

Developing an Online Dungeons and Dragons Tool to Support Children with Autism Cope with Anxiety

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Abstract

Many children with Autism Spectrum Conditions (ASC) experience anxiety due to their core traits acting as possible sources of stress. The most relevant traits include reliance on routine, rigidity of thoughts due to resistance of change, and difficulties navigating social situations. This effect is only amplified due to the effects of the social distancing and lockdown rules established during the COVID-19 global pandemic.

This research explores how online tools can be used to support children with autism cope with anxiety using mindfulness techniques. Previous research revealed that technology based interventions are effective in supporting children to aid them in their daily lives and how mindfulness can aid children with autism dealing with challenges specific to anxiety.

Dungeons and Dragons was identified as a viable therapeutic tool due to its ability to provide players with "the opportunity to explore their mental dungeons and slay their psychic dragons" through narrative exploration which can be customised to cater towards their specific interests.

Using a design process involving typically developing children and experts in the fields of ASC, Mindfulness and Dungeons and Dragons, an online helper tool for Dungeons and Dragons Fifth Edition was developed along with a revised rule set catering towards the needs of children with ASC. This was then critically evaluated with experts to reveal its potential in helping children with ASC cope with anxiety, as a simple and user-friendly alternative to the original game.

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Table of Contents

1	Introduction	1
1.1	Autism Spectrum Conditions	1
1.2	Research Goals	1
1.2.1	Research Questions	1
1.2.2	Proof of Concept	2
1.3	Structure of the Dissertation	2
2	Background and Literature Review	3
2.1	Previous Work	3
2.2	Autism	3
2.2.1	Description of Autism	3
2.2.2	Anxiety	5
2.2.3	Anxiety and ASC	5
2.2.4	Prevalence of anxiety in autistic children	6
2.2.5	Anxiety and COVID-19	7
2.3	Mindfulness	7
2.3.1	Definition of Mindfulness	7
2.3.2	Mindfulness and ASC	7
2.3.3	Mindfulness and COVID-19	8
2.3.4	Mindfulness in Technology	8
2.4	Dungeons and Dragons	9
2.4.1	Description of Dungeons and Dragons	9
2.4.2	Dungeons and Dragons in Therapy	9
2.4.3	Dungeons and Dragons in COVID-19	9
2.5	Technology Based Interventions	10
2.5.1	Design Principles in Game Environments for Children with ASC	10
2.6	Motivation	11
2.7	Summary	11
3	Design Phase	12
3.1	Design Methodologies	12
3.1.1	User Centered Design	12
3.1.2	Participatory Design	13
3.1.3	Impact of COVID-19	13
3.1.4	Stages of Development	13

3.2	Design Workshops	14
3.2.1	Aim	14
3.2.2	Participants	15
3.2.3	Materials	15
3.2.4	Procedure	15
3.2.5	Results	17
3.3	Evaluation of the Design	18
3.3.1	Aim	18
3.3.2	Participants	19
3.3.3	Materials	19
3.3.4	Procedure	19
3.4	Results	20
3.4.1	Customisation	20
3.4.2	Game Design specific to Designing for Children with ASC	20
3.4.3	Delivering Mindfulness through Online Tools	20
3.4.4	Addressing Anxiety during Covid-19 with Mindfulness	21
3.4.5	Adapting Dungeons and Dragons for Children with ASC	21
3.4.6	Suitable Rewards within Dungeons and Dragons	21
3.4.7	Presentation for Further Feedback	22
3.5	Design Principles	23
3.5.1	HCI Design Principles	23
3.5.2	ASC Design Principles	23
3.6	Design Requirements	23
3.6.1	Game Design	23
3.7	Summary	24
4	Implementation	25
4.1	Game Design	25
4.1.1	Adapting the Core Mechanics of Dungeons and Dragons	25
4.1.2	The Role of the Dungeon Master	26
4.1.3	The Character Sheet	27
4.1.4	The Dragon's Crystal - A Mindfulness Adventure	28
4.2	Choice of Platform	28
4.3	Development in Unity	29
4.4	Platform Structure	29
4.4.1	The Main Menu	29
4.4.2	Creating a Character	29
4.4.3	The Character Sheet	30
4.5	Consideration for Future Work	31
4.5.1	Settings and Customisation	31
4.5.2	Dungeon Master Space	31
4.5.3	Further Visual Aids	32
4.5.4	Managing Multiple Characters	32
4.6	Summary	32
5	Evaluation	33
5.1	Evaluation Workshops	33

5.1.1	Aim	33
5.1.2	Participants	34
5.1.3	Materials	34
5.1.4	Procedure	34
5.1.5	Introduction	35
5.1.6	Running the Session	35
5.1.7	Post Workshop Questions	35
5.2	Results	35
5.2.1	Character Creation	35
5.2.2	Gameplay	36
5.2.3	Minor bugs and fixes	36
5.2.4	Suggestions for Improvements and Additional Features	36
5.3	Limitations	37
5.3.1	Proof of Concept	37
5.3.2	Workshops with Typically Developing Children	37
5.3.3	The Dungeon Master	37
5.4	Summary	37
6	Conclusion	38
6.1	Discussion	38
6.1.1	Limitations	40
6.2	Future Work	40
6.3	Conclusion	40
	Bibliography	41
	Appendices	47
A	Character Creation Flowchart	47
B	Character Creation	49
C	Character Sheet	53
D	Character Sheet Comparisons	57
E	Revised Rule Set for Dungeons and Dragons Fifth Edition	60
F	Parent Information Sheet	73
G	Parent Consent Form	81
H	Child Info and Consent Form	86
I	Expert Interview Consent Form	92
J	Child Certificate	95

List of Figures

A.1	Character Creation Flowchart	48
B.1	Character Creation Question 1 of 6	49
B.2	Character Creation Question 2 of 6	50
B.3	Character Creation Question 3 of 6	50
B.4	Character Creation Question 4 of 6	51
B.5	Character Creation Question 5 of 6	51
B.6	Character Creation Question 6 of 6	52
C.1	Character Sheet with Example Character	53
C.2	Rolling an ability check	54
C.3	What Can I Do? Panel	54
C.4	Spells Panel	55
C.5	Dealing damage to the character	55
C.6	Healing the character	56
D.1	Annotated Character Sheet with Example Character	57
D.2	Annotated Traditional Character Sheet with Same Character	58
D.3	Traditional Spells Tab	59

List of Tables

2.1	Correlation of core characteristics of anxiety and ASC	6
3.1	Design Workshop Participants	15
3.2	Experts in the fields of ASC, Mindfulness and Dungeons and Dragons	19
3.3	Experts in the fields of HCI, ASC and Mental Health	22
4.1	Comparison of D&D 5E Rules and Revised Versions	26
5.1	Evaluation Workshop Participants	34

Chapter 1

Introduction

1.1 Autism Spectrum Conditions

Autism Spectrum Conditions (ASC) are a neuro-development conditions characterised by impairments in verbal and non-verbal social communication and interaction, restrictive interests and rigidity of thought (*Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)* 2013). Overall ASC is estimated to occur in 6-7 in 1000. These estimates are higher than in previous years (Spence et al. 2004). Anxiety is a challenging set of symptoms to deal with often cause disruption to their daily lives, especially with the relationship with the core traits of ASC and the onset of the COVID-19 pandemic changing the structure of our every day lives. Mindfulness and table-top role playing games such as Dungeons and Dragons are identified as potential therapeutic tools suitable for online spaces to aid children with autism overcome their difficulties.

1.2 Research Goals

The main aim of this research is to design and implement an online tool which supports mindfulness techniques to aid children with ASC cope with anxiety. This takes the form of a Dungeons and Dragons environment that facilitates play during the COVID-19 pandemic. This concept is based on criteria grounded in using mindfulness for young people with the aim of reducing stress and anxiety. In order to achieve these research goals, the following questions have to be addressed.

1.2.1 Research Questions

RQ1. How can mindfulness techniques be applied in an online Dungeons and Dragons environment to aid children with ASC experiencing anxiety during COVID-19?

RQ2. What are the current strategies being employed to help children with ASC experiencing anxiety during COVID-19?

RQ3. How can mindfulness techniques be used in a Dungeons and Dragons setting

to help children experiencing anxiety and are these feasible for children with ASC?

RQ4. How can these strategies be implemented on an online tool supporting Dungeons and Dragons play suitable for children with ASC?

1. Are the activities appropriate to help children with ASC cope with anxiety?
2. Is the tool perceived as engaging for the target population?

1.2.2 Proof of Concept

This research acts as a proof of concept to discuss the possibility of implementing mindfulness techniques through a narrative table-top role-playing game like Dungeons and Dragons, and the effectiveness of this in online spaces due to the effects of the COVID-19 pandemic. Evaluating if it is effective for children with ASC experiencing anxiety is outside of the scope of this research due to limited time and access to resources. This research bases its discussions and conclusions on the extensive experience of experts and case studies presented in literature. The research acknowledges the limitations of this approach.

1.3 Structure of the Dissertation

This dissertation is presented with the following structure:

Chapter 2: This chapter presents the literature review on autism, anxiety and mindfulness that was conducted that serves as a background to this dissertation. It identifies Dungeons and Dragons as a viable therapeutic tool during COVID-19.

Chapter 3: This chapter presents the design methodologies of the dissertation used to inform the design requirements. The design requirements are based on design workshops held with typically developing children acting as proxies for children with ASC and interviews with experts in the fields of ASC, mindfulness and Dungeons and Dragons.

Chapter 4: This chapter presents the implementation of the online tool developed using in Unity 5 2019 and the revised rule set of Dungeons and Dragons Fifth Edition, based on the game design requirements collected from the design phase.

Chapter 5: This chapter presents the evaluation of implementation based on workshops with experts with a range of experience levels with Dungeons and Dragons. The limitations of the evaluation are also discussed.

Chapter 6: This chapter concludes the results and limitations of the research overall and discusses different possibilities for future work.

Chapter 2

Background and Literature Review

Chapter two presents the general characteristics and behaviours of Autism Spectrum Conditions (ASC), how this results in anxiety and how this is especially relevant to this group of individuals. The chapter then discusses how mindfulness techniques can be used to aid autistic individuals experiencing anxiety, and how this is especially apparent during the COVID-19 global pandemic. Table-top role-playing games such as Dungeons and Dragons have been identified as a possible therapeutic tool and how this can be implemented using current technology approaches for autism. These derive the design criteria and provide the motivation for the online tool. Parts in quotes are reused from the literature review previously conducted in the MInf Project Part 1 Report from the previous year. This chapter aims to answer the second research question, **RQ2 What are the current strategies being employed to help children with ASC experiencing anxiety during COVID-19?**

2.1 Previous Work

This research is the second part to the MInf Project Part 1 Report delivered in April 2020. The project explored how mindfulness activities can be implemented in an interactive technology based tool to aid children with autism experiencing with anxiety. A prototype touch based game incorporating mindfulness techniques, "Settle the Snow" for tablet devices was developed based on the results of expert interviews and workshops with typically developing children. The prototype game showed initial results supporting the use of mindfulness in a interactive game setting to support children with ASC, however due to the scope of the project and extraneous circumstances, it was not possible to directly address the ability to use the tool to cope with anxiety.

2.2 Autism

2.2.1 Description of Autism

"Autism Spectrum Conditions (ASC) are a neuro-development conditions characterised by impairments in verbal and non-verbal social communication and interaction, restric-

tive interests and rigidity of thought, as specified in DSM-V (Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association, 2013) (*Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)* 2013).

Individuals with ASC often misread and avoid hidden social cues and find it difficult to build friendships appropriate for their age. Some may also be overly-dependent on consistent routines, highly sensitive to changes in their environment and intensely focused on items relevant to their restrictive interests but not appropriate to the current task or activity (*Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)* 2013).

ASC describes a spectrum of considerably heterogeneous conditions meaning it can manifest with varying degrees of severity with a range of different associated symptoms (Johnson & Myers 2007).”

2.2.1.1 Prevalence and impact

”These symptoms vary widely across individuals and across different ages; they are often identifiable within childhood. It is widely acknowledged that ASC often appears in conjunction with other developmental deficits and psychiatric conditions. Presence of symptoms must appear in the early stages of development, even if these symptoms are not diagnosed until later. Intellectual disability or developmental delay are not root causes of ASC, but rather symptoms to be addressed (*Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)* 2013).

Overall ASC is estimated to occur in 6-7 in 1000. These estimates are higher than in previous years, most likely due to the increase in awareness of autism and improvements and changes made to the diagnostic criteria (Spence et al. 2004).”

2.2.1.2 Deficiency of Social Behaviour and Communication

”Verbal and non-verbal communication difficulties manifest in ASC in varied and complex forms. This can develop in a range from complete failure of expressive and receptive language skills to specific pragmatic and semantic impairments. Individuals with the fluent speech abilities often show such semantic errors or miscommunications in social contexts such as sustaining or initiating reciprocal conversation or understanding subtleties of language (Johnson & Myers 2007).”

2.2.1.3 Sensory Sensitivities and Overload

”Individuals with autism can also exhibit sensory difficulties which include any of oral, tactile, visual and auditory (*Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)* 2013). A study conducted by Kern et al shows that of 39 children with ASC, sensory difficulties were one of the most common associated features amongst the children. These may manifest as hypersensitivities which develop avoidances to loud sounds, bright lights or wearing clothes with certain textures or hypersensitivities where the individual shows an unusual attraction to lights or specific sounds and objects (Kern et al. 2006). Too much exposure to these sensory sensitivities can result in overloading the individual.”

2.2.1.4 Rigidity of Thought and Repetitive Behaviours

”The most widely studied and stereotyped forms of behaviour in autism is repetitive motor behaviours commonly including finger-flicking, hand flapping, body rocking, self-spinning, or running in circles. This is most likely due to the fact that it is easy to quantify and observe and high levels of repetitive motor behaviour are also observed in other psychiatric and developmental conditions (Richler et al. 2010).

Repetitive behaviours are suggested to offer some sense of control to the individual with ASC or allow withdrawal from the world, as it appears frightening due to its unpredictability. This behaviour occurs more often in the event of a change or an unpredictable situation, and this can cause challenging behaviour such as aggression, non compliance and tantrums which can be potentially harming to the individual or others (Turner 2003).

Leo Kanner suggested that many of the core symptoms of ASC, especially the reliance on consistent routines and rigidity of thought, were related to and driven by anxiety. Anxiety may not play a fundamental role in their difficulties but play a secondary role, compounding the phenomenon to make the situation all the more stressful (Kanner 2017).”

2.2.2 Anxiety

”Anxiety is defined as excessive anxiety and worry (apprehensive expectation) which the individual finds difficult to control. Characterised by restlessness, being easily fatigued, difficulty in concentrating, irritability, muscle tension and sleep disturbance. Represents one of the major groups of disorders seen in psychiatry as defined by DSM-V. The anxiety disorders group does not include obsessive-compulsive and related disorders nor does it include trauma and stressor related disorders and panic attacks are now symptoms of all DSM-V disorders(*Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)* 2013).”

2.2.3 Anxiety and ASC

”Anxiety related concerns are common for both children and adolescents with ASC. Rise of anxiety symptoms being expressed in people with ASC. Young people face increasingly complex social situations which lead them to become more aware of their differences, interpersonal difficulties and increasing pressure on social behaviours leading to rising anxiety levels. Anxiety is not a product of ASC but rather a co-occurring disorder which can compound existing anxiety and this makes it critical to understand how it interacts with core traits of ASC is important. (Gillott et al. 2001).

Another core trait of autistic individuals is the reliance on consistent routines, which causes individuals to struggle coping with change and anticipation or engagement of new events. This source of stress causes the individual to experience more anxiety. The individual will also feel more incapable of handling their own demands, the higher their anxiety is (Gillott & Standen 2007).”

2.2.4 Prevalence of anxiety in autistic children

”Multiple psychiatric disorders coexist with autism spectrum conditions and occur frequently. Looking at the prevalence of comorbid psychiatric disorders based on DSM-IV criteria in a population with children with confirmed ASC, the most commonly co-occurring psychiatric disorder was social anxiety followed by attention-deficit hyperactivity disorder (ADHD), present in up to 70% of individuals with ASC. Anxiety disorders are common in the broader ASC population and not just clinical cases (Simonoff et al. 2008).

White et. al discusses the reports published between 1990 and 2008 to identify the prevalence of anxiety within autistic individuals as well as other disorders. Some of the most frequently reported anxiety disorders and symptoms seen in children with ASC are simple phobias, generalized anxiety disorder, separation anxiety disorder, obsessive–compulsive disorder, and social phobia. These are present through all levels of cognitive functioning. Specific to children with ASC, the anxiety is most commonly related to acting out specific behaviours. This could be due to the co-occurring social anxiety which is a core deficit of ASC (White et al. 2009).

Up to 71% of individuals with ASC, dependent on gender and race, expressed suicidal ideation or attempts, due to the high comorbidity with depression (Mayes et al. 2013).”

Table 2.1 shows the potential correlation to anxiety symptoms that can be caused by the characteristics of the Autism Spectrum Conditions.

Characteristics of ASC	Characteristics of Anxiety
Difficulties in social skills can make it hard to maintain friendships, due to issues with social empathy and the perceived unpredictability of other people	Finding it hard to maintain a social circle and meeting new people, not understanding the social behaviours of those around you leading to a rise in pressure and experiencing anxiety
Difficulties in terms of language and communication skills, due to what they understand, as well as what they are able to express	Difficulties with communicating and expressing yourself and any needs you may have
A rigidity of thought processes that makes it challenging to deal with change or accommodate the needs of other people	Preference to do or act in a particular way leading and heavy reliance on structure and routine leads to increased anxiety when an unforeseen change occurs or thought is fixated on a hypothetical unwanted change
Difficulties with processing sensory information including being hypersensitive	Sensory sensitivities can lead to overload which is stressful and can provoke stress and anxiety to the point of a panic attack

Table 2.1: Correlation of core characteristics of anxiety and ASC

2.2.5 Anxiety and COVID-19

The introduction of social distancing measures and lockdown procedures due to the COVID-19 global pandemic have introduced profound changes which in turn have led to a surge of pandemic-related psychological stress related to fear, stress and anxiety resulting in higher levels of sleep disturbance and suicidal ideation, attempts and death. Recent case studies in the UK demonstrate the increase in anxiety levels compared to pre-lockdown status and may well affect engagement in both work and social interaction in the future to come (Nikčević & Spada 2020).

For autistic individuals, these symptoms are especially heightened due to the core traits being disturbed by the results of the pandemic, such as uncertainty of change, loss of regular coping mechanisms or access to specific interest, and change in routine. Furthermore isolation and social distancing measures introduce additional challenges providing specialised in-person support. (Cassidy et al. 2020)

2.3 Mindfulness

2.3.1 Definition of Mindfulness

”Mindfulness is the fundamental attentional stance underlying all streams of Buddhist meditative practice. The most widely accepted understanding of mindfulness in the social sciences comes from Jon Kabat-Zinn, the creator of Mindfulness-Based Stress Reduction (MBSR). Mindfulness is defined as “the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment”. This is understood to be the result of paying attention with intention, centredness and absence of judgement to one’s experience. Mindfulness practice has been shown to be effective in addressing stress and anxiety as well as depression (Hwang et al. 2015).

Mindfulness is the fundamental attentional stance underlying all streams of Buddhist meditative practice. MBSR is a stress reduction strategy employing Buddhist meditation to engage the understanding of what Buddhists call the untrained mind and offers potential transmutation that can calm and clarify the mind, and enhance attention and perception (Kabat-Zinn 2003).”

2.3.2 Mindfulness and ASC

”An analysis of six mindfulness studies on individuals with ASC show reduction in symptoms of anxiety and depression and support producing positive psychological effects. This stems from greater adaptation to social environments through promoting increased self-awareness and empathy for others through meditative practices, broader psychological well-being through increased attention in the present and reduced aggression (Cachia et al. 2016).

