

UNIVERSITI TEKNOLOGI MARA

**EXPLORING THE EFFICACY OF
DIGITAL ART THERAPY IN
ENHANCING SOCIAL
COMMUNICATION FOR AUTISTIC
CHILDREN IN MALAYSIA**

SARAH BINTI AHMAD RIZAL

MA

April 2026

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SARAH BINTI AHMAD RIZAL

Thesis submitted in fulfilment
of the requirements for the degree of
Master of Art and Design

Faculty of College Creative Arts

April 2026

CONFIRMATION BY PANEL OF EXAMINERS

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ABSTRACT

Digital Art Therapy (DAT) integrates traditional art-making with digital technologies to support emotional expression, social communication, and engagement in children with Autism Spectrum Disorder (ASD). In Malaysia, where conventional therapies may face accessibility and engagement challenges, DAT offers a flexible and inclusive approach. This study investigates the effectiveness of DAT for children aged 6–10 at the National Autism Society of Malaysia (NASOM) Titiwangsa branch. Using a mixed-methods design, qualitative observations, interviews, and artwork analyses were combined with quantitative progress assessments to evaluate therapy outcomes. Findings indicate that DAT enhances emotional regulation, social communication, and creative engagement, particularly for non-verbal participants. The research also identifies digital tools, artwork types, and design elements that optimize therapeutic benefits. The study contributes to the development of structured DAT programs in Malaysia and informs policy and practice for integrating digital art interventions in healthcare and education. It highlights the potential of digital art as a culturally adaptable, accessible, and evidence-based therapeutic tool for neurodiverse children.

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LIST OF ABBREVIATIONS

Abbreviations

ABC	Aberrant Behaviour Checklist
ADHD	Attention Deficiency Hyperactive Disorder
AOP	Art on Prescription
AR	Augment Reality
ASD	Autism Spectrum Disorder
COAT	Context Outcomes Art Therapy
DAT	Digital Art Therapy
EFT	Emotion Focused Therapy
EXA	Expressive Art Treatment
GMAHN	Greater Manchester Art and Health Network
MATTISE	Multicentre Study of Art Therapy in Schizophrenia: Systematic Evolutions
K/S	Kinaesthetic/Sensory
NASOM	National Autism Society of Malaysia
NVIVO	NVivo is a Qualitative Data Analysis (QDA) Computer Software Package Produced by Lumivero (Formerly Called QSR International)
PDF	Portable Document Format
PT	Psychological Therapy
PTSD	Post-Traumatic Stress Disorder
SPAC	Special Purpose Acquisition Company

SQ	Social Quotient
VR	Virtual Reality

CHAPTER 1

INTRODUCTION

1.1 Research Background

Digital Art Therapy (DAT) is an emerging field that leverages technological platforms alongside traditional art-making processes to foster emotional expression, communication, and social engagement. In Malaysia, this approach is gaining traction as a promising alternative to conventional medication and behavioural therapies for the growing number of children with Autism Spectrum Disorder (ASD).

The foundational concept of art therapy involves integrating psychotherapeutic techniques with the creative process to enhance mental health (American Art Therapy Association, 2023). DAT extends this by using digital mediums, such as tablets, drawing applications, and Virtual Reality (VR), which are often inherently motivating and familiar to neurodiverse children. These tools are particularly valuable for non-verbal individuals, offering them a means to externalize inner thoughts and communicate emotions symbolically.

Research validates the benefits of this modern approach. For instance, studies indicate that digital art tools help promote emotional regulation and improve communication among autistic participants (Jalambadi, 2019). Furthermore, digital drawing activities have been shown to enhance attention spans, social connection, and hand-eye coordination (Cheng et al., 2020).

1.2 Types of Art Therapy

To understand how art therapy is transformed in a digital context, it is helpful to first examine its two primary foundational philosophies.

i) Art as Therapy

This approach, often associated with pioneer Edith Kramer, posits that the creative process itself is the primary source of healing. The focus is on the *act* of making art. The sensory experience of manipulating materials, the emotional release in the act of creation, and the sense of mastery gained from completing a piece are all considered

therapeutic (Kramer, 1971). The therapist's role is more of a facilitator, creating a safe space for this self-understanding to occur. In its digital form, this principle are seen in the use of drawing apps or interactive painting tools. The immediate sensory feedback, the state of "flow" achieved, and the creative control provided by the digital medium are as seen as inherently beneficial.



Figure 1.1 A Mother-Daughter Dyad Explores Differing Gender Identities Through Art (Children, 2022, 9, 1320)

ii) Art Psychotherapy (Art in Therapy)

This second major approach, rooted in the work of Margaret Naumburg, is more aligned with psychoanalytic theory. Naumburg viewed art as a form of "symbolic speech" that provides a direct path to the unconscious (Naumburg, 1958).

In this model, the artwork is a communication bridge between the client and the therapist. The therapy lies not just in the making, but in the *interpretation* and dialogue *about* art. The final product seen as a collection of symbols, narratives, and emotional meanings to be discovered.

In Digital Art Therapy (DAT), this extends to the joint interpretation of digital imagery, the analysis of compositions created in virtual reality, and the discussion of the child's engagement patterns with technology.

By integrating both approaches, DAT forms a hybrid therapeutic model. It successfully aligns the healing power of creative exploration with the deep psychological insight gained from interpretation, creating a unique synthesis of art, science, and technology.

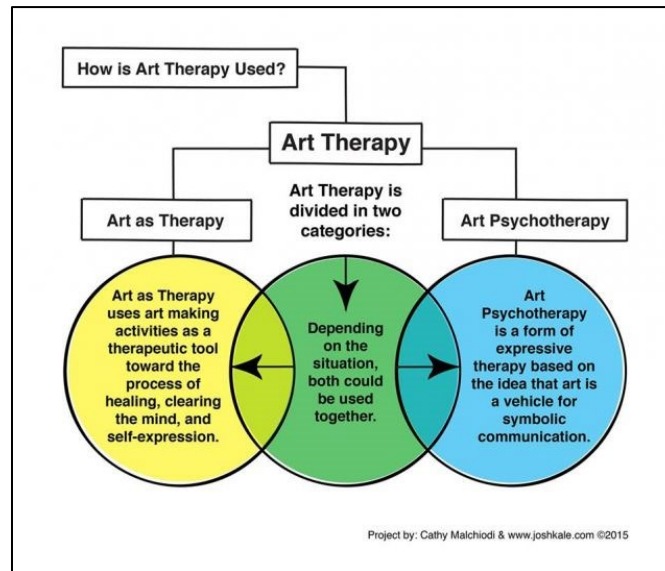


Figure 1.2 Art Therapy: It's Not Just an Art Project. Psychology Today (Kale, 2015)

1.2.1 Technology

The word "technology" originates from the Greek terms *technē* (meaning 'art' or 'craft') and *logos* (meaning 'word' or 'speech'). In ancient Greece, the term essentially meant a discussion about the arts and crafts.

When it entered the English language in the 17th century, "technology" was used to describe a discussion of the applied arts. Over time, this meaning shifted, and the term began to refer to the applied arts themselves, rather than just the discussion of them.

By the early 20th century, the definition of technology had expanded significantly beyond just tools and machines to include a wide range of processes, means, and ideas. By the middle of the century, this led to the broad definition of technology as "the means or activity by which [humans] seek to change or manipulate [their] environment" (Encyclopædia Britannica, 2024).

Following this modern, expansive definition, the materials and tools used within art therapy, such as brushes, clay, and paints, can also be understood as a form of technology.

1.2.2 Digital Technology

The terms "digital technology" and "social media" are in a state of constant evolution, with definitions that must be continually updated to encompass a vast range of media. These terms refer to the internet, mobile devices, virtual and augmented realities, and various forms of textual, voice, and video communication.

1.2.3 Digital Art Therapy

A defining feature of this digital age is the increased access to personal information. While this can promote openness and democratic dialogue, it concurrently raises significant fears of privacy invasion and the potential for totalitarian surveillance, famously conceptualized as "Big Brother" in George Orwell's *Nineteen Eighty-Four* (Orwell, 1949). These privacy and surveillance issues form a core part of the ethical considerations that art therapists must address when using digital media and services in their practice

The rapid assimilation of computers, the internet, and mobile devices into daily life has necessitated comprehensive changes in professional practice worldwide. Prominent international bodies, such as the British Association of Art Therapists and similar American associations, were prompted to issue detailed guidelines governing online practice.

As Malaysian art therapy practices mature, the integration of digital media necessitates consideration of these established international models. While some practitioners globally maintain a preference for traditional, natural materials and environmental art, akin to the practices of contemporary artists like Andy Goldsworthy and Richard Long, the dominant academic perspective, rooted in the foundational work of American scholars, views digital media differently.

Shaun McNiff (2018) advocates for digital media to be understood as existing on a continuum of art materials within art therapy. He argues that a distinct discipline of 'Digital Art Therapy' is unnecessary, instead urging practitioners to focus on the inherent 'healing qualities' of the materials, including digital tools.

In this progressive understanding, which is increasingly relevant to Malaysian clinical settings, digital media is not conceptualized as separate, alien, or "other."

Rather, it is viewed as a natural, non-threatening extension of the traditional art materials available to facilitate therapeutic goals (McNiff, 2018).

1.2.4 Digital Art Therapy in Adult Autism

The potential for integrating digital media as an expressive modality within art therapy for individuals with Autism Spectrum Disorder (ASD) is now widely recognized globally. This recognition is supported by recent international clinical initiatives, which provide valuable models for local adaptation. A notable example is the innovative group digital art therapy program established by the Paparella Innovative Arts Center at Lawson Ministries Hamilton (Darewych, 2021).



Figure 1.3 Art Therapy: The Fast Track to Healing and Rehabilitation (Vsee, 2020)

This international program, which targets adults with medium- to high-functioning ASD, was strategically designed to address core developmental areas that are highly relevant to clinical practice in Malaysia. These objectives include maintaining imaginative thinking, strengthening executive function skills, expanding digital media literacy, and promoting social engagement capabilities within the group setting.

This clinical practice model provides a comprehensive framework that is highly relevant for adapting services within the Malaysian context (Darewych, 2021). The detailed information regarding the digital equipment and applications utilized, the specific role of the art therapist during sessions, and the illustration of art-based interventions can serve as a crucial guide. Ultimately, the article presents current

program evaluation outcomes, offering a summary of the observed benefits and limitations associated with this innovative approach to digital art therapy, providing a valuable blueprint for local practitioners and institutions seeking to establish similar programs in Malaysia.

1.2.5 The Type of Artwork in Digital Art Therapy

The various digital art therapy modalities are differentiated by the hardware, software, and creative processes they employ. Each offers unique clinical benefits, engaging distinct psychological mechanisms and motor skills that can be leveraged for specific therapeutic goals. The following table summarizes the primary digital art modalities used in contemporary practice, adapted from the foundational work in the field (Luce & Stone, 2022).

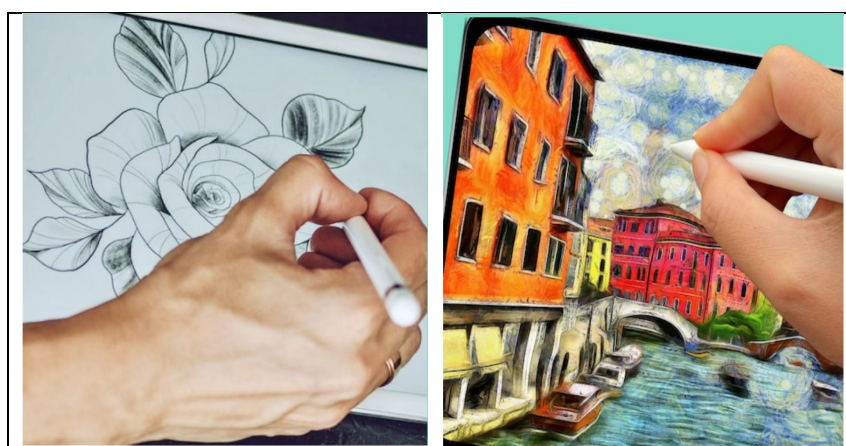


Figure 1.4 Parenthetical (Digital Art Classes for Adults, n.d.)

i) Digital Painting and Drawing

This foundational modality utilizes specialized tablets and stylus pens in conjunction with raster graphics software, such as Photoshop or Procreate. While closely simulating traditional drawing, it provides significant advantages, including immediate color selection, enhanced layering capabilities, and non-destructive editing. Clinically, this method is excellent for facilitating **direct expression** and promoting **cognitive control**. The reduced consequence of error, due to the ease of correction, lessens frustration and directly supports the development of **fine motor skills** and dexterity.

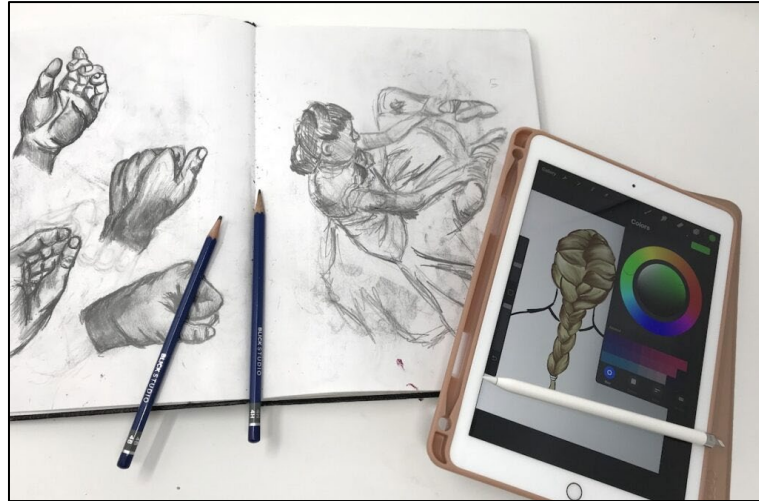


Figure 1.5 Digital vs. Traditional Art: Is One Better Than the Other? The Art of Education University (Schukei, 2019)

ii) Digital Collage and Photo Manipulation

This modality involves the sophisticated alteration, selection and combination of photographs, text and found digital images using editing softwares. This practice is highly effective for identity exploration, processing complex internal narratives and addressing trauma. By physically deconstructing of recontextualization visual memories, the client gains a sense of distance and control over emotionally charged material.



Figure 1.6 Digital Collage. Expressive Art Workshops (Expressive Art Workshops, n.d.)

iii) Vector and Geometric Art

Vector and geometric art focuses on creating precise, structured, line-based imagery and mathematical designs, often using programs like Adobe Illustrator. This includes the creation of complex digital mandalas. This modality is particularly valuable for clients seeking structure, control, or self-regulation. This practice rigorously engages executive function skills and requires careful planning and precision, thereby reinforcing internal organization and containment.

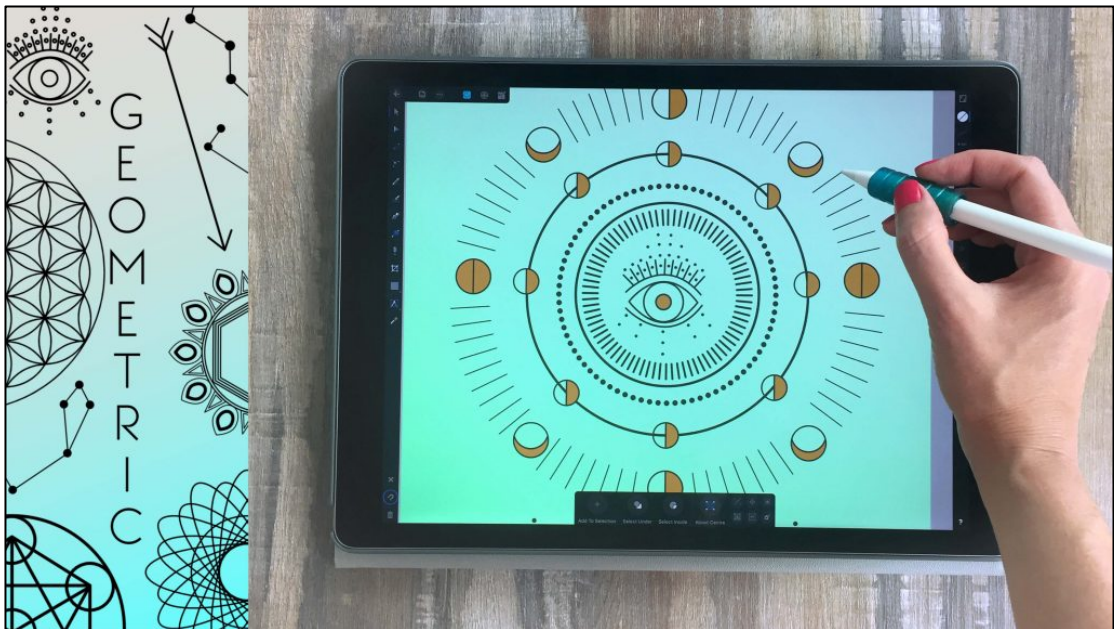


Figure 1.7 What are Vectors and Do You Need to Use Them? Liz Kohler Brown (Brown, n.d.)

iv) Interactive and Generative Art

Interactive and generative art is created using code or specific software where the visual output responds to external, real-time input, such as sound, biofeedback, or movement. This unique modality provides immediate, non-judgmental feedback to the client's internal state or actions. It is particularly useful for individuals working on emotional self-regulation and increasing awareness of their physical or emotional impact on the external environment.

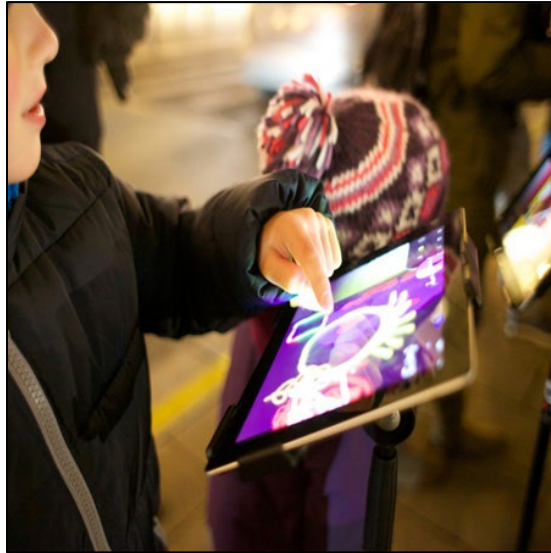


Figure 1.8 Children's Interactive iPad Art. Scarlett Entertainment (Scarlett Entertainment, n.d.)

1.3 Motivation for This Research

In Malaysia, the integration of technology into mental healthcare remains at an early stage, with limited exploration of creative and art-based digital interventions. Digital Art Therapy (DAT) offers an innovative pathway that merges the fields of art, design, and psychological science to promote emotional expression, cognitive regulation, and social communication. This interdisciplinary bridge aligns with the global shift towards Digital Therapeutics (DTx), a movement that redefines how digital tools can deliver clinically validated treatments (Dewan, 2023).

A key pioneer in DTx, Pear Therapeutics, successfully introduced the first FDA-approved prescription digital therapeutics (PDTs), reSET® for substance use disorder and Somryst® for chronic insomnia, which demonstrated that digital applications could serve as legitimate medical treatments (Pear Therapeutics, 2020). Although the company filed for bankruptcy in 2023, its work has left a lasting legacy by establishing a new model of digital healthcare delivery (O'Leary, 2023). This global movement highlights the potential for art- and design-driven platforms such as DAT to expand beyond traditional therapy spaces and enter formal healthcare ecosystems.

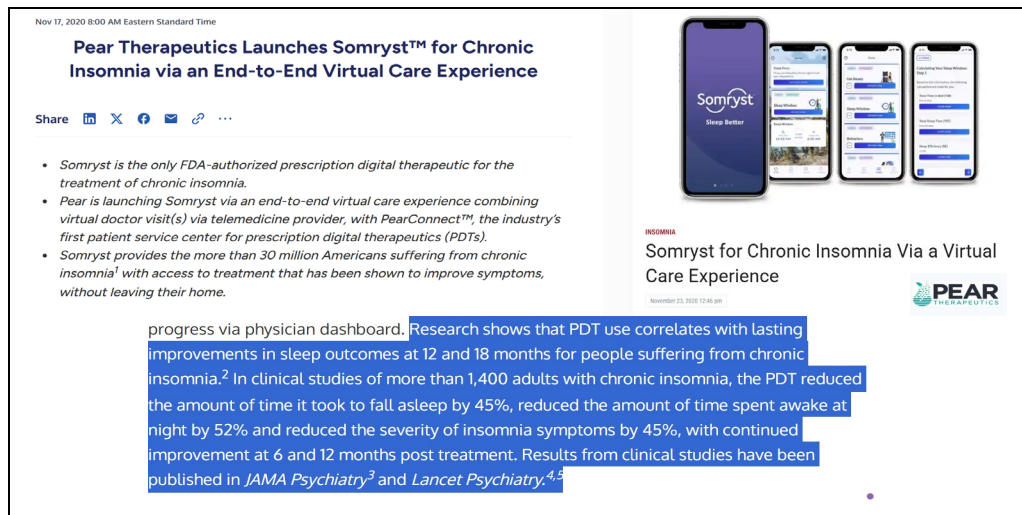


Figure 1.9 Overview of Somryst Prescription Digital Therapeutic for Chronic Insomnia (Morin, 2020)

From an art and design perspective, this research is motivated by the need to validate creative disciplines as evidence-based contributors to national well-being. While digital health in Malaysia has advanced in telemedicine and AI diagnostics, art and design remain underutilized in therapeutic innovation. DAT seeks to address this gap by demonstrating how digital creativity through drawing, visual storytelling, and interactive design can become a form of structured intervention for individuals with autism spectrum disorder (ASD).

By situating this study within Malaysia's creative economy and healthcare transformation goals, the research advocates for cross-sector collaboration where designers, artists, and therapists work alongside clinicians to co-develop inclusive and culturally responsive digital interventions. This not only empowers creative practitioners but also aligns with the Ministry of Health and Ministry of Higher Education's vision for integrated, technology-enhanced mental health frameworks (MOH, 2022). Ultimately, this research aims to position art and design not merely as aesthetic practices but as critical agents of healing, innovation, and national development.

1.4 Problem Statement

Despite its growing relevance, art therapy in Malaysia continues to face skepticism due to limited empirical support and a lack of official recognition within the

national healthcare system. Traditional therapy methods are often inaccessible to autistic children who struggle with sensory processing, focus, or verbal communication.

