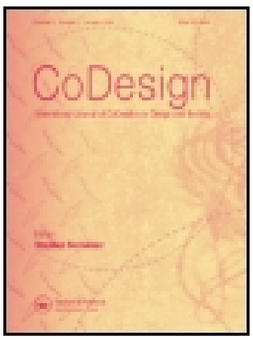

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Learning from the Resilience Playtest: increasing engagement in resilience promoting games through participatory design

Angie Hart[a], Mirika Flegg[a], Anne Rathbone[b], Nick Gant[c], Lisa Buttery[b], Ollie Gibbs[d] and Scott Dennis[b]

[a]Centre of Resilience for Social Justice, University of Brighton, Brighton, UK; [b]Project Management, Boingboing Social Enterprise, Brighton, UK; [c]School of Architecture & Design, University of Brighton, Brighton, UK; [d]Youth Engagement, Blackpool HeadStart, Blackpool, UK

ABSTRACT

This article considers the co-design, co-production and evaluation of resilience-focused educational games developed by and for young people with complex needs. For the purposes of this article, we have defined complex needs as experiencing learning or health-related difficulties such as sensory, learning and mobility impairments or mental health issues, alongside other challenges such as living in poverty. Using the development of these games and the results of the evaluation as a case study, it addresses key debates surrounding participatory design within the context of social inequalities. It suggests that participatory design, when seen as a methodology, may provide an action-based strategy to improve communication between people that face adversity, and those who support them. Findings from the evaluation of the process and the games suggest that involving young people with complex needs in the design of educational games may improve the social value associated with the end-product. Findings from this case study may be relevant to people interested in participatory design processes, those that incorporate educational or therapeutic games into their practice, and researchers seeking to work with groups where verbal communication has traditionally been seen as a barrier, or is an actual barrier.

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Participatory design; co-design; collaborative methodologies; social inequalities; resilience; complex needs

1. Introduction

'Participatory Design' describes a process whereby end-users are involved in designing projects to ensure outcomes are useful for them (Spinuzzi 2005, 164). Specific tools have been introduced to facilitate participatory design practices with young children (Sanders 2000). Authors such as Moraveji et al. (2007) caution, however, that due to time pressures, those wishing to include young people in participatory design processes often solely select children with advanced communication skills. Kam et al. (2006) support these concerns and suggest that participatory design often does not involve individuals who are truly representative of the end-user. They specifically question the opportunities for young people with complex needs to be actively involved. Participatory design is a process of co-production, which is established as a method for creating richer

CONTACT Mirika Flegg resilience@brighton.ac.uk

and more contextually relevant knowledge as well as social value (Campbell and Vanderhoven 2016, 11). This is supported by Merter and Hasırcı (2018) specifically in relation to participatory design with disadvantaged children, in that the process in itself provides a platform to better understand the challenges they face. Kelly (2019) tentatively offers four ethical principles to help align participatory practices with notions of empowerment, yet acknowledges limitations within their study and suggests further research is required. Many argue that limited resources and designer attitudes may inadvertently limit participatory processes (Ampatzidou and Gugerell 2019; Kelly 2019; Ho, Ma, and Lee 2011). Therefore, a gap remains in the literature surrounding how participatory design processes can include those traditionally seen as facing the greatest barriers to inclusion (Kam et al. 2006; Moraveji et al. 2007) and in particular, young people with complex needs (Merter and Hasırcı 2018).

Including young people experiencing disadvantage and marginalisation in participatory design, practices may be especially important in the area of educational game design. Here, there is a growing public desire to produce educational games to promote learning, empathy and social values (Harteveld and Sutherland 2017). Whilst advances have been made in the design of educational games for young people that aim to address social inequalities, questions still exist around how the social value of educational games can be assessed and improved (Bennett, Cassim, and van der Merwe 2017; Horn et al. 2016). Here, these authors report the assessment of social value to be the responsibility of the designer.

However, the social value of an intervention more broadly is defined by the theory of change that underpins it (Kroeger and Weber 2014). This paper argues that educational games underpinned by a theory of change with a social justice focus, necessitate collaborative evaluative strategies to be embedded within participatory design processes. To this effect, it reflects on the processes and evaluation of The Resilience Playtest Project.