Mindfulness intervention studies in the field of ASC can be discussed according to three types of intervention - supporting children through supporting their parents, sup-

porting both the children and the parents and supporting either the parent or children exclusively (Rempel 2012).

Parents are able to support their children with ASC by learning patience, and conscious attention and acceptance through mindfulness. The parent can cultivate a supportive environment that is not overloaded with emotional changes, by creating a breathing space before responding to difficult behaviour. This cultivates a more non judgemental approach towards accepting their child. Children are then placed in a more supportive environment during their developmental years (de Bruin et al. 2015).

Mindfulness practices being used to engage with children, especially those experiencing anxiety, often focuses on attention. Children may either have difficult shifting attention between tasks or have difficulty focusing on a particular rumination. Their attention may be fixed on themselves in social situations, giving them minimal awareness of external events. Focusing on the present discourages focusing on past or hypothetical events that may cause anxiety for the child, and accept their current state of mind instead (Hayes & Greco 2008).

When engaging with these practices it is evident that there is a bi-directional experience for both the parent's stress and the child's behaviour (Keller et al. 2014)."

2.3.3 Mindfulness and COVID-19

Mindfulness has been recognised to help cope with emotional distress in chronic diseases and other mental illnesses. The current global COVID-19 pandemic has negatively impacted mental health worldwide. Early results from studies suggest that negative emotions and sensitivity to social risks have greatly increased during lockdown. Conversano et al. have initial research that suggests that higher mindfulness disposition correlates to lower overall psychological distress that have arisen during lockdown. Their analyses of earlier research also demonstrates that mindfulness acts as a protective factor against anxiety, loss of vital energy, feelings of hopelessness and other symptoms of depression that have seen a recent spike due to the pandemic (Conversano et al. n.d.).

2.3.4 Mindfulness in Technology

There is support to suggest that mindfulness techniques presented without an instructor (i.e via apps, websites and other online programs) can still provide similar benefits without losing quality of face-to-face interactions when aiming to mitigate anxiety, depression and other symptoms. Implementing mindfulness programs in technology allows for it to become more cost-effective, accessible and flexible based on the user's requirements and preferred methods of engagement with the practice, such as offering a choice of text, audio and video. This needs to be balanced with the preservation of integrity and authenticity that would be found in in-person mindfulness sessions (Fish et al. 2016). A study for incoming university students suggests that there is an increasing preference for digital psycho-therapeutic interventions. Emerging research also suggests that young adults prefer online mental health interventions to face-to-face therapy (Flett et al. 2020).

2.3.4.1 Design Guidelines for Mindfulness in Online and App-Based Platforms

Applications and web based interventions prove a supportive framework for positive thinking, engagement and rewards, while also addressing harmful core beliefs and self deprecating thoughts and speech (Fish & Saul 2019). Sliwinski et al found game-like interventions to be a promising scope for mindfulness to encourage positive behaviour change and improve emotion regulation. Design guidelines were suggested to include a straightforward interface that utilises capturing all the senses to achieve higher levels of immersion for each activity (Sliwinski et al. 2017).

2.4 Dungeons and Dragons

2.4.1 Description of Dungeons and Dragons

Dungeons and Dragons (D&D) is an immersive fantasy, table-top role-playing game (TTRPG) which allows players to fulfill character led stories through interaction during imaginative play. D&D was the first published RPG of its kind, created in 1974 by Gary Gygax and Dave Arneson, and since it has gained increasing popularity (Ewalt 2013). D&D has inspired numerous TTRPG systems, comics, movies, TV-shows and has gained further traction through online streaming such as the immensely successful show, “Critical Role”. The game system has significantly changed since its initial conception but the core dynamics remain the same. The Dungeon Master (DM) guides the players through a story structure and presents different scenarios for the players to interact with. They enforce rules and provide the world building and action descriptions. The primary development is dependent on the creativity of the players, who take on their characters’ roles within the game to accomplish tasks and develop the overall story. The emotions, camaraderie and accomplishments experienced are real, though communicated in narratively constructed TTRPG scenarios. (Gygax & Arneson 1974)

2.4.2 Dungeons and Dragons in Therapy

D&D has been utilised as a therapeutic tool to help depressed individuals meet social needs. The system allows the players to practice important cognitive and social functions, effectively providing the players with the “opportunity to explore their mental dungeons and slay their psychic dragons”. Initial research suggests that TTRPGs support the positive development of group skills, empathy, social and cognitive skills. In particular, the system supports communication within the specific context of role-playing, encouraging teamwork and cooperation with other players, demonstrating the results of their actions and encouraging empathetic and moral actions, providing a sense of extraordinary experience lived through a character, and allowing the freedom of creativity to support custom and personalised gameplay experiences (Adams 2013).

2.4.3 Dungeons and Dragons in COVID-19

A recent case study presented the results of 9 to 12 year-old children playing D&D through existing online technologies during COVID-19. The results demonstrated the

game's ability to help improve relationships and social skills, creative writing and numeracy skills as well as providing a suitable outlet for the children to explore their thoughts and allow them to express themselves freely, which may be otherwise lacking due to lockdown. These, along with newly released D&D supplements focused on accessibility such as *The Combat Wheelchair*, allow more people to see themselves and connect to the game (Spotorno et al. 2020).

2.5 Technology Based Interventions

"In the field of autism research, computer-based interventions are being used to improve social skills, communication skills, fine motor skills, functional life skills, organizational skills, and promote independence. In particular lack of social interaction, predictability and consistency when engaging with technology are attractive features (Lofland 2016).

The development of these new technologies aimed to enhance both the individual with disabilities as well as the work of carers and parents is a quickly growing field. A variety of different technologies such as mobile computers, virtual reality and robotics exist (Grynszpan et al. 2014). Conceptual minigames for learning are one such approach shown to result in an increase in enthusiasm (Vila et al. 2020).

Children with autism spend twice as much time playing video games than typically developing children. One of the primary reasons this may be the case is that video games promote stress relief, and can act as a management system for mood and anxiety in addition to being an entertainment system (Mazurek et al. 2015)."

2.5.1 Design Principles in Game Environments for Children with ASC

"The privacy of game environments provides a safe and non threatening context to practice and acquire new skills. This also has the advantage of clearly defining the task and having reduced distractions from unnecessary sensory stimuli, addressing some of the core deficits of ASC (Malinverni et al. 2017).

Cause and effect gives children a sense of control over the environment, as they are also in control of the pace of the activity. In order to represent experiences for children with autism in a way they can understand them, the environment must be constructed such that it reinforces the cause and effect relationships (Villani et al. 2018).

Individuals with ASC may be more prone to failure when participating in activities and it is apparent that intrinsic motivation may not be sufficient to complete the activity and extrinsic rewards to supply a sense of completion and accomplishment are required. Customisation features motivate the individual through the creation of tailored narratives, environments and rewards to suit an individual's interests (Constantin et al. 2017).

Additionally, sensory feedback can have a positive influence on the performance of autistic children in a game based environment as it encourages them to focus on the

events occurring on screen. It is possible to create an adaptable tool by including adjustable graphics and using both verbal and non-verbal means of communication (Lofland 2016).”

2.6 Motivation

The difficulties experienced by individuals with autism include social interaction, communication and rigidity of thought which can manifest the need for routine and repetitive behaviours and develop a resistance to change. The requirements for social interaction can be particularly stressful as this places significant pressure on individuals with ASC. Not accounting for these needs can otherwise result in sensory overload or feeling stressed and anxious to the point of experiencing a panic attack or meltdown.

Strategies for aiding them when they are experiencing or in order to prevent anxiety or dealing with overloaded information are crucial to help them cope with changes in their social or daily lives. This is even more essential during the COVID-19 pandemic due to the lockdown and social distancing rules introduced resulting in changed routines, adjusting to new ways of regular communication and restricting social interaction entirely.

ASC is a heterogeneous set of conditions and its symptoms varies amongst individuals and this includes the set of symptoms and severity in which individuals experience anxiety. There are a range of different techniques and activities in mindfulness and other fields that can be used to help cope with anxiety but these may differ in effectiveness for each individual. Designing an online tool that can be used to meet the needs of different users becomes even more challenging. This further highlights the potential of Dungeons and Dragons being a suitable therapeutic tool due to its inherent ability to customise the game to the players specific interests.

The purpose of this research is to create an online tool to facilitate Dungeons and Dragons play during the COVID-19 pandemic while supporting the use of mindfulness interventions designed to help cope with anxiety.

2.7 Summary

This chapter presented the current research on ASC and identified existing methods and technologies that help children with autism cope with anxiety. From the literature, mindfulness was identified as a possible technique to help individuals with autism cope with anxiety and stress, and Dungeons and Dragons was identified as a viable therapeutic tool suited to online play which is a must for COVID-19. This enables the motivation behind the research to design an online tool enabling autistic children to play Dungeons and Dragons. In the next chapter, the design of the online tool and revised mechanics for Dungeons and Dragons is discussed based on workshops held with four typically developing children and four interviews with experts in ASC and mindfulness.

Chapter 3

Design Phase

This chapter discusses the design methodologies and stages of development considered in this research. The following consisted of conducting Design Workshops with typically developing children in early November to refine game requirements acquired in the literature review into early design decisions. These were then presented to experts to conduct an initial design evaluation on how the online tools meets the proposed criteria. The finalised design requirements were used to inform the implementation of the online tool and the revised mechanics of Dungeons and Dragons. Parts in quotes are reused from the literature review previously conducted in the MInf Project Part 1 Report from the previous year. This chapter aims to answer the research question **RQ3 How can mindfulness techniques be used in a Dungeons and Dragons setting to help children experiencing anxiety and are these feasible for children with ASC?**

3.1 Design Methodologies

3.1.1 User Centered Design

”User Centred Design (UCD) focuses on putting users at the center of product design and development in each phase of the design process. The game is being designed for children with ASC aged 8 - 13. The design process involves identifying the most salient features required for children with ASC, the possible contexts where and when a child may play this game and the choices of hardware for this game. (Norman & Draper 2017)

UCD is defined by four interdependent processes that inform the structure of the work. (for Standardization. 2010)

1. Specify potential context of use
2. Specify requirements
3. Produce design solutions
4. Evaluate designs against requirements.”

3.1.2 Participatory Design

”Participatory design (PD) is the approach of involving users during different stages of the design process by using interviews and workshops during the requirements gathering and evaluation stages. This is an iterative process that can lead to products well suited to the users needs. This is illustrated using the typically developing children and researchers of Human-Computer Interaction (HCI) and ASC we worked with (Aki Namioka 1993).

The design criteria derived from the literature informed the creation of the Design Workshops. These designs will help us create a prototype for the game subject to expert and group evaluation in a followup workshop. At all times we must consider the target user, which makes the participation of the children particularly important (Fails 2012).

The typically developing children act as proxies for children with autism, as these evaluations may cause them stress which is to be avoided. Previous research suggests that using typically developing children can be crucial when informing the designs of technologies for children with disabilities (Malinverni et al. 2017).”

3.1.3 Impact of COVID-19

Due to the social distancing and and lockdown procedures, the research was conducting while working from home which introduced new challenges that needed to be addressed. Due to this, workshops and interviews were conducted through video conferencing tools, and activities were adapted to fit in an online space. The option of being able to conduct offline workshops was considered, where the participants could complete the activities and provide feedback on their own time. The researcher opted to conduct live workshops and interviews to fully gauge the participants’ actions throughout.

3.1.4 Stages of Development

The methodology followed in this research is an adaptation of (Scaife & Rogers 2001). This is illustrated by the following stages of development.

Establishing Requirements

As outlined by the first step of UCD, the first step requires establishing the context of use by understanding how children with ASC experience anxiety and how this is the case during the COVID-19 pandemic. Mindfulness techniques and Dungeons and Dragons have been identified as potential therapeutic tools for aiding with this difficulty. This was achieved by reviewing the literature on individuals with ASC and exploring the current research on these particular topics.

Informing the Design

The initial requirements for the game were established by carrying out collaborative design workshops with typically developing children acting as proxies for children with ASC. These requirements were then presented to experts of ASC, Mindfulness

and Dungeons and Dragons to incorporate additional requirements relevant to the method of delivery and target population's preferences and limitations. In addition to this, the exploration of how platforms and online games are being used to adapt current strategies to the COVID-19 pandemic is also considered to inform our design.

Designing and Prototype

Based on the results of previous stages, initial design decisions are made before implementing a prototype. This prototype is then evaluated by experts and children to test its suitability to the target population with the principal goal of delivering mindfulness. In this evaluation stage, more appropriate alternatives are considered and usability problems are identified. This allows us to refine the design of the game based on the new requirements.

Implementation

The implementation of the game is created on the defined platform using the specified technologies. This is done in an iterative manner as first a prototype is built based on the initial requirements before being further modified to address all the additional requirements from the evaluation.

Evaluation

To identify possible usability problems, test the suitability of the game to its target audience and test the effectiveness of implementing mindfulness in a Dungeons and Dragons environment online evaluation workshops with experts with ranging experience in Dungeons and Dragons were held. Further feedback and any requirements not addressed is discussed for potential future work and the limitations were acknowledged.

3.2 Design Workshops

Design workshops with typically developing children of similar ages to the target population acting as proxies for children with ASC were held, as per the methodology in Section 3.1.

3.2.1 Aim

The aim of these workshops was to gather informed design decisions to create a D&D session for autistic children that would involve mindfulness techniques which can be used to ease the symptoms of anxiety. This involves answering the following questions:

1. How can these mindfulness techniques be incorporated to create characters?
2. How can you create a quest for these characters by helping them?
3. Which of the activities are more appealing/engaging to the children?

3.2.2 Participants

Workshop	Participant	Participant Age	Participant Gender
1	P1*	6	Male
2	P3	12	Male
	P4	9	Female
	P5	13	Male
	P6	13	Male

Table 3.1: Design Workshop Participants

*P1 is the only participant who took part in these workshops who has ASC and represents the target audience.

3.2.3 Materials

The materials used to setup the room in preparation for the workshop included:

- Consent form and information sheet for parent/guardian
- Consent form for children
- Additional audio recording and playback devices for audio recording, ensuring a backup was available in Microsoft Teams failed
- Audio playback device for meditation bell sound
- Laptop for conducting workshop
- Plain white sheets with colouring pencils and pens

3.2.4 Procedure

Design Workshops are traditionally held in person to completely gauge the results of and support the children, however due to the COVID-19 pandemic the workshops were adjusted to be conducted completely online. Each workshop had senior and co-researchers present and muted to aid the children and help observe the studies.

- The study underwent the ethical procedure as defined by the School of Informatics at the University of Edinburgh.
- Parents and children were contacted by email with information sheets on the study and consent forms if they were willing to participate
- If the children and the parent submitted their consent forms they were invited to participate in the study.
- Held 2 workshops over the course of 2 days
- Each workshop ran for 30 minutes

- The workshops were conducted over Microsoft Teams to fall in line with the University's guidance on secure online video platforms, which also has the ability to record the video and audio for the workshop.
- Activities that required physical objects were replaced with a suitable alternative and each child worked on sheets which were then scanned and sent to the researchers afterwards.
- After completion of the workshop, certificates were sent to each participant to show they are great game designers to show appreciation for their participation and input

3.2.4.1 Introduction (5 Minutes)

Firstly the different mindfulness techniques (Hanh 2011) were introduced, allowing all children to familiarise themselves with the activities and also asking if any of them had been introduced to mindfulness previously. Krupa Patel supported the use of these mindfulness techniques which can be engaging and effective specifically for children with autism (Patel 2017).

Bell Listening Exercise

Ring a meditation bell, using an application or website or a physical bell, and ask the children to close their eyes and listen to the vibration of the bell. Tell them to show their palms facing outwards once the ringing stops. This is a simple and powerful exercise that shifts their attention to the present moment and immediate surrounding environment.

- Originally the exercise suggest raising their hands once you hear the bell, however while conducting this online, it was more space effective to show the palms towards the screen

Mindful breathing and meditation

Ask the child to close their eyes and sit comfortably with their feet on the ground. Direct their attention to the sensation of breathing in and out. Ask them to raise their hands above their heads on each rise and lower their hands on each fall of the breath.

- Originally the exercise suggests hands on the stomach to feel the breath, however while conducting this online, it was more effective to engage with the kids by raising and lowering the arms

Snow globe visualisation

Ask the child to close their eyes and sit comfortably as a visualisation of a snow globe is presented. Present a snow globe and ask them to shake the globe and observe the swirling chaos of pieces of glitter. Each piece of glitter correlates to a thought in the mind and when the snow globe is left, watch as the glitter settles and the image in the centre becomes clear. This technique is a powerful metaphor that relates the internal state of mind to a visual object.

- Originally the exercise involved passing around a physical snow globe to each child however this is infeasible to do online, so a similar visualisation is used as a meditative practice

Colour wheel visualisation

Ask the child to close their eyes and sit comfortably as a visualisation of a spinning colour wheel is presented. While the wheel is spinning in your palm, focus all of your attention onto the wheel, it slowly begins to shift colours. This is an engaging tool to shift their attention to the present moment.

- Originally the exercise involved passing around a physical fidget spinner to each child however this is infeasible to do online, so a similar visualisation is used as a meditative practice

Observations

The snow globe visualisation attracted the most attention, with most children immediately able to zone in on the visualisation and come to a calm. The mindful breathing was also engaging since the children were able to move their arms and enjoyed exaggerating the motion. Some children were familiar with the concept of mindfulness due to them learning it in school and participating in mindful breathing and eating exercises.

3.2.4.2 Activity 1 (15 Minutes)

The children were tasked with describing a character who had one of the mindfulness techniques as their superpower. The children had the choice of which mindfulness technique appealed most to them, or could combine multiple techniques together. The participants worked individually for this activity. Everyone then presented their ideas to the group. Most children engaged fully with this activity, though P1 found elements difficult due to how the task was presented but picked up ideas with the help of the experts and examples.

3.2.4.3 Activity 2 (15 Minutes)

The children were tasked with describing a quest that could be used to help their character regain their mindfulness superpower if it was somehow lost or learn a new technique altogether. The participants worked individually for this activity. Everyone then presented their ideas to the group. The children took more time to engage with this activity and needed extra prompting and examples.

3.2.5 Results

Aim 1: How can these mindfulness techniques be incorporated to create characters?

A variety of all techniques were used to create characters.

- Person who continuously spins in cartwheels and has a snow white rabbit companion who hides in the snowglobe

- Person who can remove worries from the mind by lifting their hands
- Person who has to remain completely frozen to meditate
- Person who can seal away the worries inside of the snowglobe
- Person with a super nose for calming breathing exercises

Aim 2: How can you create a quest for these characters by helping them?

One of the common design elements was consulting a mindfulness tutor or some other form of re-teaching to help their character relearn their lost mindfulness ability. Other common elements involve the original design being exaggerated to present a problem, such as the super nose now creating a tornado.

Aim 3: Which of the activities are more appealing/engaging to the children?

The snowglobe was the most popular mindfulness activity as they enjoyed the visualisation and the breathing and bell exercise also went well since they enjoyed the movement aspect.

3.2.5.1 Initial Design Requirements

Based on the different character design elements that the children presented from the workshops, the initial design requirements can be used as a basis for a customisable Dungeons and Dragons session that involves the characters as non-playable characters (NPCs) with mindfulness abilities the players have to help on their journey. Due to the lack of overlap of mindfulness abilities, these characters will function as different possible quests.

3.3 Evaluation of the Design

The initial design requirements obtained from the design workshop were presented to three different experts in the form of semi-structured interviews. These experts work in the fields of ASC, mindfulness and facilitating D&D for school children with special needs. These additional requirements gathered were used to refine the design, as per the methodology stated in section 3.1.

3.3.1 Aim

The aim of these interviews is to inform the technical and educational aspect for delivering mindfulness with the particular goal of aiding individuals with anxiety. Additionally, how to adapt delivering dungeons and dragons sessions specifically suited to a younger audience with ASC and how this can be implemented in an online platform. This study also helped evaluate possible design alternatives and considerations. Specifically we wanted to answer the following questions:

1. How can dungeons and dragons mechanics and gameplay be adapted for children with ASC?

2. What is the best way to present mindfulness techniques to a younger audience through online tools?
3. What are the game design considerations that need to be considered when designing for children with ASC?
4. Are these techniques suitable for addressing anxiety?