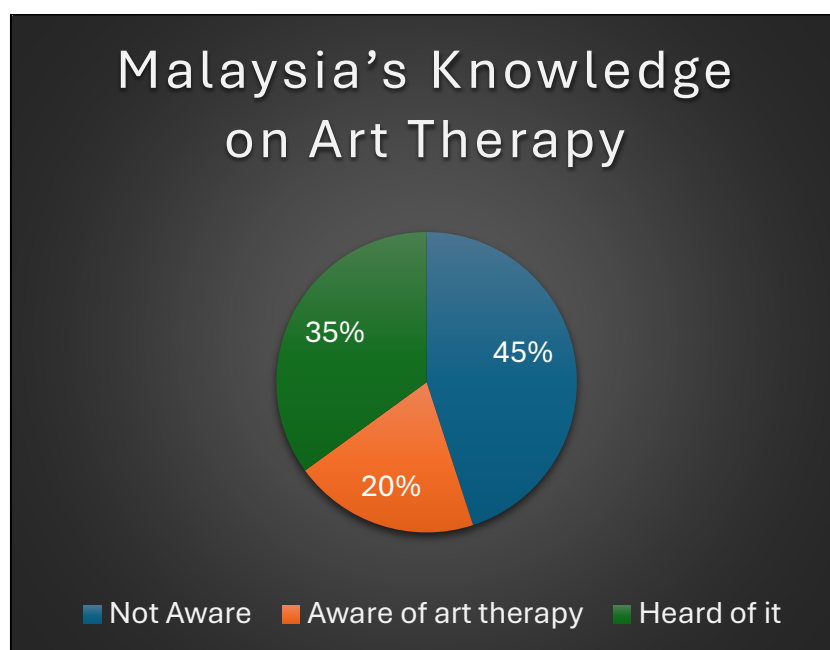


Figure 1.10 Malaysian Allied Health Professionals' Awareness of Art Therapy's Neurological Benefits by Brain Region (2020-2024)

At the same time, there has been a noticeable rise in screen and smartphone dependency among children, including those on the autism spectrum. Studies suggest that excessive screen time can negatively affect social communication, emotional regulation, and cognitive development, especially among neurodiverse children (Domingues-Montanari, 2017; Cho et al., 2021). However, digital devices also offer comfort, structure, and predictable sensory experiences for autistic individuals. When used thoughtfully, they can become valuable tools in a therapeutic setting.

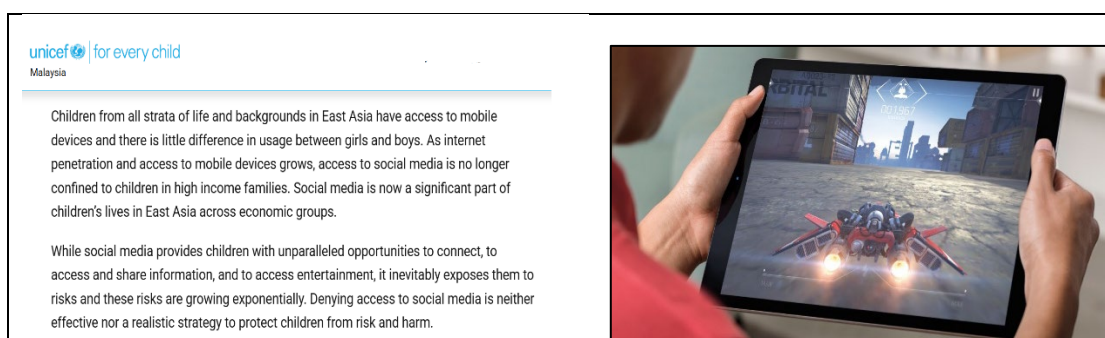


Figure 1.11 Our Lives Online: Use of Social Media by Children & Adolescents in East Asia – Malaysia Edition. UNICEF Malaysia (United Nations Children's Fund (UNICEF), 2020, August)

The COVID-19 pandemic has only deepened children's reliance on screens, as many forms of education and therapy have shifted online. This situation highlights both the need and the opportunity for alternative approaches. It also raises an important question: can digital tools be used in a deliberate and therapeutic way to reduce the risks of screen addiction while encouraging creative expression and meaningful communication?

Although international research has explored the potential of digital art therapy (DAT) to support emotional and social development, there is a lack of local studies in Malaysia. This gap makes it essential to evaluate how DAT can be adapted and applied in Malaysian contexts, especially for autistic children who are already familiar and comfortable with digital environments.

1.5 Research Questions

Autism Spectrum Disorder (ASD) often involves difficulties in communication, emotional expression, and social interaction, making flexible and engaging therapies important. Art therapy supports ASD patients by offering a non-verbal way to express feelings, improve focus, and build confidence. With the rise of digital tools, art therapy can now be conducted through tablets, apps, and interactive media. Digital art therapy may be especially suitable for ASD patients because it provides structured, visually stimulating, and customizable experiences. However, more research is needed to confirm its effectiveness and determine what digital art forms and design features best support therapy outcomes. Therefore, this study addresses the following research questions.

- i) Is digital art therapy effective for ASD patients?
- ii) What is the type of artwork would be used in digital art therapy?
- iii) What are the influences of principles and elements of design that will be used in affecting the therapy on the ASD patients?

1.6 Research Objectives

The research explores digital art therapy for individuals with ASD, focusing on advanced Expressive Art Treatment (EXA) to enhance emotional communication and

digital art comprehension. It examines improvements in kinaesthetic movements and motor skills and investigates design concept to aid communication among nonverbal autistic individuals, aiming to offer innovative therapeutic strategies.

- i) To evaluate the effectiveness of digital art therapy for ASD patients.
- ii) To examine the type of artwork that would be used in digital art therapy.
- iii) To explore the influence of design principles and elements in digital art therapy on ASD patients.

1.7 Significance of Study

This study is significant because it addresses an important gap in Malaysian therapeutic and educational systems by integrating art-based healing with emerging digital innovation. It emphasizes inclusivity for autistic children, particularly those who are non-verbal, who often struggle with verbal communication and emotional expression (American Psychiatric Association, 2022). Research shows that digital tools can support communication and emotional development in autistic children by offering predictable, visually structured and accessible modes of interaction (Fletcher-Watson & Happé, 2019).

The rise of screen and smartphone dependency among Malaysian children has become a pressing concern. UNICEF (2020) reports that children and adolescents in Malaysia engage heavily with online platforms and begin using digital devices at increasingly younger ages. This pattern of early and frequent digital engagement heightens the risks of emotional dysregulation, attention difficulties and reduced interpersonal communication. These risks are even more significant for children with ASD, who already face challenges in communication and sensory processing. Excessive and unstructured screen exposure has been linked to behavioural dysregulation, emotional instability and reduced social interaction (Domingues-Montanari, 2017; Cho et al., 2021).

However, many autistic children also demonstrate a strong affinity for digital media due to its consistency, controllability and predictable sensory input (Kagohara et al., 2013). Instead of viewing this tendency solely as a problem, this study reframes it as a potential therapeutic advantage. By redirecting screen engagement into guided, expressive and purposeful digital art-making, digital art therapy transforms a possible

source of overstimulation into a tool that encourages emotional expression, self-regulation and meaningful communication (Johnson & Lee, 2024).

This research aligns with Malaysia's broader digital transformation goals. National commitments, such as the Ministry of Health Malaysia's push for digital mental health solutions and the MyDigital 2021–2030 ambitions, highlight the importance of integrating evidence-based digital tools within educational and healthcare systems (Economic Planning Unit, 2021). Digital art therapy complements these national priorities by combining creativity, mental health support and digital technology into a child-centred therapeutic approach.

The findings of this study are expected to promote stronger collaboration among educators, psychologists and digital artists. Such interdisciplinary partnerships can lead to the development of accessible, culturally grounded and evidence-based therapeutic programs for neurodiverse children in Malaysia. By merging art therapy with digital tools, this study supports Malaysia's movement toward innovative mental health care and prepares the country for a future where digital creativity and therapeutic intervention are closely connected.

1.8 Importance of Study

DAT promotes creativity, emotional regulation and social interaction in children with ASD. Research shows that digital artmaking can strengthen emotional expression, improve affective regulation and enhance social responsiveness by providing a structured yet flexible medium for communication (Kuo et al., 2021; Moon, 2016). By leveraging interactive and visually engaging digital tools, DAT increases motivation and sustains participation, which are often challenging areas for autistic children (Fletcher-Watson & Happé, 2019). These tools also support self-expression for children who struggle with verbal communication, allowing them to communicate through symbols, colours and digital imagery (Johnson & Lee, 2024).

The outcomes of this research could contribute to:

- i) The development of structured DAT modules for special education institutions, supported by findings that digital interventions improve accessibility and learning engagement among children with ASD (Kagohara et al., 2013; Knight et al., 2019).

- ii) Policy recommendations for integrating art-based digital interventions into public healthcare, aligning with increasing global evidence that digital mental health tools offer therapeutic value, especially for neurodiverse populations (UNICEF, 2020; Economic Planning Unit, 2021).
- iii) Cross-disciplinary collaboration between art, psychology and technology sectors, reflecting literature that emphasizes the importance of merging creative arts, therapeutic science and digital innovation to create effective interventions for ASD (Huri & Yilmaz, 2020; Zubala et al., 2023).

1.9 Scope of Study

This research focuses on Malaysian children aged 6 to 10 diagnosed with ASD, a developmental stage where early intervention is most effective for improving communication, emotional regulation and social interaction (American Psychiatric Association, 2022; Lord et al., 2020). Participants were recruited from the National Autism Society of Malaysia (NASOM), Titiwangsa branch, which provides structured early intervention and inclusive learning environments that support both behavioural and creative therapeutic work. Community-based settings such as NASOM are considered ideal sites for therapeutic research because they allow naturalistic observation and authentic behavioural responses, particularly among autistic children (Lyons & Fitzgerald, 2019).

The study adopts a mixed-methods design, combining qualitative and quantitative approaches to obtain a deeper, multi-dimensional understanding of DAT's therapeutic impact. Mixed-methods research is widely endorsed in art-therapy and ASD studies because it captures both measurable behavioural changes and rich expressive data derived from visual and emotional content (Creswell & Plano Clark, 2018; Kapitan, 2010).

The qualitative component includes non-intrusive observation, semi-structured interviews with caregivers and facilitators, and systematic artwork analysis. These methods provide insights into emotional expression, engagement patterns and symbolic communication that may not be observable through verbal reports alone (Malchiodi, 2012; Moon, 2016).

The quantitative component involves structured progress assessments and rating scales that measure observable behavioural changes, communication attempts, attention, emotional regulation and session-based engagement. Quantitative assessments are important for documenting measurable outcomes and establishing evidence for therapeutic effectiveness in ASD interventions (Kuo et al., 2021; Knight et al., 2019).

By integrating these two methodological perspectives, the research aims to produce a comprehensive understanding of how Digital Art Therapy (DAT) supports emotional, communicative and behavioural development among autistic children in Malaysia. This approach ensures that both the artistic process and observable behavioural progress are captured, providing reliable and meaningful evidence for the effectiveness of DAT as a therapeutic tool.

1.10 Limitation

DAT explores the application of smart technology such as the iPad, styluses and VR helmets for individuals with ASD. These tools allow for greater interactivity and accessibility in therapy with ASD patients, which might be found laborious and restrictive through traditional therapeutic approaches. For many children with ASD, engaging with a therapist can feel like an unpleasant experience, but the inclusion of digital tools affords them a broader repertoire of expressive tools they find more natural as their means of expression, and may also enhance their engagement with therapy in more enjoyable ways where they can feel safer to explore their creativity and emotions. (Dong H Cheng et al, 2020)

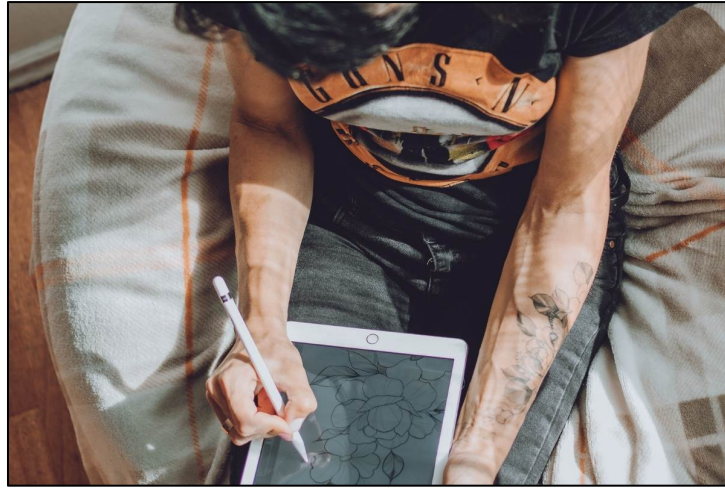


Figure 1.12 The Pros and Cons of Digital Art (ARTmob, 2022, June 16)

However, there were many complications to this study, especially during the COVID19 pandemic, with the major issue being lower numbers of participants who otherwise would have undergone the therapy sessions in person as planned. Safety concerns, unsurprisingly, reduced parent caregiver confidence in bringing their child to a clinical or group setting and thus, it was more challenging to conduct sessions as initially intended. A rise in concerns around surfaces and equipment, including the need for physical contact with iPads and VR helmets, further raised safety and hygiene issues, which also had to be considered. Such challenges only highlight the additional importance of solid strategic planning, collaboration and behaviour integration between therapists, families and healthcare. (Rahman,2022.)

It does call for flexibility and innovation. Therapists were able to adapt to fit the changing circumstances: ‘some therapists utilised new technological tools, such as online audio or video sessions with the use of digital platforms; others found ways to sanitise their tools between uses, or involved caregivers (such as parents or siblings) to operate the tools so that there would be physician supervision from a distance.’ Family involvement was a common and critical factor: ‘In many cases, with thorough planning beforehand, and with family observation and input through regular follow-ups, strategies were deployed by the therapists and their teams to enable progress.’ By recalibrating how therapy could be administered within the context of difficulties, this ‘proactive’ study highlighted that, with creativity and collaboration between therapists, carers and patients, progress could still be accomplished even when the circumstances made it difficult.

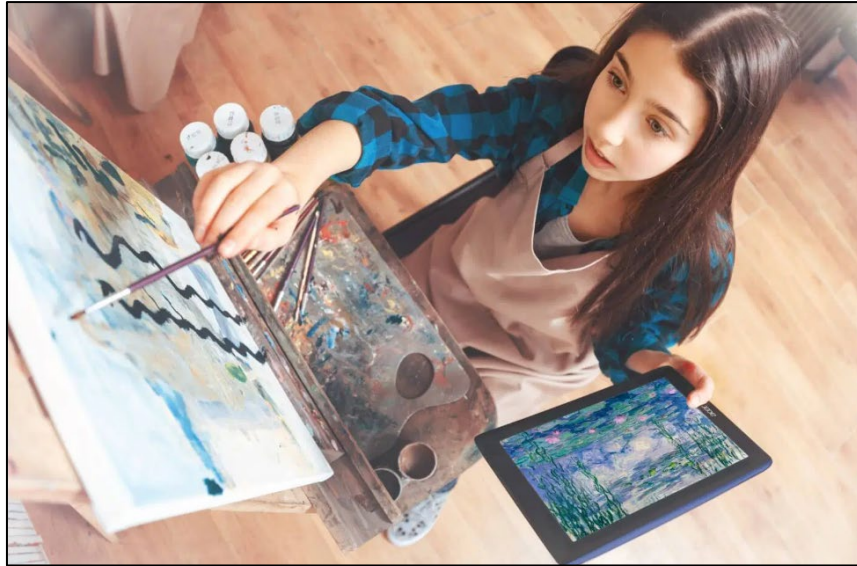


Figure 1.13 In the Art Classroom: How Technology is Changing It. Acer for Education (Acer, n.d.)

Technological obstacles notwithstanding, the findings are heartening. Not only does combining SBM with technology make therapy more interesting for ASD patients, it might make it easier to eventually extend access to more kids who don't respond well to conventional therapies and who might be more at ease communicating onscreen. Overall, the results are a sign that DAT could eliminate the barriers of access to therapy and be widely beneficial to people with ASD. However, it will take a significant level of planning and collaboration to achieve.

1.11 Assumption

In conducting this study, several assumptions are established to ensure the research design, data collection and interpretation are grounded in realistic expectations. Assumptions are necessary in qualitative and mixed-method studies to acknowledge conditions that cannot be fully controlled but are reasonably expected to hold true (Creswell & Plano Clark, 2018). In art therapy research, especially involving neurodiverse children, these assumptions help clarify the therapeutic context and the operational conditions that support reliable evaluation (Kapitan, 2010; Malchiodi, 2012). The following assumptions guide this study:

- a) **Participants and caregivers have access to and can effectively use technology** such as iPads and VR helmets, which aligns with evidence showing that children with ASD often respond positively to digital interfaces (Kagohara et al., 2013; Fletcher-Watson & Happé, 2019).
- b) **A consistent and calm therapeutic environment is maintained**, reflecting best practices in ASD interventions where structured and low-sensory environments support regulation and engagement (Lord et al., 2020).
- c) **Participants are willing to engage in digital art therapy**, an assumption supported by literature indicating that many autistic children show strong motivation when interacting with digital creative tools (Kuo et al., 2021).
- d) **A level of homogeneity in ASD diagnosis among participants is assumed**, which is important for drawing meaningful conclusions in clinical and behavioural research (American Psychiatric Association, 2022).
- e) **Digital art therapy is assumed to be beneficial for emotional, cognitive and social development**, based on established findings showing positive outcomes from digital expressive therapies (Moon, 2016; Johnson & Lee, 2024).
- f) **Data collection methods are assumed valid and reliable**, consistent with recommendations for mixed-method research that combines observational, qualitative and quantitative assessments for neurodiverse populations (Creswell & Plano Clark, 2018; Knight et al., 2019).

1.12 Ethical Considerations

The Ethical UiTM Committee ensures adherence to ethical standards in the research. It reviews protocols, ensures informed consent, maintains confidentiality, and assesses risks of digital technology use, emphasizing cultural sensitivity.

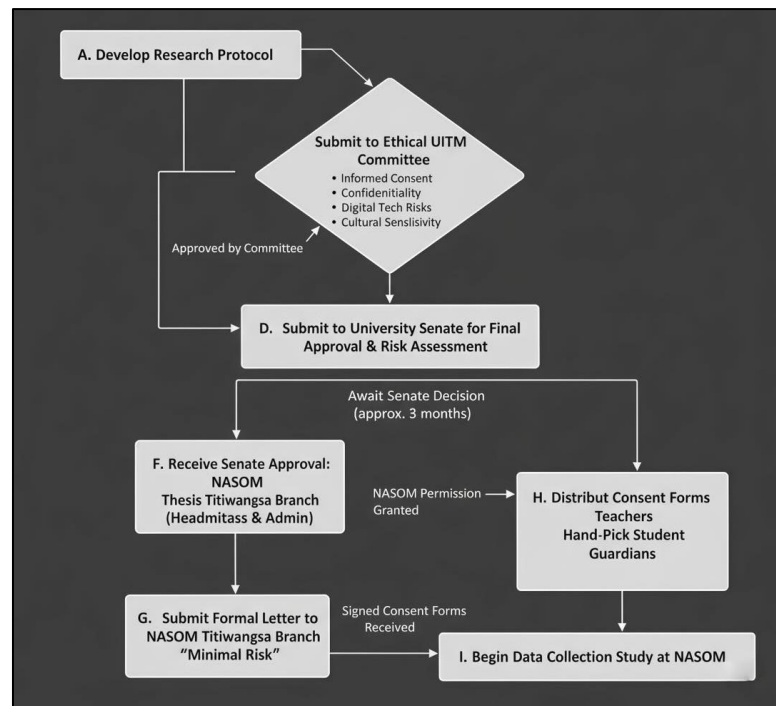


Figure 1.14 Research Data Collection Process

1.12.1 Formal Approval and Risk Assessment

Following the initial review by the Ethical UiTM Committee, the research protocol was submitted to the **University Senate** for final institutional approval and official risk assessment. After a mandatory waiting period of approximately **three months**, approval was granted, and the thesis was officially classified as a **Minimal Risk** to the participants. This clearance signifies institutional endorsement to commence external data collection.

#	PART	INCOMPLETE INFORMATIONS
1.	Part A: Project Details	Completed
2.	Part B: Members	Completed
3.	Part C: Research Risk	Completed
4.	Part D: Participant Form	Completed
5.	Part E: Supporting Documents	Completed
	Part E: Clinical Trials Documents	

☒ I hereby confirm that the information provided herein is accurate, correct and complete and that the documents submitted along with this application form are genuine. With this, I will comply with the ethical principles as appropriate and approved by the Research Ethics Committee of

Figure 1.15 Ethics Checklist and Declaration

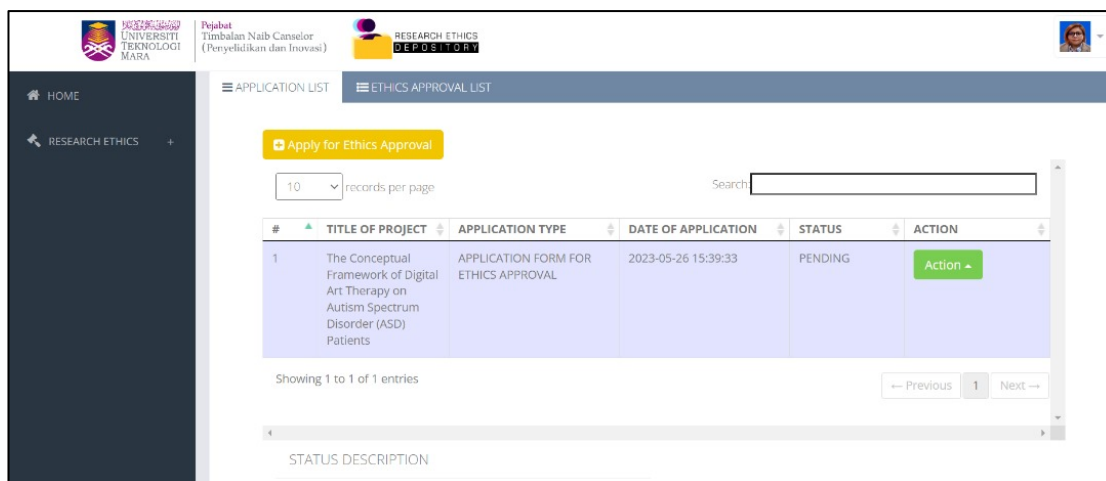


Figure 1.16 Ethics Submission



Figure 1.17 Ethics Approved by the Senate of Research Ethical Depository (RED)
UiTM

1.12.2 Data Collection Logistics and Consent

With Senate approval secured, a formal letter detailing the study's objectives and methodology was submitted to the **Headmistress and Administration of the NASOM Titiwangsa Branch** to gain permission to conduct the data collection study on-site.