The term 'resilience' is a complex construct that can be defined in a variety of ways (Hart, Blincow, and Thomas 2007; Luthar 2003; Luthar, Cicchetti, and Becker 2000; Masten 2007; Ungar, Ghazinour, and Richter 2013; Ungar and Liebenberg 2009). Within the Resilience Playtest Project, the construct of resilience is based on a socio-ecological approach and is defined as 'overcoming adversity, whilst also potentially subtly changing, or even dramatically transforming (aspects of) that adversity' (Hart et al. 2013). Within educational settings, it has been suggested that resilience-based research and practice are improved through co-production activities with young people, and in particular, those with complex needs (Hart et al. 2016). As Hromek and Roffey (2009) have noted, games are a valuable tool in promoting young people's social and emotional development, including therapeutic potential for those experiencing additional challenges. Here, they identify specific development through games, including belonging and connectivity, relationality, self-regulation, decision-making, problem-solving and appropriate enlisting of support. All of these have been linked to resilience building (Aumann and Hart 2009).

Games, as a tool for critical pedagogy, have the potential for personal and social transformation through changes in understanding and insight into solutions to challenges (Fetherston and Kelly 2007). For games specifically focused on resilience through a socio-ecological lens, this potential for transformation can be applied to building resilience.

The theory of change for this study, was that co-design would result in games that made facilitated discussions around resilience and overcoming adversities easier and more effective; increasing the accessibility and relevance of the games (Ampatzidou and Gugerell 2019; Zimmerman and Forlizzi 2008). In this project, four educational games co-designed by young people with complex needs, were produced and evaluated for use with their peers and supporters. Here, young people with complex needs were defined as those experiencing health-related difficulties such as sensory, learning and mobility impairments or mental health issues, alongside other challenges such as living in poverty (Aumann and Hart 2009). Their supporters included parents, practitioners, teachers and the wider public. An overview of the games is presented in Table 1.

2. Aims of the project

Making the games fun was a key aim of the young people participating in the co-design and co-production. As Rea, Millican, and Watson (2000) argue, fun is a basic psychological need. These authors note that fun through structured activities provides an essential control balance between enjoyment and learning through serious purpose. Fun, therefore, facilitates learning and achievement. The research of Tugade and Fredrickson (2004) indicates that experiencing positive emotions facilitates regulation of emotions, and identification of positive meaning in adversity contexts, and is therefore a contributor to resilience-building. The Resilience Playtest games were designed therefore to be used as resilience-building tools that are perceived as fun to play. It was not the aim of the evaluation to explore the impact on levels of resilience from developing or playing the games. Therefore, this was not explicitly measured. The overall aim of this study was to see if games co-designed by young people with a range of complex needs were seen as socially valuable when tested by groups of young people with similar characteristics and, more widely. In keeping with our theory of change, here these games were assessed as socially valuable if they were perceived to be participatory, relevant, and accessible to co-designers and their peers.

Specifically, the evaluation of the games sought to:

(1) Determine whether the games' design made them suitable for their intended purpose as resilience-based educational tools:
    (i) Does playing the games help start resilience-based conversations between young people with complex needs and those who support them?
    (ii) Are the games considered enjoyable or perceived as 'fun' when played?
(2) Determine barriers to engaging with the games and identify any design improvements to promote accessibility to diverse young people and their supporters.
(3) Determine how this information might feed into future collaborative design processes.

3. Methods

Participatory design has been referred to as both a method where end-users participate in aspects of product/service design (Sanders 2000), and as a methodology whereby end-

Table 1. An overview of the Resilience Playtest games.

Name, aim and acknowledgements	Photograph
Sun and Clouds Aims: To produce a game to help participants discuss contextual adversity and use resilient moves. To aid players in talking about their own resilience and help improve their resilience. In this game, players roll the dice to move places. They may land on a sun or cloud card where they answer questions about building resilience. Cloud cards present challenging situations to prompt discussion of resilient responses. Suns cards promote short, bonding activities or resilience based questions. This game was co-produced by Arts Connect Ambassadors in partnership with the University of Brighton, Boingboing social enterprise and Community21. Funding was provided by the AHRC (Arts and Humanities Research Council) and ESRC (Economic and Social Research Council).	 Co-designers with the Sun and Clouds Game Prototype, 16 November 2016.
The Resilience Tower Aims: To help players think and chat through things in life they may find challenging. To take an assets-based approach to problem solving. In this game, players try to remove a block from the tower without bringing it crashing down. Each block has a resilience building move, which they can discuss according to the facilitator's specific aim (e.g. to assess individual need, or to promote group discussion about resilience). Designed as part of a wider research project on applying Resilient Therapy, the Resilience Tower was created by Tadgh Crozier.	 The Resilience Tower.