3.3.2 Participants

Expert	Profession/Occupation	Area of Specialisation
E1	Teacher at Special Needs School	Head of Dungeons and Dragons Club for young individuals with special needs
E2	Carer of Autistic Family Member	Working with a young individual with ASC
E3	Mindfulness Chaplain at the University of Edinburgh	Mindfulness Practitioner

Table 3.2: Experts in the fields of ASC, Mindfulness and Dungeons and Dragons

3.3.3 Materials

The following materials were used to conduct the interviews.

- Smartphone for recording audio and transcription
- Laptop for conducting interview

3.3.4 Procedure

Due to the COVID-19 pandemic the interviews were adjusted to be conducted completely online.

- The study underwent the ethical procedure as defined by the School of Informatics at the University of Edinburgh.
- Each expert was emailed information sheets related to the study and consent forms for participation
- Each interview ran for approximately 30 minutes and was tailored to the expert's particular background
- The workshops were conducted over Microsoft Teams to fall in line with the University's guidance on secure online video platforms, which also has the ability to record the video and audio for the workshop.
- After completion of each interview, the expert was emailed thanking them for their input and offering option for involvement in later study

3.4 Results

3.4.1 Customisation

Answering Aim 3: What are the game design considerations that need to be considered when designing for children with ASC?

E1 and E2 both highlighted the importance of having customisable environments and gameplay elements that are specific to the particular autistic individual(s) playing. Dungeons and Dragons is especially suited to this due to the nature of TTRPGs, where the DM designs the story and environment for the players. E1 noted that the DM will need to introduce the game and be familiar with each person playing, in order to be able to embed elements of their specific interests into the core story of the session.

Framing the game in this way increases enthusiasm and engagements and highlights the heterogeneous nature of ASC, as noted previously in the literature. (Simonoff et al. 2008)

3.4.2 Game Design specific to Designing for Children with ASC

Answering Aim 3: What are the game design considerations that need to be considered when designing for children with ASC?

Following on from customising the environment and gameplay mechanics to suit the child's specific interests, E2 noted that the platform should also allow the child to feel in control of the environment, they should be able to exit and switch activity at any point. While including all of these options the design should also be simple not to overwhelm the child.

In order to mimic the feel of an in person TTRPG session and also provide the autistic children the attention they need, E1 suggested that the platform will serve primarily as an add-on to facilitate online play of Dungeons and Dragons and provide the critical features such as a simple display of character information as well as an online dice roller. This also provides a clean gateway to customising the level of complexity relative to the original rule set of Dungeons and Dragons.

3.4.3 Delivering Mindfulness through Online Tools

Answering Aim 2: What is the best way to present mindfulness techniques to a younger audience through online tools?

E3 noted that a lot of young adults are more distressed and experiencing higher levels of trauma during Covid-19 as well as Zoom fatigue. (Wiederhold 2020) Through popular apps like Headspace there is an increase in accessibility to mindfulness practices and more people are incentivised to self learn, however it cannot replace regular interactions with practitioners.

Online tools provide a unique ability to allow the practitioner to offer multiple methods of delivering mindfulness teaching such as video, audio and written articles, and also allows the user to conduct these practices in their own time and in a manner that works

best for them. Considering that the platform is aimed to be an add-on to help facilitate play, it's possible to customise the main method of communication to the autistic child's needs.

3.4.4 Addressing Anxiety during Covid-19 with Mindfulness

Answering Aim 2: What is the best way to present mindfulness techniques to a younger audience through online tools?

And Aim 4: Are these techniques suitable for addressing anxiety?

Constant online interaction as the main form of social engagement can lead to an individual feeling "disembodied" and this helps grounding and bringing the attentions back to the person. When using mindfulness to address anxiety in the online space in particular, E3 noted that using grounding techniques that focuses on particular "anxiety resistant" parts of the body, such as the feet, is a useful way to cope with stresses unique to Covid-19.

Another tool E3 offers is written "mind letters" which are anecdote driven examples to allow the reader identify the specific causes for anxiety and gently guide the reader to be kind and curious towards their own thoughts. Both methods fit in well to the context of Dungeons and Dragons as it is a story driven game and the activities can be embedded into the quests given by the DM.

3.4.5 Adapting Dungeons and Dragons for Children with ASC

Answering Aim 1: How can dungeons and dragons mechanics and gameplay be adapted for children with ASC?

E1 has run in person Dungeons and Dragons sessions for children with ASC and other special needs and has come up with some general guidelines to adapt the original fifth edition rule set as well as other key takeaways.

While customising the environment and gameplay is important, another key aspect is familiarity between the DM and the players, as well as playing with a group of children with similar needs to each other to avoid conflict. Visual aids are great tools to use for anything new introduced, such as the environment and NPCs. The gameplay can be ramped up to a traditional Dungeons and Dragons game with time, as the DM can slowly add in the additional mechanics if the players are willing and eager to play. Online tools such as *Roll20* and *DnDBeyond* exist to support traditional D&D and inspiration can for features can be drawn from there.

3.4.6 Suitable Rewards within Dungeons and Dragons

Answering Aim 1: How can dungeons and dragons mechanics and gameplay be adapted for children with ASC?

And Aim 4: Are these techniques suitable for addressing anxiety?

The key rewards described by E1 are generally the cool or silly events that occur within the game itself, as this is what the children particularly enjoy and get the most out of while playing the game. There is an equal share in the imagination and story telling and generally the DM is able to use the children's creative skills to enhance the rewards.

E1 also noted that depending on the mood of the child, Dungeons and Dragons can become a safe space for venting or expressing themselves more clearly through their characters, and this outlet helps the children cope with anxiety and stress.

3.4.7 Presentation for Further Feedback

The summary of these findings were then presented to three experts based in the University of Edinburgh for further feedback.

Expert	Profession/Occupation	Area of Specialisation
E4	Lecturer at University of Edinburgh	Researcher in HCI
E5	Lecturer at University of Edinburgh	Researcher in HCI and ASC
E6	Lecturer at University of Edinburgh	Researcher in Psychology and Mental Health

Table 3.3: Experts in the fields of HCI, ASC and Mental Health

3.4.7.1 Simplifying the Options

Dungeons and Dragons fifth edition is a comprehensive rule set which also allows a wide breadth of different character options, including 55 different races, 30 different backgrounds and 12 classes all which can be customised. During the sessions, when the players are presented with different scenarios, there are many possibilities to move forwards due to the variety and creativity of the players. E5 and E6 pointed out that a lot of choices can be overwhelming and anxiety inducing for children with ASC in particular. The options presented will need to be simplified to cater for this, with not as many options presented at once.

3.4.7.2 Proof of Concept

All the experts agreed that while the concept of fully being able to customise the game to meet the needs of every single player's interests and needs, this project is a proof of concept for the application of Dungeons and Dragons. For the scope of this project, it will be more adequate to have some set storylines that can be tailored and the possibility for full customisation can be pushed to future work.

3.5 Design Principles

3.5.1 HCI Design Principles

”In addition to the technical requirements defined above, it is important to take into account the design principles which can be used to guide the design process of an interactive game. The 10 Nielsen’s Usability Heuristics (1994) act as a good rule of thumb and are the most general principles in the field of HCI. (Nielsen 1995)”

3.5.2 ASC Design Principles

”A set of design principles specifically aimed to accommodate for individuals with ASC is taken into account for designing the game. The design principles were collected by Bartoli et al. (2014), who presented general guidelines for designing technology for children with autism, and expands on the results from the interviews conducted with experts.

1. The goals should be unique and explicit.
2. The goal should focus on a singular task.
3. The instructions should be explicit and provided at every step.
4. The game should be repeatable and predictable, there should be no sudden or unseen events
5. The graphics should be minimalistic, but aesthetically nice and visual elements should not distract or overwhelm the child.
6. Rewards should be offered after good performances. A reward system which is preferred by the child, increases motivation.
7. The icons should be large and easy to see. The text should be simple, clear and easy to read. The colours should be soft.
8. Navigation should be straightforward.”

3.6 Design Requirements

3.6.1 Game Design

Based on the literature review in Chapter 2, the results of the Design Workshops in Section 3.2, the results of the interviews with experts in Section 3.3 and the design principles outline in section 3.4, we can refine our game design requirements for implementation.

1. The target population is children with ASC between the ages of 8 and 13.
2. The target platform is web based devices to allow online cooperative play.
3. The language is simple and direct.

4. The platform is intended to be used by both children and facilitators of the game.
5. The platform serves as a tool to be used as an add-on to facilitate Dungeons and Dragons play online alongside a video conferencing tool.
6. The play environment is for the child.
7. The facilitator environment allows changing settings in addition to the requirements handled by the game.
8. The platform can be customised.
9. The platform will have a minimalist design.
10. The platform will be easy to navigate and allow quitting at any point.
11. The platform will not present anything more than five choices at once to simplify the options.
12. The Dungeons and Dragons mechanics will be simplified with the option of ramping up complexity.
13. The Dungeons and Dragons sessions will have an in game reward system incentivising play.
14. The Dungeons and Dragons sessions will be customised towards the children interests.
15. The Dungeons and Dragons quests will be based off of the design workshop results.
16. The mindfulness activities will have slow gameplay, with a focus on attention.
17. The mindfulness activities will be embedded into the storyline quests.

3.7 Summary

This chapter presents the design principles and methodologies for gathered requirements that will be used for the design of the online tool and to inform the revised Dungeons and Dragons game mechanics. It discusses the procedure and outcomes of the design workshops with typically developing children and interviews with experts in ASC, Mindfulness and facilitating D&D for school children with special needs. It also presents a set of HCI and ASC design principles acting as guidance when creating the tool. In the next chapter, the resulting requirements are used to create the online tool for the target population and context.

Chapter 4

Implementation

This chapter presents the two core parts of this research - the implementation of the online tool that facilitates Dungeons and Dragons gameplay based on the design requirements discussed in chapter 3 and the revised rules and mechanics for D&D. The chapter then discusses which features are pushed for future work. This chapter aims to answer the research question **RQ4 How can these strategies be implemented on an online tool to support Dungeons and Dragons play for children with ASC?**

4.1 Game Design

The core mechanics of Dungeons and Dragons Fifth Edition (D &D 5E) as officially described in the *The Player's Handbook* (James Wyatt 2014) and *The Dungeon Master's Guide* (Mike Mearls 2014) was used as the base game as per E1's guidance. The base elements remain unchanged, **the Dungeon Master (DM)** creates worlds for the players to explore, rich with NPCs to meet, quests to undertake and treasure to find. **The players** are the heroes driving the adventure and weaving their own imagination into the world and the story through their characters. Both parties work together to build a narrative. An adventure can be a singular session, or multiple sessions can be woven together to form a campaign, building on the story continuously.

The success or failure of their choices are determined by rolling dice and adding the character's ability modifiers to the rolls. The core six abilities are Strength which measures physical strength, Dexterity which measures speed, Constitution which measures stamina, Intelligence which measures knowledge and mental fortitude, Wisdom which measures common sense and willpower, and Charisma which measures your force of personality. (Gygax & Arneson 1974)

4.1.1 Adapting the Core Mechanics of Dungeons and Dragons

The gameplay elements of Dungeons and Dragons have been simplified to cater for children with ASC and can be customised by the DM to suit the needs of the table of players they are running the game with. A fundamental element of this is simplifying the number of options presented. (**requirement 12**) A full description of the updated

rule set is described in Appendix E. Table 4.1 compares the original rules described in D&D 5E to the revised rules adjusted for children with ASC.

Category	D&D 5E	Revised Rule
Dice	Seven core polyhedral dice consisting of D20, D100, D12, D10, D8, D6 and D4. During computations that involve fractions, round down to impose additional challenge	One core die, the D20. During computations that involve fractions, round up to give the benefit of the doubt to the players
Character Options	55 different races, 30 different backgrounds and 12 playable classes with over 100 subclass options	3 different races and 6 playable classes with preset subclasses
Abilities	6 core abilities with scores ranging from 0 to 20 and the corresponding modifier ranging from -5 to 5 and 20 different ability options, rolled by the player to determine scores	6 core abilities with modifiers ranging from 0 to 5, pre-generated scores provided to the players
Magic	Shows list of leveled spells with the cost of casting along with a more comprehensive description	Simple list of names and descriptions, can be cast at will
Combat	Each turn consists of one action, bonus action and movement. Turn order is based on initiative. An attack involves rolling to hit against the character's armour class before rolling damage, and can become quite cluttered due to the many abilities available	Simplified to only include one action and movement, damage is controlled by the DM, turn order is based on Dexterity

Table 4.1: Comparison of D&D 5E Rules and Revised Versions

4.1.2 The Role of the Dungeon Master

In addition to creating the world and providing the plot hooks for the players to follow, the DM is also primarily the rule keeper when running the game. When running the game for children with ASC, the DM has additional roles they have to take on to support the children as described by E1 and in section 3.4.

- Customising the session to the unique interests of the players - Children with ASC in particular are more engaged when the session is catered to the child's preferences.

- Keeping the rules consistent - The DM needs to be mindful of how the results of dice rolls are communicated to keep things consistent for each player.
- Additional calculations - D&D normally includes some level of addition or subtraction, especially during combat sequences. Since the players only use the core D20 and children with ASC may have lower numeracy skills, any additional dice to calculate damage is controlled by the DM.
- Avoiding anxious surprises - D&D is a game of surprise where the dice determine the outcomes of situations, however sometimes these can lead to more stressful situations due to player decisions. Clearly describing the outcome or nudging the players in a particular direction before rolling dice avoids this.

4.1.3 The Character Sheet

The character sheet displays your character's basic information such as their name, race, class and level and everything functional you need to play the game. It includes the ability modifiers are the numbers you add to your dice rolls when asked for a specific ability check (e.g. Having a strength modifier of +3 and rolling a 16 on a D20 produces a 19), a place to track your health, magic, equipment and other special attributes or actions your character may have. Figures D.1 and D.2 compare the new character sheet with a traditional D&D 5E character sheet.

The character sheet has been simplified to adjust to the new mechanics used.

1. The ability scores have been simplified to omit proficiency bonuses, the break down into individual attributes and only display the ability modifier.
2. Keeping track of health is displayed using a health bar which you can add or subtract amounts for
3. The Character Header omits the character background and alignment.
4. Features and Traits are listed under a separate panel when you select *What Can I Do* instead of displaying everything in the same panel to avoid an overload of information
5. The spell panel is separate to the original character sheet
6. Omitted Armour, Initiative and Movement Speed since this is standardised for all characters following the simplified combat rules
7. Omitted the basic description of the character, since this can be conveyed by the player in other ways including a drawing or image.
8. Omitted list of combat abilities following the simplified combat rules
9. Omitted equipment for the scope of this research and pushed for future work. An equipment/inventory panel is useful when playing campaigns or longer sessions that involve lots of item tracking.
10. Omitted proficiencies for simplicity and passive skills since these are otherwise known by the DM and can be simply calculated if required.

4.1.4 The Dragon's Crystal - A Mindfulness Adventure

This adventure uses the mindfulness techniques presented in Chapter 3 and embeds them into the puzzles, with success relying primarily on slowness and actively engaging with each technique to progress. (**requirements 16 and 17**) The quests and NPCs described in this adventure are based off of the results from the Design Workshop, described in section 3.2.5. (**requirement 15**).

The full adventure is described in Appendix E. The rewards initially consist of progress and additional information and clues to help solve the puzzles in each room. As the players get closer to the end, the rewards become more magical and powerful in nature and eventually the players receive gold, a level up and get to meet a dragon. (**requirement 13**) The story and environment is described in a floating city with a tower which can be tailored by the DM running the adventure to different themes based on the needs of the players. (**requirement 14**) The adventure incentivises more peaceful approaches rooted in mindfulness to each room rather than aggressive behaviours.

4.2 Choice of Platform

From early on in this research, it was a requirement for the game to run in an online space, since we are focusing on using the tool during lockdown in the COVID-19 pandemic. Additionally this allows us to run the game without a restriction on Operating Systems and either on computer or tablet devices. This decision was based on the literature review and further re-informed in Chapter 3. When choosing between the available online frameworks, Android, Figma and Unity were considered for delivering the prototype.

- **Figma** - Figma is an interactive prototyping tool for web-based, iOS and Android applications. The researcher has previous experience designing and prototyping interactive features and app mock-ups in Figma.
- **Unity** - Unity is a Game Engine platform that allows us to develop in 2D and 3D using C# that exports to multiple different platforms which allows us to get around any platform specific restrictions related to development.
- **Android** - Android is developed by Google and applications for this OS is developed using Android Studio using Java, Kotlin and XML. The researcher has previous experience in all the languages and developing in Android Studio.

The researcher decided to use Unity for developing due to previous experience and lack of restriction on platform choice, game development support in both 2D and 3D, and its online capabilities using WebGL. (**requirement 2**) As there are no specific features or libraries of developing in either OS that result in a particular benefit or limitation, the choice of OS is based on the resources available to the researcher. The project is hosted on play.unity.com.

4.3 Development in Unity

The prototype of the game was developed using Unity 5 (2019) which is available for both Mac and Windows operating systems. Unity uses C# for development as its default scripting language and includes pre-existing functions that facilitate the creation of the game. Unity also allows for cross-platform functionality including computers, tablets, video game consoles and virtual reality (VR) which is potentially useful for both testing and future expansion.

The researcher already had experience developing in Unity 2D and 3D and using similar object-oriented programming languages, which reduced the amount of time to familiarise themselves with C# and Unity technologies. Initially the researcher opted to create a 2D tool focusing on simplifying the gameplay for D&D, however having the ability to develop in both 2D and 3D in Unity allows for many expansive options for an online tool, such as creating an experience closer to a real table-top role-playing game. This kind of environment is richer and can offer a stronger contextual narrative.

4.4 Platform Structure

The tool is a Dungeons and Dragons Helper to facilitate online D&D play for children with ASC between the ages of 8 and 13. (**requirements 1 and 5**). The tool has the following core functions: Guiding the player through creating a character and generating a character sheet, allowing you to view created characters and play using their character sheets. (**requirement 6**) The main colour scheme is blue, dark grey and purple with large white Comic Neue text. Blue is the main colour to display a feeling of friendliness, open communication and calmness. (**requirement 9**) (Widrich 2017)

4.4.1 The Main Menu

The game opens with the Main Menu Screen. This screen implements a Unity Canvas which presents options to Create a Character to create a new character and generate a character sheet for that character or see Your Character. The Help option navigates them to a screen with instructions and information about the game (**requirement 10**). The Quit option quits out of the game.

4.4.2 Creating a Character

Creating a character involves a quick questionnaire where you are assigned a class based on the personality and type of character you want to play. The questions are presented using simple language and offer no more than three choices at a time. (**requirements 3 and 11**). The flowchart of this questionnaire is shown in Figure A.1 and the screens can be viewed in Appendix B. The Quit option in the top left returns to the main menu and is present in all screens.

The following features and abilities are pre-generated for the player:

- Ability score modifiers are assigned and can have values from 0 to 5 where 0 represents being average and 5 represents excelling for that ability. The distribution of the modifiers depends on the class with the physical classes leaning more towards strength/dexterity and constitution, the magic classes leaning more towards wisdom and intelligence, while choosing a balance provides a more even spread.
- If the players have chosen a class that involves spellcasting, the spells are pre-selected and given to the player. The pure magic classes have 5 spells and the balanced classes have 3.
- Health is automatically calculated based on the following formula $17 + \text{the Constitution Modifier}$. This calculation is based off of using a base of 10, and then using the average result of a D10 as a Health Die before adding the result of the Constitution Modifier.
- Each character has a special class and racial ability, in addition to all of the regular actions.

Once finished, the player is automatically taken to the character sheet scene which displays the newly created character.