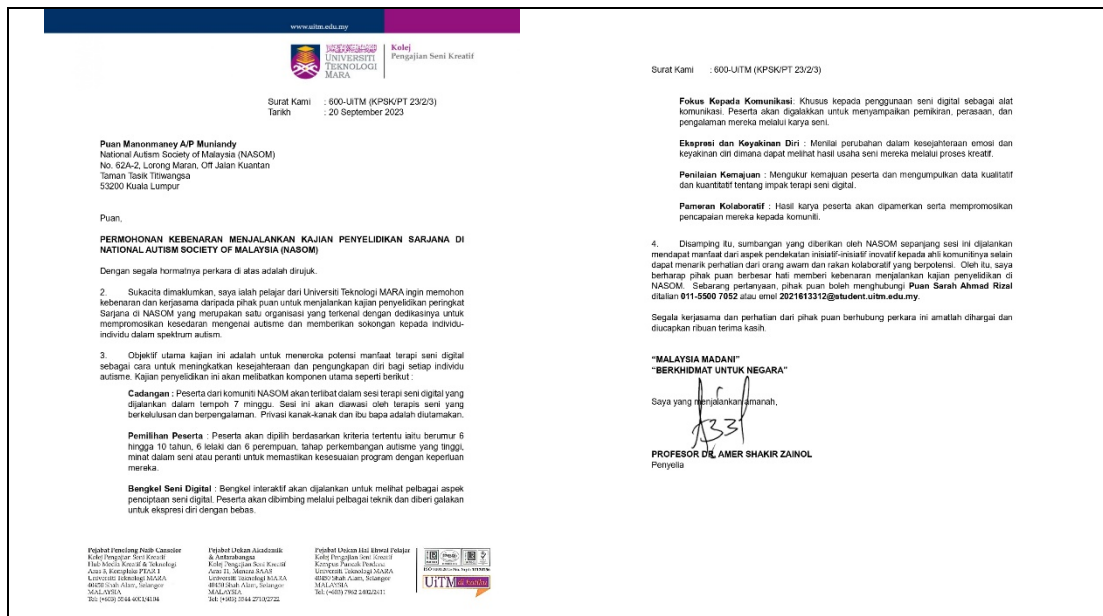


Figure 1.18 Permission Letter Addressed to the Headmistress of NASOM

Subsequently, a specific cohort of students was identified for observation and data collection. Prior to participant selection, a brief proposal and detailed explanation of the study's objectives, interventions, and data collection schedule was provided to the Headmistress. This document, which included a flowchart to visually clarify the sequence of the therapeutic intervention and the ethical approval process, ensured the Headmistress had a complete and transparent understanding of the research.

1.12.3 Ensuring Institutional Endorsement and Transparency

The act of submitting a detailed proposal and explanation, complemented by a flowchart, served several essential functions beyond merely gaining access:

- Site Gatekeeping:** By providing the Headmistress and Administration with a brief proposal and visual flowchart, the researcher ensured that the site's leadership fully comprehended the study's objectives, the therapeutic model, and the data collection schedule. This high level of transparency is critical when introducing new interventions, like digital art therapy, into an established special education setting.
- Informed Institutional Consent:** The flow chart visually clarified the ethical chain of command (from UiTM Senate to NASOM), providing confidence that the research complied with external university mandates. This detailed

communication secures not just permission, but active institutional endorsement of the research.

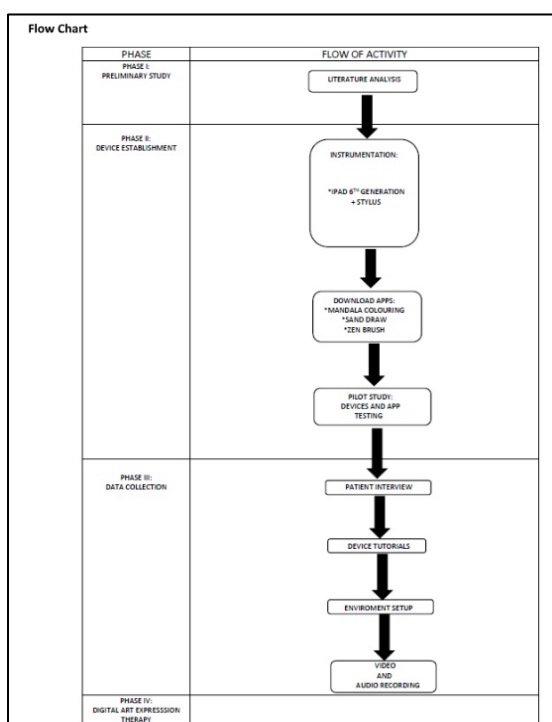


Figure 1.19 Flowchart of the Ethical Approval and Data Collection Protocol

1.12.4 The Implications of Purposive Participant Selection

The decision to have the participants **hand-picked** by the Headmistress and teachers represents a methodological choice known as **purposive sampling** guided by expert knowledge.

- i) **Maximizing Clinical Relevance:** This approach ensures that the students selected for the three-month activity possess the most appropriate characteristics (e.g., specific functioning level, co-occurring challenges, technology exposure) based on the pre-established inclusion criteria. This maximizes the **clinical relevance and feasibility** of the intervention results.
- ii) **Navigating Selection Bias:** While expert selection ensures clinical suitability, it is important to acknowledge that this process introduces **selection bias**. The results, therefore, are highly specific to this cohort and must be interpreted cautiously, as they may not be readily generalizable to the entire ASD population at the center or to other NASOM branches.

REC 4/ 2019/RI Rev. 2 (2020)

Research Ethics Committee
Research Management Centre
Universiti Teknologi MARA
40450 Shah Alam
Tel: 03 – 5544-8080, Fax: 03 – 5544-2090/2767

Participant Information Sheet

Research Title
(State)

Introduction of Research
(Maximum of 300 words using non-expert language/terms)

Purpose of Research
(Maximum of 150 words using non-expert language/terms)

Research Procedure
(Using non-expert language/terms)

Participation in Research
Your participation in this research is entirely voluntary. You may refuse to take part in the study or you may withdraw yourself from participation in the research at any time without penalty.

Benefit of Research
(State the benefit to participants)

Information obtained from this research will benefit the individuals, researchers, institution and community for the advancement of knowledge and future practice.

Research Risk
(State the risks involved)

Confidentiality
(Include the confidentiality clause provided below)

Your information will be kept confidential by the investigators and will not be made public unless disclosure is required by law.

By signing this consent form, you will authorize the review of records, analysis and use of the data arising from this research.

If you have any question about this research or your rights, please contact (state the name of the investigator) at (state the direct telephone number of the said investigator).

REC 4/ 2019/RI Rev. 2 (2020)

Consent Form¹

To become a participant in the research, you or your legal guardian are required to sign this Consent Form.
I herewith confirm that I have met the requirement of age and am capable of acting on behalf of myself / as a legal guardian as follows:

1. I understand the nature and scope of the research being undertaken.
2. I have read and understood all the terms and conditions of my participation in the research.
3. All my questions relating to this research and my participation therein have been answered to my satisfaction.
4. I voluntarily agree to take part in this research, to follow the study procedures and to provide all necessary information to the investigators as requested.
5. I may at any time choose to withdraw from this research without giving any reason.
6. I have received a copy of the Participant Information Sheet and Consent Form.
7. Except for damages resulting from negligent or malicious conduct of the researcher(s), I hereby release and discharge UTM and all participating researchers from all liability associated with, arising out of, or related to my participation. I agree to hold them harmless from any harm or loss that may be incurred by me due to my participation in the research.

Name of Participant/Legally authorized representative (LAR)	Signature
I.C. No.	Date
Name of Witness ²	Signature
I.C. No.	Date
Name of Consent Taker	Signature
I.C. No.	Date

¹ Original signed copy is to be retained by the Principal Investigator.
² Delete whichever is not applicable.
³ A witness is only required for oral consent.

Figure 1.20 Research Ethics Committee Research Management Center Form for the Parents/Guardians

1.12.5 Finalizing Ethical and Legal Authorization

The distribution and receipt of the signed consent forms represent the final, indispensable ethical stage before commencing the intervention:

- i) **Proxy Consent:** For children and adults with ASD, legal guardians or parents act as **ethical proxies**. The detailed consent form ensures they are fully aware of the nature, duration, and risks of the digital art therapy activity before granting **informed consent** for their children's participation.
- ii) **Time Commitment Transparency:** Explicitly outlining the **three-month duration** of the activity ensures that parents understand the necessary time commitment and intervention intensity, which is vital for maintaining high compliance and low dropout rates throughout the data collection period.

1.13 Thesis Scope

The thesis explores the efficacy of digital art therapies designed especially for autistic children in Malaysia, and centers their bodies, minds and lived experiences at the core of its enquiry. As such, it situates and contextualizes Malaysia as a specific site, analyses these young people's landscape in relation to their cultural, social and

environmental milieu, and queries the relative potential of digital art therapies to enable free emotional, social and cognitive expression that incites authentic human and aesthetic interactions. The research prioritizes the lived experiences of autistic children and their families, and carers, as well as the specific needs of this subset within Malaysia's healthcare and education institutions.

The thesis uses individualized methodologies such as case studies, interviews and interactive therapy sessions to grasp the complexities of how digital art therapy can help children's express emotions through colour and form, as well as allow them to communicate non-verbally, and most crucially how this specific approach can be made inviting within the Malaysian context by making art therapy more accessible and receptive to children.

It is through this process that the thesis hopes to contribute not only to clinical practice but also to national discourses about how to improve educational and mental healthcare services to children with ASD. It proposes for digital art therapy to advance into the mainstream within the confines of other treatment approaches that might help children with their sensory and emotional barriers, including their artistic potential to express themselves, increase self-confidence and social skills.

i) Research Focus

Children with ASD can develop skills that support their emotional and communication growth more easily through digital art therapy than through traditional art tools. Many autistic children struggle to verbalise their thoughts, and even when they attempt to communicate, their expression can feel disconnected or indirect. This difficulty in expressing emotions verbally can sometimes lead to frustration, which may escalate into behavioural meltdowns because the child cannot communicate their internal state or needs effectively (Yalim & Mohammed, 2023).

Different children engage with technology in different ways, and the user-friendly, immersive and intuitive functions of digital art tools such as tablets and creative apps can act as a bridge for communication in ways that traditional media often cannot. These digital tools are interactive, making them ideal for non-verbal, expressive communication through creative exploration. A child may use bright colours and dynamic shapes to express joy or excitement, or softer tones and gentle lines to express calmness or introspection. Through this creative process, children learn to represent

their inner experiences visually, helping them articulate emotions and develop a clearer sense of self.

Digital art therapy also supports cognitive development and fine motor skills. To progress through the creative process, children must explore and manipulate digital interfaces. Choosing colours, drawing shapes, adjusting line thickness or experimenting with textures through apps fosters fine motor control and hand-eye coordination. At the same time, digital art-making strengthens cognitive functions such as problem-solving, decision-making and creative thinking. As children interact with these apps, they navigate the digital canvas, make aesthetic choices and receive immediate visual feedback, which enhances engagement, learning and emotional processing.

When these digital tools are integrated into therapeutic practice, they create a responsive and supportive environment that acknowledges and adapts to the unique needs of each child with ASD. Digital art therapy gives children a safe channel for expression, helps reduce frustration that may lead to meltdowns, and allows them to flourish as creators, learners and individuals (Johnson & Lee, 2024; Yalim & Mohammed, 2023).

Child Development



A Guide on Autistic Meltdowns

by Dr. Jonathan Wright, PhD, Founder

What is a meltdown?

A meltdown is an intense involuntary reaction causing someone to lose control of their behaviour due to an overwhelming situation. Autistic individuals of any age can have meltdowns, not just children. It is important to note that a meltdown is not a bad behaviour or a form of manipulation. It is also not due to bad parenting. Since autistic often struggle with communication difficulties, sensory differences, and emotional regulation, they are more susceptible to meltdowns.

It is important for everyone, not just parents, to understand what a meltdown is. Meltdowns are incredibly taxing, both mentally and physically, and one of the most misunderstood parts of the autistic experience. In children, this is often confused with tantrums.

Meltdowns vs tantrums

Meltdowns	Tantrums
- An overwhelming emotional response that lasts longer - Can occur at any age - Beyond one's control - Does not require an audience - Triggered by sensory/emotional overload - Unable to redirect/triggered by sensory/emotional overload	- A typical emotional behaviour - Common in toddlers and young children - Driven by one's will/ intention - Seeks attention and requires an audience - Related to not getting their way or was told "no"

Meltdown triggers

Meltdown is a diverse experience that holds a different meaning to different autistic individuals but these are some of the common triggers:

- Sensory overload, e.g. due to strong smell or taste, loud noises, flickering lights, being in a crowd, etc.
- Changes in routine, life or environment, e.g. moving to a new house, sudden changes in school schedule
- Challenges in communication
- Anxiety or stress
- Loss of autonomy (choice and control)

A meltdown is a severe reaction to an extraordinary circumstance in which a child with autism either loses control of their actions or experiences no control at all (National Autistic Society, 2021). However, this does not necessarily indicate that they are acting inappropriately. Most children with autism find it difficult to communicate their emotions, especially when they become overly anxious or overwhelmed by circumstances or environments, which can result in a meltdown.

Figure 1.21 Meltdowns - A Guide for All Audiences (National Autistic Society, 2020, August 20)

ii) **Research Participants**

The study focuses on children aged six to ten from specialized institutions in Selangor, including verbal and non-verbal children with a formal ASD diagnosis. Ethical considerations include informed consent and pre- and post-therapy assessments.

iii) **Methodologies**

a) **Mixed-Methods Approach and Technology Justification**

This study utilizes a balanced mix of high-tech and low-tech methods to achieve multi-dimensional interpretation of the data. Qualitative insights are gathered through narrative accounts shared in interviews and focus groups with therapists, caregivers, and children. This depth reveals how the art creation process yields insights into both a child's emotional and cognitive development (Smith and Jones, 2024). These narratives are crucial for capturing moments of breakthrough and contextualizing the patient's experience.

This qualitative data is paired with technological tools that capture outcomes otherwise difficult to measure. This high-low technology blend creates a rich tapestry of insights into the experience of children with ASD in digital art therapy (Smith and Jones, 2024).

b) **Benefits of Incorporating Digital Tools**

Incorporating technology such as **iPads and Virtual Reality (VR) headsets** provides experiences that conventional, two-dimensional art materials often cannot offer:

- **Multisensory and Intuitive Interface:** Intuitive devices, such as iPads, offer a familiar and natural interface for children, along with a wide variety of apps that allow for immediate experimentation with colors, shapes, and textures.
- **Enhanced Focus and Self-Regulation:** The use of art apps has the potential to help children, particularly those with **Attention Deficit Hyperactivity Disorder (ADHD)**, enhance their focus and attention. By adapting these apps to control the pace, therapists can promote **collaboration and self-regulation** through timely correction and reflection.

- **Immersive Digital Art:** Using the iPad and stylus transforms the art creation process into a digital one. This allows children to create and place their art using multi-layered digital canvases and specialized software, providing a unique dimension of control and flexibility in the creation process.

The combination of qualitative narratives (human connection) and technological outputs (quantifiable data) allows the study to track both the discrete, measurable outputs of online art therapy and the non-tangible, human aspects of the therapeutic journey (Smith & Jones, 2024).

iv) **Geographical Focus**

The research is cantered in urban areas, specifically the National Autism Society of Malaysia (NASOM) Titiwangsa branch in Kuala Lumpur, chosen for its resources and expertise in supporting individuals with ASD. Cultural sensitivity is emphasized in therapy and communication.



Figure 1.22 Logo [Photograph]. NASOM (National Autism Society of Malaysia, n.d.)

1.14 **Thesis Outline**

This thesis examines the integration of technology into therapeutic practices, with a particular emphasis on Digital Art Therapy (DAT) for individuals with Autism Spectrum Disorder (ASD). The use of digital tools in psychological and educational interventions has garnered increasing attention in recent years, as technology provides structured, visually predictable, and adaptable environments that cater to the learning

and communication strengths of many autistic individuals (Fletcher-Watson & Happé, 2019; Kagohara et al., 2013). For children who struggle to verbalise emotions or articulate their internal states, digital creative platforms offer an alternative avenue for expression through colour, imagery, and symbolic representation, potentially enhancing their ability to communicate complex thoughts and feelings (Moon, 2016; Johnson & Lee, 2024).

The incorporation of digital artmaking into therapeutic contexts aligns with a broader global trend toward digital mental health solutions in clinical and community settings. Research indicates that digital therapeutic tools can support emotional regulation, reduce behavioural frustration, and improve attention in ASD populations, particularly when interventions are interactive and visually engaging (Kuo et al., 2021). This approach also responds to contemporary concerns surrounding screen exposure among children, including those with ASD, suggesting that structured and purposeful digital engagement can transform passive screen time into meaningful therapeutic activity (Domingues-Montanari, 2017; UNICEF, 2020).

In the Malaysian context, the relevance of digital art therapy is amplified by national priorities aimed at advancing digital health and educational innovations. Policies such as the MyDigital 2021–2030 roadmap and initiatives by the Ministry of Health emphasise the responsible adoption of digital technologies in healthcare and educational settings, focusing on accessibility, scalability, and inclusivity (Economic Planning Unit, 2021). Studying DAT within this framework allows this research to contribute insights that are both clinically significant and aligned with Malaysia's broader digital transformation goals.

Overall, this study seeks to provide a comprehensive understanding of how digital tools can enhance therapeutic outcomes, support emotional development, and improve communication pathways for autistic individuals in Malaysia. Through a mixed-methods approach combining qualitative and quantitative analyses, the research aims to strengthen the evidence base for digital art therapy and to inform future practices, policies, and collaborative initiatives across the fields of art, psychology, and digital technology.

1.15 Overview

This thesis provides an insightful exploration into how the integration of digital art programs significantly enhances therapeutic outcomes for individuals with Autism Spectrum Disorder (ASD). By leveraging innovative technological tools, these programs offer fresh, engaging, and accessible avenues for self-expression, which are crucial for those who often find traditional verbal or non-digital communication methods challenging (Darewych, 2021). The study is grounded in the premise that the structured, multisensory nature of digital media naturally aligns with the unique sensory and cognitive profiles of individuals on the autism spectrum.

1.16 Context and Value

Art therapy has established itself as a cornerstone of contemporary mental health treatment, providing unique pathways for individuals to process emotions and foster growth. This approach is particularly impactful for those who find verbal communication challenging, offering art as an alternative language for self-expression.

The recent integration of Digital Art Therapy (DAT) has revolutionized the field, merging the healing power of art with technology. This evolution is highly significant for the treatment of Autism Spectrum Disorder (ASD), where digital tools, such as tablets, Virtual Reality (VR), and specialized applications, provide new, engaging, and tailored avenues for self-expression (Darewych, 2021). DAT thrives on visual and interactive stimuli, easily capturing the attention of individuals with ASD. The controlled digital environment fosters a sense of autonomy and safety, while simultaneously supporting the development of fine motor skills and cognitive functions (Darewych, 2021).

This combination of digital and traditional methods creates a powerful synergy, blending established therapeutic principles with future technological capabilities. This approach aligns with the theoretical understanding that digital media is simply on a continuum of art materials (McNiff, 2018). By enhancing effectiveness and expanding accessibility, DAT promises a future for mental health treatment that is both innovative and compassionate, offering personalized care and new possibilities for personal growth and healing.

1.17 Research Aim

The core of this study involves a comprehensive literature review that examines the dual evolution of virtual creative tools alongside contemporary advancements in mental healthcare.

This review aims to frame the theoretical foundation of digital art by viewing it as a continuum of art materials rather than a separate discipline (McNiff, 2018). By understanding the intersection of technology and therapy, the study seeks to identify key elements that contribute to successful therapeutic outcomes.

The research is particularly focused on evaluating the effectiveness of modern digital art approaches, such as Virtual Reality (VR) and specialized digital drawing applications, in capturing client interest and enhancing specific therapy outcomes. These engaging platforms allow therapists to create immersive and personalized experiences that resonate deeply with the individual, enabling the capture of therapeutic outcomes otherwise difficult to track via traditional methods (Smith and Jones, 2024).

1.18 Conclusion

This chapter has established the foundation for investigating Digital Art Therapy (DAT) as an innovative therapeutic intervention for children with Autism Spectrum Disorder (ASD) in Malaysia. The discussion began with the research background, highlighting how DAT merges traditional art therapy with digital platforms such as tablets, drawing applications, and virtual reality. These tools support emotional expression, behavioural regulation, and social communication, particularly for neurodiverse children who may find verbal or conventional therapies challenging.

The theoretical framework was clarified by distinguishing between the “Art as Therapy” and “Art Psychotherapy” approaches. DAT, as a hybrid model, incorporates both perspectives by combining the sensory, process-oriented benefits of art making with the symbolic and interpretive potential of digital artworks. The chapter also explored how digital technology can be understood as an extension of traditional art materials, reinforcing its place within therapeutic practice rather than positioning it as a separate or unfamiliar medium.

Ethical, practical, and methodological considerations surrounding DAT were examined, including issues of privacy, safety, and accessibility. The chapter emphasised

the research gap in Malaysia, where limited empirical work has explored how DAT can be adapted to meet the needs of autistic children in culturally sensitive and contextually relevant ways.

The research objectives were clearly outlined. These include evaluating the effectiveness of DAT for ASD, identifying the types of digital artworks used, and examining how design principles influence therapeutic outcomes. These aims align with national priorities in Malaysia that support digital health innovation, interdisciplinary collaboration, and greater accessibility in mental health services.