(*Continued*)

Table 1. (Continued).

Name, aim and acknowledgements	Photograph
Resilience Road Aims: To provide an assessment, reflective and problem-solving tool to help young people build The established concept of a journey as a psycho- educational tool was used in the co-design of this game. Road blocks, speed signs and junctions are examples of prompts for exploration of life challenges and resilient decision making and strategies. The idea for the Resilience Road came from the Young People's Executive Group of HeadStart Blackpool, with co-design support from the University of Brighton, Boingboing and Community21. Funding was provided by the Imagine programme and the HeadStart programme funded by The National Lottery Community Fund.	 The Resilience Road in action.
Talking Heads Aim: To utilise young people's engagement with technology and technology-based skills to facilitate the creation and storing of digital, animated conversations around the Resilience Framework in an augmented reality game. In its basic form, facilitators can use the Talking Heads digital poster to promote discussions around resilience. Using the underpinning application players can create their own age appropriate characters and verbal slogans to represent resilient moves. The different headings represent theory-based resilience building factors. The idea evolved from the co-designed use of this technology design by young people within participatory planning (Gant and Druggan (2015), Gant et al. (2015)). The Talking Heads wall was co- designed by young people with support from the University of Brighton, Boingboing and Community21.	 A young person playing Talking Heads.

users participate in the prototyping, refinement, and evaluation of products/services (Spinuzzi 2005). Here, participatory design has been applied as a resilient methodology whereby co-production is a necessary component when working with young people with complex needs (Hart et al. 2007, 2016). Working *with* and *as* communities facing disadvantages, this asset-based approach requires a strong focus on inequalities transformation (Hart et al. 2016). Socio-ecological values associated with interventions, products, and services are to be considered in partnership with disadvantaged communities consistently throughout the research process (Wenger-Trayner et al. 2019). The Resilient Playtest games were co-produced through a three-stage series of collaborative design workshops, within which accessible print and production techniques were employed. Young people worked alongside university design researchers, university design students, and youth support practitioners.

Games were developed around Hart, Blincow, and Thomas (2007) Resilience Framework with young people involved in interpreting and embedding the evidence base into the design direction of each game. Evaluation was embedded within the methodology and took place throughout the project, including during prototype and end-product stages (Spinuzzi 2005). Young people participating in the co-design were involved in iterations of feedback and improvements throughout the process of design and production. The prototype games were presented to potential users at stakeholder events and then improvements made from the data and feedback gathered.

Forlizzi and Ford (2000) recommend that participatory design evaluations consider the 'functional, personal and social contexts in which the product functions' (Forlizzi and Ford [2000, 35] cited in Visser et al. 2007). To assess the functionality and social value of the games, they were evaluated in contexts where they would likely be used (schools, community provisions and by parents/caregivers of children with complex needs). This included four schools in London and Blackpool, UK, and through Arts Connect, an arts-based programme for people with learning disabilities (many of whom had co-existing physical impairments) in East Sussex, UK.

Primary and secondary data were collected at the prototype and end-product stages, including the views of 257 participants in total. Qualitative and quantitative data were collected using universal and individual data collection methods, including surveys and interviews. Primary data were collected from 121 participants including practitioners, parents, school-aged children, and young adults supported by non-school-based educational programmes (i.e. the lead users). The inclusion of 'lead-users' is essential in the innovation process and associated evaluations (Dell'Era and Landoni 2014), and here, some of the community-based facilitators were also young adults with complex needs (making a total of 123 involved in contributing to primary data collection).

Secondary feedback data were collected at various stages of prototyping from 136 participants from a more general public sample via surveys and at open design events.

Further feedback on commercially available games was collected from an open exhibit at the Utopia Fair (Connected Communities Festival 2016), London. For details of data collection see Table 2.

Table 2. The data sources from the Resilience Playtest.

	Number of participants	Description of participants	Types of data collected
	51	Young people (aged 11–15) sampled from four schools in Blackpool and London, UK.	Individual data via surveys. Universal data via feedback from school staff/ practitioners.
	26	Youth (aged 15–18) and adults with learning disabilities and/or physical disabilities.	Individual data via surveys. Universal data via feedback from school staff/ practitioners.
	12	Parents, guardians or caregivers of children with learning disabilities and/or physical disabilities.	Universal data via feedback from practitioners.
Primary Data	32	26 consultations with external practitioners collaborating throughout the life-time of the project, and 6 (Anonymised section) staff members directly using the games in practice.	Individual data via interviews. Universal data via feedback from workshops.
Primary Data Total: 121			
	83	Teaching and support practitioners, parents, young people and academics at a one-day seminar exhibiting prototypes.	Individual data via surveys.
Secondary Data	53	Young people, academics, community and schools practitioners, parents and wider public at an exhibit of commercial versions of the tools.	Individual data via surveys.
Secondary Data Total: 136 Participant Total: 257			

