates to the parents. For adults, this is complicated by generally prevalent unemployment and institutionalised housing.

5.2 Research

As the research methods have general implications for the knowledge we create, we now focus on the design and evaluation approaches of the papers in the corpus. In addition, Table 5 shows how we categorised each of the papers along these dimensions.

5.2.1 Design Method. Most papers within the corpus (56, 84.8%) were developed in a theoretically informed top down fashion. Game designers then drew largely on existing medically positioned works describing specific conditions. Of those papers, six (9.1% overall) have been commercially developed, although three of the papers all concern *Minecraft*. Of the remaining ten, four (6.1%) actively solicited information through interviews (two) and observations (two). Note that one paper was using both interviews and observations as their source of information. Finally, six papers (9.1%) conducted participatory design (PD) in some way or another. While two of the papers conducted PD with their neurodivergent target group, two seem to not follow the method too closely and use the method without the necessary epistemological grounding. One worked with proxies and another one with ‘experts’, presumably neurotypically presenting ones (cf. [93]).

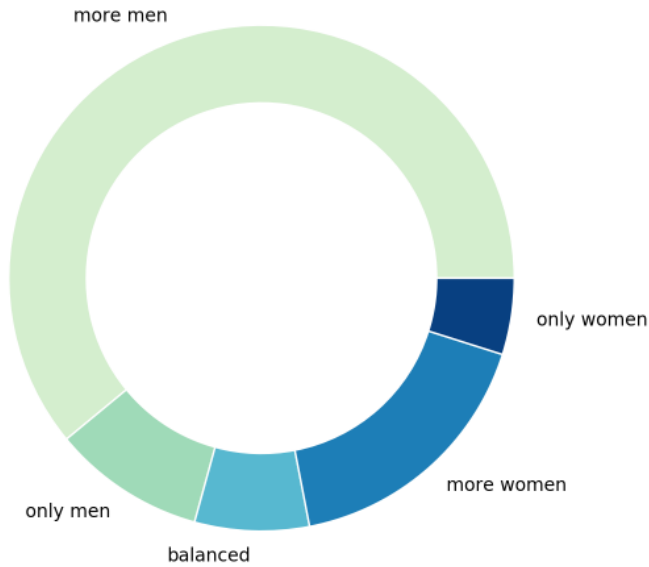


Fig. 7. Gender distribution of participants across all studies along the reported binary notions

We have shown above how game designers and researchers largely operate from within a medical model of disability when it comes to neurodivergence. Here, we could see how they also ground their designs largely within medical literature. While observing approaches situate their designs more directly, participatory design – at least nominally – acknowledges a lived experience of participants. However, within the little work that used this framing of their work, only two worked directly with the target population and none were free in allowing participants to shape the purpose or technological background of the games. Hence, there is a potential for future research to approach methods that allow for co-construction of game and play scenarios with neurodivergent populations.

5.2.2 Evaluation. Only seven papers (10.6%) have not conducted or reported on an evaluation study yet. Researchers have used exploratory studies (including pilot testing and case studies) in 26 (39.4%) cases, followed by controlled or quasi-controlled studies aiming at experimental validation in 16 papers (24.2%) whereas observations, interviews or ethnographic field studies are found in 14 articles (21.2%). The remaining three papers (4.5%) use heuristics or proxy assessments to acquire knowledge about their games.

The high amount of papers reporting on playtesting (59, 89.4%) indicates that there is a high priority within the community to report on at least some testing for the games. However, the large number of exploratory tests indicates that the resulting games are largely prototypes and less fully fledged robust generally usable games. Given comparable results of general technologies with autistic children [126], the high rate of direct inclusion of neurodivergent testers in evaluation indicates that games and play researchers in HCI are focused on gathering insights directly as well. Given the strict constraints of knowledge construction within medical research, it was surprising to us, to see how comparatively little work (24.2%) aims at experimental verification of results. Note,

Papers	Design	Evaluation
[14, 25, 28, 29, 45, 46, 52, 53, 55, 56, 59, 65, 67, 81, 95, 105, 125, 129, 132, 134]	top down	exploratory
[17, 26, 36, 69, 83, 121, 137]		observation/interview
[86]		field study
[8, 18, 48, 49, 75, 78, 91, 101–104, 110, 115, 138]		controlled study
[7, 34, 58, 87, 128]		none
[57, 130]		proxies
[54]		heuristics
[106–108]	commercial	field study
[12]		exploratory
[13]		controlled study
[77]		none
[16, 27]	interviews	exploratory
[1]	observation	exploratory
[96]		observation/interview
[60]	proxy participation	exploratory
[122]	‘expert’ participation	
[94]	participation	controlled study
[9, 82]		observation/interview
[98]		none

Table 5. Research approaches in papers in the corpus

that we have not looked more closely on whether the evaluations hold within the paradigmatic requirements (e.g., sample size) for such research.