By adopting a mixed-methods approach within a real-world setting at the NASOM Titiwangsa branch, this research aspires to produce empirical evidence on the therapeutic value of DAT while proposing a practical framework for integrating creative technology into existing clinical and educational systems. Its broader significance lies in supporting the development of evidence-based, locally grounded digital art therapy practices and strengthening connections between the fields of art, psychology, and technology.

Building on the foundation established in this chapter, the next chapter will examine previous research and theoretical discussions related to Digital Art Therapy and Autism Spectrum Disorder. Chapter 2 will review global and local literature, identify the main themes and methodological trends, and highlight existing gaps that shape the direction of this study. This review will provide the scholarly context needed to support the research design and analytical framework presented in the later chapters.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter examines the conceptual and empirical foundations of art therapy and its digital evolution. It is structured to trace the field's progression from traditional, manual forms of art therapy to the current era of digital art therapy (DAT). The review focuses on therapeutic principles, technological integration, and the specific implications of these approaches for children with Autism Spectrum Disorder (ASD).

2.2 Manual (Traditional) Art Therapy

Art therapy originated as a psychotherapeutic approach emphasizing creativity as a means of communication and healing. Margaret Naumburg (1958) framed art-making as a symbolic language through which unconscious thoughts can be expressed, while Edith Kramer (1971) emphasized the process of creation itself as inherently therapeutic.

Traditional art therapy uses tactile materials such as paint, clay, and collage, enabling sensory engagement and emotional release. Studies such as Mirabella (2017) and Durrani (2019) highlight art therapy's capacity to improve emotional regulation, attention, and social behaviour in both children and adults.

However, manual therapy can pose challenges for children with ASD who have tactile sensitivity, fine motor difficulties, or difficulty sustaining attention in physical studio environments. These limitations have prompted a global movement toward digital adaptation.

2.3 Art Therapy in Autism

Art therapy has shown measurable benefits for autistic individuals, particularly in areas of communication, sensory processing, and emotional understanding (Donnellan, Hill, & Leary, 2012). Through repetitive, structured art-making, children with ASD develop better motor coordination and emotional awareness.

Research by Zeinab Jalambadi (2019) found that painting therapy helps autistic children express emotions they cannot verbalize, reducing anxiety and improving interpersonal engagement. Similarly, Mirabella (2019) demonstrated that multisensory engagement through art promotes relaxation and social connection.

The adaptability of art therapy allows each session to be individualized according to the child's needs, making it an inclusive and flexible form of intervention.

2.4 Transition from Manual (Traditional) to Digital Art Therapy

Digital art therapy (DAT) represents a natural progression of the discipline, integrating traditional art-based healing with contemporary technology. As societies become increasingly digital, therapists have adopted tablets, drawing applications, and Virtual Reality (VR) to expand the possibilities of creative expression.

Austin (2011) argued that digital media maintains the depth of creativity and embodiment present in manual art while adding accessibility, adaptability, and multisensory feedback. Digital art platforms such as Procreate and ArtRage allow children to explore colour, texture, and shape with minimal mess and immediate results, thus encouraging engagement and experimentation.

2.5 Digital Art Therapy and Technology in Healing

DAT aligns with global digital therapeutic trends that integrate digital tablet and computer uses, sensory feedback, and gamified experiences to enhance motivation and therapeutic outcomes (Elkis-Abuhoff, 2018).

Technological devices such as iPads, styluses, and VR headsets enable immersive therapy sessions where children interact visually and kinaesthetically. This format supports children who find physical interaction stressful, allowing for safe, personalized, and controlled experiences.

However, ethical considerations remain critical: ensuring privacy, minimizing screen dependency, and maintaining the human relationship between therapist and participant (American Art Therapy Association, 2021).

2.6 Theoretical Framework

The study is grounded in Expressive Therapies Continuum (ETC) (Kagin & Lusebrink, 1978) and Context and Outcomes of Art Therapy (COAT) (Schweizer, 2020).

ETC explains how sensory, affective, cognitive, and symbolic processes emerge through art-making, while COAT contextualizes therapeutic change within social and environmental settings.

2.7 Technological Advancements in Art Therapy Applications

Several studies have demonstrated the effectiveness of digital art therapy in medical settings, particularly for patients undergoing intensive treatments such as chemotherapy. Digital tools have been shown to support emotional regulation, provide distraction, and offer patients a sense of agency during medical procedures (Malchiodi, 2018; Kaimal, Carroll-Haskins, Berberian, Dougherty, & Carlton, 2020). For instance, a patient diagnosed with colon cancer was introduced to various digital art applications, including ArtRage, Zen Brush, and 123D Sculpt, to support engagement in creative practices during treatment sessions (Elkis-Abuhoff, 2018).

Using ArtRage, the patient could paint with a variety of virtual instruments such as an oil brush, watercolour brush, paint tube and roller, palette knife, inking pen, felt pen, and gloop pen. This variety enabled flexible and expressive digital painting techniques that aligned with findings suggesting that digital media can expand expressive range in therapeutic contexts (Malchiodi, 2018). Zen Brush, a Japanese ink brush application, allowed the creation of contemplative artworks by mimicking the fluidity and delicacy of traditional ink brush strokes, with adjustable brush sizes and ink density to portray mood and atmosphere. Meanwhile, 123D Sculpt enabled tactile digital sculpting on three-dimensional models, offering a safe alternative to traditional clay particularly important in sterile medical environments (Elkis-Abuhoff, 2018).

During initial sessions, the patient explored the applications and derived enjoyment from the novel methods of ‘painting,’ ‘drawing,’ and ‘sculpting.’ Over time, these digital art sessions became routine, providing structure and familiarity amid the clinical environment. This reflects broader evidence that digital artmaking can support focus and emotional anchoring during medical stressors (Kaimal et al., 2020).

Through repeated sessions, the patient reported increased agency and satisfaction. He created a tree artwork titled “Me” in ArtRage, experimenting with paint blending and droplet effects to form a three-dimensional appearance. This digital engagement served as a meaningful distraction, helping manage anxiety associated with chemotherapy and enabling real-time emotional expression paralleling findings that virtual artmaking can reduce distress and promote psychological processing (Hacmun, Regev, & Salomon, 2021).

Elkis-Abuhoff (2018) concluded that digital art applications in medical settings allow patients to participate in creative practices that would otherwise be restricted due to sterility concerns. The use of iPads during treatment provided opportunities for distraction, self-expression, and emotional processing, integrating artistic creativity into the therapeutic context and enhancing the patient’s sense of control and well-being.

This case, adapted from Elkis-Abuhoff (2018), describes a young cancer patient who relied on digital art applications during chemotherapy to manage pain, anxiety, and emotional distress. Because traditional materials could not be used in a sterile environment, the iPad became a safe and accessible tool that allowed him to paint, draw, and sculpt digitally. Over time, these applications helped him regain a sense of control, establish routine, and express complex emotions throughout his treatment journey. The following sections outline how three specific apps ArtRage, Zen Brush, and 123D Sculpt supported the patient’s emotional well-being.

i) ArtRage

ArtRage offered the patient a wide selection of virtual painting instruments, including oil brushes, watercolour brushes, paint tubes, rollers, palette knives, inking pens, felt pens, and gloop pens. These tools allowed him to explore expressive digital painting techniques safely within the chemotherapy room.

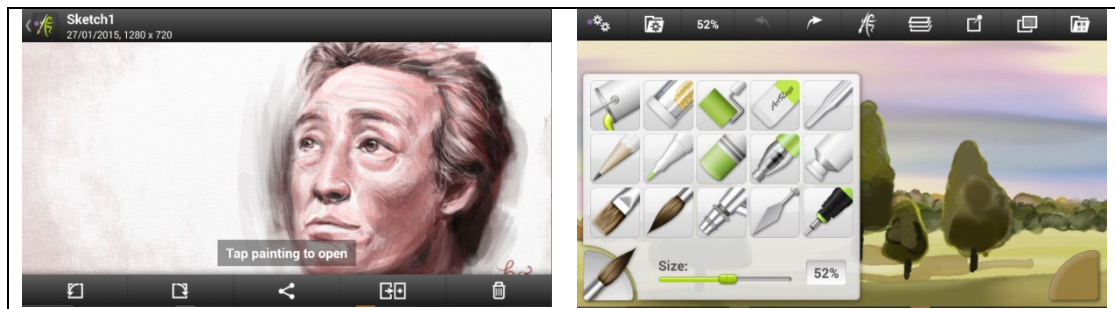


Figure 2.1 ArtRage (Version) [Mobile App]. Google Play Store
(Ambient Design Ltd, n.d.)

As sessions progressed, ArtRage became a comforting and familiar part of his treatment routine. He would begin by requesting the stylus and iPad immediately after the IV was prepared, demonstrating how digital artmaking provided both structure and psychological readiness for the difficult procedure ahead.

In one session, he created a tree artwork titled *Me*, experimenting with blending features and paint droplets to produce a three-dimensional effect. This symbolised not only his creative exploration but also his emotional processing as he awaited surgery following successful chemotherapy shrinkage of the tumour. Although relieved by the progress, he expressed apprehension about the upcoming operation, and ArtRage became a meaningful outlet for expressing these mixed emotions.

ii) **Zen Brush**

Zen Brush enabled the patient to create more contemplative and atmospheric works. The app simulates a traditional Japanese ink brush, allowing users to adjust brush size and ink density with fluid, delicate strokes. This virtual tool allowed him to develop portraits and mood-driven artworks that conveyed emotional presence without the need for physical ink.



Figure 2.2 Zen Brush 3 Released to App Store
(PSOFT Co., Ltd., 2020, September 30)

The calming, meditative quality of Zen Brush supported the patient during moments of heightened anxiety. Its simplicity and gentle responsiveness encouraged slow, reflective mark-making, helping him centre his thoughts and emotions during sessions when discussing his medical condition felt overwhelming.

iii) 123D Sculpt

123D Sculpt introduced a tactile digital sculpting experience that would not have been possible with real clay in a sterile medical environment. The app provided pre-made body forms such as heads, figures, and objects like aircraft that the patient could manipulate using his fingers or stylus.

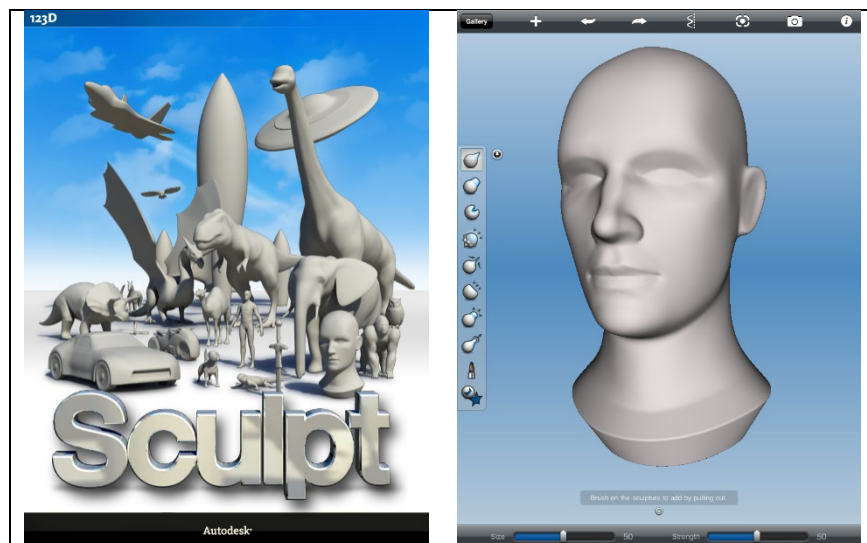


Figure 2.3 123D Sculpt, Virtual Clay Never Felt Better [Blog Post]. WordPress
(Hyrule Foundry, 2013, August 26)

This digital sculpting process allowed him to engage in hands-on creative exploration without contamination risks. The app enabled him to reshape, mould, and model virtual forms, giving him a sense of physical interaction and control at a time when his body felt medically vulnerable.

During the early sessions, he enjoyed experimenting with these sculptural tools. Over time, digital sculpting became part of his coping routine, offering distraction, tactile engagement, and emotional grounding while chemotherapy was being prepared or administered.

Elkis-Abuhoff (2018) concluded that technology and the selected art apps in these examples allow a medicalized patient to access iPads, which would otherwise be restricted due to a medicalized setting and the risk of becoming ‘contaminated’ in a medically ‘sterile’ environment.

The patient employed the iPad as a distraction during chemotherapy, which enabled him to visualize his thoughts and emotions. These thoughts and emotions were present in the present moment. Consequently, virtual art therapy incorporated the process of artistic creativity and self-expression into the room while the patient was undergoing chemotherapy in real time. Ultimately, he was able to alleviate his apprehensions through the virtual artwork process and the outload processing with the art therapist.

2.8 Art Therapy Materials and Media

Understanding the role of materials and media is essential in art therapy because different tools evoke different emotional, psychological, and sensory responses. The central question in any therapeutic setting is: Which art materials are most suitable for the patient’s needs? According to Gaydos (2018), artmaking is inherently an exploratory process that examines an individual’s emotions, reasoning, and internal conflicts. Therefore, material selection becomes a deliberate therapeutic decision shaped by the client’s medical condition, sensory profile, and emotional needs.



Figure 2.4 Wp-Art-Pack [Online Image] (Akoma Healing Harts, n.d.)

2.8.1 Importance of Material Selection in Medical Art Therapy

For medical patients who may experience psychological, physical, or combined conditions, the choice of medium can significantly influence therapeutic outcomes. Materials must support physical expression and evoke meaningful emotional responses that relate to the patient's medical experience.

Gaydos (2018) argues that medical symptoms can disrupt the mind and body connection, limiting an individual's ability to regulate or understand their condition. Through active, tactile, and immersive art-making, patients reconnect with the body and regain a sense of control. In these situations, art materials do more than facilitate expression. They become part of the healing process by providing kinesthetic stimulation and emotional grounding.

Art therapy is therefore relevant and useful across diverse medical settings, including inpatient hospitals, outpatient clinics, and community programs.



Figure 2.5 Art Therapy (Screenshot from Main Line Health, n.d.)

2.9 Kinesthetic and Sensory Benefits

Kinesthetic, sometimes referred to as kinaesthetic or body-based learning, relates to the use of physical movement, motor activity, and tactile engagement as a mode of learning, sensing, or understanding the world. It involves awareness of one's body position, muscle movement, and physical coordination, supported by the proprioceptive system (Sherrington, 1906; Gallagher, 2005).

In educational and therapeutic contexts, kinesthetic processes emphasise learning through “doing,” where individuals interact with materials using hands-on actions, gestures, and movement to reinforce cognitive and emotional processing (Anderson, 2019).

Kinesthetic engagement is particularly meaningful in creative arts and therapy, as movement-based activities can enhance sensory integration, improve emotional expression, and support regulation for individuals who benefit from physical forms of communication (Ayres, 2005; Malchiodi, 2015).

For many autistic individuals, kinesthetic or tactile-based interactions provide grounding input that aids attention, reduces anxiety, and supports learning through embodied experience (Schaaf et al., 2014).

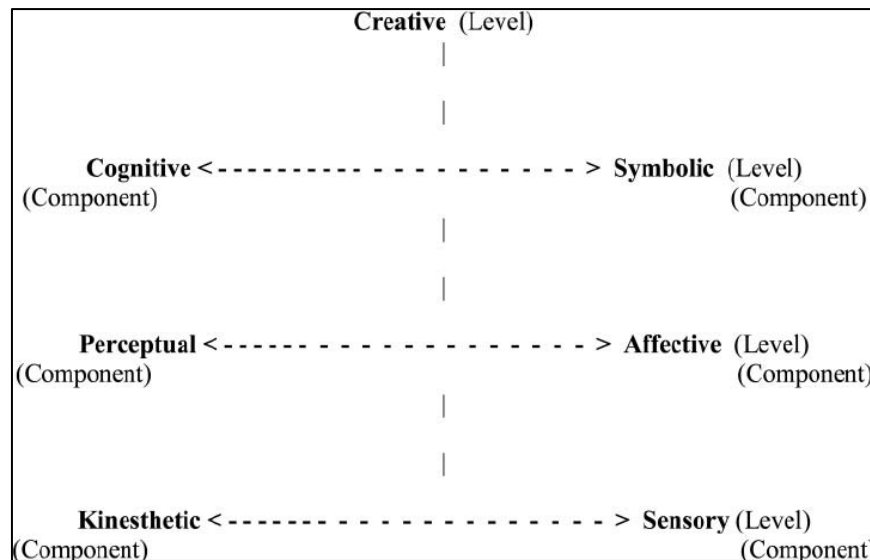


Figure 2.6 The Expressive Therapies Continuum (Hinz, 2015)

In essence, kinesthetic refers to a mode of experiencing, learning, and expressing through bodily movement and physical interaction with the environment.

Research highlights the positive impact of kinesthetic and sensory materials on neurological and developmental populations. Hass-Cohen et al. (2015) found that materials requiring fingertip contact stimulate the brain and can benefit individuals with the following conditions:

- Parkinson's disease
- Alzheimer's disease
- Multiple sclerosis
- Stroke or seizure histories
- Autism Spectrum Disorder (ASD)

These materials support active sensory processing and may enhance brain activity. For patients who have difficulty expressing or verbalizing emotions due to neurological or developmental differences, sensory engagement provides an alternative expressive pathway (Elkis-Abuhoff and Gaydos, 2018). Through movement and tactile exploration, individuals often show changes in physical engagement, motor patterns, and emotional expressiveness.

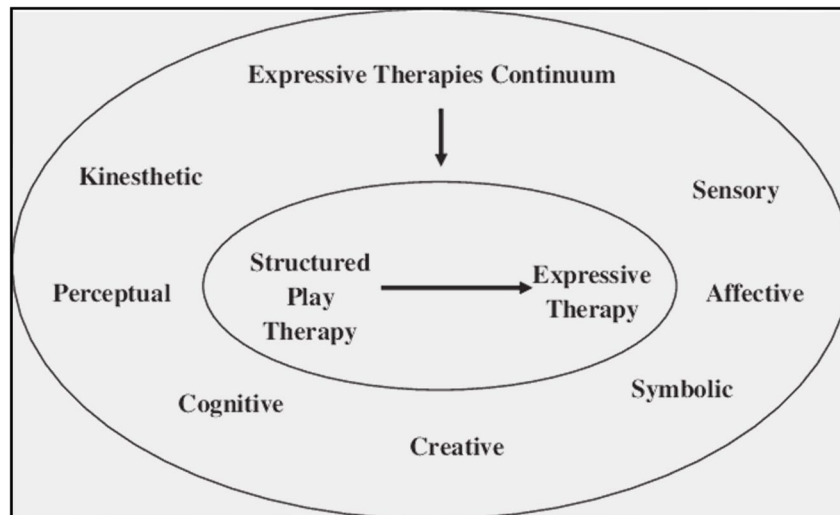


Figure 2.7 Conceptual Framework of the Use of the Expressive Therapies Continuum in the Intervention of a Client with Selective Mutism (Fernandez et al., 2014)

2.10 The Role of Sensory and Kinesthetic Engagement in Therapy

Gaydos explains that art therapy is multidimensional and contains both structure and unpredictability. Materials possess unique qualities such as rigidity, fluidity, and texture. These qualities influence the artwork and shape the patient's psychological response. For example, using a sponge-tip brush or a textured applicator can create a completely different sensory experience.

This flexibility offers patients the following benefits:

- A sense of control
- Opportunities for self-exploration
- Multiple ways to express internal emotions

The connection between mind and body becomes stronger when patients handle materials directly. This reinforces therapeutic engagement and enhances emotional processing.

2.11 Material Qualities and Psychological Response

Art materials are not neutral; they possess unique physical attributes such as rigidity, fluidity, and texture, which directly influence the artwork and shape the patient's psychological response.

- i) **Rigidity vs. Fluidity:** Materials demanding rigidity (like a sharp pencil or hard clay) often appeal to the client's need for control and precision, engaging executive function skills. Conversely, fluid materials (like watercolor or ink) invite spontaneous, non-structured expression, which can facilitate the release and processing of intense, often unpredictable, internal emotions (Gaydos, 2023).
- ii) **Sensory Experience:** As Gaydos explains, using a sponge-tip brush or a textured applicator introduces a deliberate sensory difference. This tactile input creates a unique somatic experience, which is particularly vital for grounding and engagement in clients who struggle with emotional dysregulation.

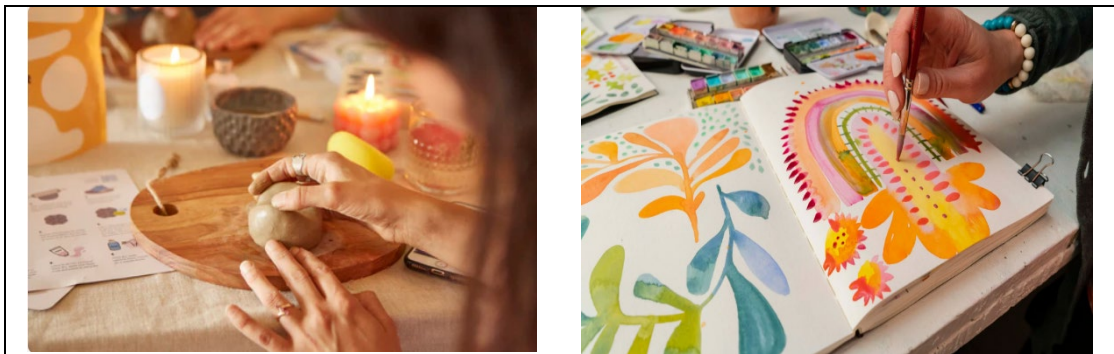


Figure 2.8 Rigidity Art Material —Clay—Sculpting Hard and Concrete Affirmation of the Art Expression. Fluid Art Material—Watercolour—Illustrating Spontaneous and Expressive Movement
(Adapted to Represent the Concept of Fluidity in Gaydos, 2023)

2.12 Therapeutic Benefits and Mind-Body Integration

This inherent flexibility and sensory richness in the materials offer several critical therapeutic benefits:

- i) **A Sense of Control:** By choosing and manipulating materials (e.g., controlling rigid clay or releasing fluid paint), the patient gains a tangible sense of autonomy and mastery over their creative process, which can then translate to a feeling of control over their internal world.
- ii) **Opportunities for Self-Exploration:** The immediate, concrete feedback provided by the materials encourages deep self-exploration. The artwork serves as a

projection of internal emotions, offering a safe, externalized form for the patient to interact with their psychological content.