4. Analysis

Data were pragmatically analysed in NVivo to assess the functionality and value players attributed to the games, and any barriers surrounding the use of the resources by young people with complex needs. Seen as an extension of participatory action research, involving participants in the interpretation of findings produced via participatory design is 'an essential part of the process' (Spinuzzi 2005, 164). The analysis of findings, and the contents of this article, were shared with young people involved in the co-design and practitioners with experience of facilitating the games, to provide them with the opportunity to comment on the findings and the article. The young people and facilitators agreed that the findings were in line with their own experiences and views, and that the article was an accurate reflection of the process.

5. Findings

The findings provide insights into the perceived value of the games and determine whether the games are fit-for-purpose. Responses are considered as they relate to individual games, followed by a discussion of the ability of the games, in general, to be perceived as a 'fun' way to initiate a resilience conversation. Those involved in designing the games additionally reported personal and interpersonal benefits of this process and these results have been reported elsewhere (Boingboing 2016b, 2016c).

5.1. Reported values of the games

5.1.1. Value for promoting discussion about resilience

Primary data suggest that all games improved understanding of resilience and promoted further discussions and collective problem-solving. For example, when asked the main reasons someone would want to use the resilience games, responses included: to start conversations about resilience, explore different adversity contexts, and identify resilient strategies. School-based and community-based facilitators also commented on the ability of all of the games to facilitate learning around resilience, thereby potentially enhancing mental health and wellbeing:

> One aspect I particularly like is the fact that the whole group can get involved in suggesting resilient moves. This conveys to players that resilience-building is not just an individual activity, but we can support each other to enhance it. (Community- based facilitator of Sun and Clouds Game)

In the Resilience Playtest, all games were evaluated in a facilitated environment, either 1:1 or in groups. Teachers, adult practitioners and parents suggested that the games were helpful for initiating discussions when used both in groups and during 1:1 sessions. For example, a community practitioner reported that the games were a, '*great way to open discussions with young people in small groups or 1:1'*. Comments on all the games supported this, except the Resilience Wall, which was perceived as more helpful for groups than individual work. Therefore, the reported value of the games can be seen to be aligned with their intended purpose as resilience-based educational tools.

5.1.2. Value for helping to deal with specific challenges

Young people who tested the Resilience Road and the Suns and Clouds game, across the sites, directly reported that playing the games helped them, '*deal with challenges*'. Those supporting young people also reported the Resilience Road prompted discussion of challenges and solutions. The Resilience Road and The Resilience Tower were particularly reported, at the Blackpool sites, to be a useful facilitation tool to assist young people facing challenges arising from transitions. In relation to the Resilience Road, for example, a school-based facilitator reported that children who played the game said that they felt, '*more confident about starting Year 7, finding their way to school and realising who can help them with their journey, and also how the game can help them if they have any worries*'. Referring to the Resilience Tower, a community-based practitioner reported that, '*it was a good way to talk about worries. They really thought about their responses to the questions around transition*'. School-based facilitators also reported this.

As Wood (2018) observes, the role of deliverer of social and emotional learning (SEL) with children risks 'othering' disadvantaged children who do not fit perceived norms, in need nor behaviour. This supports our own learning from this project, wherein facilitators fed back the importance of the need to be highly reflexive in their facilitation, open to different responses from children and young people according to need (including neuro-diverse needs). It was reported by several of the facilitators that the co-production of the games by young people with complex needs appeared to assist with this. A particular example was the Sun and Clouds prototype which included specific life challenges that had come from young adults with learning disabilities themselves. Parents

and carers involved in the testing phase reported that they could see that the life challenge situations, presented for discussion in the game, were contextually relevant for their children. Thus, they could imagine the game being easier to facilitate, and more engaging for the young person, with higher social and emotional learning value.

5.1.3. Value for wider populations of children and young people

A review of secondary data (from the general public) suggests that the games appealed to children, young people, parents and practitioners from more general contexts, and therefore may also be useful for a broader population. This is supported by requests by participants to purchase copies of games for use in mainstream secondary schools. Fifty-three participants provided information on their understanding of resilience before and after playing the game via a 5-point Likert scale. Ninety-two per cent responded that their understanding had improved, with only four respondents reporting no improvement. Many reported that the structure of the games, and having, *'a framework to share and reflect within'*, aided their learning.