5.3 Play

In this section, we take a closer look at how play is conceptualised for neurodivergent populations. For this, we specifically investigate the context of play, whether games are intended to be played by oneself or with others, what the envisioned setting for play is and which genres are deemed relevant. Table 6 provides an overview of all papers within the corpus along these aspects.

5.3.1 Single/Multiplayer Scenarios. Most papers within the corpus (40, 60.6%) discuss games that are exclusively envisioned in a single player context. However, another large part (15, 22.7%) concerns multiplayer scenarios with an additional nine (13.6%) allowing flexibility for both. The remaining two (3.0%) are played within single player scenarios that are either public or explicitly observed.

Papers	Players	Setting	Genre
[25, 65]	single	home	serious game
[52]			exergame
[104]			chess
[1, 26, 45, 46, 56, 58, 87, 103, 121, 125, 138]		therapy	serious game
[67]			therapy game
[28]			exploration
[115]			casual
[27, 91]			exergame
[7, 55, 78, 95, 102, 110]		doctor	serious game
[57, 101]			unspecified
[134]			toys
[12, 14, 18, 36, 48, 54, 59, 60, 69]		school	serious game
[75, 128]		workplace	serious game
[53]	multi	exhibition	exploration
[132]		therapy	therapy game
[9, 13, 17, 82, 83, 86, 98, 105]		school	serious game
[8]			puzzle
[16]			flipper
[94, 96]			exploration
[122]			unspecified
[106–108, 137]	both	home	exploration
[77, 81]			unspecified
[129]		therapy	therapy game
[130]			serious game
[49]		school	exploration
[34]	single in public	exhibition	unspecified
[29]	single with observation	therapy	unspecified

Table 6. Context of play in papers in the corpus

The high percentage of single player games has implications for the (often deemed deficitary within this corpus) sociality of neurodivergent people. This context furthers the medical stance that places divergence as an individual responsibility and isolates play. Given the overall high trend towards multi-player games indicated by the popularity of *Dota 2*, *League of Legends* or *World of Warcraft* and the opportunities for individually different play with others [88] as well as the medical drive to address “social skills” [66], it is surprising that only three papers (all by the same first author) investigate a game, *Minecraft*, that allows neurodivergent players to explore sociality

with others online from their home environment [109]. Hence, a further gap in current HCI related games and play research lies in the investigation of how to support neurodivergent socialities in play with others.

5.3.2 Setting. Table 6 shows how most multi-player games as well as a fair amount of single player games are envisioned in a school setting. Subsequently, school (23, 34.8%) is the most prominent context for play, with home or private settings only occurring in ten (15.2%) instances. However, taken together therapy (19, 28.8%) and dedicated medical environments (i.e. at a doctor’s office) (9, 13.6%), make up 42.2% (28) instances of the corpus, mostly in single player settings. Further, two (3.0%) games are part of an exhibition and another two (3.0%) are part of workplace environments as part of onboarding and acquiring specific work skills (see also, Figure 8).