4.4.2.1 Justification of Design

The questionnaire format of the character creation process was inspired by *The Young Adventurer's Guide* (Andrew Wheeler 2019) approach of simplification of class selection by using a flowchart and this is supported by other popular role-playing video and computer games for the target age group that implement a similar questionnaire style when customising the play style of your character. (Dickey 2006)

4.4.3 The Character Sheet

The character sheet is the primary screen used when playing D&D. It offers a header with basic information about your character, an image of the character with the class icon, a display of the current health, options for viewing the character's abilities and actions they can perform and finally the core mechanic of D&D, the ability to roll ability checks. The `Quit` option in the top left returns to the main menu and is present in all screens. If exited to the main menu and returned, the most recent character created will appear in the character sheet. The screens can be viewed in Appendix C

4.4.3.1 Rolling Abilities

The ability modifiers are shown on the left in the squares next to the `Roll [Ability]` buttons. The modifiers are automatically added to the random D20 roll which produces a number from 1 to 20 and adds the modifier to it. The result is displayed in a small panel at the bottom and also explains the addition performed so the player knows how the number is generated. There are two special events, a natural 1 and natural 20, (meaning the number produced by the die before adding a modifier) resulting in a critical failure or success respectively, normally resulting in a spectacular narrative

event happening in game. The panel can be dismissed at any point by the player by selecting anywhere on the screen and will not disappear until this occurs.

4.4.3.2 What Can I Do?

A large panel displays the basic actions you can perform as well as your special race or class feature. This is used for the player's reference, so they are able to check what they are able to do at any point. The panel can be dismissed using the exit button.

4.4.3.3 Spellcasting

A large panel displays the spells they are able to cast if they are a spellcasting class, and if not, the option is removed from the character sheet. This is used for the player's reference, so they are able to check what they are able to do at any point. The panel can be dismissed using the exit button.

4.4.3.4 Managing Health

The health bar has their current health/health total displayed. Underneath there is an option to enter numbers and damage or heal the character. Small panels appear with messages asking the players to input valid numbers if the number is negative or the amount entered is not a number. The panel can be dismissed at any point by the player by selecting anywhere on the screen and will not disappear until this occurs.

4.5 Consideration for Future Work

Due to the limited scope of this research as a proof of concept to demonstrate the potential use of D&D as a therapeutic tool to communicate mindfulness techniques in an online space and time constraints, particular features which have been discussed as part of the game requirements have been left as future work. The main focus of this implementation was the play environment used by the child. Features deemed as extra are discussed below.

4.5.1 Settings and Customisation

The `Settings` option will enable the practitioner/ Dungeon Master to customise specific settings. To prevent the child from altering these settings, this could be password protected. This would create two separate environments. (**requirement 8**)

The expansive scope of customisation options such as colour, text, enabling text-to-speech, and implementation of different environments, the full functionality of customising the tool using the `Settings` option was omitted.

4.5.2 Dungeon Master Space

In addition to customising the look and interaction with the tools, the DM would also have the ability to customise the different pre-set options for classes, races and other

features of the character sheet.(**requirement 4 and 7**) Furthermore, the full capability to ramp up to the original D&D Fifth Edition could be available for keen players. (**requirement 12**) Regularly when playing, the DM is able to view the players' character sheets and this is often fundamental for offering clarifications and support. Due to the expansive scope of the environment required for the practitioner/DM, this was omitted.

4.5.3 Further Visual Aids

More visual aids could be implemented for smoother gameplay, such as a chat to both write and communicate but also to store the results of rolls and abilities. A visual turn order for signalling players whose turn is next and maps to visually show the environment or characters in the story can help children with ASC have a better understanding of what is happening in the narrative and the gameplay.

4.5.4 Managing Multiple Characters

Currently the player can only hold one stored character at a time, however it would be possible to include the ability to manage multiple characters. This would allow the children to play with whichever character they wanted to play as the most, or explore different options without losing a previous character which they may become attached to. To avoid overload, a maximum number could be set by the DM. It would also be possible to include the managing of multiple different campaigns or session environments for the DM.

4.6 Summary

This chapter discusses the possible choices of software to implement the online tool. Based on these decisions, the online tool was created using Unity 5 (2019) in C#. The design requirements based on the literature review, design workshops with TD children and interviews with experts is discussed and justified during the implementation. The implementation is composed of a revised simplified rule set for D&D with play supported by the online tool. The player is guided through the character creation process after which the player can view their character sheet to play with. The next chapter presents the evaluation of the revised rule set and online tool.

Chapter 5

Evaluation

This chapter presents the results of evaluation with an experience range of beginner to regular players of D&D 5E in another round of workshops held in late March. The goal of the workshops was to address the aims and critically analyse the implementation of the online tool and the revised rule set, with an emphasis on analysing user-friendliness and simplicity. The success and limitations of the online and tool and revised rule set are discussed, and a list of suggested improvements and further features are presented. The limitations due to time constraints and resources of this stage are also discussed. and This chapter aims to answer the following research questions.

RQ4.1 Are the activities appropriate to help children with ASC cope with anxiety?

RQ4.2 Is the tool perceived as engaging for the target population?

5.1 Evaluation Workshops

The evaluation workshops were held with six experts ranging in previous experience with D&D 5E. This follows the methodologies described in section 3.1. Due to the impact of COVID-19 as discussed in section 3.1, the workshops were run remotely online. A pre-requisite of the evaluation workshops is having some prior knowledge of Dungeons and Dragons or a similar table-top role-playing game due to the length of time it takes to fully understand and engage with.

The experts were asked to create a character using the online tool, and then participate in the mindfulness based D&D session following the revised rule set described in section 4.1.4 for which the researcher acted as the DM. Afterwards, they answered some short questions so the researcher could gather feedback on all aspects; the online tool, the rule set and the mindfulness session.

5.1.1 Aim

The aim of the workshop was to evaluate the design and functionality of the online tool and the simplicity of the revised rule set compared to D&D 5E, keeping in mind the target audience. This included the following:

1. Determine if the tool was clear and easy to understand
2. Determine if the navigation was easy to use
3. Determine if any usability problems or significant bugs exist
4. Gather feedback for improvement and future features

5.1.2 Participants

Workshop	Expert	Age	D&D Experience
1	E2*	22	Familiar with rules and played before
2	E7	24	Regular player
	E8	24	Regular player
3	E9	23	Beginner player
	E10	23	Beginner player
	E11	22	Beginner player

Table 5.1: Evaluation Workshop Participants

*E2 previously participated in the Design Workshop and is a carer for a family member with autism, and was able to advise on features specific to ASC. All the other participants were familiar with other online tools that exist to play traditional D&D 5E such as *Roll20* and *DnDBeyond* and were able to make comparisons on the ease of use.

5.1.3 Materials

The following materials were used to conduct the interviews.

- Smartphone for recording audio and transcription
- Laptop for conducting the workshop and accessing the online tool

5.1.4 Procedure

Due to the COVID-19 pandemic the workshops were adjusted to be conducted completely online.

- The study underwent the ethical procedure as defined by the School of Informatics at the University of Edinburgh.
- Each expert was emailed information sheets related to the study and consent forms for participation
- Each workshop ran for approximately 1 hour and was tailored to the experts' prior experience with D&D

- The workshops were conducted over Microsoft Teams to fall in line with the University's guidance on secure online video platforms, which also has the ability to record the video and audio for the workshop.
- After completion of each interview, the expert was emailed thanking them for their input

5.1.5 Introduction

All players were informed of the target audience for the tool before proceeding. For all players, a brief run through of the rule set was provided to allow the players to familiarise themselves with basic D&D concepts. The players then each went through the Character Creation process to create their own character for the session. Once this process was finished and the players were taken to the Character Sheet, the players had a couple of minutes to familiarise themselves with the gameplay mechanics using the tool before the session began.

5.1.6 Running the Session

The researcher is personally familiar with all experts and as such, was able to tailor the material of the mindfulness session to the experts. Additionally the researcher has experience running Dungeons and Dragons sessions online. E2 was the only player that has not previously played D&D with the researcher and as such is not used to the DM's style of play. They were also the only player to participate alone, in which case the researcher offered playing as an NPC companion if they felt they needed additional support to which they declined and they were able to run the adventure solo. *The Dragon's Crystal* (Section 4.1.4) adventure was then run to completion.

5.1.7 Post Workshop Questions

- How did you find the character creation process
- How did you find the gameplay during the session
- What did you think of the mindfulness activities
- Did you feel the in-game rewards for each puzzle were suitable
- Did you like the look of the tool?
- Any final suggestions

5.2 Results

5.2.1 Character Creation

Answering Aim 1: Determine if the tool was clear and easy to understand

All participants found the character creation process simple and easy to go through and enjoyed being able to select an image that reflected their character. E9, E10 and E11 were all particularly surprised but happy that the process was simple, and found it easy to create a character they enjoyed playing as. Another benefit is that customising a character for traditional D&D 5E can take up to an hour if the player has not pre-selected choices, however this process took no longer than a few minutes.

5.2.2 Gameplay

Answering Aim 1: Determine if the tool was clear and easy to understand

And Aim 2: Determine if the navigation was easy to use

All participants enjoyed the session and found the Character Sheet user friendly and easy to navigate. E2 expected to put in the amount before selecting damage or heal when managing health, but found all the messages clear when they needed additional guidance. The mindfulness elements were effective and the researcher's knowledge of the players was especially useful when it came to nudging the players in the right direction for the puzzles. E2, E8 and E10 liked the message panels and how they remained on screen so they could be referred back to. All participants found the revised rule set simple to use and didn't feel overwhelmed or confused. E10 and E11 specifically emphasised this compared to their first time playing with regular D&D 5E.

5.2.3 Minor bugs and fixes

Answering Aim 3: if any usability problems or significant bugs exist

E9 noticed that entering a negative number is valid for altering health. Additionally the message panel occasionally covered the Roll Charisma button depending on the screen size of the online tool.

5.2.4 Suggestions for Improvements and Additional Features

Answering Aim 4: Gather feedback for improvement and future features

Some of these suggestions were previously discussed in section 4.5.

- E10 and E11 noted that the Spells and What Can I Do? options were in the same colour as the Roll Ability buttons, but performed different actions and suggested using a different colour to differentiate them.
- E2 would forget the equipment they had and suggested having an equipment panel similar to What Can I Do?
- E7 noted a small class change that they would have liked to see in the process and justified the use of the wizard vs the cleric as a more traditional D&D variant and an easier to grasp fantasy archetype. This also fits in well with popular games and literature for children and young adults.

- E7 and E8 noted that for any who are familiar with D&D, even conceptually and not through play, should be able to choose their class upon request, bypassing the questionnaire. This would make it easier for children with autism to customise their character as they see fit.

5.3 Limitations

5.3.1 Proof of Concept

The implementation of the online tool, the revised rule set and the session acts as a proof of concept presents the possibility of implementing mindfulness activities within a Dungeons and Dragons setting for children with autism. Whether this would be effectively address anxiety is outside of the scope of this research due to feasibility and restriction of resources. Further evaluation is required for validation on these results. Cardon suggests that technologies designed to serve the needs of an individual with ASC can benefit a wider audience, and this could be expand to include a wider population of typically developing children and age groups including young adults. (Cardon 2016)

5.3.2 Workshops with Typically Developing Children

Unfortunately while the research was slated to run the workshops with typically developing children acting as proxies for children with ASC, no children with prior D&D experience were recruited and due to the time constraints of this research, was skipped.

5.3.3 The Dungeon Master

The researcher acted as the dungeon master for these workshops and this was effective due to the ability to customise the session to each participant. However, to measure the mindfulness component, the dungeon master would also ideally be a mindfulness expert to accurately measure how well these techniques were received by the participants. Additionally, should the workshops with TD children happen as initially conceived, the dungeon master would need to be familiar with them as well for better gameplay results.

5.4 Summary

This chapter presents the results of evaluating the implementation of the online tool and the revised rule set of D&D 5E. It discussed the procedure and outcomes, and presents the successes of its simplicity and user-friendliness and limitations of both the tool and the rule set. Further improvements and suggested features are presented and the limitations of the research evaluation. The conclusive chapter of this research critically discusses the results against the initial research questions.

Chapter 6

Conclusion

This research project follows on from the MInf Part 1 Report, exploring how mindfulness activities can be implemented in technology based tools to aid children with autism experiencing anxiety. This research focused on the potential use of Dungeons and Dragons as a therapeutic tool to deliver this, and how an online space to facilitate play of the table-top role playing game can be created for use during the COVID-19 pandemic. The research began with an exploration of how technological tools and mindfulness techniques can aid children with autism, and how this relates to their experience with anxiety. During this background research, Dungeons and Dragons was identified as a potential tool that can be used during COVID-19. This formed the motivation behind the research and the four main research questions were used to structure this approach. This conclusive chapter discusses the extent to which each research question was answered based on the results, and critically considers the limitations and possible direction for future work.

6.1 Discussion

RQ1. How can mindfulness techniques be applied in an online Dungeons and Dragons environment to aid children with ASC experiencing anxiety during COVID-19?

This is the primary research question this research project aims to answer. This is based off of the literature review which explored the relationship of ASC, anxiety and identifies mindfulness techniques as a method of coping with these symptoms. Furthermore, the research focused on how to implement these in technologies suitable to the COVID-19 pandemic, and identified Dungeons and Dragons as a viable therapeutic tool for doing so. The following research questions provide further insight to what extent this question was answered as the primary purpose.

RQ2. What are the current strategies being employed to help children with ASC experiencing anxiety during COVID-19?

The background research and literature review in Chapter 2 discusses how individuals with ASC experience anxiety and the prevalence of this in younger people, as well as

the relationship of the core traits of autism and anxiety (White et al. 2009). Mindfulness was used as the coping strategy for these specific symptoms and was found as a useful strategy for the COVID-19 pandemic (Conversano et al. n.d.). Implementing mindfulness techniques using storytelling methods would be a possible integration into table-top role-playing games such as Dungeons and Dragons, which was identified as a feasible therapeutic tool which is effective for young people during COVID-19 (Spotorno et al. 2020). The researcher aimed to bring these components together to create an online environment suitable for helping children with ASC cope with anxiety.

RQ3. How can mindfulness techniques be used in a Dungeons and Dragons setting to help children experiencing anxiety and are these feasible for children with ASC?

In Chapter 3, workshops with TD children acting as proxies for children with ASC were conducted and the results of these led to the creation of mindfulness based quests to include in a Dungeons and Dragons session. Experts in the fields of ASC, Mindfulness and facilitating Dungeons and Dragons for children with special needs were then consulted to retrieve and informed set of requirements for the online tool and revised rule set for Dungeons and Dragons Fifth Edition. The final set of requirements also included game design considerations specifically for children with ASC, and these were used for the implementation.

RQ4. How can these strategies be implemented on an online tool supporting Dungeons and Dragons play suitable for children with ASC?

Chapter 4 presents the implementation of the online tool in Unity 5 (2019) and the revisions of the D&D 5E rule set that simplifies the experience to make it more suitable for children with autism. This is based on the design methodologies and final results of game design requirements discussed in Chapter 3. In order to evaluate the effectiveness of this implementation, the following research questions were asked.

RQ4.1 Are the activities appropriate to help children with ASC cope with anxiety?

Due to the limitations discussed in section 5.3 and the scope of this project being limited to a proof of concept, it is not possible to completely evaluate as we do not have access to children with autism. Furthermore it was not possible to conduct workshops with children in the target age group due to lack of recruitment. To fully evaluate the ability to deliver mindfulness techniques effectively in this space, the dungeon master would also need to be an expert practitioner of mindfulness, which was not the case.

RQ4.2 Is the tool perceived as engaging for the target population?

As discussed in section 5.2, the workshops were engaging and effective for introducing mindfulness techniques through an online space that facilitates D&D play. All participants actively gave suggestions for both the online tool and the revisions of the rule set which could be added and the online tool was user friendly and simple to use compared to alternatives for the original game.

6.1.1 Limitations

Due to the limited time available for this research and limited scope of the project, access to practitioners and children with autism was limited. The research involved TD children and experts in relevant field at every stage, however this still limits the scope of the results. It is not possible to analyse if running Dungeons and Dragons with the mindfulness techniques implemented effectively eases anxiety in children with autism, as this requires a much longer study with access to more expert individuals as well as individuals from the target group.

The online tool has a list of features slated for future work, with the work presented in this research being the base concept and not capturing all requirements discussed in Chapter 3.

Due to the ever changing nature of the ongoing COVID-19 pandemic, it would be difficult to measure the results of a study of this nature, though there are smaller case studies in addition to this project during this time that support the primary purpose (Spotorno et al. 2020).

6.2 Future Work

As mentioned previously, a number of features were marked as future work from the original set of design requirements due to the limited scope of this research. The expert interviews and evaluation workshop identified a list of features that would make a more complete online tool fit for this purpose. These include implementing a fully functional dungeon master space with the options of customising the D&D content and pre-set options and including further visual aids that support the narrative. Additionally including networking capabilities for the players to communicate with each other and also store the results of gameplay mechanics would be beneficial. An advantage to this kind of game and tool is the ability to be fully customised for the child with autism which requires a fully functional Settings option to allow a carer to customise the tool for the child including offering multiple options for communication including text-to-speech. Further evaluations on the suitability and effectiveness of this tool must be considered to more critically analyse the primary research question.

6.3 Conclusion

This research explored the possibilities of implementing mindfulness into an online Dungeons and Dragons tool to help children with autism cope with anxiety during COVID-19. A prototype using the results from the literature review, design workshops with typically developing children and interviews with experts in the fields of HCI, ASC and Mindfulness. The online tool was then critically evaluated and the resulting successes and limitations of the tool presented, with a set of suggestions for improvement and future work. The potential of a tool being useful for this purpose is highlighted by its simplicity and user-friendliness but further study and evaluation is required to fully judge its capabilities.