The exception to this was the Sun and Clouds game, which was reported to be most beneficial for use with groups of individuals that had similar complex needs as the co-design group (i.e. with moderate learning disabilities), with many comments suggesting, *'the game helps to build a sense of community'*. Analysis of the secondary data suggests that the game can help create connections between people, even when they were not previously known to each other. For example, one survey respondent said the Sun and Clouds game was, *'simple, yet promotes sharing and discussion, which quickly creates a connection amongst strangers'*. Therefore, this game is reported to help build community connections, both within subsections of communities and beyond. It should be noted, here, that whilst the data shows that the Sun and Clouds game was reported as being particularly effective for use with young adults with learning disabilities, some facilitators felt that it could be useful for work with Primary and Transition (i.e. from Primary to Secondary) age children. The emphasis in the findings on the value of the Sun and Clouds game for young adults with learning disabilities may have been influenced by the facilitators' prior knowledge that it was co-designed by young adults with learning disabilities.

5.1.4. Value for promoting discussion about resilience

There were also unexpected or alternative values attributed to two of the games.

Responses surrounding the value of the Resilience Wall suggested that it may be more aptly used as a starting point for a larger design-based activity for young people. Comments about this game primarily centred on what other activities could be done with it (such as making interactive movies). Many suggested that it could be incorporated into school lessons via drama, media and arts-focused classes, and that with youth stories included within the interactive design features it could, *'be used as a collective or community activity/tool'*.

Young people who were involved in governance structures for the 'Resilience Revolution', HeadStart Blackpool (a National Lottery Community Fund resourced approach to mental health systems change), reported that they found the Resilience Road a useful tool to increase communication between youth and adults for the purpose of decision-making:

> The resilience tools would be especially useful in boards of directors with youth reps to aid strategic planning around overcoming potential obstacles. Using the tools would encourage group problem solving. (Youth facilitators)

Therefore, this evaluation suggests that the Resilience Road may have additional benefits as a tool for strategic co-decision making.

5.2. Barriers to involvement and suggested improvements

5.2.1. Content: alternative instructions in various formats and facilitation

Suggestions for improvements to the games often centred on modifying facilitator instructions so that games could be used in different ways, and making instructions available in various formats.

The Resilience Wall was perceived as more helpful in group situations than 1:1 and the level of technological skill required to facilitate it was problematic. One young person said, '*using the graffiti* [resilience] *wall alone might feel odd on an individual level*', and community facilitators agreed saying it, '*requires a lot of knowledge for individual use. It might be too much to get, in terms of understanding all the different moves, unless it's for a collective*'. The technological aspects of the Resilience Wall were reported as a barrier for some participants and facilitators, highlighting the need for very clear instructions on how to use the underpinning digital application. The need for the facilitator to have a more advanced understanding of the theory behind the game was highlighted more for the Resilience Wall in comparison to other games.

Improvement-oriented responses for the Resilience Wall suggest that some may have been excluded from the activity due to physical limitations, such as being hard of hearing. One parent said, '*the sound isn't good when using the Aurasma App and there are no subtitles*'. The evaluation suggested that the games be facilitated by someone who fully understands the instructions, recognising that both players and facilitators may have additional needs. Thus, the games may be made more accessible if essential features are made available in various formats. Creative suggestions to improve the instructions included making short subtitled videos about using the games in different ways, and providing instructions in accessible alternative formats. Other suggestions included having printable template cards available with theme-focused scenarios (such as youth experiencing transitions) to provide a starting point.

Across all the feedback, effective facilitation was seen to be key, and facilitators reported that two things, in particular, were important for effective working in relation to the games. Firstly, that the instructions needed to be very clear, so that facilitators could deliver without prior experience or training in using the games. Eighty-three attendees (out of 150) at the one-day seminar for secondary data collection showed interest in learning how to use the games, including requests for facilitated sessions in schools and community settings and questions about the purchase of the games, but many highlighted the need for clearer facilitator instructions. Secondly, that facilitators needed to have a level of understanding of a socio-ecological approach to resilience, in order to maximise opportunities arising from children and young people's responses and discussions. We addressed both of these points in the final versions of the games. We revised facilitator instructions and improved clarity, considering specific facilitator

feedback from the testing. The final versions of the games also include some accessible background information on the theories behind the construct of resilience, through the inclusion of the Resilience Framework (Boingboing 2016a; Hart, Blincow, and Thomas 2007), to aid facilitation of the games by both practitioners and parents/carers.