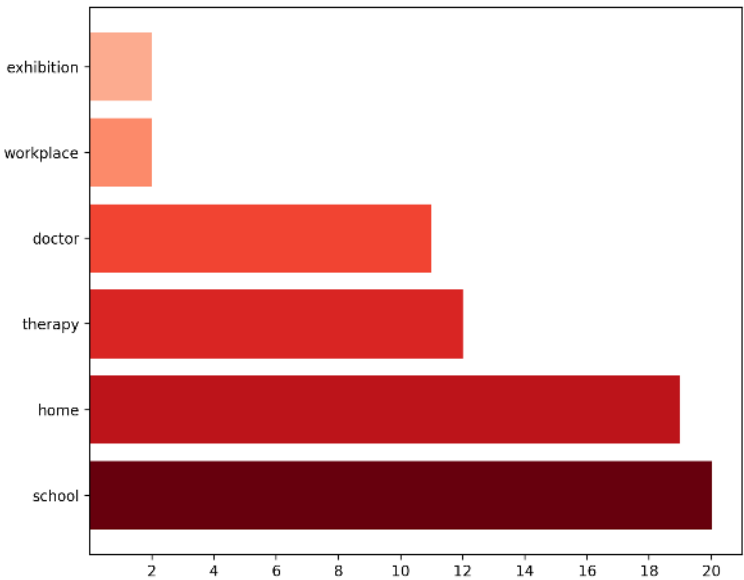


Fig. 8. Envisioned play setting of games within the corpus

Play settings, hence, further illustrate the effect of the high medical context that is part of play for neurodivergent people (see below). The high count of school based approaches directly follows from the abovementioned focus on children as the primary age group of interest. Given how many games that are intended to be part of education and school environments, it is surprising that nine of 20 papers discuss single player games. While games tend to be situated in some location or another, we identify a gap in works that span across people’s lived contexts.

5.3.3 Genres. Within the corpus, most games (39, 59.1%) can be classified as “serious games”, small, closed games that have a real life purpose, predominantly with educational intent. Nine games (13.6%) follow a mode of exploration (though three of those are all papers on *Minecraft*), six (9.1%) are explicitly therapy games of which three are exergames, i.e. games that aim at motivating players

to use their entire body for play. Five papers (7.6%) discuss games within a unique genre (casual game, toys, chess, puzzle, flipper). For seven games (10.6%), we were unable to specify a clear genre. As a large proponent of the corpus, we focus here on serious games. This genre exists on a continuum ranging from purposeful software with a high degree of fun and challenging tasks to more experiential less game-driven applications [85]. The games within the corpus are predominantly short and have a high degree of playfulness, even if those might be somewhat repetitive. For example, an unnamed game for measuring attention span for children with ADHD makes ample use of game design and elements from which to infer the clinical measures [110]. *Speech Adventure* is a game for dyslexic children that is intended to be played for about ten minutes a day. Players are encouraged to give a slug commands for daily tasks by reading them out loud [46]. This is a game predominantly focused on tasks that could be understood as a game environment to the purpose with comparatively fewer 'game' elements. The unnamed game for money identification by Hassan et al. can be seen more as an simulation allowing, in this case, autistic children to practice real life skills in a safe environment that is prepared for failure [65]. The high prevalence of serious games in our corpus indicate that game development is driven by predefined notions of purpose that are deliberately part of play for neurodivergent youth.

5.4 Purpose

Given how externalised purpose is so heavily represented within our corpus, we now take a closer look at the purpose of play that researchers envision for neurodivergent players. Table 7 illustrates which model of disability applies to specific purpose groups and provides high level categories.

Model	Purpose	Papers
Medical	Therapy	[1, 26–29, 45, 46, 58, 67, 81, 87, 95, 121, 125, 129, 130]
	Diagnosis	[7, 34, 57, 78, 95, 101, 102, 110, 115, 134]
	Training	[54–56, 91, 103, 132, 138]
Social	Collaboration	[8, 9, 13, 16, 17, 49, 83, 94, 96, 98, 105, 122]
	Education	[12, 18, 25, 36, 48, 59, 60, 65, 69, 82, 86]
	Communication	[14, 45]
	Sports	[36, 52]
	Work Skills	[75, 128]
Identity	Art & Public	[34, 53]
	Free Play	[77, 104, 106–108, 137]

Table 7. Purpose categorisation with papers in the corpus

Some papers span more than one purpose, sometimes even across models of disability. One such instance is the work by Craven et al. which is intended for public, artful engagement as well as envisioned within diagnostic contexts [34]. Similarly, Durango et al. incorporate simultaneously communication and therapy purposes in their game [45]. Within models, Navalayal and Gavas target therapeutic and diagnostic aspects, both part of a medicalised stance [95] and Dandashi et al. equally include educational as well as sports-related motivations [36]. Hence, the overall count of instances across purpose categories is larger than the number of papers within the corpus. Figure 9 illustrates the distribution further.