- iii) **Multiple Ways to Express Internal Emotions:** The sheer variety of textures and applications ensures that patients have multiple, distinct pathways to express emotions that may be too complex or overwhelming for verbal articulation.

Ultimately, when patients handle these materials directly, the mind-body connection becomes stronger. This direct sensory-motor reinforcement is crucial because the somatic experience anchors the emotional process, significantly enhancing both therapeutic engagement and the depth of emotional processing (Gaydos, 2023).



Figure 2.9 Mind and Body – Behavioral Health Integration in the Primary Care Office (Nichols, 2021)

2.13 Therapeutic Qualities of Common Art Materials

i) Clay

Medicinal qualities:

Three-dimensional, tactile, formable, resistant yet yielding, earthy, repetitive, grounding, and portable.

Psychological responses:

Symbolic, affective, regressive, soothing, deeply sensory.



Figure 2.10 Transforming Emotions into Art: The Healing Practice of Sculpting Vessels in Art Therapy (Art Therapy NJ, 2022, March 14)

ii) Illustration Materials (Pencils, Pastels, Watercolour Pencils)

Medicinal properties:

Portable, controlled, systematic, fluid (pastels) or resistive (pencils).

Kinesthetic and sensory components:

Small or large movement drawing, textural surfaces, residue on fingertips with pastels, blending by hand.

Psychological responses:

Supports organization, creativity, and structured expression.



Figure 2.11 The Best Watercolor Pencils for Beginners. Life I Design (Traikos, N., 2024, February 12)

iii) Painting Materials

Includes oil, acrylic, tempera, fingerpaint, watercolour (cakes or liquid), ink, and paint markers.

Medicinal qualities:

Fluid, loose, expressive, colourful, relaxing or stimulating, varied surfaces such as canvas or paper, layering possibilities.

Kinesthetic and sensory components:

Gesture-based movement, tactile fingertip use such as fingerpainting, texture play.

Psychological responses:

Affective, symbolic, regressive, supportive of emotional discharge.



Figure 2.12 Beginner's Checklist for Flawless Paint Results (ColourSupplies, n.d.)

iv) Collage

Variations:

Pre-cut images, textured or smooth papers, three-dimensional objects, adhesives such as glue or varnish.

Therapeutic qualities:

Symbolic communication, structure, layering, controlled expression, multimedia flexibility, low skill requirement.

Kinesthetic and sensory components:

Paper tearing, texture mixing, sorting, assembling.

Psychological responses:

Symbolic meaning-making, representational communication, narrative development.



Figure 2.13 How Art Therapy Can Help Relieve Kids from Stress (IggyRide, n.d.)

2.14 Expressive Therapies Continuum (ETC)

Kagin and Lusebrink's Expressive Therapies Continuum (ETC) (1978; expanded by Hinz, 2009; Lusebrink et al., 2013) is fundamental for selecting materials that meet patients' therapeutic needs. The ETC outlines four levels of processing:

i) Kinesthetic/Sensory (K/S):

Movement and sensory pleasure; stimulation through touch, motion, colour, or sound.

ii) Expressive/Affective (E/A):

Emotional expression, spontaneity, affective communication.

iii) Cognitive/Symbolic (C/S):

Planning, structure, symbolism, meaning making.

iv) Creative/Innovative Level:

Integration of all previous levels; creative problem-solving.

Patients with medical conditions often begin at the kinesthetic/sensory level, especially during diagnosis, treatment, or hospitalization. Sensory materials (e.g., clay, fingerprint) support grounding, while controlled materials (e.g., pencils, collage) help transition to symbolic and cognitive processing (Pénzes et al., 2014).

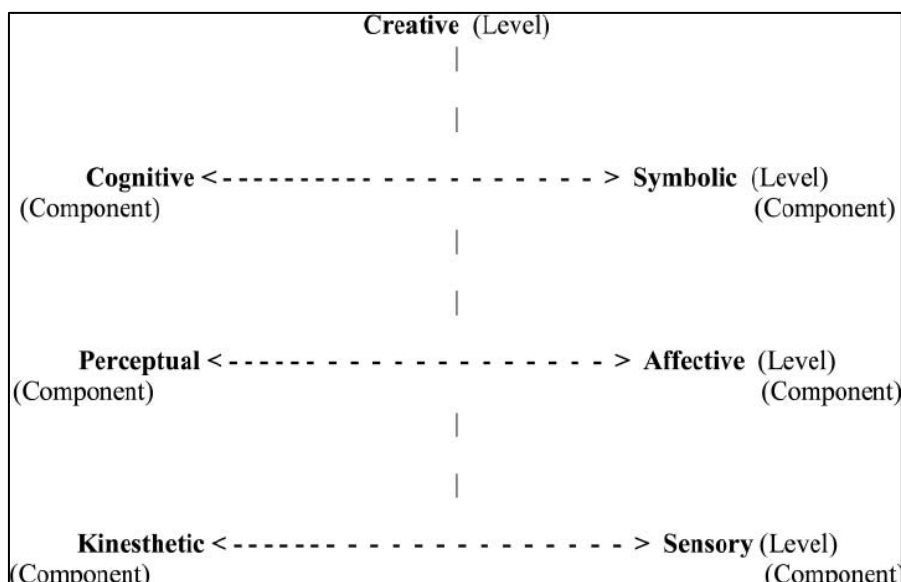


Figure 2.14 The Expressive Therapies Continuum (ETC) Model. Adapted from the Expressive Therapies Continuum: A Framework for Assessment and Treatment (p. 23), by S. K. Levine and K. L. Levine, 2011, Routledge. Copyright 2011 by Routledge. Reprinted with Permission

2.15 Digital Art Materials in Medical Settings

The integration of digital tools has provided a clean, flexible, and essential alternative to traditional materials within modern healthcare environments. As observed by Elkis-Abuhoff et al. (2017) and Waller (2015), digital tables and tablets offer significant advantages. Specifically, these devices provide **clean, hospital-friendly surfaces**, which is crucial for maintaining sterile conditions and infection control in medical settings.

Furthermore, the technology is highly adaptable, capable of **mimicking real art materials through enhanced visual and tactile simulation**, ensuring the core sensory benefits of art creation are maintained. These digital tools also **expand access in sterile or restricted spaces**, allowing art therapy to reach patients who are bedridden or isolated.

Critically, the platforms provide a diverse array of **digital brushes, textures, and colors** that would be impractical to manage in a non-traditional therapeutic location.

In essence, digital media function as a vital bridge between traditional art experiences and the controlled, medically safe environments required in contemporary healthcare.



Figure 2.15 The Anatomy of the Digital Medium. Medical Artist (Al-Khalili, A. J., 2018, February 16)

2.16 Theoretical Synthesis: From ETC to COAT

This study synthesizes the Expressive Therapies Continuum (ETC) and the Context and Outcomes of Art Therapy (COAT) model to create a comprehensive framework for exploring the efficacy of Digital Art Therapy (DAT) in enhancing social communication for autistic children in Malaysia. The ETC provides the micro-level understanding of the therapeutic process, while COAT provides the essential macro-level context for validating outcomes.

i) ETC: The Micro-Level Framework of Digital Artmaking

The ETC, originally proposed by Kagin and Lusebrink (1978), functions as the primary process-oriented framework. It explains how engagement with art materials moves through sequential levels of processing, from sensory input to symbolic meaning.

Application to Digital Art Therapy (DAT) for ASD

The ETC is crucial for understanding the efficacy of DAT because digital materials directly and strategically engage the lower, less verbal levels first:

- **Kinesthetic/Sensory Levels:** Digital tools immediately engage these foundational levels. Using a stylus on a tablet or navigating a VR environment provides structured, controllable sensory and kinesthetic feedback (fine motor control and spatial awareness). This controlled structure is often highly regulating for children with ASD.
- **Affective/Perceptual Levels:** The ease of digitally creating and manipulating colors, shapes, and textures allows the child to express and process feelings non-verbally. This is vital for emotional regulation and self-expression when traditional affective communication is difficult.
- **Cognitive/Symbolic Levels:** The higher levels link directly to the thesis's goal. Planning sequences in digital creation (cognitive) and developing narratives or symbols within the artwork (symbolic) form the basis for improved social communication.

ii) COAT: The Macro-Level Contextual Framework

The Context and Outcomes of Art Therapy (COAT) model (Schweizer, 2020) provides the essential ecological framework, linking the internal changes observed through the ETC to the external changes in the child's social environment.

Application to Social Communication in Malaysia

COAT contextualizes therapeutic change within two domains: the treatment context (the DAT group at NASOM Titiwangsa) and the outcome context (the child's social environment).

- **Linking Internal Change to External Outcome:** The model helps define how improvements at the symbolic ETC level (e.g., creating a digital story about sharing) lead to the desired **social outcome** (e.g., initiating conversation or maintaining eye contact with peers).
- **Contextualizing Therapeutic Change:** COAT ensures that the **social communication enhancements** observed are not just isolated therapeutic

events but are recognized as meaningful changes within the child's specific social and environmental settings in Malaysia (e.g., improved interaction with family or teachers).

iii) Synergy of the Models

In combination, the two models provide a robust methodological backbone:

- The **ETC** validates that the **digital materials** are therapeutically active and explains *how* the creative process works in the autistic child.
- The **COAT** validates that the resulting changes in the child's internal process are meaningful, **measurable social communication enhancements** within the study's specific context (NASOM, Malaysia).

2.17 Autism, Artmaking, and Digital Art Therapy: A Theoretical Understanding

Although Autism Spectrum Disorder (ASD) has been extensively studied from behavioral, cognitive, and developmental viewpoints, there remains limited academic exploration of how autistic individuals interact with art processes and creative media. A deeper understanding of ASD through an art-based lens is vital for establishing Digital Art Therapy (DAT) within broader therapeutic and developmental frameworks. This section outlines the sensory, cognitive, communicative, and emotional aspects of artmaking in ASD populations, drawing on global scholarship to address the identified gaps in Malaysian literature.

2.17.1 Sensory Processing and Artmaking in ASD

Autistic individuals commonly experience **atypical sensory processing**, which may manifest as **hypersensitivity** or **hyposensitivity** to visual, tactile, and auditory stimuli (Tomchek & Dunn, 2007; Tomchek & Dunn, 2013). Artmaking naturally engages these sensory pathways, offering avenues for **regulation, grounding, and exploratory play**.

Sensory-friendly art tasks can support autistic children by:

- Offering predictable structures

- Providing repetitive and rhythmic movements (Schweizer et al., 2014; Source 1.2).
- Allowing non-verbal forms of self-expression
- Enabling safe sensory exploration.

Research shows that art activities help **modulate arousal levels, reduce anxiety, and promote self-regulation** (Kapp et al., 2019; Schaaf et al., 2014; Source 1.1; Miller & White, 2023). For children who struggle with **tactile defensiveness**, **digital media** may offer a less overwhelming alternative to messy or unpredictable traditional materials.

2.17.2 Communication and Symbolic Expression in ASD Through Art

Many autistic children experience challenges with **verbal language**, but may communicate effectively through **visual and symbolic forms** (Malchiodi, 2015; Hinz, 2009). Art therapy literature stresses that drawing, color choices, and spatial arrangements can serve as **expressive languages** when verbal pathways are restricted (Malchiodi, 2015; Hinz, 2009; Carlyle & Graham, 2019).

Studies indicate that artmaking supports:

- Symbolic thinking .
- Turn-taking and joint attention.
- Emotional identification and expression.
- Early narrative formation.

For non-verbal or minimally verbal autistic children, **visual expression** becomes a crucial alternative **communication modality** that bypasses linguistic barriers (Malchiodi, 2015; Hinz, 2009; Source 1.1).

2.17.3 Cognitive Strengths of Autistic Children in Visual-Spatial Domains

Autistic individuals frequently demonstrate significant **visual-spatial reasoning, pattern recognition, and detailed perception** (Motttron et al., 2006; Source 1.2). These inherent strengths align well with both traditional and digital art creation.

Digital tools, in particular, offer features that cater to these strengths:

- **Structure and predictability** (Kagohara et al., 2013).
- **Step-by-step achievable tasks** [Inferred from benefits of structured activities.
- Opportunities to **refine details** (Source 1.2).
- Multiple “**undo**” options that reduce performance anxiety
- **Visual clarity** that suits rule-based and system-oriented thinking.

These characteristics can transform DAT into an accessible platform that effectively combines cognitive strengths with therapeutic goals.

2.17.4 Kinesthetic Learning and Repetitive Motor Engagement

Children with ASD often engage in **repetitive motor behaviors**. When these movements are channeled through art tasks, they can support:

- **Motor planning** (Fournier et al., 2010).
- **Fine-motor coordination.**
- **Kinaesthetic learning pathways.**
- **Sustained attention.**

Kinesthetic engagement, such as through **touchscreen drawing** or **stylus-based movement**, helps build **sensorimotor integration**, which is linked to improvements in communication and self-regulation (Fournier et al., 2010).

2.17.5 Digital Art Therapy and ASD: Global Insights

Digital Art Therapy (DAT) has garnered international attention for its particular suitability to ASD populations. Research highlights several key advantages of the digital medium:

- **Predictability and structure:** Digital environments mitigate the sensory unpredictability often found in traditional materials (Kagohara et al., 2013).

- **Controlled sensory input:** Features like sound, color, and visual effects can be precisely adjusted based on an individual's sensitivity (Fletcher-Watson et al., 2019; Hutson, 2022).
- **Immediate feedback:** Digital tools provide instant results, which strongly supports engagement and motivation (Kaimal et al., 2020; Source 4.2).
- **Low mess, low stress:** Children who exhibit a strong aversion to tactile mess can still fully participate in expressive creation (Source 4.2).
- **Visual routine building:** Digital interfaces naturally support clear, step-by-step task sequencing [Inferred from structured art benefits, Source 3.2].

Furthermore, DAT allows therapists to easily **track progression** through saved digital files, time logs, and layering, a feature traditional media cannot easily replicate.

2.17.6 Why This Matters for Malaysian ASD Populations

Despite the wealth of global evidence, Malaysia currently lacks **empirical research** documenting how autistic children interact with art whether traditional or digital

There is no established theoretical or cultural understanding concerning:

- How **Malaysian autistic children** respond to **tactile versus digital materials**.
- Whether artmaking effectively supports **communication and emotional regulation** within local contexts.
- How **sensory preferences** manifest in Malaysian ASD populations during creative.
- Whether DAT is **appropriate or culturally relevant** for Malaysian children.

This significant lack of foundational knowledge, particularly concerning the digital medium within the Malaysian context, underscores a critical gap in the national literature and highlights the necessity for the current study to explore the intersection of ASD, artmaking, and digital therapeutic tools within a Malaysian context.

2.18 Conceptual Gap

Although international research consistently demonstrates that Digital Art Therapy (DAT) enhances engagement, supports emotional expression, and provides structured visual environments well suited for individuals with ASD, the Malaysian research landscape shows a significant lack of empirical work in this area. Global studies highlight how digital tools can strengthen communication, reduce anxiety, and offer predictable interfaces that align with autistic learning preferences (Fletcher-Watson & Happé, 2019; Kagohara et al., 2013). Several scholars also note that DAT enables therapists to tailor interventions, monitor progress, and use digital data to adjust treatment more effectively (Schweizer et al., 2017).

Despite these reported benefits, Malaysian literature predominantly focuses on general art therapy practices or broader digital learning tools for ASD, rather than examining DAT as a clinical intervention. Research addressing digital media in Malaysian therapeutic contexts is limited, fragmented, and often does not include outcome-based assessments or analyses of user engagement (Ismail & Basri, 2020). There is also limited understanding of how cultural expectations, caregiver attitudes, and varying levels of technological readiness influence the implementation of DAT in Malaysian settings (Rahim & Dawood, 2021).

This gap indicates that the integration of DAT into ASD support services in Malaysia remains underexplored. There is insufficient evidence on its feasibility, clinical effectiveness, and cultural acceptability. As a result, the present study is necessary to investigate how DAT can be adapted to Malaysia's therapeutic landscape, how it can support autistic individuals more effectively, and what infrastructural or professional training considerations are required to sustain its use.

2.19 Conclusion

Chapter Two presented a comprehensive review of the theoretical, historical, and empirical foundations underpinning both traditional and digital art therapy, with emphasis on their relevance for children with ASD. The chapter began by examining the origins of manual art therapy, grounded in the work of Naumburg (1958) and Kramer (1971), who established creativity as a channel for symbolic communication and emotional healing. Empirical studies such as Mirabella (2017) and Durrani (2019)

further demonstrated the effectiveness of tactile artmaking in supporting emotional regulation, attention, and social engagement.

The review then addressed the specific benefits of art therapy for autistic children, noting improvements in communication, sensory processing, and emotional expression (Donnellan, Hill, & Leary, 2012). Research by Jalambadi (2019) and Mirabella (2019) affirmed that structured and repetitive art activities help autistic children express emotions, reduce anxiety, and build social connection.

The chapter next outlined the global shift from manual to digital modalities. Studies by Austin (2011), Elkis-Abuhoff (2018), and the American Art Therapy Association (2021) highlighted the ways in which Digital Art Therapy (DAT) enhances accessibility, personalisation, and multisensory engagement.

These features make DAT particularly suitable for children who experience tactile sensitivities or require predictable, visually structured environments. The integration of theoretical frameworks such as the Expressive Therapies Continuum (Kagin & Lusebrink, 1978) and the COAT model (Schweizer, 2020) established how digital tools continue to activate sensory, affective, cognitive, and symbolic processes within therapeutic settings.

Despite these advancements, the chapter identified a significant conceptual gap. Although international studies demonstrate strong positive outcomes for DAT, research in Malaysia remains limited, with few studies addressing its clinical applicability, cultural fit, or therapeutic effectiveness (Ismail & Basri, 2020; Rahim & Dawood, 2021). This gap emphasises the need for localised inquiry to understand how DAT can be implemented within Malaysian therapeutic environments and how autistic children respond to digitally mediated creative processes.

This identified gap directly informs the purpose and direction of the present study. With the theoretical foundation established and the need for local evidence clearly articulated, the discussion now transitions to Chapter Three. The next chapter outlines the research design, methodology, participant selection, and ethical considerations that guide the investigation into Digital Art Therapy for children with ASD in Malaysia.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter details the methodological framework underpinning the study, including the research design, participant selection, instruments, data collection, and ethical considerations. A **mixed-methods approach** was adopted to explore the effectiveness of Digital Art Therapy (DAT) for autistic children. Mixed-methods research is particularly valuable in therapeutic and educational contexts because it integrates numerical data with personal experiences, producing a more holistic understanding of participant outcomes (Creswell & Plano Clark, 2018). By combining qualitative and quantitative evidence, the study captures not only measurable behavioural shifts but also the subtle emotional and expressive changes that occur during DAT sessions.

3.2 Research Design

3.2.1 Participant Selection

A sample of ten participants was selected due to several contextual and methodological considerations relevant to the period in which the study was conducted. The data collection took place during the COVID-19 pandemic, when national health regulations imposed restrictions on group size, physical distancing, and hygiene protocols within educational and therapeutic institutions. These limitations made it impractical and unsafe to conduct sessions with larger groups, particularly with young children whose sensory and behavioural needs require close supervision. As a result, a smaller sample was not only appropriate but necessary to ensure adherence to safety guidelines while maintaining the integrity of the intervention.

The participants were also intentionally selected through purposive sampling. The Headmistress and teachers at the National Autism Society of Malaysia (NASOM) handpicked the children based on their suitability for Digital Art Therapy activities and their ability to participate consistently in the study. Their professional familiarity with

each child's behavioural profile, sensory preferences, and communication abilities enabled the identification of participants who would benefit most from the intervention and who could safely engage in weekly sessions under pandemic conditions.

A sample of ten participants provided sufficient qualitative depth, allowing the researcher to observe unique expressive, sensory, and behavioural characteristics across cases (Stake, 1995). The limited sample size enabled manageable weekly sessions with individualized support, which is a crucial component of ASD-focused interventions where sensory regulation and emotional needs vary widely between children. Additionally, qualitative research literature notes that thematic saturation is typically achieved within 6 to 12 cases, indicating that the selected sample offered an adequate foundation for generating stable and meaningful findings (Guest et al., 2020).

Together, these practical, ethical, and methodological factors justified the selection of ten participants for the study.

3.2.2 Justification of the Ten-Participant Sample Size

The selection of ten participants was guided by methodological, logistical, and contextual considerations that ensured the study could be carried out with quality and consistency. Given the constraints during the COVID-19 period, strict health protocols limited group size, physical contact, and shared material usage. As a result, working with a small, controlled sample was essential to maintain safety and comply with institutional and national guidelines.

Furthermore, the study relied on limited technological resources, specifically one iPad and one stylus, which were used for all Digital Art Therapy sessions and for the collection of digital artwork. A larger sample would have resulted in long waiting periods, inconsistent session durations, and reduced engagement, potentially compromising the reliability and validity of the data collected. By limiting the sample to ten participants, the researcher could ensure systematic rotation, equal access to the digital tools, and consistent observation across all sessions.

A ten-participant sample also allowed for tighter quality control. Each child's progress, behavioral responses, and digital artwork could be monitored in depth across multiple sessions, which is essential in ASD-focused research where sensory, emotional, and communicative needs vary significantly between individuals. The smaller sample ensured the researcher could provide adequate support, maintain

therapeutic consistency, and collect data without compromising ethical or methodological rigor.

Therefore, the decision to work with ten participants was not only practical but also aligned with the study's goals of maintaining safety, ensuring high-quality data collection, and delivering structured and equitable Digital Art Therapy interventions.

3.2.3 Intrinsic Case Study: Selection of Each 10 Participant

This study adopts an intrinsic case study approach, which focuses on understanding the unique qualities, needs, and developmental trajectories of a specific group rather than seeking broad generalizations (Stake, 1995). The ten participants were intentionally selected by the NASOM Headmistress and teachers based on their diverse developmental profiles, communication abilities, and therapeutic needs. Their inclusion reflects the centre's professional judgment regarding which children would benefit most from Digital Art Therapy (DAT) while also contributing meaningful insights to the research aims.

Each participant presents distinct characteristics that inform their engagement with digital media.

For example, Participant A, with exceptional visual-spatial strengths, provides insight into how DAT can support high-functioning learners with strong perceptual abilities. Participant B, a creative non-verbal child, offers a perspective on how digital tools may facilitate expression among children who rely more on visual than verbal communication. Participants C and E, both diagnosed with severe ASD and additional sensory or behavioural challenges, highlight the ways digital platforms may aid emotional regulation, focus, and self-expression in children with more complex needs.