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Appendices

Appendix A

Character Creation Flowchart

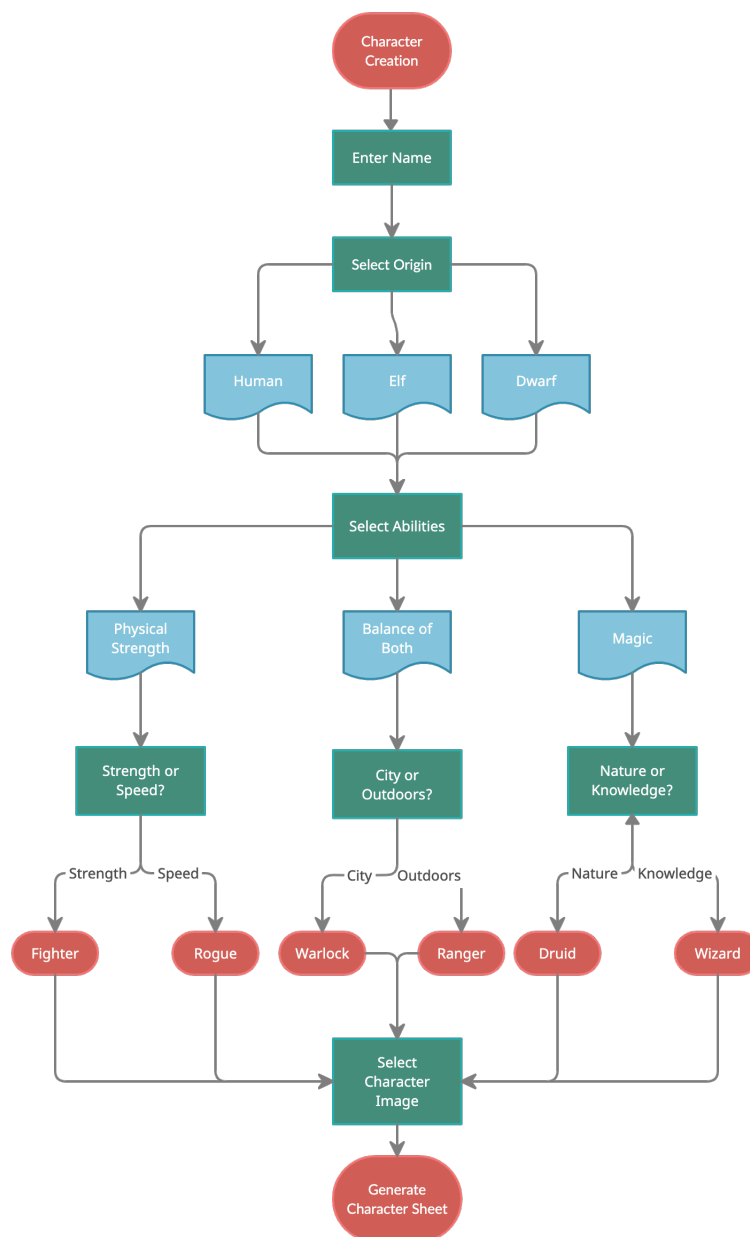


Figure A.1: Character Creation Flowchart

Appendix B

Character Creation

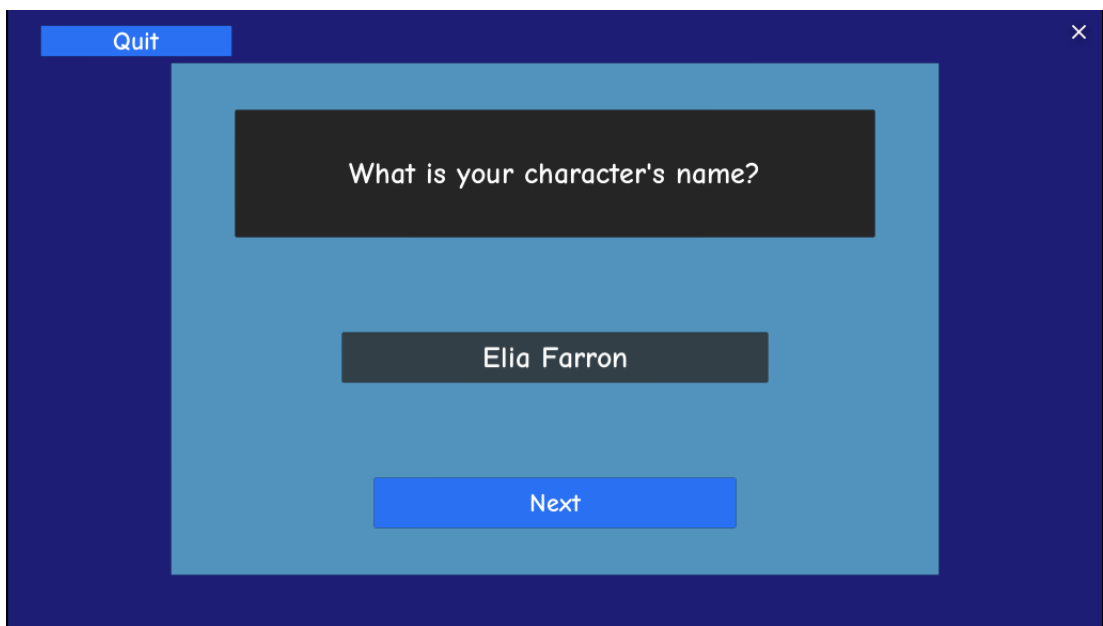


Figure B.1: Character Creation Question 1 of 6

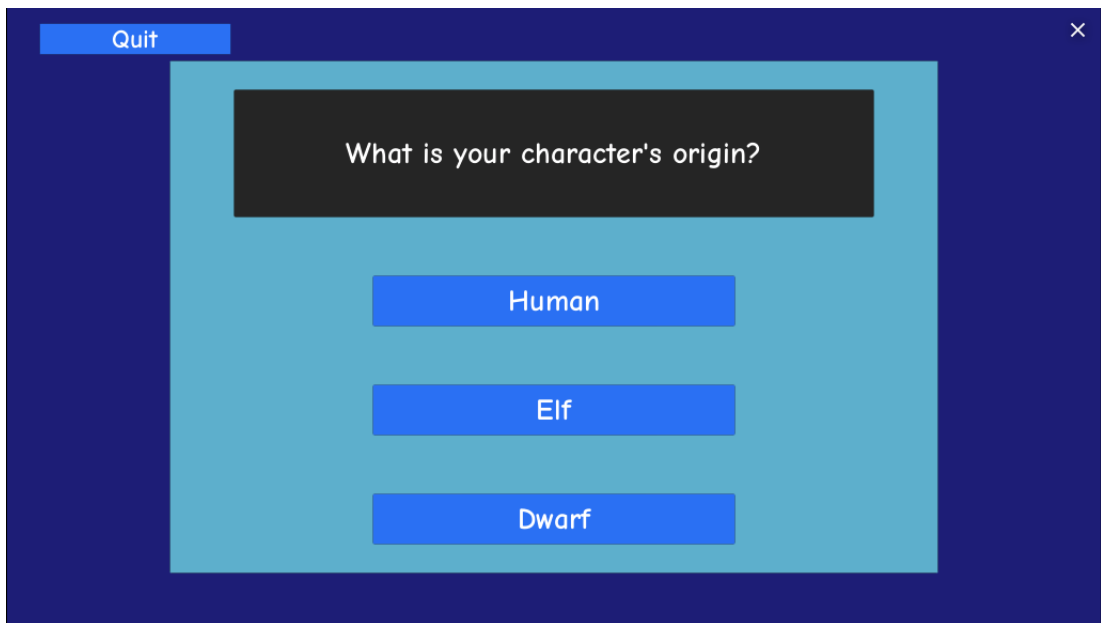


Figure B.2: Character Creation Question 2 of 6

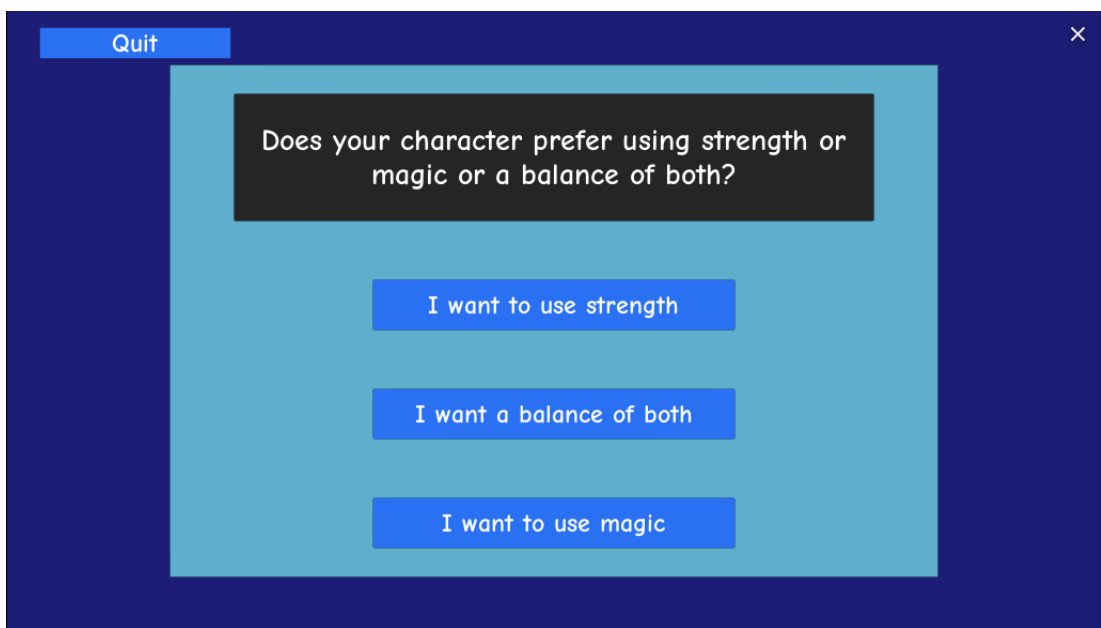


Figure B.3: Character Creation Question 3 of 6

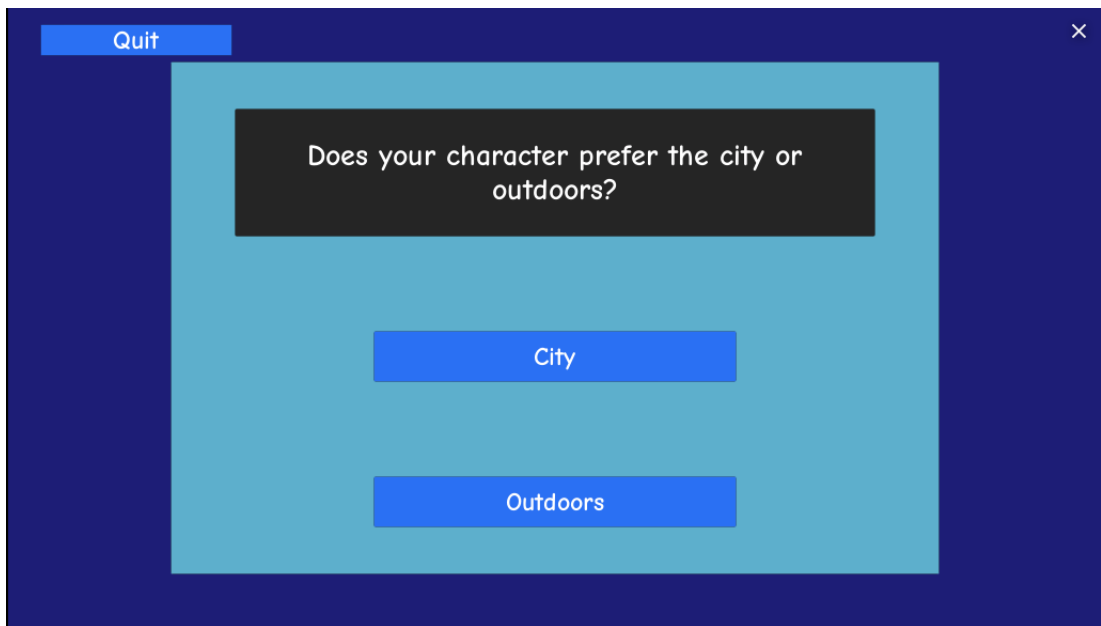


Figure B.4: Character Creation Question 4 of 6

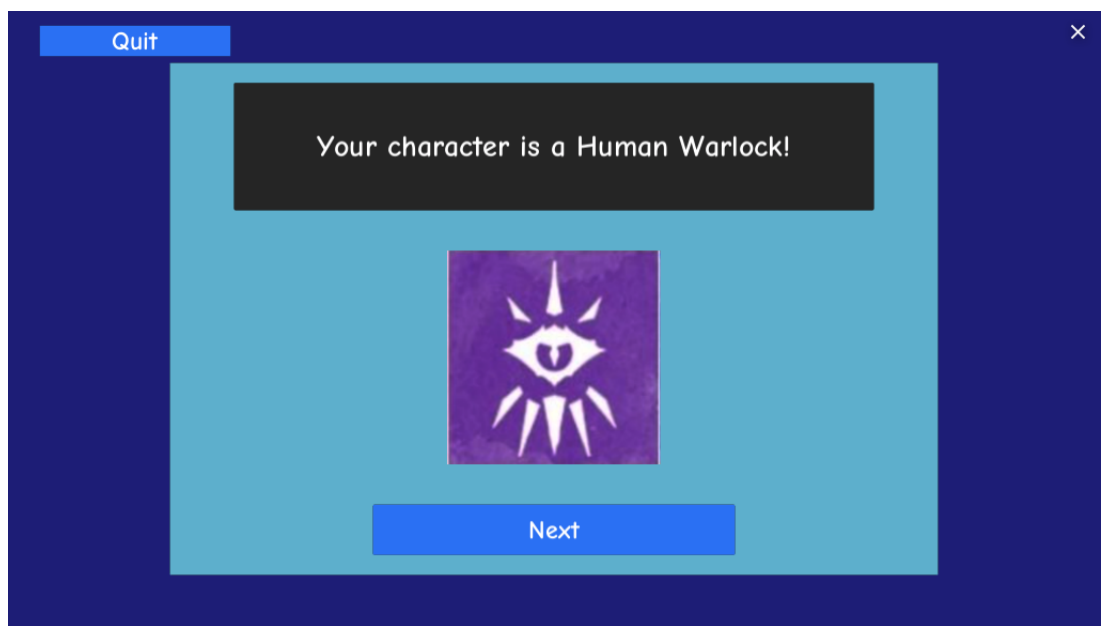


Figure B.5: Character Creation Question 5 of 6

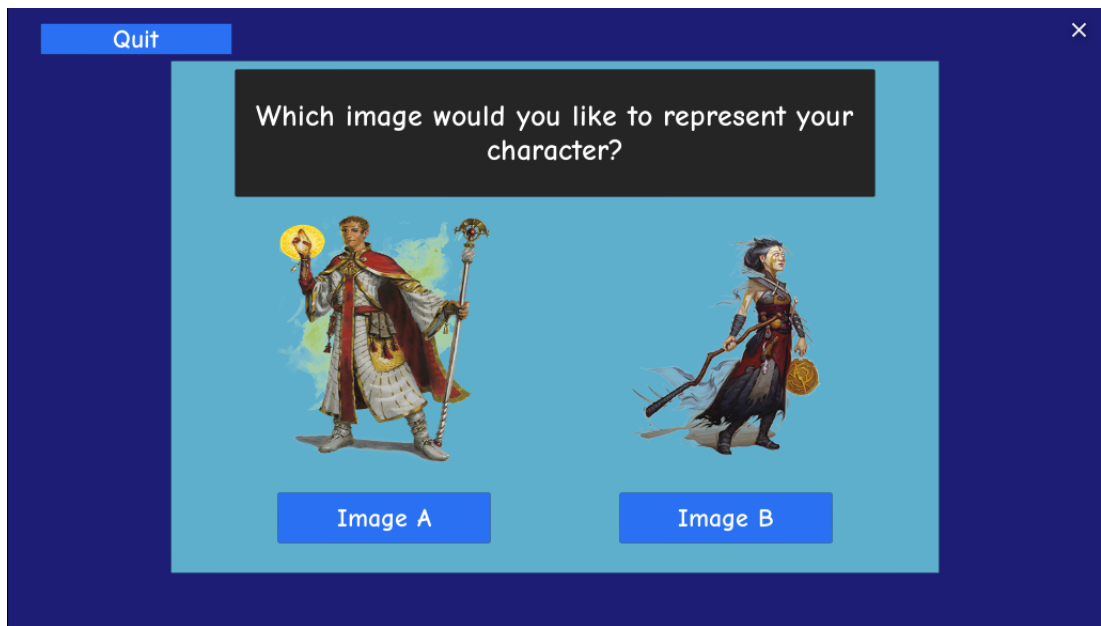


Figure B.6: Character Creation Question 6 of 6

Appendix C

Character Sheet

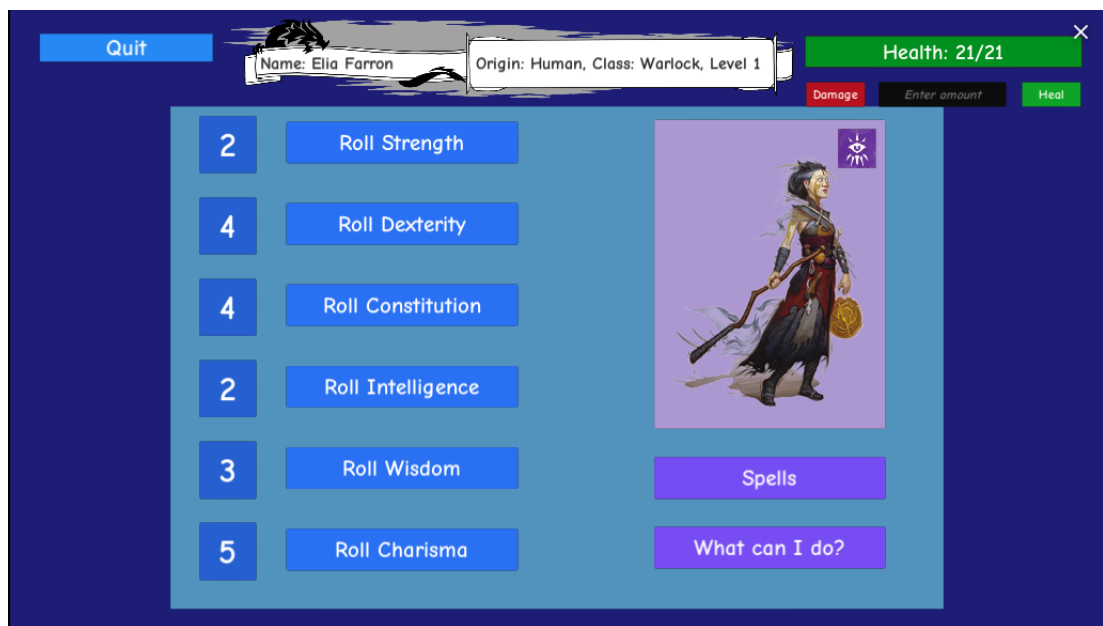


Figure C.1: Character Sheet with Example Character

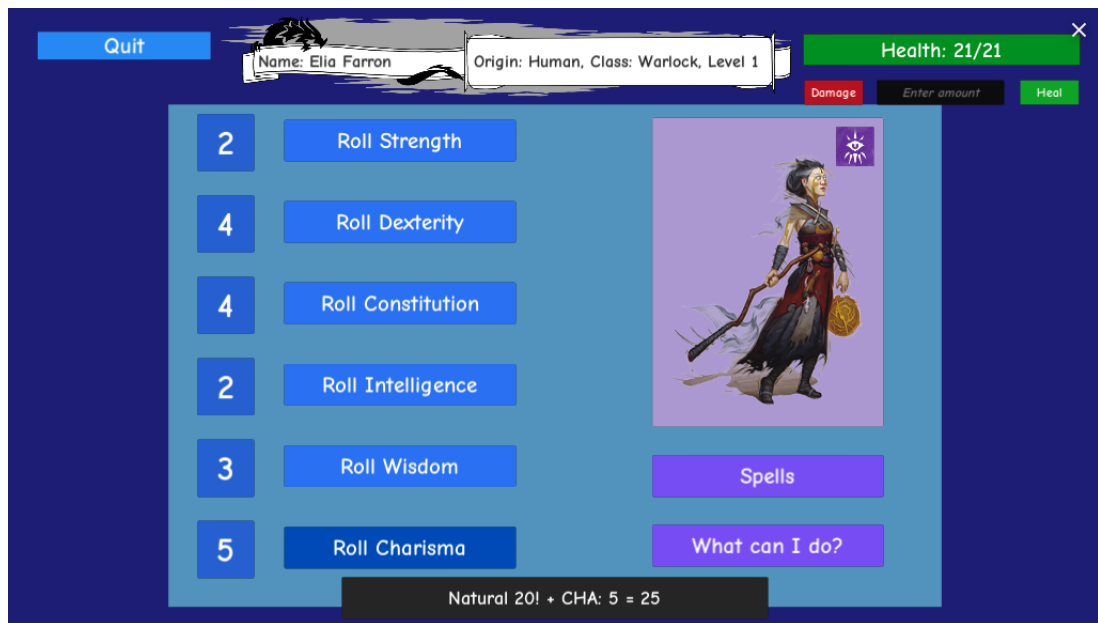


Figure C.2: Rolling an ability check

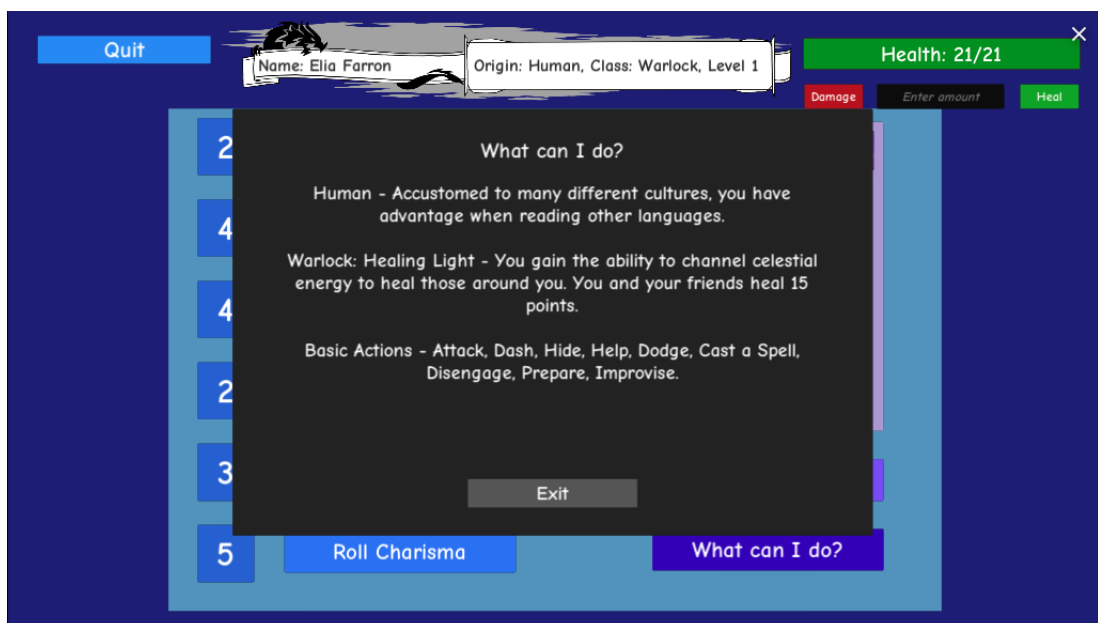


Figure C.3: What Can I Do? Panel

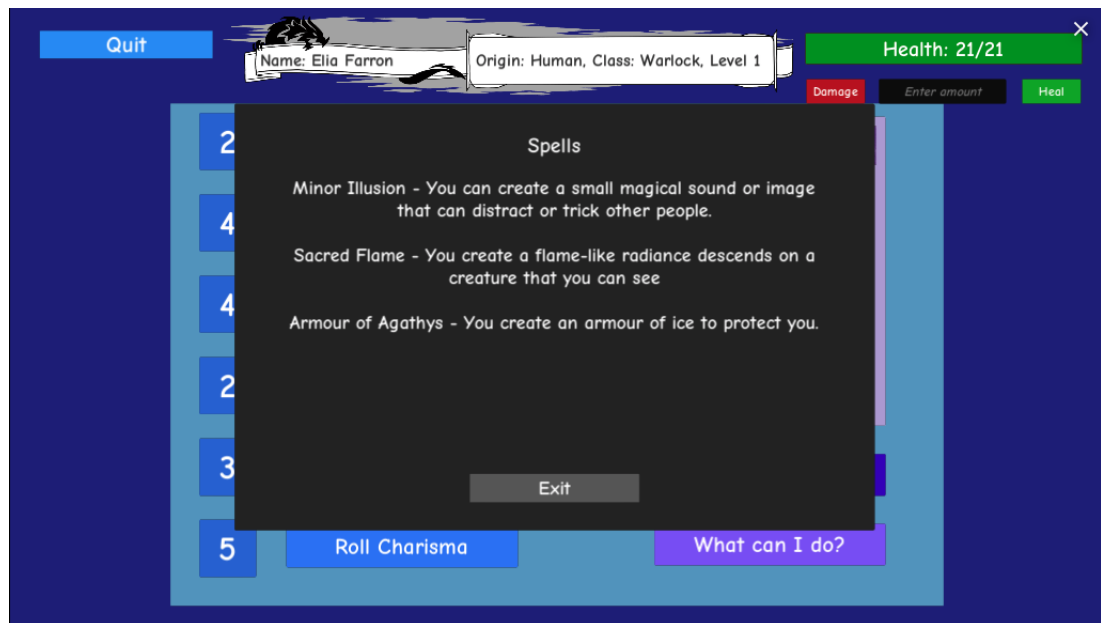


Figure C.4: Spells Panel

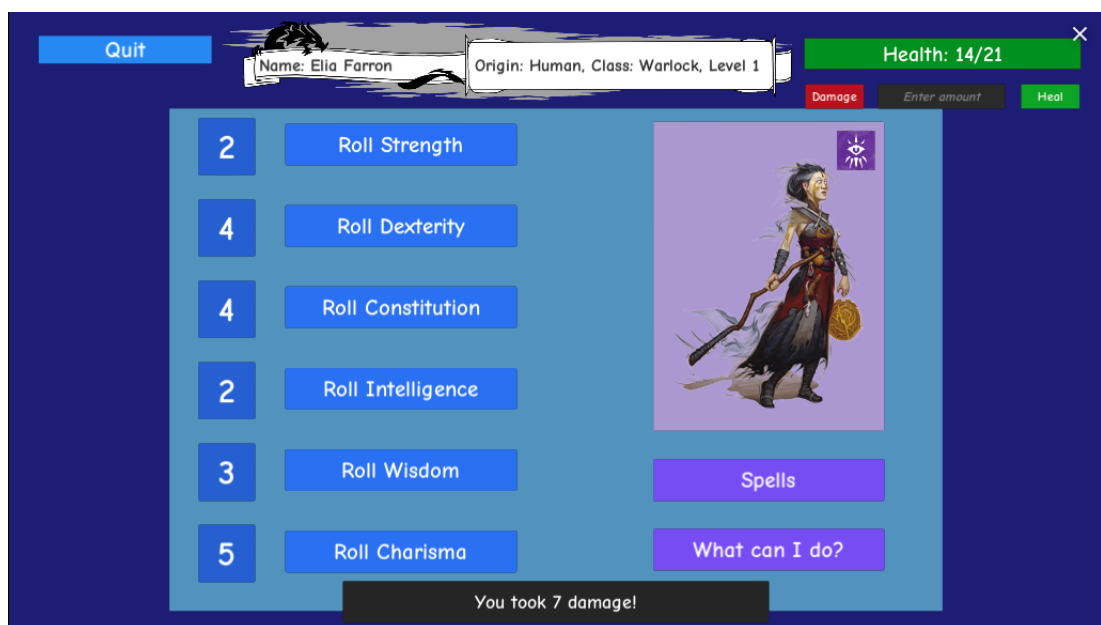


Figure C.5: Dealing damage to the character

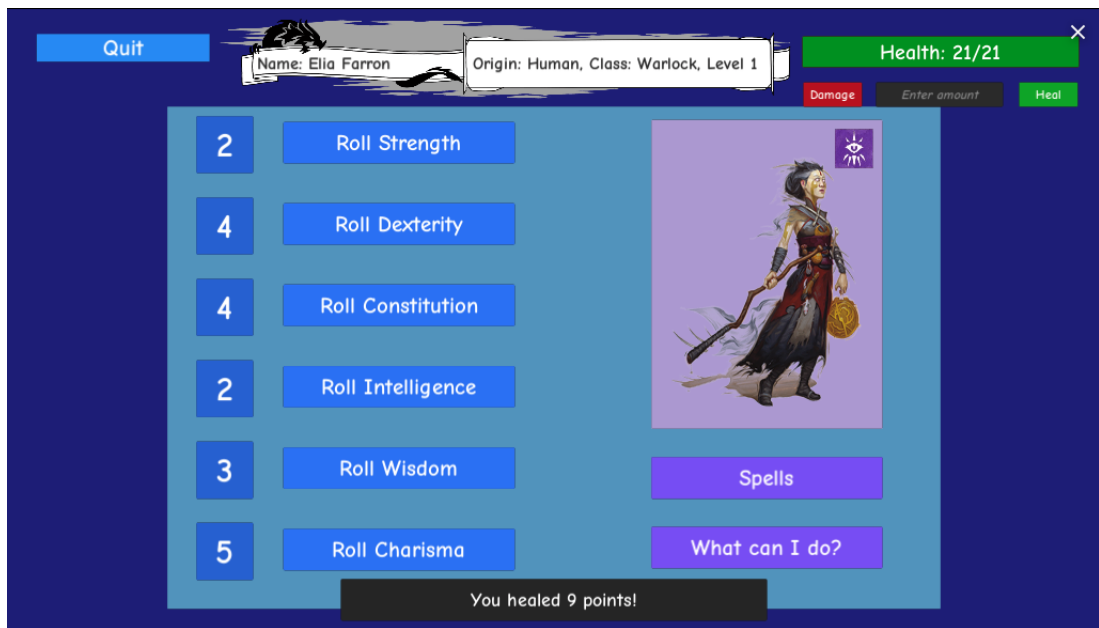


Figure C.6: Healing the character

Appendix D

Character Sheet Comparisons



Figure D.1: Annotated Character Sheet with Example Character

Warlock 8
CLASS & LEVEL

3

Hunter's Initiate
BACKGROUND

Elia
CHARACTER NAME

Standard Human RACE **Lawful Neutral** ALIGNMENT EXPERIENCE POINTS

1

STRENGTH **1** (13)

DEXTERITY **3** (16)

CONSTITUTION **4** (18)

INTELLIGENCE **-1** (8)

WISDOM **2** (14)

CHARISMA **5** (20)

INSPIRATION

PROFICIENCY BONUS **3**

SAVING THROWS

SKILLS

6

ARMOR CLASS **17**

INITIATIVE **3**

SPEED **30**

HIT POINT MAXIMUM **66**

CURRENT HIT POINTS **66**

TEMPORARY HIT POINTS **0**

HIT DICE (D8) **8**

SUCCESSES **000**

FAILURES **000**

DEATH SAVES

5

CORE BIO SPELLS

Team player - having skilful allies is the way

Sympathetic to the local dragon and patron

PERSONALITY TRAITS

Preserving life and nature

Helping those in need

IDEALS

Hunter's Guild is family
Dedicated to patron
Parents left her alone

BONDS

No real ambition, just searching for family

FLAWS

CLASS RESOURCE OTHER RESOURCE

8

NAME	ATK	DAMAGE/TYPE
Flaming Rebuke	DC16	2d10 Fire
Magus staff (On...)	+8	1d6+5 Bludgeoni
Magus staff (Tw...)	+8	1d8+5 Bludgeoni
Dagger	+6	1d4+3 Piercing

ATTACKS & SPELLCASTING

9

ITEM NAME	CP	SP	EP	GP	PP
Magus staff	4				
Component pouch	2				
Dungeoneer's Pack	0				
Dagger	1				
Leather Armor	10				
Backpack	5				
Crowbar	5				
Hammer	3				
Piton	0.25				
Torch	1				
Rations	2				
Waterskin	5				
Hempen rope	10				
Armour of Lead	0				
Grappling hook	1				

TOTAL WEIGHT **78.25**

EQUIPMENT

15

PASSIVE WISDOM (PERCEPTION)

TOOL	PRO	ATTRIBUTE
Herbalism Kit	5	WISDOM

TOOL PROFICIENCIES & CUSTOM SKILLS

TYPE	PROFICIENCY
ARMOR	Light Armor
ARMOR	Medium Armor
ARMOR	Shields
LANGUAGE	Common
LANGUAGE	Draconic
LANGUAGE	Elvish
WEAPON	Martial Weapons
WEAPON	Simple Weapons

OTHER PROFICIENCIES & LANGUAGES **10**

4

GUILD MEMBERSHIP
Background: Hunter's Initiate

HEXBLADE'S CURSE
Class: Hexblade

ACCURSED SPECTER
Class: Hexblade

UNCOMMON MAGUS STAFF
Other: Monster Hunter Weapon

KECHA WACHA TALON
Other: Armour

SELTAS WING ARMOUR
Other: Armour

DALAMADUR CLAW SHARD
Other: Weapon

NERSCYLLA CHELICERA
Other: Weapon

DALAMADUR FANG PIECE
Other: Trinket

GORE MAGALA SCALE
Other: Trinket

SNAKE EYES
Other: Trinket

FEATURES & TRAITS

Figure D.2: Annotated Traditional Character Sheet with Same Character

Elia
CHARACTER NAME

CHARISMA 16 SPELLCASTING ABILITY
SPELL SAVE DC 8
SPELL ATTACK BONUS

CORE BIO **SPELLS** ⚙️

0 CANTRIPS **3** **0** **0** **6** **0** **0**

Eldritch Blast vs Sending VSM +

Booming Blade VM +

Guidance VS

Produce Flame vs **4** **2** **0** **7** **0** **0**

Spare the Dying VSM +

Minor Illusion SM +

+

SLOTS TOTAL SLOTS REMAINING

1 **0** **0** **5** **0** **0** **8** **0** **0**

Armour of Agathys VSM +

Hellish Rebuke vs

Witch Bolt VSM +

2 **0** **2** **9** **0** **0** +

+

Figure D.3: Traditional Spells Tab

Appendix E

Revised Rule Set for Dungeons and Dragons Fifth Edition

Towards Accessible TTRPGs
A Dungeons and Dragons 5E Add On for Autistic Children

Sophia Singh

March 2021

CONTENTS

The Dungeon Master	1	Rule of Cool	6
The Players	1	Worlds, Adventures, Rules	6
Using this Add On	1	Worldbuilding	6
Adjusted Mechanics	1	Three Pillars of Adventure	6
Running A Session	1	Rules and Roleplay	6
The Dragon's Crystal	1	Homebrew	6
Ramping up to 5E	1		
1 Creating a Character	2	4 Combat and Spellcasting	7
Character Creation Flowchart	2	Simplifying Combat	7
Choosing Your Origin	2	Battling Against Monsters	7
Choosing Your Class	2	Simplifying Spells	7
What's Given To You	3	Real Life Wizards	7
New Character Sheet	3	Ramping up to 5E	7
Ramping up to 5E	3	Armour Class	7
		Equipment and Attunement	7
		Spell Points and Slots	7
		Leveled Spells	7
2 Level Up	4	5 The Dragon's Crystal	8
Predefined tables	4	Introduction	8
Fighter	4	Cue the Players	8
Rogue	4	Gaining Entrance	8
Warlock	4	The Meditation Floor	8
Ranger	5	The Golden Key	8
Wizard	5	Crystal Chamber	9
Druid	5	A Forest Glade	9
Ramping up to 5E	5	A Champion's Portrait	9
		A Sea of Ships	9
		The Top of the Tower	9
		A Broken Crystal	9
3 Running a Session	6	6 Challenges	10
How to Play	6		
Game Dice - The D20	6		
Advantage and Disadvantage	6		
Round Up	6		
Know Your Players	6		

INTRODUCTION

THIS DOCUMENT IS DESIGNED AS AN ADD ON for running fifth edition Dungeons and Dragons games for autistic children. It is a supplement to the original game, where additional design decisions are used to adjust regular rules where relevant to cater for this specific audience. The Add On assumes that you know the basics of how to play D&D and can be used alongside *The Player's Handbook* and *The Dungeon Master's Guide*. This Add On is not affiliated with Wizards of the Coast.

THE DUNGEON MASTER