Fig. 9. Purpose of play as distributed within the corpus. *Therapy, Diagnosis, Training, Collaboration, Education, C*ommunication, Sports, Work Skills, Art & Public, Free Play*

5.4.1 *Medical*. Almost half the papers in the corpus (32, 48.5%) are driven by a medical purpose. Of those, 16 (50.0% within medical) follow therapeutic intentions, ten (31.3% within medical) are intended to be part of diagnostic procedures and seven (21.9% within medical) towards training (e.g., attention). The high number of instances of games incorporating a medical purpose, indicates that play is understood as a means to identify (through diagnosis) and correct (through therapy and training) a perceived deficit. We now illustrate the consequences of how play is meant to serve these purposes for one paper as an example along each of the categories.

MEDIUS offers a suite of small games with *therapeutic* purpose all of which targeting different skills an autistic child is assumed to have difficulty with [1]. The authors specifically refer to PECS (Picture Exchange Communication System) approaches and ABA (Applied Behavioural Analysis) methods as informing their work—without critically contextualising the controversies, particularly surrounding ABA (cf. [74]). Context-specific, the game allows players to fail without reprimanding them until they are presumed to master a skill, although their progress is systematically recorded and reported. “The player will not be judged either by the number of failures or by the duration that puts in each scene (these information will be registered in the Data Base for the tutor)”⁸ [1, p9]. Hence, the medical purpose is, apart from the setting, not made entirely transparent to the child echoing previous analyses of technologies for autistic children more generally (see [126]). In that regard, player enjoyment plays a role predominantly in how it might facilitate compliance, which is why it has to be monitored as well. “[*MEDIUS* is] equipped with a facial recognition part added in order to calculate a degree of concentration to know if the autistic child is interested or not in this game” [1, p3].

⁸The paper calls therapists “tutors” throughout. However, the setting is clear from contextual descriptions.

Li et al. also present a suite of games, though with *diagnostic* purpose, intended “to quantitatively assess children’s executive functioning (EF) skills” [78, p1]. Subsequently, the authors discuss how “stimuli” are presented within the game and are interested in how reliable the data is in predicting a set of diagnostic criteria. Similar to therapeutic purposes above, the interest in players’ engagement is not a self-sufficient question of enjoyment, but rather an indicator on compliance in not playing but rather *finishing all elements of the game*. In this context, the authors implemented feedback loops, as their “EF game design pilots indicated that participants were more engaged into the game with those feedbacks” [78, p4]. In that regard, not just play itself, but also player involvement are relegated to the purpose of the game. Appropriation and enjoyment caused by disruption are not valued opportunities for intrinsically conceptualised playfulness in such games.

As an example for a game, with a *training* purpose, *Imagination Soccer* “is designed to motivate training, improve hand-eye coordination in 3D interaction task, and increase bodily emotion recognition ability for ASD individuals” [91, p157]. The authors investigate the effect of several customisation features on players’ motivation to engage with the game. However, here as well, the extensive discussion of this feature serves a purpose that identifies said player as deficient and in need of training, not as a self-determined agents (cf. for autism in particular, [135]) making informed and self-guided choices following their own interests in play.

The detailed discussions of these papers is not meant as a condemnation of those papers, rather, they are instances of a larger systemic context in which play for neurodivergent people appears to be generally purpose driven as we show above regarding the genres that are prominently represented. More than half of the papers in this corpus use notions of game and play to disguise or automate procedures that usually require highly intricate engagements of human experts even within these medical settings [39]. Diagnosis, therapy and training interventions are nigh impossible to be fully automated, and even if it would, the desire to do so casts neurodivergent people as “individuals that have to be managed”, always dependent and other.

5.4.2 Social. Overall, 29 papers (43.9%) in the corpus implicitly or explicitly follow a social model of disability, in which environments and social structures are, at least partly, seen as contributing to making an experience disabling to an individual player. Of those, twelve (41.4% within the model) are explicitly envisioned in a context of collaboration and cooperation, whereas eleven (37.9% within the model) are related to education in schools or structured learning environments. The remaining eight are equally distributed across communication, sports, work or job training as well as artful or public experiences (two/6.9% each).