Participants F and G represent children with pronounced behavioural or cognitive profiles, including dominant personality traits, hyperactivity, and echolalia. Their participation allows the study to examine whether digital art-making can support self-regulation, attention, and adaptive social behaviours. Finally, Participants H, I, and J, all non-verbal with strong sensory-based communication styles, offer essential insight into how DAT accommodates children requiring high structure, visual predictability, and gentle sensory engagement.

The combined diversity of these ten profiles provides a rich and multifaceted case. By examining their individual experiences, the study can explore how Digital Art

Therapy functions across varied cognitive, emotional, and sensory needs within the Malaysian ASD context. The intrinsic case study design enables deep engagement with each child's unique therapeutic journey, aligning with the study's aim to understand the personalised, child-centred nature of digital art-based interventions.

Table 3.1
Participant Demographics, Diagnosis, and Selection Profiles (N=10)

Name	Age	Diagnosis	Profile
Participant A	10	Non-verbal ASD	Participant A has exceptional visual-spatial skill and was highly recommended by the Headmistress for data collection and participation inclusion
Participant B	9	Non-verbal ASD	Participant B is creative and has the ability to express herself through abstract art. The teacher wishes to boost her self-esteem while improving both her verbal and creative expressions
Participant C	6	Severe ASD, weak motor skills	Despite Participant C's sensory challenges and weak motor skills, he shows enthusiasm for tactile art. The teacher hope to improve his motor skills, emotional regulation and he can express in a more creative outlet
Participant D	6	Non-verbal ASD	Participant D is familiar with digital art as her parents provide it to her during her rest time at home after school. The teacher hopes that this session will improve on her social development
Participant E	6	Severe ASD, Hyperactivity, ADHD	Participant E has trouble focusing and finishing basic and daily tasks. Based on the proposal given, the teacher encouraged Participant E to join the program to improve on his focus, self-control and social interactions with the rest of his peers
Participant F	8	ASD, Hyperactivity, ADHD	Participant F is hard to deal with due to his dominant personality, show stubbornness and hard to mix around with his peers and other people. Tacher hopes this program would make him more docile and obedient to calm his dominant side

Name	Age	Diagnosis	Profile
Participant G	7	High functioning ASD, Echolalia	Participant G has auditory memory memorizing all that he hears primarily LRT and MRT stations. Teacher hopes to help him navigate social relationship and personal challenges using the digital art therapy.
Participant H	11	Non-verbal ASD	Participant H who exhibits a strong preference for sensory-based exploration. He communicates primarily through gestures, eye contact and physical cues. He responds well to well structured routines and visual prompts, making digital art therapy potentially suitable for supporting engagement, self-expression, and sensory regulation.
Participant I	10	Non-verbal ASD	Participant I expresses himself through movement, touch and non-verbal vocalization. He benefits from predictable environments and visual support, and digital art therapy offers an opportunity for simplified, low-pressure interaction aligned with his communication needs.
Participant J	12	Non-verbal ASD	Participant J engages with his surroundings mainly through, tactile and visual exploration. He shows curiosity towards colored stimuli and responds positively to calm, structured environments. Digital art therapy presents opportunity for gentle, guided sensory engagement tailored to his communication and regulation needs.

3.2.4 Research Approach

The study employed a mixed-methods design that integrated qualitative and quantitative strategies to provide a comprehensive understanding of how Digital Art Therapy (DAT) influenced social communication, emotional expression, and behavioural engagement among children with ASD. Mixed-methods research is widely recognised for its ability to combine the depth of qualitative inquiry with the structure

and reliability of quantitative measurement, producing richer and more triangulated findings (Creswell & Plano Clark, 2018).

Qualitative Component

The qualitative component consisted of naturalistic observation, semi-structured interviews with teachers, and systematic artwork analysis. Observation allowed the researcher to document spontaneous behaviours, sensory responses, and engagement patterns that emerged during DAT sessions. Such observational methods are especially valuable in ASD research because many autistic children communicate more readily through behaviour and non-verbal cues rather than spoken language (Odom et al., 2014). Semi-structured interviews with teachers provided contextual insight into each child's progress, emotional state, and classroom behaviours outside of therapy sessions.

This format offered flexibility while ensuring consistency across interview sessions, aligning with recommendations for qualitative data collection in special needs contexts (DiCicco-Bloom & Crabtree, 2006).

Artwork analysis served as the third qualitative source, enabling the researcher to examine expressive themes, symbolic content, colour choices, and changes in artistic behaviour across sessions. Art-based analysis is supported by art therapy literature as a valid method for interpreting emotional and cognitive shifts in children (Hinz, 2009; Malchiodi, 2012).

Quantitative Component

The quantitative component involved pre- and post-assessments using adapted social communication checklists and emotional response scales. Standardized behavioural scales are frequently used in ASD research to quantify changes in communication, self-regulation, and interpersonal responsiveness (Matson & Sturmey, 2011).

The adapted instruments in this study enabled measurement of observable improvements linked to digital art-making, such as increased eye contact, gesture use, initiation of interaction, and emotional expressiveness.

Integration and Triangulation

By combining these two methodological strands, the study achieved triangulation, which strengthens validity by cross-verifying findings from multiple sources of evidence (Fetters, Curry, & Creswell, 2013).

Narrative insights from observations and interviews were interpreted alongside measurable behavioural outcomes, offering a holistic view of each participant's development. This mixed-methods approach was therefore essential for capturing both the observable and experiential dimensions of change during DAT sessions.

3.2.5 Research Instruments

A combination of observational tools, respondent-based feedback, structured interviews, digital artefact collection, and qualitative analysis software was used to capture the behavioural, emotional, and expressive changes that occurred throughout the Digital Art Therapy (DAT) sessions. The integration of multiple instruments is consistent with best practices in mixed-methods research, which emphasise triangulation and methodological complementarity (Creswell & Plano Clark, 2018).

Observation Checklist

An observation checklist was employed to systematically record each child's communication behaviours, emotional responses, sensory reactions, and overall engagement during the sessions. Structured observational tools are particularly suitable for ASD research because they allow for the capture of rich behavioural data, especially when participants may have limited verbal communication (Odom et al., 2014). The checklist included indicators such as eye contact, gesture use, persistence in tasks, affective expression, and interaction with digital tools, ensuring consistency across all ten participants.

Questionnaire

Questionnaires were administered to teachers and caregivers to gather insights into each child's behaviour beyond the DAT environment. These instruments enabled the collection of contextual information such as changes in social communication, mood

regulation, and classroom participation. Questionnaires are frequently used in developmental and ASD-related studies because they provide multi-informant perspectives that enhance ecological validity (DeVellis, 2017; Matson & Sturmey, 2011).

Interview Protocol

Semi-structured interviews with teachers were conducted using a structured interview protocol that focused on the child's progress, behavioral consistency, and comfort with digital platforms. The semi-structured format allowed for follow-up questions and deeper exploration of individual experiences, which is essential when documenting the nuanced ways autistic children respond to therapeutic interventions (DiCicco-Bloom & Crabtree, 2006). Teachers' longitudinal observations contributed significantly to understanding behavioural changes that extended beyond the therapy sessions.

Digital Artwork Collection

In addition to behavioural and narrative data, the study also collected and analysed each participant's digital artwork produced during the DAT sessions. Art-based artefact analysis is a recognised qualitative method in art therapy research because creative products serve as visual records of emotional expression, cognitive processing, and thematic development over time (Hinz, 2009; Malchiodi, 2012). The digital artworks were examined for patterns in colour use, symbolic elements, compositional changes, and motor precision, providing another layer of insight into each child's therapeutic progress.

NVivo Software

NVivo 12 qualitative analysis software was used to code, organise, and visualise data from observations, interviews, questionnaires, and artwork descriptions. NVivo enhances analytical rigour by supporting systematic thematic coding, memo-writing, matrix queries, and visualisation techniques such as thematic maps and cluster analyses

(Bazeley & Jackson, 2013). This enabled the researcher to identify patterns across multiple data sources and ensure transparent, structured analysis.

3.2.6 Justification of the Mixed Method Approach

The mixed-methods approach was selected because it offered the most comprehensive framework for understanding the complex therapeutic effects of Digital Art Therapy (DAT) on children with Autism Spectrum Disorder (ASD). Given the considerable variability in communication styles, sensory needs, and behavioural expressions among autistic children, relying on a single methodological tradition would have been insufficient. Mixed-methods research, which integrates qualitative depth with quantitative structure, is well regarded for producing holistic and triangulated insights in developmental and therapeutic studies (Creswell & Plano Clark, 2018).

Justification Through Qualitative Methods Used

The qualitative component of this study consisted of:

- i) Naturalistic Observation
- ii) Semi-Structured Interviews with Teachers
- iii) Digital Artwork Analysis

These qualitative tools were essential because children with ASD often communicate through behaviour, gesture, sensory responses, and visual expression rather than spoken language. Observational methods allowed the researcher to capture spontaneous behaviours, emotional expressions, sensory preferences, and engagement patterns that emerged naturally during DAT sessions. This aligns with ASD research recommendations, which emphasise the value of behavioural observation in understanding non-verbal communication (Odom et al., 2014).

Semi-structured interviews provided professional insight from teachers who interacted with the participants daily. This method offered flexibility for follow-up questions while maintaining consistency across interviews, making it especially suitable for special needs contexts where individual variability is high (DiCicco-Bloom & Crabtree, 2006).

Artwork analysis was also integral, as digital art products served as symbolic records of emotional states, thematic development, sensory choices, and motor engagement. Art therapy literature widely recognises artwork as a valid qualitative data source for tracking psychological and expressive changes (Hinz, 2009; Malchiodi, 2012). These qualitative approaches collectively allowed a nuanced interpretation of each child's internal experiences and expressive transformations.

Justification Through Quantitative Methods Used

The quantitative component consisted of:

- i) Pre- and Post-Assessment Checklists on Social Communication
- ii) Emotional Response Rating Scales

Quantitative measures were necessary to provide objective, comparable indicators of behavioural change across the ten participants. These tools captured observable improvements such as increased eye contact, gesture use, emotional expression, and initiation of interaction. Behavioural checklists and rating scales are commonly used in ASD studies due to their reliability in measuring communication and self-regulation changes over time (Matson & Sturmey, 2011). Quantitative data therefore added structure and empirical rigour, supporting measurable claims about DAT's effectiveness.

Integration and Triangulation

The integration of both qualitative and quantitative strands allowed for triangulation, which enhances validity by cross-verifying patterns from multiple data sources (Fetters, Curry & Creswell, 2013). Observational narratives, teacher insights, and artwork themes were compared with quantitative behavioural scores to determine whether emotional or expressive changes aligned with measurable social communication improvements.

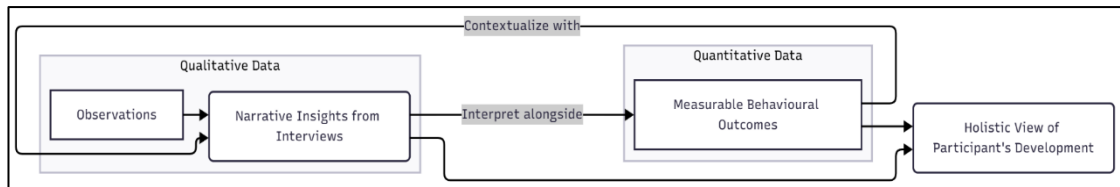


Figure 3.1 Data Triangulation Strategy

Why Mixed Methods Were Necessary

The mixed-methods design was justified for four key reasons:

ASD requires multimodal assessment.

Behaviour, communication, and emotional expression manifest differently across children, making it essential to gather data through multiple channels.

DAT produces both observable and internal changes.

Digital artwork and sensory responses reveal emotional shifts that quantitative tools alone cannot capture.

- i) Triangulation increases trustworthiness and depth.
Cross-referencing artwork, behaviour, and assessment scores strengthens the validity of findings.
- ii) It aligns with global DAT and art therapy research practices.
Studies evaluating expressive therapies often combine behavioural scales with qualitative interpretation of creative output (Hinz, 2009; Malchiodi, 2012).

For these reasons, the mixed-methods approach was the most appropriate and effective research design, enabling a robust analysis of how Digital Art Therapy supports communication, emotional regulation, and engagement among children with ASD.

3.2.7 Conceptual Framework

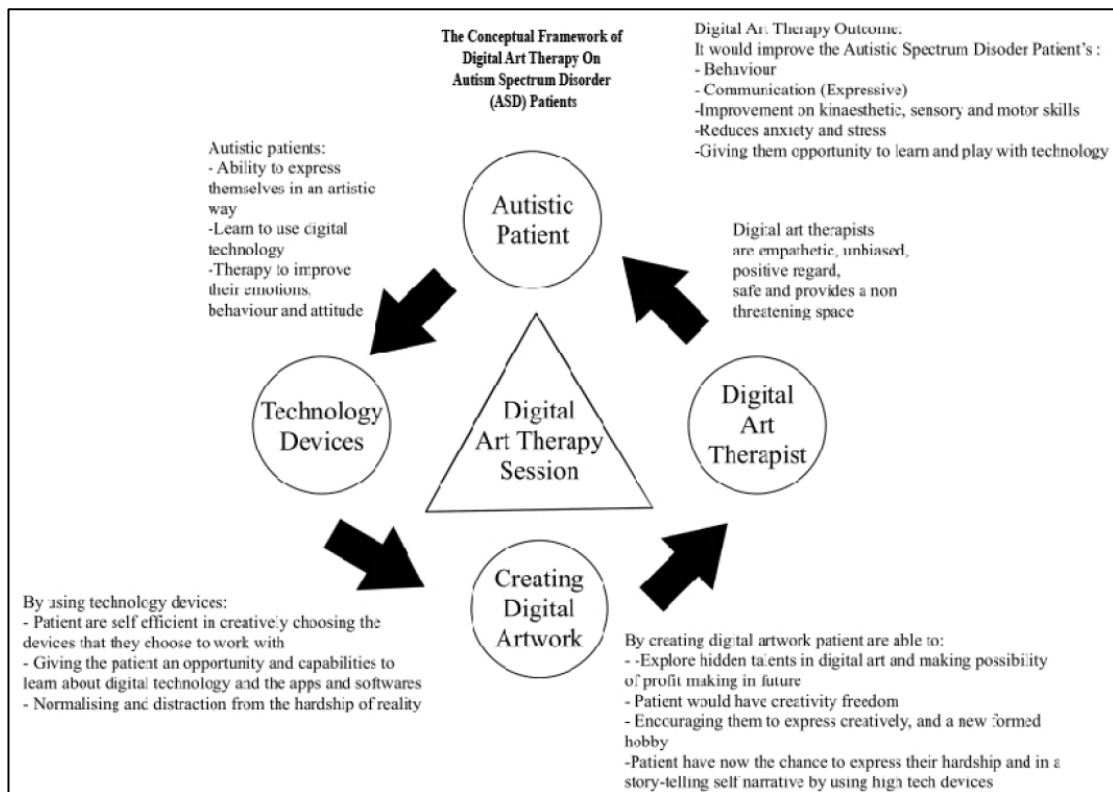


Figure 3.2 The Conceptual Framework Explaining the Process of the Digital Art Therapy Session

The process starts with the Autistic Patient. The framework sees the patient as an active person who can express themselves artistically (Author, Year). The therapy's goal is clear: to help the patient learn digital skills while improving their feelings and behavior.

Next, the patient moves to using Technology Devices. Here, the framework stresses that the patient is in charge; they use their own choice to pick the specific devices, apps, and software they want to work with. This choice does two things: it builds technical skills and helps make things feel normal by giving the patient a positive focus away from daily stress.

Using these devices leads to the phase of Creating Digital Artwork. This output allows patients to share their personal stories and struggles using technology. Concrete benefits include finding hidden talents, which could lead to ways to earn money in the future, and starting a new hobby through creative freedom.

The entire process is supported and guided by the Digital Art Therapist. The therapist must show important qualities for helping ASD patients: being empathetic,

fair, and kind. By creating a safe and welcoming space, the therapist ensures the patient keeps taking part, completing the cycle.

The total impact of this framework leads to specific Digital Art Therapy Outcomes. As the model shows, these results include clear improvements in behavior and the ability to communicate. It also leads to better movement, sensory, and motor skills. Overall, the goal is to lower the patient's anxiety and stress while giving them a chance to keep learning and playing with technology.

3.3 Ethics When Conducting the Research Involving Autistic Children

This thesis provides an insightful exploration into how the integration of digital art programs significantly enhances therapeutic outcomes for individuals with ASD.

By leveraging innovative technological tools, these programs offer fresh, engaging, and accessible avenues for self-expression, which are crucial for those who often find traditional verbal or non-digital communication methods challenging (Darewych, 2021).

The study is grounded in the premise that the structured, multisensory nature of digital media naturally aligns with the unique sensory and cognitive profiles of individuals on the autism spectrum (Author, Year).

The theoretical framework for this study rests upon the complementary synergy of two models: the Expressive Therapies Continuum (ETC) and the Context and Outcomes of Art Therapy (COAT). The ETC, originally proposed by Kagin and Lusebrink (1978), functions as the micro-level, process-oriented framework, explaining how engagement with art moves through sequential levels of processing, from sensory input to symbolic meaning.

In contrast, the COAT model (Schweizer, 2020) provides the macro-level, ecological framework, essential for contextualizing therapeutic change within the child's specific social and environmental settings in Malaysia. This dual foundation ensures that the study can both validate the internal therapeutic process and measure its external social effectiveness.

The need for this highly tailored intervention is underscored by empirical findings. Smith et al. (2022) emphasize the significant role of communication in reducing anxiety and breaking down emotional barriers in individuals with ASD. The study advocates for a multifaceted treatment approach, recognizing that shorter, more

focused sessions and tailored strategies are often more effective in improving mood and reducing anxiety.

This comprehensive, patient-centered approach fosters autonomy and improves overall quality of life (Smith et al., 2022). Digital Art Therapy (DAT) is uniquely positioned to fulfill these criteria by providing a medium that is manageable, non-threatening, and highly adaptable.

DAT effectively addresses social interaction deficits, communication barriers, and repetitive behaviors. Digital tools enhance emotional regulation and behavior by providing a means of expression that bypasses traditional social norms.

Studies by Miller et al. (2023) and Chung et al. (2024) demonstrate specific improvements in emotional expression, behavioral control, social skills, and stress reduction through DAT. The ease of access to diverse tools stimulates imagination and engagement, supporting both personal growth and the simultaneous development of fine motor skills and cognitive abilities.

This use of technology aligns with the idea that digital media exists on a continuum of art materials, embracing technological advancements while maintaining core therapeutic principles (McNiff, 2018).

Overall, the combination of digital and traditional methods creates a powerful synergy that transforms therapeutic landscapes. The methodological structure, guided by the ETC and COAT models, validates the internal workings of the DAT process while ensuring the resulting social communication enhancements are meaningful and measurable within the Malaysian context. By building upon the foundational necessity of digital integration (Malchiodi, 2018), this thesis promises to offer new, compassionate, and effective pathways for holistic personal growth for children with ASD.

3.4 Previous Models of Digital Art Therapy and ASD Patients

i) The Cycle of Frustration and Anxiety

For many individuals with ASD, the inability to effectively express internal states, needs, or distress leads to significant internal buildup of tension. This communicative deficit can manifest as behavioral challenges, anxiety, and frustration because the individual lacks a reliable channel to externalize their emotional experience

(Baron-Cohen, 2009). The resultant anxiety is often cyclical: increased anxiety further impedes the ability to communicate, reinforcing the sense of isolation and dysregulation.

ii) Evidence Supporting Expressive Pathways

Past studies advocate for therapeutic approaches that prioritize expressive communication as a means of managing this cycle:

- a) **Reducing Emotional Barriers:** Smith et al. (2022) emphasize that addressing communication challenges is key to reducing anxiety and "breaking down emotional barriers." Their work highlights that focused, manageable discussions or expressive activities prevent the patient from becoming overwhelmed, thereby creating a supportive and effective therapeutic environment.
- b) **Improving Behavior and Skills:** When individuals are provided with an accessible, alternative means of expression, improvements are seen across multiple domains. Studies focusing on Digital Art Therapy (DAT), for instance, demonstrate that bypassing traditional social norms allows for enhanced emotional expression and behavioural control (Miller et al., 2023). This improved ability to communicate needs and feelings reduces the underlying tension that often drives repetitive or challenging behaviors.
- c) **Enhancing Social Outcomes:** By enhancing expressive communication, interventions lay the groundwork for better social function. Research by Chung et al. (2024) confirms that structured expressive activities improve social skills and stress reduction. This indicates that the ability to articulate or externalize emotions, even non-verbally, is a prerequisite for achieving broader social and emotional resilience.

In essence, therapeutic interventions, especially those involving non-verbal media like DAT, are crucial because they provide the necessary **externalization pathway**. By equipping individuals with reliable expressive tools, therapists enable them to navigate their internal challenges confidently, fostering self-awareness and self-regulation, which ultimately leads to a marked improvement in their quality of life (Smith et al., 2022).

The Need for Tailored and Focused Intervention

A foundational study by Smith et al. (2022) emphasizes the significant role of communication in reducing anxiety and breaking down emotional barriers. Their findings advocate for a multifaceted treatment approach that prioritizes tailored, patient-centered care. Specifically:

Shorter, focused discussions between patients and specialists are often more effective in enhancing mood and reducing anxiety than longer, exhaustive sessions. This prevents the individual from feeling overwhelmed, thereby creating a supportive and manageable therapeutic environment (Smith et al., 2022).

The goal is to **holistically equip individuals** with tools to thrive, not just to treat symptoms. This means focusing on improving communication skills, motor abilities, and emotional expression to foster a sense of **autonomy and self-regulation**, ultimately enhancing their quality of life (Smith et al., 2022).

This shift reflects a commitment to **personalized, evidence-based interventions** that recognize the complex connection between communication and emotional health in ASD (Smith et al., 2022).

3.5 Digital Art Therapy Paradigms and Their Relevance to ASD

Digital Art Therapy (DAT) as a Solution

Digital Art Therapy (DAT) effectively meets the need for tailored, engaging intervention by addressing common ASD deficits like **social interaction difficulties, communication barriers, and repetitive behaviors**.