Dungeons and Dragons is a table-top roleplaying game about storytelling in fantastical worlds. The Dungeon Master (DM) creates worlds for the players to explore, rich with NPCs to meet, quests to undertake and treasure to find. The rules are not in charge of the game - *you*, the DM, are. Adapting the rules through inventing, improvising and baking these additions into the story is your job, you are the magic behind the screen. You are there to guide the players through this journey, and adapt to everyone around your table. Your goal is to make the players feel like the heroes of their own adventure, and have fun while doing so.

THE PLAYERS

A game of Dungeons and Dragons is nothing without its players, the heroes driving the adventure and weaving their own imagination into the world and the story. Autistic Children have their own needs and interests, and it is with this in mind that this Add On is created. A regular campaign may include more complex maths, challenging puzzles and notes to figure out and multitudes of npcs which can be overwhelming for someone who is autistic. Remember the emphasis is not on the number crunching or the particular rules of every single class. This Add On simplifies the complexities to suit these needs while offering options for players who are more keen to try something more complex. Not all autistic children have the same needs - curating a table of players where all needs can be catered towards is just as important as adjusting the rules of the game. The players are here to have fun and pour their own imagination into a wondrous story that everyone can take part in and be the heroes of.

USING THIS ADD ON

This Add On is primarily written for Dungeon Masters who wish to run games for autistic children and are looking for extra suggestions and guidelines to aid them in doing so. The following sections discuss core areas where the rules have been adjusted to cater for the additional needs autistic children may have. Additional content suitable for the audience including monsters, treasure and an example adventure has also been provided.

ADJUSTED MECHANICS

The core dice, spells, combat and character creation have all been simplified and are discussed in this Add On. There is an emphasis on keeping things short and sweet as overdrawn complexities will only do more to hinder than help. For autistic children, having a large number of choices can be overwhelming, so this offers a variety of presets that can be used as a quick start guide. If a keen Dungeon Master is looking for more options, there is the official *Young Adventurer's Guide* as well as friendlier TTRPG systems which may have features that you can adapt to your liking.

RUNNING A SESSION

Keeping things consistent and customising both the adventure and the rules to your players is the key to running successful sessions. It is advised to keep things light and loose, to help engage your players and keep them relaxed.

THE DRAGON'S CRYSTAL

A short one-shot adventure rooted in mindfulness involving the players fix a magical crystal that has been broken to help a floating Elvish city. This is aimed for level 1 characters and approximately takes one hour to complete.

RAMPING UP TO 5E

In all the chapters, there is a section dedicated to ramping up the content, including ways to slowly and gently introduce more of the complex ruleset from Fifth Edition Dungeons and Dragons. This is for keen players looking for more, but the most basic version is suggested as a starting place.

CHAPTER 1: CREATING A CHARACTER

THE FIRST STEP FOR EVERY ADVENTURER in all tabletop role-playing games is to imagine and create a character of your own. The player's character is a combination of game statistics to aid gameplay and imagination. The core steps are choosing your origin, choosing your class, and describing your character. Veteran Dungeons and Dragons DMs would note that there is a key step missing here - assigning ability scores, class equipment and spells for classes with spellcasting and customising the personality is left out of the decision making for now.

CHARACTER CREATION FLOWCHART

This model suggests a simpler framework for creating and choosing elements of the character.

CHOOSING YOUR ORIGIN

You start off by selecting your character's name and then origin, which has been limited to Human, Elf and Dwarf as the core fantasy archetypes of the game. In the Ramp up to 5E, more options can be reintroduced. In general, other options are not disallowed but these are the basic functions. If one of the kids wanted to play as a pokemon or dragonborn, there's nothing stopping them! Human is the general default origin and this should not limit the imagination.

HUMAN

The default and still most versatile of all the options, being the youngest and most adaptable. Their main ability is their understanding of many cultures and languages, giving them advantage in these kinds of scenarios.

ELF

Skilled and graceful fae like people that have an other-worldly quality to them. Their main ability is their ability to turn invisible due to their understanding of the twilight forests they call home.

DWARF

Bold and hardy mountain-dwellers that are keen smiths and skilled warriors. Their main ability is their ability to see in the dark due to their natural understanding of caves and other dimly lit interiors.

CHOOSING YOUR CLASS

Selecting the class has now become a simple flowchart in deciding your type of character. Similar to the kinds of questions seen in the tutorial sections of popular RPGs such as *The Elder Scrolls* or *Kingdom Hearts*. The questions asked are firstly, "Is your character more physical or magical or a balance of both?". The next question is more about their personality. The class breakdown is as follows:

FIGHTER

One of the two non-spellcasting options, a very versatile option for characters that are physically based. Their main ability is **Second Wind** which gives them a brief reprieve.

ROGUE

One of the two non-spellcasting options, a great option for characters that are quick and sneaky. Their main ability is the **Sneak Attack** which allows them to deal more damage when they have advantage.

WARLOCK

For those looking for a balance of both spellcasting and physically based characters. Their main ability is **Healing Light**, which allows them to entreat their patron to heal themselves and those around them.

