

Jamie Richards - 0852036 - Project Proposal

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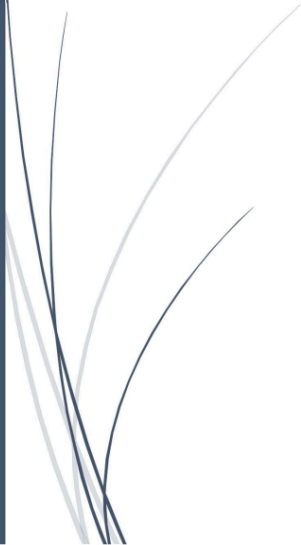
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02.10.2025

Independent Project Research Proposal

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ACCA6020 – INDEPENDENT PROJECT

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1. Introduction

Autism Spectrum Disorder (ASD) is characterised by an individual's differences in communication, cognitive processing and emotion, as stated on the national autistic society website "More than one in 100 people are autistic and there are at least 700,000 autistic adults and children in the UK." [1]

In a recent conference paper titled Identification of Autism Spectrum Disorder (ASD) in Adults through Various Machine Learning Algorithms [2] written by S. Yuvaraj, S. Sugavanaesh, C. Tharun Kumar, G. Saran and R. Subha suggests Autism as a development disorder which generally appear in children around two years old.



Gaming in recent years has drastically expanded in people's lives, gaming provides more than just entertainment.

Figure 1 to the left taken from the game quitters website, illustrates the amount of individuals in the UK who play video games and on average how long for. [3]

With figures like these there is no surprise that there is a growing accessibility of the use of games to help support the development of individuals with ASD.

The importance of this project will fall into the potential of improving the quality of life and development for individuals with autism, more so on a personal level the motivation for this project branches on to the desire to further the research and advancements in aid for people with ASD using game-based interventions.

2. Background to the Proposal

With ASD, traditional approaches often face limitations in engagement which has led to an increased interest in games-based interventions.

Serious games are digital or physical games designed for the purpose beyond entertainment, for instance education or training. Serious games unlike commercial games intentionally integrate learning or development objectives within the environment so it can achieve real world outcomes. [4]

In conference paper [5] where the usability of serious games for health was presented, it was concluded that a serious game had more satisfaction than an entertainment game, even though only a small number of volunteers participated.

People with ASD often experience difficulties in social interactions such as challenges in understanding the social parameters and even forming relationships. Game based interventions have shown promising advances in addressing these challenges by providing an organised environment where the user can practise different scenarios.

In a journal by O'Keeffe and McNally it was identified that in nine studies, which explored play-based interventions targeting social communication skills in an educational environment. It was suggested that the game-based interventions were effective in improving the social outcomes. [6]

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However, a conference paper by Ian Dunwell, Kate Torrens, Samantha Clarke and Stella Doukianou, titled Game-based lifestyle interventions for adolescents: An evidence-based approach found such interventions required more time to produce viable results. [7]

Cognitive deficiencies such as attention and memory are common with individuals with ASD and game-based interventions offer an interactive platform which can target these cognitive needs. A journal article on science direct, written by Suzanne Derks, Agnes M. Willemen and Paula S. Sterkenburg reported that a serious game was associated with improved cognitive skills in children with ASD and highlighted the potential of game-based interventions in their development. [8]

Emotional responses are challenging for individuals with ASD, meaning their ability to manage things like stress and respond appropriately to others become difficult. Game-based interventions can provide a controlled environment where the users can learn and practise emotional responses or strategies to use in the real world. A conference paper titled Autism Screening Using a Video Game Based on Emotions used a serious game with four algorithms to screen children to attempt to identify if any had ASD. The report indicates many subjects were not familiar with emotions and could not properly play the game suggesting the difficulty in using this method for research. [9]

Furthermore, an article by Sara Peretti, Maria Pino, Federica Caruso and Tnia Mascio on evaluating the potential of immersive virtual reality based serious games with autism found that there is an importance on the accessibility on such intervention and whether its effectiveness needs to be questioned. [10]

5

A conference paper on the Design and development of console-based gaming for balance training in Autism Spectrum Disorder Children showed the possibility of success where a console-based game was used to improve the physical balance of children with ASD. [11]

With all these promising findings there still are several gaps remaining in the field of game-based interventions and individuals with ASD, one being the need for more research into play-based interventions in an educational setting which was mentioned in the O'Keeffe and McNally paper [6]. Additionally with current technological innovations offering new avenues for intervention there is a need for more thorough evaluation framework to assess the effectiveness of these new interventions, as [10] expressed the need for this and the importance of developing such frameworks to allow future research.