For example, Boyd et al. presents *Zody*, a game that is intended to implicitly create a range of different social scenarios relevant to cooperation and *collaboration* [13]. Players solve tasks in minigames together and can use a range of interaction strategies to succeed together. Consequently, the authors state that autistic people “often experience difficulties developing social relationships (...), leading to social isolation” [13, p3:2], a description of the target population that describes an effect of different modes of interaction without making a causal interference that this is only a result of individual embodiment.

However, the description of neurodivergent populations does not always follow the context or intent of the game. As an example for an *educational* purpose Dandashi et al., propose a physical mat with pressure sensors as input for a memory game focused on teaching fundamental maths [36]. In describing their target group, though, they state that “[c]hildren with intellectual disability (ID) often have several characteristics, which hold back their development” [36, p1]. Such statements are embedded in a notion of individual pathology, even though the game itself operates within a social model of disability as it adapts learning processes to the needs of neurodivergent learners.

Games in the other categories are similarly embedding game design in a notion of altering inputs to serve neurodivergent communities and specifically develop to their needs in contrast to using games as a mode of expecting individuals to act more in line with neurotypical modes of expression. However, the purpose of these games and the specific situated support provided is largely defined by researchers and neurotypically presenting ‘experts’ without consciously reflected lived experience. In that regard, these games are not oriented towards play as an activity in and of itself but rather use games as a tool with the main intent of the software being external.

5.4.3 Self-Determined. Only six out of the 66 papers in the corpus (9.1%) concerned themselves with free play driven by self-guided exploration and enjoyment. Half of those (three), though all discuss the commercial game *Minecraft*.

There are subtle differences sometimes that make a game freely explorable and self guided instead of falling into either a medical or a social model of disability. The *Stomp* system Wyeth et al. present [137], for example, is similar to the pressure mat described above [36]. However, they describe their games as a range of experiences and aim to make those broadly accessible to neurodivergent players; in their own words: “Stomp afforded opportunities for experiences that would otherwise be inaccessible to service users” [137, p2:15]. While sociality and collaborations were addressed as desirable effects of play, the games are not directly focused on promoting these as an inherent purpose of play. Hence, while some might argue that the game follows a social purpose, the difference is in how the authors subtly negotiate play experiences with a notion of autonomy of neurodivergent players – of which there appears to be comparatively little work given the context of play for majority populations.

6 DISCUSSION

On a higher level, what the results mean and what this implies for research practices and society and large and how we use technological utopias to normativise ableism

6.1 Medicinal Knowledge – Simultaneously Omnipresent and Absent

little medicalised knowledge production -> medical as rhetoric that might not even be that useful to the field, though it is oriented around solutionism (alt.chi paper and solutionism lit)

6.2 Lack of Self-Determination

for discussion: individualisation and highly medicalised context make it difficult to talk about ‘play’ or ‘game’ with all the overarching purpose tied into it (relay with critique on gamification more generally) -> combining 5.3.3 and 5.4

high therapy means that play is meant as a deficit correction, which taints play as something you *have* to do instead of something you *get* to do (how children understand play ref, which is appropriate given the high amount of children related work here) (training can be understood as the same basically) -> probably the ‘cure’ rhetoric for discussion here

“getting to do, having to do” -> also, not about not having purpose assigned to game, but it depends on who does it and how it plays into the grand scheme of things

serious games question what it means to be ‘serious’ and what is ‘good’ [114] is a good source illustrating how just general youth are here already in conflict with developers

-> discuss along competence, autonomy and relatedness

Further, “by failing to provide supports for *competence, autonomy, and relatedness*, (...) socializing agents and organizations contribute to *alienation* and ill-being” [112, p74] (emphasis our own). Hence, if the named core components in SDT are not supported in play, even when it is meant to be persuasive, it will not even reach the purpose it intends to be.

6.3 Marginalised Immersion

what does this mean for the 'privilege of immersion' and how game and play is conceptualised for neurodivergent populations

what does this mean for neurodivergent folks though; othering, cure, identification, wrongness, abject (relate to clare?)

absence of playfulness

6.4 Recommendations for Future Work

it's not a call for not doing the work here, it has its place, but the question becomes why there is a lack of research into actual enjoyment, fun and play preferences from neurodivergent perspectives.

ways forward -> accountability -> Rua's PD paper

7 CONCLUSION

Limitations, Additional/Future work, Summary, Contribution Statement

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