RANGER

For those looking for a balance of both spellcasting and physically based characters and are more in touch with nature. Their main ability is **Beast Bond**, allowing them to communicate with the animals and plants around them.

WIZARD

For those looking for a completely magical character, the wizard is a classic example for those interested in learning and seeking out knowledge of the world's wonders. Their main ability is **Chronal Shift**, which allows them to reroll an ability check twice per day.

DRUID

A completely magical character that is completely one with nature and has control over the elements. Their main ability is **Wild Shape**, which allows them to magically transform into creatures.

WHAT'S GIVEN TO YOU

These are either assumed to be decided by the player or automatically generated and given to the player. This reduces the amount of work they need to start and can begin adventuring quite quickly!

ABILITY SCORES

Ability Scores are pre-generated and automatically assigned using the point-buy system and assigning the numbers to the general strengths of each class. Ability Scores are displayed as their modifiers being in the range of -5 to 5. The stat boosts of the origins are as they originally were according to *The Player's Handbook*.

SPELLS

Spells are pre-selected based on each class and assigned to the player. There are a wide range of spells which can be intimidating to choose from for an autistic child. Spells of course can be swapped out for a suitable replacement to customise towards the child's interests.

DESCRIPTION AND PERSONALITY

Description and personality is left to the child to decide as they play the game and most of these features can be improvised on the spot. This gives the players freedom to roleplay as their dream hero, themselves or anything else they wish to try out in the space of the game.

EQUIPMENT

Characters are automatically distributed their class equipment, with the main choice of weapon being the only main selection.

NEW CHARACTER SHEET

The character sheet has also been simplified to aid the players focus on gameplay and allow them to get a hold of the core mechanics.

HEALTH

The players can keep track of their health although death saving throws are not included. Players only fall unconscious once their health drops to 0 and they will only die if something drastic happens, this is left to the DM's discretion and must be handled with great care.

ABILITY SCORES

The only scores shown for abilities is the ability modifier. There is no proficiency bonus, saving throw or break down of the different ability checks (Athletics, Acrobatics, etc.). This is a

heavily simplified version that allows the players to focus on the simplest elements of gameplay - rolling a d20 and adding the relevant ability modifier.

WHAT CAN I DO?

A summary of their key equipment, class and origin abilities and spells if they have any. This also gives a brief overview of the actions available to them such as Attack, Dash, etc.

RAMPING UP TO 5E

Ramping back up to the original fifth edition version of Dungeons and Dragons will be a long process however as children become more comfortable with the gameplay and seek out more complex gameplay, more mechanics can be introduced.

PROFICIENCY BONUS, ARMOUR CLASS, INITIATIVE

These three additional numbers can be reintroduced to add an additional level of gameplay. The Proficiency Bonus can be added to a whole skill before the entire ability list is reintroduced.

ABILITY SCORES AND MODIFIERS

The full ability list can be reintroduced once the players have a good idea of what each skill is for. The original display of ability levels having the range of 1-20 and their corresponding modifiers can be displayed with explanation and ability scores can be rolled for during character creation.

SPELLS

Similar to a wizard studying their spells, the characters can choose from their spell list. When selecting spells, the players can research them ahead of time and select from the entire list available to them. Spell slots can be reintroduced, or the corresponding spell point variant.

CLASSES AND SUBCLASSES

The other classes can be reintroduced in a similar way using the pre-defined leveling system. Subclasses and their features can also be reintroduced. When doing so there are two levels of complexity, either the player can choose the subclass and allow the DM to choose each level up point or the the player can customise both if they are inclined to do so.

GAME DICE

The full set of game dice can be introduced for each component.

CHAPTER 2: LEVEL UP

PREDEFINED TABLES

FOR THE CLASSES MENTIONED in the previous chapter, *Creating a Character*, pre-defined level up tables are introduced to automatically level up each player. These tables can be customised towards the players interests but in general follow the guidelines from *The Player's Handbook* for levels 1 - 5. This is an example and further level ups can be customised by the DM.

FIGHTER

With each level you gain, your hit point maximum increases by 7 + your Constitution modifier.

LEVEL 2

Action Surge. You can push yourself beyond your normal limits for a moment. On your turn, you can take one additional action on top of your regular action and bonus action. Once you use this feature, you must finish a short or long rest before using it again.

LEVEL 3

Improved Critical. Your weapon attacks score a critical hit on a roll of 19 or 20.

LEVEL 4

Ability Score Improvement. Your Strength modifier increases by 1.

LEVEL 5

Extra Attack. Whenever you take the Attack action on your turn, you can make two attacks instead of one, as part of taking that action.

ROGUE

With each level you gain, your hit point maximum increases by 5 + your Constitution modifier.

LEVEL 2

Cunning Action. Your quick thinking and agility allow you to move and act quickly, so you can take a bonus action on each of your turns in combat. This action can be used only to take the Dash, Disengage, or Hide action.

LEVEL 3

Sneak Attack. You deal 2d6 damage with your *Sneak Attack* feature, instead of 1d6.

Second-Story Work. You gain the ability to climb faster than normal, so climbing no longer costs you extra movement. In addition, when you make a running jump, the distance you can cover increases by a number of feet equal to your Dexterity modifier.

Fast Hands. You can use the bonus action granted by your *Cunning Action* to make a Dexterity (Sleight of Hand) check, take the Use an Object action, or use your thieves' tools to try to disarm a trap or open a lock.

LEVEL 4

Ability Score Improvement. Your Dexterity modifier increases by 1.

LEVEL 5

Uncanny Dodge. When an attacker you can see hits you with an attack roll, you can use your reaction to halve the attack's damage against you.

Sneak Attack. You deal 3d6 damage with your *Sneak Attack* feature, instead of 2d6.

WARLOCK

With each level you gain, your hit point maximum increases by 5 + your Constitution modifier.

LEVEL 2

Spellcasting. You learn the *Cure Wounds* and *Charm Person* spells.

Eldritch Invocations. You have unearthed fragments of forbidden knowledge that imbue you with additional magical abilities. You gain the *Beguiling Influence* and *Mask of Many Faces* Invocations.

LEVEL 3

Spellcasting. Your spells are now cast at level 2 instead of level 1. You learn the *Eldritch Blast* and *Suggestion* spells.

Pact Boon. Your otherworldly patron bestows a gift upon you for your loyal service. You gain the *Pact of the Talisman* giving you the following benefits. Your patron gives you an amulet, a talisman that can aid the wearer when the need is great. When the wearer fails an ability check, they can add a d4 to the roll, potentially turning the roll into a success. This benefit can be used a number of times equal to your Charisma modifier, and all expended uses are restored when you finish a long rest.

LEVEL 4

Ability Score Improvement. Your Charisma modifier increases by 1.

Spellcasting. You learn the *Invisibility* spell.

LEVEL 5

Spellcasting. Your spells are now cast at level 3 instead of level 2. You learn the *Major Image* spell.

RANGER

With each level you gain, your hit point maximum increases by 7 + your Constitution modifier.

LEVEL 2

Primal Awareness. You can focus your awareness through the interconnections of nature: you learn additional spells when you reach certain levels in this class if you don't already know them, as shown in the Primal Awareness Spells table. These spells don't count against the number of ranger spells you know.

LEVEL 3

Ranger Companion. You gain a beast companion that accompanies you on your adventures and is trained to fight alongside you. You can choose the kind of beast companion.

LEVEL 4

Ability Score Improvement. Your Dexterity modifier increases by 1.

LEVEL 5

Extra Attack. Whenever you take the Attack action on your turn, you can make two attacks instead of one, as part of taking that action.

Spellcasting. You can now cast spells at level 2. You learn the *Hunter's Mark* spell.

WIZARD

With each level you gain, your hit point maximum increases by 4 + your Constitution modifier.

LEVEL 2

Arcane Recovery. You have learned to regain some of your magical energy by studying your spellbook. Once per day when you finish a short rest, you can choose expended spell slots to recover. The spell slots can have a combined level that is equal to or less than half your wizard level (rounded up), and none of the slots can be 6th level or higher.

Temporal Awareness. Starting at 2nd level, you can add your Intelligence modifiers to your initiative rolls.

Spellcasting. You learn the *Magic Missile* and *Find Familiar* spells.

LEVEL 3

Spellcasting. You can now cast spells at level 2. You learn the *Fortune's Favor* and *Scorching Ray* spells.

LEVEL 4

Ability Score Improvement. Your Intelligence modifier increases by 1.

Spellcasting. You learn the *Mirror Image* and *Dragon's Breath* spells.

LEVEL 5

Spellcasting. You can now cast spells at level 3. You learn the *Fireball* and *Dispel Magic* spells.

DRUID

With each level you gain, your hit point maximum increases by 5 + your Constitution modifier.

LEVEL 2

Wild Companion. At 2nd level, you gain the ability to summon a spirit that assumes an animal form: as an action, you can expend a use of your Wild Shape feature to cast the *Find Familiar* spell, without material components. When you cast the spell in this way, the familiar is a fey instead of a beast, and the familiar disappears after a number of hours equal to half your druid level.

Spellcasting. You learn the *Guidance* and *Guiding Bolt* spells.

LEVEL 3

Spellcasting. You can now cast spells at level 2. You learn the *Moonbeam* and *Summon Beast* spells.

LEVEL 4

Ability Score Improvement. Your Wisdom modifier increases by 1. **Spellcasting.** You learn the *Faerie Fire* and *Lesser Restoration* spells.

LEVEL 5

Spellcasting. You can now cast spells at level 3. You learn the *Daylight* and *Call Lightning* spells.

RAMPING UP TO 5E

The original level up tables can be reintroduced, firstly for the specific subclasses chosen before offering the full choice of subclasses and customisation. These choices of spells and other features act as rough guidelines work as a quick start up into the game.

CHAPTER 3: RUNNING A SESSION

HOW TO PLAY

GAME DICE - THE D20

THE CORE DIE OF THE GAME. The D20 is used for all ability checks, saving throws and for combat. The regular difficulty checks still apply and the other dice are not being used to avoid confusion, however they can be slowly reintroduced as the players gain confidence. It is important to always explain calculations since autistic children may need additional aid with the computations.

ADVANTAGE AND DISADVANTAGE

Extraordinary ideas, roleplay and unique implementations of character attributes can be rewarded with advantage. Ideas that are difficult or disincentivised can be challenged with disadvantage.

ROUND UP

Always round up to give the benefit of doubt to your players.

KNOW YOUR PLAYERS

The success of a Dungeons and Dragons game hinges on your ability to understand the players at your table. Keep things safe, organised and always give players their opportunity to shine. For autistic children, it is even more important to incorporate their unique interests in a positive way to keep them engaged and relaxed.

RULE OF COOL

Natural 20s and Natural 1s are often the foundation for the most spectacular moments in a session. The rule of cool allows your players to really shine - for every critical failure or success remember to emphasise the ridiculous or incredible. It won't always be possible to do everything but rewarding impressive imagination and dice rolls should always be the preference over sticking closely to the rules.

WORLDS, ADVENTURES, RULES

The world where you set your campaign is more than just a backdrop for adventures. Much like Middle Earth, Westeros or the many other countless fantasy worlds out there, it's a place to

let the players escape into and witness fantastic stories where they are the heroes. Consistency is key to a believable fictional world, and fundamental when described to an autistic child.

WORLDBUILDING

Remember to include what makes your players are most interested in. What kinds of stories and characters do they like? What are their current interests?

THREE PILLARS OF ADVENTURE

EXPLORATION

When exploring, be clear and concise with all your descriptions and try not to backtrack too much. Visual aids can be fundamental and descriptions will be taken literally.

SOCIAL INTERACTION

Social interaction can be daunting to autistic children so it is important to know your players' comfort levels. Gently encourage them when required but do not make this essential.

CONFLICT

Keep things short and fast, make your players feel like the heroes and remember to have fun. In stressful scenarios, explain clearly to your players what will happen ahead of their dice rolls if things are looking too stressful for them. Gently encourage their ideas and show them the benefits and consequences of their actions.

RULES AND ROLEPLAY

It is always vital to make sure things are fair but even more so when playing with autistic children. Whether it is a strong sense of justice or just how able they are to share their ideas, remember to give every player a fair amount of time. Use visual aids such as distance measurements and turn order trackers so that all players are aware of the current state.

HOME BREW

The key thing about play is catering to your players' interests. Is there a specific magical item or ability they would like to have? Sometimes, the vast number of sourcebooks and online materials don't have a feasible substitute, making homebrew a key component of the game. For autistic children, this can be vital since customisation is the most fundamental way to cater to their needs.

CHAPTER 4: COMBAT AND SPELLCASTING

THE PLAYERS ARE THE HEROES. The core of Dungeons and Dragons is battling monsters and exploring dungeons. For the purposes of simplicity, a character's equipment doesn't have any numerical benefits in combat. A character needs to have a weapon to fight and armor or a shield to defend, but as long as you have those things, it doesn't matter what kind of weapon or armor it is. If a player calls out a specific detail in their weapon, like a glaive's long reach or their plate armor's thick steel plates, allow them to have one particular ability or perform a specific action, like strike an enemy over a fence or absorb a heavy physical blow.

SIMPLIFYING COMBAT

Dexterity is used to determine the initiative order. On their turn, a character or monster can move and take an action, and this can be abstracted for the sake of simplicity. If a character has an attribute from their race or class that makes them good at a particular action, they can use that attribute to automatically succeed.

BATTLING AGAINST MONSTERS

the player will roll an ability check to see if their spell or attack affects a monster. Monsters have all sorts of special abilities. Like an adventurer's attributes, a monster's ability can only be used once per session. Like attributes, you can decide what a special ability does. Some special abilities are specifically combat based, which means you can use that ability as part of an attack. Don't abuse this power! The DM wants to challenge and empower the players.

DEALING DAMAGE

The DM rolls all of the primary damage, using the d4s, d6s, d8s and d12s available to them. The damage is not announced to the table but the impact of the blow can still be felt and indicators abstracting the status of the monster can key in the players on how well they are doing. The number crunch isn't as important as the descriptions and impact of combat.

HOW DO YOU WANT TO DO THIS?

Once defeated, the DM can determine how the monster is defeated, or you can ask the player to describe their victorious attack against the creature.

SIMPLIFYING SPELLS

All spells can be cast at any time, and their descriptions can be adapted freely to the situation. Allow your players to have creative freedom and remember that magic is magic, rules and consistency are important but remember not to hinder your players! The most important thing is to keep a solid list of spells that the players can refer to.

REAL LIFE WIZARDS

Keen players may be inclined to research and select spells for themselves, encourage this as it allows them to become real life wizards. An over abundance of choice can be overwhelming for autistic children, support your players by offering guidance on what might be most suitable for their character and encourage creative freedoms.

RAMPING UP TO 5E

ARMOUR CLASS

For players keen for a little bit of further complexity, *Armour Class* can be introduced in order to have the players roll to hit before dealing the damage.

EQUIPMENT AND ATTUNEMENT

For players familiar with other RPGs or keen for varied equipment, allow the players to select their equipment and reintroduce the defensive and damage capabilities of that equipment. Attunement is a simple way of limiting the number of magical items the players can use.

SPELL POINTS AND SLOTS

An unlimited well of magic can be overwhelming but so can a magic tracking system. *Spell Points* which is very similar to magic points or mana, is a simple numerical method to keeping track of how many times you can cast a spell each day. *Spell Slots* are a little more complicated, but can first be introduced if the spell can only be cast at the level it is defined as.

LEVELED SPELLS

Leveled Spells offer even more versatility. After all, a level 20 wizard should have much more powerful spells than the a level 10 wizard. Reintroduce the concept of making the spell more powerful by casting at a higher level.

CHAPTER 5: THE DRAGON'S CRYSTAL



A CRYSTAL SECRETED AWAY INTO A magical tower in a floating Elvish city is known to have powerful magical enchantments.

INTRODUCTION

The Enchanted Kingdom is an Elven floating city protected by a magical sphere, which has been around for thousands of years. The city has a great tower housing powerful magic and is known to be run by sorcerers. The people of the Enchanted Kingdom are known to be cheerful and prosperous as the tower contains the dragon's crystal which absorbs everyone's worries. The knowledge of this crystal and master of the tower is kept closely to the residents of this city and the tower itself is known to be guarded by magical enchantments.

CUE THE PLAYERS

The Great Tower has been attacked in the Enchanted Kingdom and its people have gone into complete disarray as the crystal has been broken into pieces, making everyone feel anxious and worried. The players have been recruited to help the city and restore the tower, the city and all of its denizens.

GAINING ENTRANCE

The great tower reaches far beyond the clouds and is of Elvish make. Two grand purple doors with golden framing stands at the base of the tower, though the doors are locked shut.

As you approach the doors you noticed a large water wheel fixed to the side of the tower. It is erratically shimmering and cycling through different colours. There is a male and female elf that call for the player's help.

The man is called Ethan and the woman is called Aimee. They are both tall and fair elves trying to settle the wheel, as they live close by. They will explain that the wheel should not be spinning so wildly and that the order of the colours is wrong.

TIPS FOR THE PLAYERS!

The colours should be cycling through the order of the rainbow, and the wheel can be stopped from spinning wildly. If pressed, they will also mention that a mysterious knight has recently been seen entering the tower before everything went wrong.

A **DC 12 Strength** check will allow the players to stop the wheel from spinning and a **DC 12 Intelligence** check will allow the players to investigate the wheel's inner mechanism and fix the colours. Ethan and Aimee will go on to ask the players to help the rest of the people stuck in the tower. As the wheel slowly and gently turns and the colours shimmer and transition, the grand doors slowly open.

THE MEDITATION FLOOR

As you approach the entrance, there are three Elvish monks sitting meditating forming a triangle around a great stone disc. The room itself is mostly bare except for the soft mats and cushions. As they breathe, they are so worried and anxious that they are slowly creating a tornado.

The tornado will slowly grow and make it harder for the players to approach the three monks meditating as time continues on. If asked, the monks will barely be able to speak and it will be clear that they are worried and anxious.

TIPS FOR THE PLAYERS!

The calm emotions spell is engraved in elvish on the walls and can be used to calm down the monks meditating. If pressed, they will also mention that a mysterious knight has recently been seen entering the tower before everything went wrong.

Once they have been calmed or subdued the monks will thank the players and offer the same information about the knight who mysteriously appeared, with the intent of meeting with the master of the tower. They are not allowed to reveal the identity of the master as they have been sworn to secrecy. They will mutter an magical incantation causing the Tenser's floating disc to activate, allowing the players entrance to the next floor.

THE GOLDEN KEY

The room is full of comfortable couches, colourful carpets and dining table with cold tea and biscuits. The lady asks for help to stop spinning and she also asks to help find her magical white bunny.

As you approach, there is an Elven lady who appears to be a caretaker of the tower. She is magically enchanted to be constantly spinning in cartwheels around the room.

The player has to look for the bunny, who can only be seen while the player offers food or when the player rings the bell, the bunny will come to them and give them the golden key. Tenser's floating disc and entrance into the next room will not activate without the golden key.

CRYSTAL CHAMBER

As the floating stone disc clicks into place, all is dark. The blue light gently emanating from the elvish engravings light up along tracks and blue light fills the circular room. A long hallway lies before the players.

You notice two grand red doors lie down a long, torchlit stone hallway. There is a large painting of a golden horizon that has been torn apart. There are large floor to ceiling windows with light flooding in and you can see the clouds before you.

The players will need to use the golden key to enter. They will enter into a large rectangular room with no exit.

You notice in the center lies an empty stone pedestal with a circle around it and three metal, triangular shaped holes in the ground. On the walls there are three large, beautiful paintings.

If the players attempt to approach the empty pedestal, a magical shield enclosed by the circle will not allow them to do so and electricity will pulse through the room. Each player has to make a **DC 12 Constitution** Saving Throw or take 1d6 lightning damage. A **DC 12 Wisdom or Intelligence** check will let the players know they have to find the triangular shaped keys.

TIPS FOR THE PLAYERS!