- a) **Mechanism of Action:** Using digital tools enhances emotional regulation and behaviour because it provides a means of expression that **bypasses the demands of traditional social norms**. The technology allows for emotional expression without the sensory or interpersonal pressure of conventional materials or verbal communication.
- b) **Empirical Support:** Studies demonstrate DAT's efficacy in key areas. Research by Miller et al. (2023) and Chung et al. (2024) show improvements in emotional expression, behavioural control, social skills, and stress reduction.

- c) **Unique Benefits:** Unlike traditional art therapy, DAT's integration of technology fosters both emotional expression and technical skills. Access to a diverse range of digital tools stimulates imagination and engagement, supporting both personal growth and cognitive development (Miller et al., 2023; Chung et al., 2024). Overall, DAT is a promising and adaptable treatment for ASD because it enhances emotional expression and skill development while simultaneously reducing stress and anxiety.

3.6 Research Method

3.6.1 Methodology

This study uses qualitative methodologies to explore DAT's impact on autistic participants. Given the novelty of digital therapeutics, qualitative methods like interviews, observation, documentation, and online journals provide nuanced insights. Questionnaires complement qualitative data, while direct observation assesses engagement with digital art devices. In-depth interviews with teachers, caretakers, and parents offer a holistic view of participants' needs and responses.

3.6.2 Qualitative Research Methods

Qualitative research methods, including interviews, observation, documentation, and online journals, are employed to provide a comprehensive understanding of the participants' experiences. The choice of these methods is driven by the limited existing literature on digital therapeutics, as it is a relatively new field dating back to around 2020 (Smith and Jones, 2023). These methodologies enable the researcher to capture detailed and contextual data about the participants' interactions with DAT tools.

3.6.3 Questionnaires

To complement qualitative data, questionnaires are distributed to psychiatric doctors, parents, and caregivers. This approach is chosen for its efficiency in collecting timely and accurate responses regarding the participants' knowledge and expressive

levels. Questionnaires are advantageous due to their ability to provide consistent and comparable data while requiring less time and effort compared to other data collection methods (Johnson et al., 2023). However, the limitations include potential constraints in data collection due to COVID-19 restrictions and reliance on third-party responses, which might affect the comprehensiveness of the information gathered.

3.6.4 Observation

In addition to questionnaires, direct observation is conducted to assess how participants engage with digital art devices and their expressive capabilities within a controlled environment. Observational data offer valuable insights into the participants practical interactions with digital tools, providing context that might be missed through other methods (Adams and Kelly, 2024). This approach helps to bridge the gap between reported data and actual behavior, ensuring a more accurate evaluation of the participants experiences.

3.6.5 Interview

In-depth interview with teachers, caretakers, and parents are conducted to gain a deeper understanding of the participants learning behaviours, mood fluctuations, stress triggers, and limitations. These interviews help validate findings from questionnaires and observations, providing a more holistic view of the participants needs and responses (Williams et al., 2023). This method enriches the data by incorporating multiple perspectives on the participants experiences with DAT.

3.7 Research Framework

3.7.1 Interview

Qualitative research frequently uses interviews to gather in-depth data, providing a comprehensive understanding of participants experiences and perspectives (Creswell and Poth, 2018). Kvale (1996) highlights the critical role of interviews in collecting data that offers valuable insights for generating future research hypotheses. Seidman (2006) suggests a structured interview process involving three stages: the first

to explore the participants background, the second to delve into specific experiences, and the third to interpret the significance of these experiences. This systematic approach allows researchers to gain profound insights into participants cognitive processes and actions. Recent studies, such as Wang et al. (2023), demonstrate the effectiveness of multi-stage interviews in understanding the complex perspectives of individuals with autism, particularly regarding their responses to treatment interventions.

3.7.2 Observation

Observation is a fundamental technique in qualitative research, where researchers immerse themselves in natural settings to gain a deep understanding of individuals or groups. This approach allows researchers to witness firsthand how people interact with their environments, engage with others, and respond to various stimuli. By observing participants in real-time, researchers can gather rich, nuanced data that often provides insights beyond what can be captured through interviews or surveys (Angrosino, 2023).

This method is particularly valuable because it allows for the discovery of unspoken behaviors, social dynamics, and cultural contexts that might otherwise remain hidden. Through close and careful observation, researchers can interpret body language, tone, and subtle interactions, offering a more complete and authentic portrayal of the participants' experiences. Additionally, observation provides a way to see how people's behaviors align or differ from what they may verbally express, offering a balanced and thorough understanding of their realities (Angrosino, 2023).

Furthermore, observation helps in identifying patterns and themes within the natural flow of everyday activities, making it easier to understand not only individual actions but also the larger context in which these actions occur. This comprehensive approach enables researchers to capture the complexity of human behavior, providing valuable insights that may significantly enhance the overall depth and authenticity of the research findings (Angrosino, 2023).

3.7.3 Case Study: Jalambadis Research (2014 -2016)

Jalambadi's research (2014-2016) in Iran highlighted the remarkable impact of art therapy on the social interactions of 8-year-old autistic children, putting light on the

extraordinary role artistic expression can play in creating relationships and increasing communication. Jalambadi saw notable improvement in the children's social skills and emotional expressiveness by including their mother in tandem painting sessions. These meetings were considerably more than just possibilities for artistic inquiry. They blossomed into meaningful bonding moments that nourished the relationship between child and caregiver, emphasizing the unique potential of art in transcending communication gaps (Jalambadi, 2016).

One of the important strategies employed in the study was Knill's 'Architect of a Session' method. This technique provided children with a regulated yet flexible setting in which they could freely express their feelings and explore their inner worlds via art. In one especially moving example, a small child named Audrey expressed her emotions using a storyboard. For Audrey, who struggled to express vocally, this artistic outlet became a crucial tool, helping her to externalize feelings that otherwise felt too difficult to describe. Through painting, Audrey was able to make sense of her mental sensations, gradually constructing a bridge between her ideas and the outside world (Garcia et al., 2023).

A significant aspect of the therapeutic process was the gathering of each child's artwork at the end of every session. This simple deed not only offered concrete evidence of their improvement but also generated a sense of pride and success in the children. As they observed their inventions mature, they began to recognize their rising talents, which in turn enhanced their self-esteem. For many of these children, the metamorphosis of their art matched a corresponding transition in their social and emotional life, presenting a visual monument to their path of growth and selfdiscovery (Kowalski et al., 2023).

Jalambadi's study demonstrates the great potential of art therapy in boosting social communication and emotional connection for children with autism. It highlights how art may act as a bridge between the inner emotional world of the kid and the exterior relationships they form with others, eventually developing connection, understanding, and emotional well-being (Jalambadi, 2016).

3.8 Methodology: Participant Observation

Participant observation is a vital qualitative research method that offers deep insights through active engagement with subjects. Yin outlines four models: fully

participating, balancing participation and observation, primarily observing with some participation, and solely observing. Effective participant observation requires balancing engagement with analytical detachment, as noted by Gold and Schwartz. In autism research, this method captures authentic social interactions and environmental impacts, providing a comprehensive view of individuals' lived experiences and enriching the quality of qualitative data.

3.8.1 Semi-Structured Questions

Semi-structured interviews are a widely used tool in qualitative research, particularly in fields such as social work and art therapy, where understanding personal experiences and nuanced perspectives is essential. This interview format blends the rigidity of structured interviews with the openness of unstructured ones, allowing researchers to focus on key research topics while remaining flexible enough to explore participants' individual viewpoints in greater depth (Creswell and Poth, 2018).

In art therapy, where each participant's experience is highly personal and subjective, semi-structured interviews are particularly valuable. They provide a framework for discussing core themes such as emotional expression, therapeutic progress, and artistic engagement while also giving participants the freedom to express their thoughts and feelings in a way that might not emerge in more rigid interview structures. This flexibility allows researchers to dive deeper into complex issues like self-expression, identity, and personal growth, which are often at the heart of art therapy.

Moreover, semi-structured interviews encourage a conversational flow, which can help build rapport and trust between the interviewer and participant. This is especially crucial in sensitive fields like art therapy, where participants may be reflecting on deeply emotional experiences. By allowing space for participants to guide the discussion, researchers can uncover rich, detailed insights that may otherwise remain hidden, contributing to a more holistic understanding of the therapeutic process (Creswell and Poth, 2018).

Ultimately, the semi-structured interview approach strikes a balance between structure and flexibility, making it an effective method for capturing the complexity of human experiences, particularly in the context of therapeutic interventions.

3.8.2 Interview with the Teachers

The study involved semi-structured interviews with three NASOM teachers experienced in special care for children with ASD. The aim was to explore their perspectives on the effectiveness of DAT, including their theoretical frameworks and practical experiences. These interviews allowed therapists to share insights based on their practices. As noted by McLeod (2022), semi-structured interviews provide flexibility to delve into emerging topics, offering depth and context to participants comments. This approach enabled therapists to discuss various aspects of art therapy, including successful methods, challenges faced, and observed outcomes in clients.

3.8.3 Recent Studies Supporting Art Therapys Effectiveness

Recent research continues to emphasize the increasing acknowledgment of art therapy's tremendous influence across many groups and therapeutic contexts, displaying its capacity to increase emotional well-being, facilitate communication, and support healing. For example, research by Kim et al. (2023) indicated considerable gains in social skills and emotional expression among persons with ASD who participated in art therapy sessions. These folks, who frequently have considerable difficulty in connecting with others and expressing their inner feelings, were able to uncover new methods to communicate and interact via the creative process. Kim and colleagues' findings suggest that art therapy is not merely a complementary practice but a valuable adjunct to traditional treatments, offering a unique and effective approach to enhancing interpersonal skills and self-expression in individuals who might struggle with verbal or social interactions (Kim et al., 2023).

This research underlines the importance that art therapy may play in helping persons with ASD traverse complicated emotional landscapes and gain critical social skills, bridging the gap between internal feelings and external communication.

In a different context, Thompson and Linder (2023) studied the effects of art therapy for trauma survivors, demonstrating that engaging in creative processes through art therapy can be a vital aspect of emotional healing. For persons who have suffered trauma, expressing feelings and digesting very traumatic memories can be incredibly challenging. Art therapy provides a safe, nonverbal way for these survivors to externalize their pain and begin the healing process. Thompson and Linder discovered

that when trauma survivors engaged themselves in producing art, they not only processed their experiences but also gained resilience. Through painting, individuals could clearly represent their anguish, their struggle, and finally, their recovery, making the emotional processing more accessible and less daunting. This study demonstrates how art therapy is a significant tool for trauma recovery, allowing patients to communicate complicated feelings that words would fail to grasp, and aiding their path toward resilience and healing (Thompson and Linder, 2023).

Further establishing the efficacy of art therapy, Rodríguez and Yoon (2023) focused on its use in controlling mental health issues. Their research highlighted the essential function art therapy plays in creating therapeutic interactions between clients and therapists. In many circumstances, the practice of producing art in a supportive atmosphere helps promote trust and openness. Rodríguez and Yoon's findings underscore how art therapy cultivates a sense of safety and mutual understanding, which is necessary for clients to fully engage in the therapeutic process. Whether individuals are coping with anxiety, sadness, or other mental health difficulties, this relationship element of art therapy enables deeper emotional inquiry. Clients are more likely to open up about their issues and engage meaningfully in therapy when they sense a true connection with their therapist, created via the shared creative process (Rodríguez and Yoon, 2023). This underscores the importance of employing art therapy as a tool not just for expression but also for developing the therapeutic connection, which is vital for attaining good outcomes.

Collectively, this research verifies the adaptability and effectiveness of art therapy in addressing a wide range of emotional, social, and mental health difficulties. Whether dealing with persons on the autistic spectrum, trauma survivors, or those managing mental health concerns, art therapy provides an innovative and very personal approach to healing and personal growth. By bringing artistic expression into therapeutic procedures, art therapy enhances established treatment techniques and provides unique, powerful solutions for boosting emotional well-being and social functioning. Through art, individuals may find new ways to express themselves, heal from trauma, and develop meaningful connections, underlining the transformational power of creativity in the therapeutic environment.

3.8.4 Recent Advances and Challenges in Digital Art Therapy

DAT holds immense promise as a transformative addition to traditional mental health treatments, particularly for individuals with ASD. However, while its potential is recognized, the full scope of its effectiveness remains to be thoroughly validated through comprehensive research. Recent studies underscore the urgent need for more empirical data, practical guidance, and ethical frameworks to ensure that DAT can be utilized effectively and safely across therapeutic settings.

For instance, Cheung et al. (2024) and Park and Lee (2023) have highlighted a critical gap in both research and application when it comes to digital tools in therapy. Although digital technology offers exciting possibilities, the lack of empirical studies that rigorously evaluate its impact leaves a significant void. Therapists and practitioners currently have limited evidence-based guidelines to rely on, making it difficult to assess how to best incorporate digital art into their existing treatment protocols. This uncertainty calls for a more structured approach to studying the effects of DAT, particularly with diverse populations. Without concrete data to support its use, many therapists may remain hesitant to fully embrace these tools, and the therapeutic benefits may remain underutilized (Cheung et al., 2024; Park and Lee, 2023). This gap in research serves as a reminder that while technology opens new doors, it must be backed by scientific validation to ensure its efficacy in improving mental health outcomes.

Another important consideration is the ethical framework that surrounds the use of digital tools in therapy, especially for vulnerable populations such as individuals with ASD. Garcia and Vale (2023) emphasize the need to develop ethical guidelines specifically tailored to the unique needs of these individuals. Without robust ethical standards in place, the introduction of DAT could inadvertently expose patients to risks, such as overreliance on technology or insufficient emotional support. For children and adults with ASD, who may already face challenges in communication and emotional regulation, it is crucial that therapy is conducted in a way that respects their needs and ensures a safe, supportive environment. Garcia and Vale argue that without a solid ethical foundation, the potential risks of DAT such as inappropriate application, privacy concerns, or emotional overload—could outweigh its intended benefits (Garcia and Vale, 2023). This call for ethical rigor highlights the importance of protecting vulnerable populations while still allowing them to benefit from innovative therapeutic methods.

On the other hand, there are compelling studies that showcase the incredible potential of digital art tools in enhancing communication, emotional expression, and social interaction among individuals with ASD. Smith and Thompson (2023) present an optimistic view, illustrating how digital tools can open up new pathways for self-expression. Children with ASD, who often find it difficult to express themselves verbally, can use digital platforms to articulate their emotions in a non-verbal, creative manner. This offers them a unique opportunity to communicate in ways that feel more comfortable and accessible. Moreover, Smith and Thompson emphasize that the key to unlocking the full potential of these tools lies in specialized practitioner training. Therapists must not only understand the therapeutic principles behind art therapy but also be proficient in the digital tools themselves to ensure they are implemented effectively. Without proper training, the therapeutic potential of DAT may be diminished, as therapists may struggle to integrate the technology meaningfully into their practice (Smith and Thompson, 2023). This research underscores the necessity of investing in both technological tools and the education of therapists to maximize the benefits of DAT.

In a groundbreaking study, Zhou et al. (2024) explored the use of augmented reality (AR) to create immersive therapeutic experiences for individuals with ASD. By blending digital and physical environments, AR can elevate sensory experiences in ways that traditional art therapy cannot. For example, interactive environments created through AR allow patients to engage with their surroundings in a dynamic and personalized manner, which can be especially valuable for those with sensory processing issues. This innovative approach has the potential to make therapy more engaging and effective, as patients can explore new forms of self-expression and interaction within an enhanced, multisensory world. Zhou et al.'s research suggests that AR could revolutionize DAT, offering patients not just a new medium of expression but an entirely new way to experience therapy (Zhou et al., 2024). However, the study also points to the need for further exploration of how this technology can be integrated into mainstream therapeutic practices and how therapists can be trained to use it effectively.

Ultimately, to fully realize the potential of DAT, comprehensive research, the development of ethical guidelines, and the integration of advanced technologies like augmented reality are essential. As we continue to explore the possibilities of DAT, it is clear that there is a promising frontier ahead, where technology and therapeutic

practice can merge to provide more personalized, engaging, and effective treatments for individuals with ASD and other mental health conditions. However, without thorough validation and a focus on ethical, responsible implementation, the true potential of DAT may remain untapped. The future of mental health treatment lies in bridging these gaps, ensuring that DAT becomes a well-researched, ethically grounded, and highly effective component of therapeutic practice.

3.8.5 The Procedure of Data Analysis Digital Art Therapy Using NVIVO

The study leverages NVIVO software to delve into qualitative data gathered from DAT sessions with individuals on the ASD. NVIVO is a powerful tool for managing and analysing complex data sets, enabling researchers to uncover patterns and insights that might otherwise be missed.

In this research, NVIVO's capabilities are employed to conduct thematic analysis and coding of the data collected during therapy sessions. This process involves identifying and categorizing recurring themes and patterns in the artistic work and interactions of ASD patients. By systematically analysing these themes, the study aims to assess various aspects of therapeutic progress, including artistic expression, fine motor skills, sensory processing, social skills, and emotional well-being.

The goal of this analysis is twofold. Firstly, it seeks to highlight the tangible impact of DAT on individuals with ASD. This includes understanding how digital art tools influence their ability to express themselves artistically, develop fine motor skills, process sensory input, engage socially, and manage their emotions. Secondly, the insights gained from this analysis will be used to craft personalized strategies that cater to the unique needs of each individual. By tailoring therapy to fit the specific requirements and preferences of each patient, the research aims to enhance clinical practice and improve overall patient outcomes.

Ultimately, this study not only provides a deeper understanding of how DAT affects individuals with ASD but also aims to inform and refine therapeutic approaches. The insights gained could lead to more effective, individualized treatment plans, fostering better outcomes and greater satisfaction in therapy for patients and practitioners alike.

3.9 Data Import and Preparation

3.9.1 Collection

The study explores the impact of DAT on individuals ASD through a meticulously designed data collection approach that captures both qualitative and quantitative aspects of therapy sessions. This multi-faceted approach includes session notes, observation grids, and interview transcripts, each contributing a unique perspective to the overall analysis.

DAT has the potential to provide a novel and creative therapy to treat adults with ASD, offering an informative tool whereby psychiatrist and art therapist can work together simultaneously. DAT provides a digital backdrop for assessment that is then evaluated per session, which mean that in addition to observations, researchers capture and document session notes, interview transcripts and researchers can create observation grids through which they note data during each session. These tools provide key data for evaluation of DAT as well as insights into the process that can be used to personalise sessions to individual needs.

Session notes are an indispensable component of this research, as they are dense, rich narratives capturing how a patient responds, reacts and behaves during each session of therapy. Such notes are not just factual and literal records but radiating, living testimonies of how patients engage with digital art tools and media, their affective states, the sensuous experiences they have, and how they relate to their environment.

The depth of such notes lies in their ability to foreground the minutiae of each patient's experience: from how she navigates through an interface and explores different painting/sculpting techniques, to how he responds differently to various colours and patterns, to how they both develop confidence and control in the use of certain tools as they become more accustomed to them.

Spanning several sessions, the notes track the evolution of the patient's behaviour during therapy and chart the gradual therapeutic progress of consistent engagement with digital art, providing researchers with thick descriptions of nuances of emotional expression that cannot be possibly captured through the traditional use of scales.

These notes are potentially invaluable, providing a qualitative yardstick with which to measure the efficacy of DAT.

Juxtaposed to these storyboards are ‘observation grids’, which provide a more structured way to track data. Whereas session notes provide a way to describe therapy and gather qualitative data, observation grids are a formal way to track measurable behaviour such as sensory reactions and shifts in mood. For example, a patient who expresses visibly stronger shifts in mood when exposed to certain colours or ways to respond with art can be tracked, quantitatively, to understand how these reactions might change under different conditions. With these types of data, researchers can begin to draw correlations between experiences with therapy and, in particular, ones related to the use of digital tools and changes in sensory processing or emotional regulation. The information captured by the observation grid provide keys to understanding whether and how specific elements of therapy might be effective.

Furthermore, transcripts of interviews with the patients, as well as with their careers and therapists provide empirical data that enables the positioning of the DAT (and the therapy sessions) within the emotional and personal landscape of the individual. These conversations, by undertaking and focusing on the interviews, address questions relating to the experience of these individuals in a way that differs from the written accounts of observations of patients provided on session notes or observation grids.

In conducting interviews with the patient, we gain a sense of how the patients saw themselves, how they feel about the process, and what was going on inside them that would not have been immediately obvious to the observer. Carer and therapist interviews provide the researcher with an opportunity to hear them speak about their observations, discuss their challenges, and reflect on the achievements they have seen.

All these perspectives described provide a more nuanced understanding of DAT’s impact, enabling one to consider the subjective description of the patient and their condition along with the ability to consider their interaction with a therapist, thereby enhancing the sociopolitical impact of the therapy. Ultimately, by bringing carers, therapists and patients to the research, the platform allows for more penetrating insights into the ways in which DAT influences the lived experience and sensibilities of individuals who experience ASD.

In this regard, session notes, observation grids and interview transcripts seem to complement each other, allowing us to create a robust and multidimensional ground for the measurement of DAT efficacy. Specifically, the combination of qualitative and quantitative data provides us with a comprehensive picture of the developmental

pathway of each patient, moving away from behavioural indicators to encompass emotional and cognitive changes.

Furthermore, the interplay between notes, grids and transcripts allows for an in-depth examination of how to tailor DAT to individual needs to whether it's by adapting the canvas, fine-tuning the artistic technique, choosing the sensory stimuli or creating a therapeutic space to foster affective development. This approach to therapy would allow DAT to be tailored and finetuned, with the goal of improving the quality of life of individuals on the autism spectrum, with positive implications on their day-to-day experiences and wellbeing. These insights will play a decisive role in future therapeutic strategies, ensuring that DAT is perceived as an effective and applicable technology for adult individuals with autism in diverse contexts.

3.9.2 Artwork Descriptions

Analyzing digital artworks plays a crucial role in assessing therapeutic progress among ASD patients, offering unique insights into their emotional and cognitive development. Elements such as colour use, form, and creativity become vital markers in this process.

For instance, Participant C's journey through art therapy can be vividly traced through Participant C's evolving palette and increasingly intricate designs. Initially, Participant C might have gravitated towards monochrome or simple hues, reflecting a more limited emotional range or comfort zone. As therapy progresses, the introduction of vibrant colours and complex forms can signify breakthroughs in emotional expression and cognitive understanding.