Several gaps found in this area are as follows:

6

- Cognitive Skills and Game-Based Intervention

Even though many game-based interventions exist very few specifically aim to improve the cognitive functions of an individual with ASD, for instance their attention or working memory. Therefore, an actionable application gap would be to use existing techniques and design a game-based intervention that directly exercises these cognitive areas.

- User Design

Current games often don't adapt to a user's cognitive or sensory understanding of an individual with ASD, meaning using a contextual gap would be to develop a customisable game or application with adjustable settings, similar to an entertainment game but with more personalised settings for an individual with ASD.

- Real world usability and engagement testing

Majority of studies measure the cognitive outcomes in certain conditions but don't track the engagement, motivation or enjoyment during the testing, an implementation gap here would be, including the user testing and feedback loops to assess these areas.

- Accessible technology

Advances in technology setups can be expensive and complex especially for implementation therefore a mobile or tablet-based intervention would be more practical and easily accessible making this limitation gap more plausible.

3. Problem statement

Game-based interventions have shown potential for supporting individuals with autism, there is as previously mentioned a lack of tailored games that address the specific cognitive, social and emotional challenges faced by these individuals. Current interventions often fail to adapt to the individual's needs, and this project will address this gap by investigating these challenges, evaluating the current approaches and developing a prototype mini game which will assess its impact on engagement, emotional responses and interaction skills.

4. Aim & Objectives

The aim of this project is to design, develop and evaluate a tailored mobile game that supports the cognitive, social and emotional development of individuals with autism spectrum disorder by addressing their specific challenges and assessing the engagement, usability and impact.

The research objectives for this project are:

- Investigate the challenges faced by individual with ASD in the cognitive, social and emotional areas through literature review.
- Evaluate existing game-based interventions and mobile application to identify effective strategies and features which can be produced into the prototype.
- Design and develop a prototype incorporating a mini game or games which target attention, memory and executive functions with adjustable setting to allow engaging feedback.
- Assess the impact of the prototype by user engagement, user performance, possible emotional response and social interaction via user testing and feedback

5. Methodology

 8 section of the project proposal outlines the research methodology which will be adopted to achieve the projects aim and objectives, it will detail the methods and strategies which will be used to design and develop the mobile game prototype for individual with autism.

The methodology will be structured in a way so that a practical and user centered approach can be taken, ensuring both quantitative and qualitative data can be used to assess the outcomes, with  9 considerations, tools and hardware requirements considered.

5.1 Methods

This project will use a mixed method approach where the combination of quantitative and qualitative techniques will address the research objectives. This will be appropriate because it will allow the research to be captured by both the objective outcomes and the subjective experiences, the research strategy will follow both a software development and research approach allowing the implementation and evaluation of a prototype.

Quantitative data will be analysed in a descriptive statistics manner, while the qualitative feedback will be used to evaluate the usability and engagement in a thematic analysis way.

5.2 Materials

 10 The data sources include individuals with Autism and input from possible care givers, the collection of data would comprise of in game metrics a structured observation and a brief feedback survey. The ethical considerations could include consent from the participants and only present a low risk factor where the individuals involved may become stressed during participation, this can be overcome by allowing the participant to withdraw at anytime but ensuring the mini games and settings take into consideration different possible triggers.

Tools needed would be sufficient software such as unity or the MIT app inventor which would help with development of the prototype, Microsoft excel and Nvivo can be used for the data analysis while a standard mobile phone or tablet will be used for the gameplay testing.

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This methodology will ensure an evidence and user centered approach which will address the cognitive, social and emotional development needs of individuals with ASD.