The paintings will be gently moving and will appear to be magical. The keys are within each of the paintings and need to be entered or retrieved through a similar manner.

A FOREST GLADE

On the western wall there is another large landscape of a peaceful forest glade. The focus is on a pulsing purple staff which radiates healing energy. The staff is held on a silver pedestal and is surrounded by trees. Throughout the trees a flock of crows sit, rustling their feathers and the leaves are gently swaying in the wind. Around the neck of the staff, one of the pieces of the key is hung on a silver chain. The crows do not take kindly to weapons or shows of force.

A CHAMPION'S PORTRAIT

On the northern wall there is a large portrait of an Ancient Red Dragonborn. He is holding a magnificent silver and red falchion with draconic engravings. He has a black cape with a red symbol of a dragon on it. He has large spines on his back and even a dragon-like tail. He is framed by an arched stone door frame. Around his neck is a silver chain with one of the key pieces. The dragonborn knight will offer the players a challenge in return for the key. Once defeated his voice will echo and congratulate the players. His armour and form will turn to dust before being whisked away into the wind. The knight that caused all of this is still at large.

A SEA OF SHIPS

On the eastern wall there is a large landscape of a fleet of ships at sea, heading towards a port in the South of the continent. There is a lighthouse on a stone cliff that is carved into the shape of a nature goddess for protection. The ships seem to be sailing away from the storm, the electricity slowly glows and pulses. On each pulse the sea gently glows another piece of the key will be illuminated. If interacted with, a will-o-wisp will greet the players and ask to become friends.

THE TOP OF THE TOWER

Once all keys have been placed, the magical shield will dissipate and the three broken shards of the the gleaming blue crystal orb will appear on the pedestal. After the dragonborn knight is defeated, the players will notice a spiral stone staircase within the painting leading to the top of the tower. The top is protected by two red doors with a blue circle in the center, the crystal orb acts as the key. At the top of the tower they will meet the master, an ancient blue dragon.

A BROKEN CRYSTAL

All three shards of the crystal will have to be taken to the dragon at the top of the tower, for it to fix at which point the dragon allows each of the players to focus on the crystal which grants each of the players a magical power and a stillness of mind.

As you focus on the crystal in the palm of your hand, you notice each thought come out as a piece of shimmering glitter. The thoughts swirl around and glitter surrounds you before they enter the crystal and everything comes to a calm, your mind is now clear.

The players will notice that the worries of all the people in the city are once again being siphoned into the crystal.

CHAPTER 6: CHALLENGES

SWARM OF CROW FAMILIARS

Medium swarm of tiny machines, unaligned

Armor Class 14

Hit Points 78 (12d8 + 24)

Speed 10 ft., fly 50 ft. (hover)

STR	DEX	CON	INT	WIS	CHA
10 (+0)	18 (+4)	15 (+2)	11 (+0)	15 (+2)	16 (+3)

Skills Arcana +3, Perception +5

Damage Vulnerabilities radiant

Damage Resistances bludgeoning, piercing, slashing

Damage Immunities necrotic, poison

Condition Immunities charmed, frightened, grappled, paralyzed, petrified, prone, restrained, stunned

Senses darkvision 30 ft., passive Perception 15

Languages —

Challenge 7 (2,900 XP)

Queen's Command. If the swarm of crows is being commanded by the queen, the swarm has advantage on all attacks and saving throws.

Swarm. The swarm can occupy another creature's space and vice versa, and the swarm can move through any opening large enough for a crow. The swarm can't regain hit points or gain temporary hit points.

Screech. The swarm of crows lets out a terrifying screech affecting all creatures caught in the swarm's space, causing them to make a DC 14 Constitution Saving Throw or be stunned until the end of their next turn.

Flyby. The swarm doesn't provoke opportunity attacks when it flies out of an enemy's reach.

ACTIONS

Blighted Talons. *Melee Weapon Attack:* +5 to hit, reach 5 ft., up to two targets within the swarm's space. *Hit:* 12 (3d6 + 3) piercing damage + 12 (3d6 + 3) necrotic damage.

Drain Magic. The swarm attempts to siphon some magical power from a creature within its space. If the target has any remaining spell slots, it must make a DC 16 Saving Throw using its spellcasting ability. The target makes the save with disadvantage if it has less than half of its spell slots remaining.

On a failed save, the target loses one spell slot, of level determined by rolling 1d6. If there is no remaining spell slots of that level, it instead loses its highest remaining spell slot below that level. The swarm then regains 1d8 hit points per spell slot level.

REACTIONS

Arcane Barrier. The swarm adds 3 to its AC against one attack that would hit as it creates an instantaneous shield of force around itself.

DRAGONBORN WARRIOR

Medium humanoid (human), any alignment

Armor Class 18 (plate)

Hit Points 75 (10d8 + 20)

Speed 30 ft.

STR	DEX	CON	INT	WIS	CHA
18 (+4)	14 (+2)	16 (+3)	9 (-1)	9 (-1)	12 (+1)

Saving Throws Str +7, Con +6

Damage Resistances fire

Senses blindsight 10 ft., darkvision 60 ft., passive Perception 9

Languages Common, Draconic

Challenge 5 (1,800 XP)

Searing Smite. The next time you hit a creature with a melee weapon attack during the spell's duration, your weapon flares with white-hot intensity, and the attack deals an extra 3d6 fire damage to the target and causes the target to ignite in flames.

At the start of each of its turns until the spell ends, the target must make a Constitution saving throw. On a failed save, it takes 1d6 fire damage. On a successful save, the spells ends. If the target or a creature within 5 feet of it uses an action to put out the flames, or if some other effect douses the flames (such as the target being submerged in water), the spell ends.

ACTIONS

Multiattack. The dragonborn can make two longsword attacks or one longsword and one whip attack.

Longsword. *Weapon Attack:* +5 to hit, reach 5 ft., one target. *Hit:* 8 (1d10 + 3) slashing damage.

Whip. *Melee Weapon Attack:* +5 to hit, reach 15 ft., one target. *Hit:* 7 (1d6 + 3) piercing damage. A creature targeted in this way is then grappled on a hit. As a bonus action, the whip can be ignited, dealing an additional 8 (3d6) fire damage.

Fire Breath (Recharge 5-6). The dragonborn exhales fire in a 15-foot cone. Each creature in that area must make a DC 15 Dexterity saving throw, taking 24 (7d6) fire damage on a failed save, or half as much damage on a successful one.

Appendix F

Parent Information Sheet

Designing Educational Games and Tools for Children with Autism

Information sheet for parents and guardians

This information sheet is for parents and guardians; it explains the research project at the University of Edinburgh, in which we would like your child to participate. It gives information about the project in the form of questions you might have and their answers. If you have further questions, we are happy to discuss them and give you more information.

This study was certified according to the Informatics Research Ethics Process, RT number XXXX. Please take time to read the following information carefully. You should keep this page for your records.

The researchers on this project and their contact details are as follows:

- Aimee Redbond: s1713640@sms.ed.ac.uk (Lead Researcher)
- Andreas Ghira: s1732228@sms.ed.ac.uk (Lead Researcher)
- Sophia Singh: s1623165@sms.ed.ac.uk (Lead Researcher)
- Ethan Soreide: s1741258@sms.ed.ac.uk (Lead Researcher)
- Kaiwen Xue: s1615893@ed.ac.uk (Lead Researcher)
- Dr. Aurora Constantin: aurora.constantin@sms.ed.ac.uk (Research supervisor)
- Aljawharah Alabdullatif: s1500319@sms.ed.ac.uk (Research advisor)
- Prof. Helen Pain: helen@staffmail.ed.ac.uk (Research supervisor)

University of Edinburgh, School of Informatics

Please return the parent consent form to one of the researchers if you give permission for your child to participate in the project.



Overview of the project

We are five UG4/Minf students from the University of Edinburgh working on educational games for children with autism as a part of our Honours projects. Each student pursues research in their chosen area and will develop their own game.

What is the goal of the project and the purpose of the workshops?

Many different circumstances can cause children with autism to suffer with anxiety. These include social situations, changes to their routines, and disruptive events such as the COVID-19 pandemic. The goal of our project is to design technology-based tools to help children with autism cope with and manage their anxiety in different situations.

Kaiwen: I have designed and developed a web game, the purpose of this game is to help children with autism overcome their anxiety and understand dentist meaning when they go to the dentist. Children will be asked to explore the game, complete some game tasks and provide some feedback on what can be changed, added or improved. **To play this game, children will need a computer with window operation system and download a document by email in advance and put it on the desktop. A short text " --enable-webgl --ignore-gpu-blacklist --allow-file-access-from-files" need to be copied and then paste. The steps are right-click on the Google browser to select properties, the copy then at the end of target (T), notice the first two space.**

Aimee: I have developed an interactive web application which aims to help children with ASC to cope with changes. The purpose of the app is to reduce the anxiety caused by changes, and to help children with autism to become more flexible and resilient when faced with changes in the future. In this workshop, the children will be asked to explore the app, complete some simple tasks, and offer feedback based on their experience interacting with the application. In order to use the application, children will need access to a web browser such as Chrome, Safari, etc. I will provide the link to the application during the workshop.

Andreas: I have developed a Minecraft map that simulates social situations (going to school, going to the hairdresser, playing soccer) that children might find stressful in

Page 3 of 7

real life and I have designed calming rooms that tries to teach the player self-calming techniques (i.e. counting in your head from 1 to 10, breathing exercise, relaxing in a quiet place). Children will be asked to explore the game by following the instructions given on the screen and provide feedback on their experience. **To play the game, children will need Minecraft Java Edition (the Official version) installed on their computer.**

Ethan: I have designed an interactive exploratory tool of what a child might experience when getting their haircut. This emulates some of the anxieties one may feel at the hairdresser and rewards you for tolerance of the stimuli. Children will be asked to explore the app, complete some activities and then provide feedback on what can be changed, added or improved. Like Kaiwen, a web browser (preferably Chrome) will be used to access the tool from a downloaded ZIP file. A detailed walkthrough for this will be given for this prior to the evaluation.

Sophia: Dungeons and Dragons is a popular tabletop roleplaying game that has potential to be an effective tool for delivering therapy in an interactive and story driven game environment. Based off the design workshops from late last year, I have built a platform to help conduct dungeons and dragons games for autistic children. The workshop will help me test the tool and retrieve feedback on how it can be improved. Similar to Ethan and Kaiwen, a web browser (preferably Chrome) will be used to access the tool from a downloaded ZIP file. A detailed walkthrough for this will be given for this prior to the evaluation. Additionally, having a sheet of paper and some pencils will be useful.

How can my child help?

The game evaluation workshops will comprise a variety of activities which will help to inform the design of our prototype games and provide potential ideas to enhance fun and engaging gameplay for an educational game.

Workshop Information

What happens during the workshop?

Workshops will take place individually online using Microsoft Teams. At least one researcher and one supervisor will be present for all workshops. Your child will get to

Page 4 of 7

engage in the numerous different games that have been made and provide feedback and ideas for c. 30 minutes. In order to facilitate these activities, we would request that you provide sheets of blank paper and colouring pencils for your child to use during the session. We may request that any materials created by your child during the session be uploaded for our review after the session. If your child is willing to talk to us about the activities, we will ask them a few questions. They will each participate in X (will edit depending on each workshop structure) workshops, if they are happy to do so.

Video and audio recordings

We would like to video record the session, to provide a record for later analysis and allow us to freely interact with your child during the session without worrying about taking notes. Microsoft Teams does not allow for solely audio to be captured, but the video recording will only be used to transcribe the audio from the session, and then will be deleted. The video would be seen only by us during the analysis. If you are not comfortable with your child being video recorded at all, then your child should not participate in this particular study. Although we will only be video recording for the purpose of transcribing the session, we would ask that your camera is switched on throughout the session, so that we can ensure your child is not becoming upset or distracted.

We ask parents to read this information sheet so you can make an informed decision about whether participation as a game designer is a good idea for your child.

If you say “yes” when returning the permission form, we will explain the game designer role to your child and ask them if they want to help. We will remind your child that they can stop being a developer at any time, without having to give any reason, and that we will always listen to them. We will check that the child agrees to be video recorded. This explanation will be based on the child information sheet included in this packet. We feel strongly that children should be given a real choice about whether to participate. Even if you say “yes” on the permission form, your child

may still say “no” if s/he does not want to be a game developer. We will respect your child’s decision.

If you say “no”, we will not contact you again about this study and will not ask your child to be a games designer.

Will this project teach my child new skills?

This project is not a type of therapy or intervention. We will not be teaching children new skills or improving existing skills. The information we learn from this project may be used in future games/smart objects that could help children with ASC.

What happens when the project is over?

After the study has finished and we have analysed the information we collected, it will be used to improve the different games and eventually be presented in a final report. This report along with the data and transcripts may be shared or presented in scientific journals or conferences. We never share children’s names, schools or other personal information.

How will personal information be protected?

Confidentiality is extremely important to us and all data will be processed in accordance with Data Protection Law. Recordings and other information (such as forms with children’s names) will be stored safely on password-protected encrypted computers. Your consent information will be kept separately from your responses in order to minimise risk. Access will be limited to the people involved in the research (listed above). Recordings and other information will be identified only by participant codes or pseudonyms, and will be separated from identifying information (such as name). Your data may be archived for a minimum of 2 years.

Who paid for this research?

This study is part of the undergraduate work for the main researchers (listed above). It is indirectly paid for by the University of Edinburgh and the funding is not attached to a specific project or to any outcomes of that project. Conducting this research brings no financial benefit to the researchers or to the university.

Who can I contact?

If you have any further questions about the study, please contact any of the lead researchers or the research supervisor Dr. Helen Pain.

If you wish to make a complaint about the study, please contact inf-ethics@inf.ed.ac.uk. When you contact us, please provide the study title and detail the nature of your complaint.

Updated information.

If the research project changes in any way, an updated Participant Information Sheet will be made available on <https://web.inf.ed.ac.uk/infweb/research/study-updates>.

Alternative formats.

To request this document in an alternative format, such as large print or on coloured paper, please contact any of the lead researchers or the research supervisor.

General information

Once again, this study is completely voluntary, and you and your child are under no obligation to take part. Even if you say yes now, you may withdraw your child from the study at any time and for any reason by contacting us. Your child may also withdraw at any time by saying that s/he does not want to be a game developer any more.

For general information about how we use your data, go to: edin.ac/privacy-research

Thank you for taking the time to read this.

Appendix G

Parent Consent Form

Parent Consent Form

* Required

1. Have you read the information sheets? *

Yes

No

2. Have you received enough information about the study? *

Yes

No

3. Do you understand that participation is completely voluntary and your child can leave the study at any time, without having to give a reason? *

Yes

No

4. Do you consent for your child to take part in this study? *

Yes

No

Details

By filling in the sections below, you indicate that you understand and accept the conditions of this study, including video recording. You agree that the researchers may explain this study to your child and invite him or her to take part as a game developer.

5. Full name of participating child: *

6. Child's date of birth: *

Format: M/d/yyyy

7. Your relationship to the child: *

8. Your full name: *

9. Email address: *

Parent Consent Form (Preview) Microsoft Forms

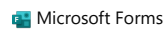
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10. Date: *

Format: M/d/yyyy

4/7/2021

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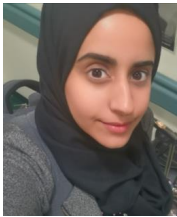







Appendix H

Child Info and Consent Form

Designing and Testing Games to Help Children
(to be read aloud to the child)

This page is for children. We will ask you to help design and test new computer games, take part in different activities, and answer a few questions. You can decide if you want to say "yes" or "no" to helping and can change your mind at any time.

Who is organising the event? This is Helen, Aljawharah, Aurora, Aimee, Sophia, Ethan, Andreas and Kaiwen. They want to make computer games that can help children. You can help them by providing ideas for new computer games, taking part in different activities, helping to test them, and answering some questions.

			
Aljawharah	Helen	Aurora	Aimee
			
Sophia	Ethan	Andreas	Kaiwen

How can I help?

Some children with autism can find that lots of different things can make them worried. They might find simple activities like talking to other people and changes to their usual activities harder than most children. Sometimes they find it hard to understand and manage what they are feeling. We would like to design some fun games to help these children with their worries, and we would like you to help us! We would like to hear your ideas for ways to make some of these situations less scary and we would like you to help us to make our games fun.

What will happen if I help?

You will get to take part in game design and testing workshops and participate in other activities. You will get to talk with other children about your ideas, and we might ask you to do some drawings to show us your designs.

You can tell Helen or one of the researchers if you want to stop doing any of the activities. You do not have to tell them why. Please tell them if you want to take a break. You can also say you do not want to be a game developer or tester anymore, and that is OK.

The researchers will ask if it is OK to make a video recording of you helping design the game and answering questions. This is because it is too hard for them to write down everything that happens. They will listen to and look at the recordings later to help them understand what you thought about the game.

What will happen after I am finished helping?

The things you make, do and say in the game testing workshops will help them. They will write about what they have learned and use it to design and evaluate their games.

Your mum or dad said it is OK for you to help us.

Do you want to be a game developer/tester? You can say “yes” or “no”. It is OK to say “no”. It will not hurt the researchers’ feelings.

Do you want to ask a question about being a games developer/tester?

It is OK to have more questions. You can ask the researchers as many questions as you want about being a game developer. Ask your mum or dad to help you call them on the phone or write an email with your question.

Child Consent Form

To be used as a guide for securing consent or refusal after the child has had a chance to get information about the study. The child may mark (or be helped to mark) this form, or the child's consent/refusal may be video recorded.

I can choose to be a game developer.

I do not have to help if I don't want to.

I can decide to stop taking part or take a break if I want to, I do not have to say why.

It is okay if I change my mind later and say I do not want to be a game developer anymore.

It is okay if some parts of the game are hard for me!

There are no wrong answers to questions.

Anything I can do is very helpful.

Do you want to be a game developer? YES NO

Helen, Aurora, Aljawharah, Ethan, Andreas, Sophia, Aimee and Kaiwen will listen to/watch the recordings later. They will not show them to other people.

Is it okay to take video recordings? YES NO

Write your name:

THANK YOU 😊!!

Appendix I

Expert Interview Consent Form

Participant Consent Form - Evaluation

Developing an Educational Game to support children with Autistic Spectrum Condition (ASC)

Researchers: Sophia Singh
(s1623165@sms.ed.ac.uk)

Supervisor: Dr Helen Pain
(helen@staffmail.ed.ac.uk)

This evaluation is to gain feedback for a Unity based online platform to aid Dungeons and Dragons play for children and young adults with ASC. All data will be anonymised with pseudonyms (such as E1, E2, etc.). The interview will take place on Microsoft Teams or on the phone for your preference. If you consent to being audio recorded, recordings will be stored safely on password protected computers. You may withdraw from this research study at any time without explanation and you can ask any data you have supplied to that point be withdrawn/destroyed. You can omit or refuse to answer to any question that is asked of you. All data from this study may be archived for a minimum of two years. Please feel free to ask any question related to this study at any time.

I confirm that I have been informed about this project by the researchers and that I have had the opportunity to ask questions, and that any questions I had were answered to my satisfaction.

Please Select: YES / NO

I understand that my participation is voluntary, and that I can withdraw at any time without giving a reason. Withdrawing will not affect any of my rights.

Please Select: YES / NO

I consent to my anonymised data being used in academic publications and presentations.

Please Select: YES / NO

I understand that my anonymised data can be stored for a minimum of two years.

Please Select: YES / NO

I agree to take part in this study.

Please Select: YES / NO

I agree to being audio recorded.

Please Select: Microsoft Teams / Phone Call

Participant's Signature:

Date:

Appendix J

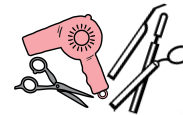
Child Certificate



THE UNIVERSITY of EDINBURGH
informatics

Games Designer Certificate

Presented To



CHILD NAMES



For being a Great Games Designer on
the Educational Games Project! Well
Done!



Professors Helen Pain & Aurora Constantin

March 2020