General comments about the games from all parties suggested they be used in a quiet room so that participants could hear one another and concentrate, with one community practitioner saying of the Resilience Road, '*several comments arose about wanting to play it again, but in a quiet room*'. A quiet space may be particularly important for players with hearing or information processing difficulties. However, the need for a quiet space, and a facilitator, may be barriers in resource-poor environments. Time may also be seen as a barrier to inclusion when resources are limited, and some highlighted that the Sun and Clouds game could take too long to actually play, for young people with learning disabilities in particular. This highlighted again the need for clear, accessible instructions.

5.2.2. Design and construction: durable, brightly coloured, 3D designs

Few comments suggested that design features of the games themselves created barriers to involving young people. Comments centring on the construction of the games included that they need, '*more sturdy construction*'. Recommendations for the construction of games and packaging included laminating instructions to improve durability, having folded compartments to make games easier to transport, and more professional-looking packaging.

Bright colours were seen to promote learning by a number of participants. Bright colours might also make games more accessible for people with visual difficulties. All games, with the exception of the Resilience Tower, which is already 3D, were recommended to include 3D design elements. School-based facilitators playing the Sun and Clouds game suggested it be made, '*3 dimensional (like a mountain that folded out)*'. Other comments, particularly around the Sun and Clouds game, stated that interactive elements aided in bringing learners together. As such, 3D and interactive elements could support those who learn in different ways.

5.2.3. Flexibility: how can games be made more accessible for diverse groups of young people?

Most comments, centred on how to improve individual games so that they would be accessible to others, with suggestions differing depending on the knowledge-base of the young people, their age, and the challenges they faced.

Some Resilience Road facilitators said it, '*needs more structure to keep young people's attention*'. However, others felt it was already too structured, with one community-facilitator saying, '*the young people had difficulty understanding the road sign meanings and it proved better for the young people to produce their own road signs*'. Another facilitator stated, '*as it was mixed ability some children were not completely sure and needed more support and prompting to interact with the game*'. Suggestions for supporting young people to interact with the game included changes to the design to provide additional road sign instructions, including some blank road signs, and '*provid(ing) prompt cards with situations/solutions around transition to promote discussions for the less vocal*'. These comments reiterate the invaluable role of a creative facilitator in making the games more accessible.

Feedback on the Resilience Tower suggested that in its current form it may be more suited to older youth, with one community facilitator reporting:

> At times some of the language on the blocks needed more explanation, such as 'accepting' and 'tried and tested treatments'. This may work better if the language was changed to be more suitable for this age group … [young people] asked if the questions could relate more to them. (Community facilitator)

In contrast, the Sun and Clouds game was viewed by some as more suited to younger youth or older youth with more complex needs. For example, one young person stated:

> I think the way that the Sun and Clouds is presented now makes it seem more appropriate for work with younger audiences. Perhaps there is a way that we can adapt it so that teenagers would want to play it without fear of losing their 'street cred'. (Young person)

Whilst the games were designed by young people with complex needs, no comments specified that the games were *only* suitable for young people with complex needs. This absence of comments may suggest that those facing complex needs, such as learning difficulties or exclusions from mainstream schools, are capable of designing games intended for use within the general population. The Suns and Clouds game in particular was co-designed solely with young people with learning difficulties, and some responses suggested that players, carers, and facilitators had a unique appreciation for the games once they learned who had designed them. For example, one community-facilitator stated:

> When I mention that the tool was co-produced by people with learning difficulties and co-existing physical disabilities, as a way to help others like themselves to learn about resilience, people seem really interested. It's a unique selling point for the tool'. (Community facilitator)

Despite this, tailoring or customisation to/by a particular group was raised as a way to increase accessibility. For example, when interviewed about their experience of using the Sun and Clouds game, one parent said:

> More people may want to buy the game and use it if they can tailor it to the group of people that they would be using it with. By personalising the questions, the game would be more relevant to the person buying it and so it would hopefully be played more. (Parent)

Analysis of secondary data gathered from the general public appeared to support this, with many asking for more, '*variety in the cards – more scenarios*', and, '*more varied questions*'. School-based facilitators saw an opportunity to address this design need by incorporating the personalisation of cards into their lesson planning:

> There could also be steps where the actual designing of the cards could be initial workshops to start conversations about resilience. So, for example, one session could be on drawing and creating identities for the game. Another session could be on discussing challenges that could be used as possible scenarios to go into the game.
>
> The final session could then be playing the game to understand how to overcome the challenges made. (School-based facilitator)

Therefore, an acknowledgement that the games were developed by young people facing complex needs was seen to make the games more accessible. Whilst overall there was

a sense that certain games were more suited to older or younger youth, many suggestions have been made about how they could be adapted for different audiences, such as changing/simplifying the language, making alternative instructions, and allowing facilitators and players more scope to customise the games together.