6 Project Plan

Project Timeline and Milestones (October 2025 – May 2026)

Week Commencing	Task / Milestone	Details / Deliverables
WC 6 Oct 2025	Literature Review & Needs Analysis	Begin reviewing game-based interventions, identify cognitive/social/emotional challenges to determine project proposal
WC 13 Oct 2025	Finalise Proposal Draft	Prepare aim and objectives, methodology and proposal for submission.
Mon 20 Oct 2025	Project Proposal Submission	Submit completed project proposal by deadline.
Await feedback from project proposal		
Nov 2025	Game Architecture & Storyboarding	Develop wireframes, gameplay flow, and define data collection and feedback mechanisms.
WC 1 Dec 2025	User Engagement Planning	Develop evaluation plan, design feedback forms, and testing
WC 5 Jan 2026	Data Analysis & Interim Viva Preparation	Summarise preliminary research and prepare slides for Interim Viva presentation.
Thurs 15 – Fri 16 Jan 2026	Interim Viva	Present progress, prototype design concept, and development strategy.
Jan 2026	Prototype Development – Phase 1	Begin coding core mini-games (attention & memory), basic UI, and data logging.
WC 2 Feb 2026	Prototype Development – Phase 2	Add executive function mini-game, feedback/reward system, and refine gameplay.
WC 2 Mar 2026	User Testing & Data Collection	Conduct sessions with ASD participants, collect engagement and performance data.
WC 16 Mar 2026	Data Analysis & Evaluation	Analyse quantitative and qualitative data, assess usability and outcomes.
WC 6 Apr 2026	Final Adjustments	Conduct final adjustments

Week Commencing	Task / Milestone	Details / Deliverables
WC 13 Apr 2026	Final Report Writing	Compile findings, discussion, and conclusions. Prepare for final submission.
Thurs 1 May 2026	Final Report Submission	Submit final project deliverables and documentation.

Timetable will adjust dependant on feedback from project proposal and ethics results.

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FINAL GRADE

55/100

GENERAL COMMENTS

Your proposal involves working with a vulnerable population (individuals with ASD), which will require extensive ethics approval (typically 3-6 months), DBS checks, specialist training, complex recruitment, and ongoing safeguarding. This often proves unfeasible within a BSc project timeline. **Strongly recommend** reconsidering your methodology to focus on technical development with expert evaluation OR neurotypical user testing for technical validation, with clinical validation positioned as future work. This maintains your core contribution while making the project achievable.

Introduction/Aims & Objectives: 11/20

Objectives are not SMART - lacking measurable, quantitative targets (e.g., no specification of n= for participants, no performance metrics, no baseline measurements)

Background/Literature Review: 12/20

Good literature coverage with 11 references (needs more journal articles, fewer websites). Main weakness: descriptive rather than critical analysis. Missing quantitative comparisons, evaluation of methodological limitations, deeper critical engagement. Minimal ethics discussion.

Project Design/Methodology: 12/30

Methodology section significantly underdeveloped (~450 words instead of required 500) with critical omissions: no development methodology specified (Agile/Waterfall?), no risk assessment, no statistical analysis methods, vague evaluation framework

Resources/Planning: 10/15

Strong timeline with specific dates and realistic progression. Good milestone identification.

Missing detailed deliverables list, resource confirmation, supervision schedule, backup strategy.

Document Presentation: 10/15



Comment 1

Opening paragraph is too informal and anecdotal for an academic proposal. Should begin with a clear, direct statement of the research problem rather than general statistics. Academic tone required from the first sentence.



Comment 2

Dont forget to caption images, this increases navigational experience and if the image fails to load or corrupts there is some context provided



Comment 3

Good use of a peer-reviewed journal article from a reputable source (Review Journal of Autism and Developmental Disorders, 2023).

Too descriptive. What specific improvements were measured? What were the effect sizes? How did different intervention types compare? Need quantitative details and critical evaluation.



Comment 4

Excellent reference choice - this is a meta-analysis of 11 RCTs published in International Journal of Child-Computer Interaction (2022), providing strong evidence.

You mention 'improved cognitive skills' but don't specify the effect size (small: $g=0.420$) or what this means practically. Critical analysis requires you to evaluate and interpret these quantitative findings.



Comment 5

Good synthesis connecting back to earlier literature and identifying genuine research gaps that emerge from the reviewed studies.



Comment 6

Excellent identification of multiple specific research gaps with clear explanations of why each gap exists and how it could be addressed. This demonstrates strong understanding of the field.

PAGE 5



Comment 7

STRENGTH: Clear problem statement identifying the gap (lack of tailored games) and stating what you will do about it.

PAGE 6



Comment 8

No development methodology specified. Will you use Agile? Waterfall? Iterative prototyping? This is essential - you need to justify your choice of development approach with reference to software engineering best practices.



Comment 9

Such as?



Comment 10

EEK



Comment 11

no comment

PAGE 7



Comment 12

A gantt chart would have been so much easier to visualise than this

PAGE 8

PAGE 9

PAGE 10