6. Discussion

The games included in the Resilience Playtest were designed as resilience-based educational games to be used with children, young people, and their supporters. As such, their intended purpose was to facilitate learning around resilience and to initiate conversations about overcoming adversities in a way perceived as participatory, relevant, accessible, and fun. Others have suggested educational games should facilitate action-based problem-solving that is both situated in the activity and promotes learning transfer (Horn et al. 2016; Rooney 2012). To assess functionality in terms of content and design, the games were evaluated in various contexts including mainstream schools, community-based educational contexts and wider community events with members of the general public. It has been suggested that products should be tested in a variety of contexts (Spinuzzi 2005; Yu and Tek-Jin 2017) and should be perceived as 'fun' to improve engagement (Ampatzidou and Gugerell 2019; Rooney 2012; Yu and Tek-Jin 2017). These concepts are interrelated because what is considered fun may be perceived differently in different contexts (Yu and Tek-Jin 2017).

Across all evaluated contexts and time points, all four resilience games were reported to be a fun and participatory way to improve communication around resilience by most of the people who played them. In terms of relevance, each individual game was perceived to have slightly different benefits for identifying and addressing adversity contexts by talking about resilience. Initiating a conversation about resilience has been suggested as a means to improve resilience and mental health (Howard and Johnson 2000). The Resilience Road and the Resilience Tower were viewed more as tools for transitional support, the Sun and Clouds game was seen to benefit those facing similar long-term challenges, and the Resilience Wall was seen as one component of a larger resilience-based or design-based programme. Therefore, the games can be said to be functional in regard to their intended purpose. However, different games may be more appropriate for use depending on the adversity context.

Participants related adversity context more to the adversities faced by all young people (such as transitioning from one educational stage to the next) rather than to an individual's perceived additional need(s). Responses did not suggest that the games were more suited to young people with complex needs or facing multiple adversities, nor did they suggest they were more useful for any particular group. As such, the evaluation suggests that games designed by those who have experienced multiple adversities, or who are considered to have complex needs, may be suitable for all young people. Publicly acknowledging the games as being designed by people with complex needs may improve their accessibility to others in similar circumstances, whilst at the same time not discouraging youth who do not identify as having complex needs. This finding may be of particular value to those seeking to engage youth facing additional challenges in participatory design process.

Our methodology had inherent social justice value. It provided many young people facing marginalisation and disadvantage opportunities to make a difference to their peers, through direct involvement in game design and development. This involvement contributed to the quality of the final products in their relevance and accessibility to other young people with diverse needs and abilities. Involving people with complex needs in participatory design processes requires more time (Kam et al. 2006; Merter and Hasırcı 2018; Moraveji et al. 2007). However, findings demonstrate that the benefits may include creating educational games suitable for a wider audience. This may be because the resulting narrative of co-produced games is more representative of the diverse experiences of young people. The importance of a relatable and reflective narrative is considered a design essential of educational games (Horn et al. 2016; Rooney 2012). The ability to relate to the narrative may also explain why players, particularly those with complex needs, appreciated learning that others 'like them' had designed the games. This finding may aid in justifying the additional resources required to include those who are often excluded.

In terms of accessibility, the Resilience Tower and Resilience Road were assessed as being more suitable for older youth. The Sun and Clouds game was assessed as being more suited to younger youth. The perception from users that some games should be played at earlier educational stages than others may be beneficial because learning can be advanced over time by playing multiple games; each one slightly more challenging than the next. This fits with educational concepts such as scaffolding (Rooney 2012). Suggested improvements include simplifying the language for the Resilience Tower and Resilience Road to make them more accessible to a wider age-range. Other responses suggest that games could be made more accessible by, (1) making them easily available for purchase, (2) allowing personalisation through templates or blank components, and, (3) providing alternative/additional instructions in various formats. From an educational perspective, the ability to personalise the games may improve learning by situating the games more readily within the context of players' lives (Rooney 2012).

Players may interpret the purpose of the games as different from designers, limiting the control designers have over the interpretive ways games are played (Barnes and Harteveld 2017; Harteveld 2011). In this study, the Resilience Road was designed as a 1:1 or group resilience educational game, yet responses suggest it could also be used as a tool for children and young people's input into strategic planning. Thus, findings provide some support for Barnes and Harteveld (2017) and Harteveld's (2011) arguments. In this study, however, participant suggestions illuminate an opportunity whereby designers may contain (although not control) players' interpretations of educational games. Suggested modifications, such as additional instructions, templates, and scenarios, could be made available on-line and presented in various formats, such as subtitled videos, in order to increase the flexibility of play. Considering these findings together, one may suggest that the creation of an online platform – where game players can suggest alternative uses for the games as they themselves discover them – may provide for on-going communication and collaboration between game players and designers. Specific to this study, adopting suggested modifications to games such as providing colourful stick-on templates for the Resilience Tower or collaboratively developed role-playing scenario cards for the Resilience Road, may make them more universally valuable.

Modifications may also support facilitators who face challenges themselves.

It is widely recognised that some learners will need assistance to play educational games due to a lack of self-directed learning skills required to engage in problem-based learning activities (Rooney 2012). Our findings support this idea that facilitators play an essential role in assisting learners to engage with the games, and some of the suggestions related to improving accessibility focused on making instructions (typically aimed at facilitators) available in various formats. Whilst the need for a facilitator may be seen as a barrier for young people to access these games directly (particularly in resource-poor environments), the benefits of having a facilitator in terms of accessibility, engagement, keeping on task, support for difficult discussions, maximising learning, and recording benefits or outcomes, should not be overlooked.

The need for a quiet room may also be a barrier in resource-strapped environments. The design and evaluation of these games took place within the context of a crisis for young people's mental health (Frith 2016), exacerbated by UK-wide reduction in support services as a result of 'austerity' measures. It is recognised that barriers to engagement cannot be addressed only by making changes to the design of the games. However, this evaluation may provide justification for investing in participatory design practices and providing resources to support their continued use. Future research may wish to consider how involving the voices of those often excluded in design processes may impact the narrative element of game design and if/how this influences product accessibility and learning transfer.

7. Limitations

All evaluations took place within England and games are currently only available in English. Further evaluations are required to evaluate the games within a cross-cultural context. This evaluation was unable to assess whether the games were able to build individual resilience for those who played them because resilience must be evaluated over time (Rutter 1987). Perceptions of games may also change over time and with repetitious use (Yu and Tek-Jin 2017). Therefore, this analysis would benefit from re-testing the games with the same group of young people over time. The evaluation sought to determine the social value of games by seeking feedback from a wide group of stakeholders and members of the public (Dell'Era and Landoni 2014; Sanders 2000). However, in this study, early participatory practices primarily included young people with complex needs. In light of our findings suggesting the importance of the facilitator, future evaluations may wish to consider the subjective and universal design applicability of these games for diverse stakeholders at various stages of development (see, for example, Brereton et al. 2015). Bennett, Cassim, and van der Merwe (2017) suggest socially responsible design evaluations should focus more on the value of games in bringing about social change, rather than assessing their financial or aesthetic value.

However, in future, a cost-based evaluation may be useful for sustainability.

8. Conclusion

As suggested elsewhere (Brudney and England 1983), The Resilience Playtest Project found that collectively produced resources may be particularly fit-for-purpose. All four games were found to aid in opening lines of communication around resilience and

promoting problem-based learning and the acquisition of new knowledge (Zimmerman and Forlizzi 2008). Participatory design practices that involve a more universal sample of young people have not always produced products that performed well across the board (Sanders 2000).

The Playtest games, designed by those with complex needs, being seen as useful for the wider youth population and their supporters is, therefore, a significant finding. It suggests that participatory designers wishing to design educational games that are socially valuable for the general youth population, may wish to involve young people often excluded in the design process, as well as their supporters, as the key stakeholders/partners in educational product design.

Findings may have implications for future designers seeking to determine who to include in participatory design practices. It suggests the value and importance of including young people often excluded when designing educational games. This finding may aid in justifying the additional resources required to include excluded young people in participatory design practices (Kam et al. 2006; Moraveji et al. 2007; Törpel 2006). Future research should test the impacts over time of educational games designed by those with complex needs, and compare these with games designed solely by designers, or in partnership with young people without complex needs. Additionally, longitudinal studies may offer greater insight as to how accessible realisation, production or distribution methods and templates may catalyse or provoke the evolution of designs over time.

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