Each artwork is more than just a creation; it's a window into the artist's mind and emotions at that particular moment. This is why meticulous documentation is essential. Therapists and researchers note every detail, whether it's the technique used, the tools chosen, or the environment in which the art was created. These factors help paint a broader picture of the patient's progress, linking the creative choices made during the art-making process to their overall therapeutic journey.

This detailed documentation process not only helps in understanding the immediate impacts of therapy but also provides a longitudinal view of the patient's development over time. Observing shifts in artistic expression can highlight

improvements in areas like mood regulation, communication, and problem-solving skills.

Ultimately, the analysis of digital artworks goes beyond surface-level observations, offering profound insights into the personal growth and therapeutic advancements of individuals with ASD. This method underscores the therapeutic potential of art as both a diagnostic tool and a medium for emotional healing and cognitive enhancement, bridging the gap between creative expression and psychological development.

3.9.3 Data Recording and Encompassment

The data collection process for evaluating DAT in patients with ASD is designed to be as comprehensive and nuanced as the therapy itself. By meticulously recording various aspects of each therapy session, researchers aim to capture a holistic view of the therapy's impact. This approach involves several key components:

- a) **Sensory Responses:** Each session is carefully observed to record how patients respond to different sensory stimuli, such as the textures and colours used in digital art tools. This helps researchers understand how sensory inputs influence patient engagement and comfort levels during therapy.
- b) **Mood Tracking:** Researchers monitor and document changes in mood throughout the sessions. By noting fluctuations in emotional states, they can assess how DAT affects emotional well-being and whether it helps in stabilizing mood or alleviating anxiety.
- c) **Creativity Assessment:** The level of creativity expressed through the artwork is recorded. This includes observing the use of colours, shapes, and complexity in the digital creations. Tracking creativity provides insights into how therapy fosters artistic expression and whether it encourages patients to explore new ideas and techniques.
- d) **Motor Skills Development:** Detailed notes are made on how patients use digital tools and their progress in fine motor skills. This includes monitoring their dexterity, coordination, and control over the digital drawing tools, which is crucial for evaluating the therapy's effectiveness in enhancing motor abilities.

- e) **Social Interactions:** Observations are made on how patients interact with therapists and peers during collaborative art sessions. This helps in assessing the impact of DAT on social skills and the ability to communicate and connect with others.

The data collected through session notes, observation grids, interviews, and artwork descriptions is then organized for analysis using NVIVO software. This advanced tool allows researchers to systematically code and analyze qualitative data, uncovering patterns and themes that reveal the therapy's impact on participants like Participant A, Participant F, Participant B, Participant G, Participant E, and Participant C.

For instance, session notes might detail how Participant A's engagement with vibrant Mandala drawings helps Participant A express complex emotions, while observation grids could reveal that Participant F's sensory responses are more positive with dynamic compositions. Interviews might provide personal insights into how Participant G's intricate designs serve as a form of emotional regulation, and artwork descriptions could show Participant E's progress in using colour palettes to manage hyperactivity.

By integrating these diverse data sources, the research aims to develop personalized interventions that address the unique needs of each patient. This thorough approach not only enhances understanding of the therapy's impact but also supports the creation of tailored strategies that can improve therapeutic outcomes and quality of life for individuals with ASD.

3.9.4 Formatting

To seamlessly integrate data into NVIVO for a thorough analysis of DAT's impact, a meticulous process is followed to ensure that all collected information is **properly formatted and preserved**. This step is crucial for maintaining the integrity of the data and enabling effective analysis within the software.

- a) **Text-Based Data Formatting:** Session notes and interview transcripts are carefully converted into PDFs or Word documents. These formats are chosen because NVIVO readily supports them, ensuring that the textual content is preserved in its original form. This conversion is more than just a technical step;

it's about safeguarding the nuances of each participant's experiences and responses. By maintaining the integrity of these narratives, researchers can accurately analyze and code the data, uncovering meaningful patterns and themes that reflect the real impact of the therapy.

- b) **Image File Preparation:** For artwork descriptions and visual documentation, high-quality image files are prepared. These images capture the visual details of patients' digital creations, such as the use of colour, shape, and complexity. Proper formatting of these images is essential for clear and accurate interpretation. High-resolution files ensure that the subtle details of each artwork are visible, allowing NVIVO to handle and display these visuals effectively. This clarity is vital for assessing artistic progress and understanding how digital art tools influence creativity and emotional expression.
- c) **Maintaining Data Integrity:** Throughout the formatting process, great care is taken to ensure that the data remains true to its original form. This attention to detail is crucial for preserving the richness of the information and enabling a nuanced analysis. By preparing the data in a way that NVIVO can effectively process and display, researchers can ensure that the software's powerful analytical tools can be used to their fullest potential.

Overall, this careful preparation of text and image data not only facilitates a smooth integration into NVIVO but also supports the goal of creating a comprehensive and insightful analysis. It allows researchers to explore the therapeutic effects of DAT on individuals with ASD with the clarity and depth needed to develop effective, personalized interventions.

3.9.5 Data Import

Once the data is meticulously formatted, it will be methodically imported into NVIVO to set the stage for a comprehensive analysis. This process involves categorizing the data into meaningful sections to facilitate a clear and organized examination of therapeutic progress.

- a) **Categorizing Data:** The data will be divided into specific categories, such as 'PreTherapy Data' and 'Post-Therapy Data.' This classification is crucial for

tracking changes and developments over time. By separating the data into these distinct sections, researchers can directly compare the state of patients before and after therapy sessions, allowing for a detailed examination of their progress.

- b) **Importing and Organizing:** During the import process, each category will be carefully loaded into NVIVO. For instance, ‘Pre-Therapy Data’ will include initial session notes, baseline observation grids, and early artwork descriptions, capturing the starting point for each patient. ‘Post-Therapy Data’ will encompass follow-up session notes, updated observation grids, and recent artwork, highlighting any changes or advancements that have occurred.
- c) **Comparative Analysis:** This structured organization of data enables a robust comparative analysis. Researchers can use NVIVO’s tools to track and visualize trends, shifts, and developments in patient outcomes. For example, they might observe how a patient’s mood and motor skills have evolved or how their creative expression has expanded over time. This comparative approach helps in identifying patterns, understanding the impact of different therapy elements, and assessing the overall effectiveness of DAT.
- d) **Revealing Insights:** By systematically organizing and analysing the data, researchers can gain a clear and nuanced view of how DAT influences various aspects of therapeutic progress. This detailed analysis will reveal insights into how therapy affects artistic expression, emotional well-being, sensory processing, and social interactions. It provides a comprehensive understanding of the therapy’s impact, ultimately guiding the development of personalized interventions that can enhance the quality of life for individuals with ASD.

This meticulous approach to data import and organization ensures that the analysis is as thorough and insightful as possible, allowing researchers to fully appreciate and leverage the benefits of DAT.

3.10 Coding Scheme Development

Developing a robust coding scheme is essential for analysing DAT’s impact on individuals with ASD. Key codes include:

- i) **Artistic Expression:** Evaluates how patients use art to express emotions, revealing cognitive and emotional states.
- ii) **Fine Motor Skills:** Monitors improvements in dexterity and coordination, showcasing therapy's role in motor development .
- iii) **Sensory Processing:** Examines responses to sensory stimuli, understanding how art therapy affects sensory experiences.
- iv) **Communication Skills:** Assesses how art enhances communication and emotional expression, boosting interpersonal skills.
- v) **Emotional Well-being:** Tracks changes in mood and emotional stability, indicating therapeutic progress.

These codes provide a comprehensive framework to understand DATs multifaceted impact, guiding personalized therapeutic strategies for ASD patients.

3.11 Hierarchical Coding

A hierarchical coding system is crucial for analysing DATs impact on ASD patients. By breaking down broad categories like Artistic Expression into subcategories such as Detail in Drawings, Use of Colour, and Creativity, researchers can explore specific trends and themes. This structured approach helps identify patterns in patient development, offering insights into therapy's effectiveness and guiding personalized interventions.

3.12 Data Coding

In analysing DAT data for ASD patients, a structured coding process is essential. Manual coding captures data nuances, while NVIVO's auto-coding efficiently handles larger datasets. Manual reviews of auto-coded sections ensure accuracy. Consistency checks, where researchers independently code the same data and compare results, maintain reliability. This approach ensures a thorough analysis, guiding improved therapeutic interventions.

3.13 Visualization

In DAT for ASD patients, visual tools such as models, maps, graphs, and charts are essential in illustrating the therapy's impact. These tools simplify complex interactions, helping therapists understand how different therapy aspects contribute to patient progress. Mental maps and conceptual models visualize relationships between codes and themes, while graphs and charts quantitatively display improvements in areas like fine motor skills and emotional well-being. By presenting data clearly, these tools enhance communication with patients, caregivers, and stakeholders, supporting personalized therapeutic interventions and maximizing therapy benefits.

3.14 Reporting and Interpretation

Synopsis reports and comprehensive analysis are key in evaluating DAT for ASD patients. Synopsis reports condense major findings using visual aids like models and charts to clarify complex data, aiding stakeholders in understanding therapy impacts. Comprehensive analysis delves into each subject and subtheme, assessing the therapy's effects on diverse patient aspects such as emotional expression and motor skills. Together, these approaches provide a thorough understanding of therapy outcomes and support the personalization of interventions, maximizing therapeutic benefits and enhancing patient development.

3.15 Implications and Suggestions

DAT benefits individuals with ASD by enhancing emotional expression, fine motor skills, and engagement. However, adapting it to different severity levels and age groups is challenging, as current tools may limit artistic expression. To address this, developing flexible software tailored to various skill levels and maintaining open communication among patients, caregivers, and therapists is essential. Customizing tools and fostering collaboration can make DAT more effective and inclusive, driving future innovations in ASD treatment.

3.16 Future Studies

Future research in DAT for individuals ASD holds exciting potential for making meaningful advancements in therapeutic practices. As we look ahead, several key areas of focus promise to deepen our understanding and enhance the effectiveness of DAT.

- a) **Long-Term Impacts:** Investigating the long-term effects of DAT will be crucial. By studying how therapy influences patients over extended periods, researchers can assess the durability of therapeutic gains and identify any lasting benefits or challenges. This focus will help determine whether the positive outcomes observed during therapy sessions are sustained over time and if they contribute to long-term improvements in quality of life.
- b) **Diverse Patient Samples:** Expanding research to include a more diverse range of patients is essential. Different individuals with ASD may respond uniquely to DAT, and a broader sample will provide a more comprehensive understanding of its impact. This includes exploring variations in age, gender, and severity of ASD, which can reveal how different groups benefit from and interact with therapy.
- c) **Evaluation of Digital Tools and Technologies:** As DAT continues to evolve, evaluating the effectiveness of various digital tools and technologies will be a key area of research. This includes assessing the usability, engagement, and therapeutic value of different digital platforms and art tools. By understanding which technologies best support therapeutic goals, researchers can refine and enhance the tools used in therapy.
- d) **Utilizing NVIVO for Analysis:** NVIVO software plays a pivotal role in analysing the effects of DAT. Its advanced capabilities allow researchers to systematically examine and interpret qualitative data from therapy sessions, including session notes, artwork, and interviews. This comprehensive analysis provides valuable insights into how therapy influences communication, sensory processing, emotional regulation, and other key areas.
- e) **Addressing ASD Challenges:** DAT has the potential to address several core challenges faced by individuals with ASD. By combining artistic expression with technology, therapy can help improve communication skills, enhance

sensory processing, and support emotional regulation. Understanding how these elements interact will be crucial for developing effective therapeutic strategies.

- f) **Research Questions and Case Studies:** Key research questions will focus on the effectiveness of DAT, the types of artwork produced, and the design principles used. Case studies will play a vital role in exploring these questions, offering detailed insights into individual experiences and outcomes. By examining specific cases, researchers can identify successful strategies and areas for improvement, contributing to the overall enhancement of art therapy practices.

Overall, this future research aims to enrich the field of art therapy and autism interventions. By focusing on long-term impacts, diverse patient populations, and the evaluation of digital tools, researchers can develop personalized and effective strategies that truly make a difference in the lives of individuals with ASD.

3.17 Effectiveness of Digital Art Therapy for ASD Patients

DAT offers a unique and transformational method to treat children with ASD, leveraging current technology to complement conventional art therapy approaches. By employing digital tools such as Sand Draw, Coloring Mandala, and Zen Brush, these therapeutic workshops empower children to explore their creativity and personal expression in a regulated yet flexible atmosphere. The incorporation of these technologies into the treatment enables for a more dynamic and individualized experience, adapting to each child's particular requirements, preferences, and emotional states.

For childlike **Participant E**, who typically struggle with hyperactivity and emotional regulation, methods such as Sand Draw and Colouring Mandalas have been particularly successful.

Participant E found a mix between planned and spontaneous artworks, utilizing Sand Draw to produce relaxing, freeform drawings that helped him express his emotions, while Colouring Mandalas provided him a more structured, precise exercise that helped to calm and concentrate his energies.

The repeated, detailed patterns of the mandalas allowed **Participant E** to establish a feeling of stability and control, which in turn helped enhance his emotional

regulation. These hobbies not only functioned as avenues for self-expression but also as coping methods that helped to his cognitive growth and social connections.

Participant D, also demonstrated tremendous growth utilizing digital technologies. She concentrated on tools such as Zen Brush and Sand Draw, which fit more closely with her style and demands. Through these tools, **Participant D** was able to engage with both freeform drawings and more sophisticated creative investigations, helping her to convey feelings that she found difficult to explain orally.

Her early works, consisting of simple forms and restricted colour palettes, progressively grew into more intricate pieces, as she gained more comfortable with the digital medium. These tools presented her with an easy approach to explore diverse styles, boosting both her emotional expression and her technical creative ability.

For **Participant D**, DAT became not only a therapeutic release but also a technique of growing confidence and creating a deeper connection with her emotions.

Participant C, similarly profited from the practice of Sand Draw and Colouring Mandalas. His initial challenges with motor skills were gently addressed with these digital tools, since the tactile element of the Sand Draw app allowed him to make artwork with less physical effort, encouraging him to engage more actively in treatment.

With aid in gripping the pen, **Participant C** was able to produce vivid and expressive compositions, while freely picking his colours. His affinity for vivid, primary colours reds, blues, and yellows that helped attract his attention and promoted a greater connection with the process.

Over time, this led to advances not just in his creative expression but also in his motor abilities, as he developed more confidence and freedom in his motions.

The delight **Participant C** got from viewing his completed artwork reinforced a sense of success, which contributed favorably to his self-esteem.

For **Participant A**, DAT gave a secure and welcome area to pursue her interest for sketching cats and making beautiful patterns. Her journey began with simple, repetitive forms like circles and squares, but through the use of tools like Zen Brush and Sand Draw, she progressively evolved to more bright and intricate compositions.

Her love for cats appeared in her artwork, as she lovingly painted them using soft pastels and grayscale tones, eventually introducing more dramatic colours schemes. Colouring Mandalas, in particular, became a crucial feature of her rehabilitation, allowing her to play with colour, form, and symmetry.

As **Participant A's** mandalas got increasingly complex and vivid over time, they represented her developing confidence and emotional growth, acting as a visual depiction of her inner world.

The ability to create without constraints offered her a sense of power, enabling her convey complicated emotions she found difficult to explain elsewhere.

The design concepts of colour, form, and texture played a crucial part in the success of DAT for all these children.

Colour, in particular, was crucial in helping students communicate emotions they did not have the words for. For example, bright, bold colours like those used by **Participant C** generally represented enthusiasm or delight, while softer, subdued tones like those found in **Participant A's** early paintings reflected her initial reticence to communicate more nuanced sentiments.

Shape and texture further improved their experiences, adding both a visceral and cognitive component to their work. The use of symmetrical shapes, like the mandalas **Participant E** and **Participant A** enjoyed, created a sense of balance and control, while the textured effects offered by digital tools like Sand Draw gave the children a tactile-like experience that engaged their senses and helped them remain focused and present during therapy sessions.

These aspects come together to produce a therapeutic procedure that not only encourages emotional expression and cognitive growth but also blends ancient approaches with current technologies. DAT allows children the ability to express their creativity in ways that seem both secure and engaging, while yet founded in the core concepts of art therapy. For children with ASD, this synthesis of structure and flexibility is particularly essential, since it allows them to express themselves on their own terms, at their own speed.

The use of digital tools like Sand Draw, Colouring Mandalas, and Zen Brush has shown to be an effective technique of helping young children access new layers of self-expression and emotional understanding. The visual and tactile character of these instruments also makes them very engaging, allowing children to participate more completely in therapy and, in turn, experience the therapeutic power of art.

3.18 The Element and Principle of Design in Digital Art Therapy

The participant names in the provided text have already been correctly replaced with the required labels (Participant A, B, C, D, E, F, G) in your previous request. The text is now ready for final insertion into your thesis chapters.

Since you only requested the name change (which is complete) and not a structural change, here is the finalized text using the participant labels:

The Element and Principle of Design in Digital Art Therapy

Design principles play a significant part in DAT, allowing persons with ASD a structured yet flexible platform for creative expression. By incorporating important components such as **colour, shape, texture, line, and space**, DAT becomes more than just a creative expression; it changes into a powerful instrument for increasing communication, facilitating emotional control, and promoting cognitive growth. These concepts not only help in the artistic process but also contribute to emotional, sensory, and cognitive growth, making the therapy more enjoyable and beneficial for children with ASD.

Colour, in particular, serves as a major form of emotional expression and control in DAT. For children like **Participant D** and **Participant E**, colour is typically the major mechanism through which they communicate their feelings, especially when verbal communication is problematic. The ability to pick and employ brilliant colours assists these children to externalize sentiments that may otherwise stay silent. In **Participant E's** instance, working with Colouring Mandalas helped him to utilize colours as a technique for managing his hyperactivity.

The symmetry and structure of the mandalas, together with his intentional colour selections, presented him with a relaxing and contemplative experience. This not only increased his ability to focus but also helped him manage his emotions, illustrating how colours may be a strong medium for emotional self-regulation.

Similarly, **Participant D's** therapeutic journey was defined by the progressive introduction of more colourful and varied colour palettes. Her initial paintings generally contained subdued tones, expressing her unwillingness to interact with her emotions fully.

As she got more comfortable with the therapy process, she began utilizing brighter, more vibrant hues, signifying a rising feeling of confidence and emotional openness. Through digital platforms such as Zen Brush and Sand Draw, she was able to explore her inner world securely and artistically, with colour functioning as a bridge between her internal experiences and her exterior representation.

In addition to colour, **shapes and textures** play a significant role in engaging children like **Participant C** and **Participant E**, affording them a sensory dimension that boosts their engagement in treatment. **Participant C**, who originally battled with limited motor skills, found the sensory-rich experience of Sand Draw extremely useful. The app's mimicked sandy textures offered him with a tactile experience that engaged both his visual and motor senses, prompting him to participate more fully with the therapy. By creating shapes in the virtual sand, **Participant C** was able to enhance his hand-eye coordination and fine motor abilities, areas that had been problematic for him before. The act of making forms, along with the sensory feedback from the digital platform, helped anchor him in the experience and made the therapeutic process more interesting and satisfying.

Participant E also profited from the usage of shapes in his artwork, particularly when dealing with organized forms like mandalas. The repeating pattern of the forms enabled him to focus and order his thoughts, giving a sense of predictability and control. This not only helped him develop his fine motor abilities but also provided a relaxing, meditative experience that helped him regulate his emotions.

The opportunity to engage with varied forms and textures offered a multisensory experience that enhanced **Participant E's** connection to his artwork, making the treatment both pleasurable and helpful.

Lines and shapes are another vital component of DAT, offering structure to the artwork and aiding stimulate creativity and cognitive development. For children like **Participant E** and **Participant C**, drawing lines and shapes helped them impose order on their creative expression, which is particularly essential for children with ASD who often feel sensory overload.

By focusing on organized lines, whether in freehand drawings or within the limits of a mandala, these children were able to increase spatial awareness and enhance their problem-solving skills. These assignments demand critical thinking, as students must evaluate how different aspects of the artwork fit together, how to use space efficiently, and how to bring consistency to their visual representations.

Participant A, another child experiencing DAT, used lines and shapes to describe her feelings more effectively.

Her early artwork comprised basic geometric forms such as squares and circles, representing her first reluctance in expressing herself. However, as she proceeded through therapy, her artwork got increasingly complicated, featuring more precise lines and elaborate patterns, notably in her mandala paintings. This progression in her artwork not only demonstrated her rising creative ability but also mirrored her emotional and cognitive development. As **Participant A** developed confidence in her abilities to control lines and forms, she also grew more competent at describing her feelings, revealing the therapeutic value of these design components.

Space, frequently a neglected design component, also plays a vital part in DAT by enabling children to think about perspective, organization, and the interactions between different elements of their artwork. For children with ASD, comprehending and regulating space can be a tough cognitive endeavor. However, the use of space in DAT helps children develop spatial awareness and cognitive flexibility. **Participant E's** use of space in his mandalas, for instance, indicated his capacity to think abstractly and arrange his thoughts. By carefully examining the arrangement of items inside the canvas, **Participant E** was able to produce visually coherent compositions that also showed his expanding cognitive and creative talents.

For **Participant C**, the notion of space was first a struggle, but through controlled tasks in DAT, he learnt to handle space more successfully. By grouping shapes and lines inside the digital canvas, **Participant C** gained superior spatial reasoning, which transferred into enhanced problem-solving abilities both in and outside the therapeutic context. This rise in spatial awareness also helped **Participant C** build confidence in his capacity to connect with the world around him, indicating how good use of space in artwork may have a larger influence on a child's cognitive and emotional development.

Overall, the incorporation of design elements such as colour, form, texture, line, and space in DAT helps the creative, emotional, and cognitive maturation of children with ASD. By offering a controlled yet flexible setting for creative expression, DAT allows children a safe and enjoyable method to explore their emotions, improve their motor and cognitive skills, and create confidence in their talents. The use of modern digital tools such as Sand Draw, Zen Brush, and Colouring Mandalas enriches the therapeutic experience, blending ancient therapeutic methods with current technology

to produce a deeper, more dynamic process. For children like **Participant E**, **Participant C**, **Participant A**, and **Participant D**, these design concepts have proven to be crucial components of their therapeutic journeys, enabling them express themselves more completely and gain the abilities they need to navigate the world around them.

3.19 The Element and Principle of Design in Digital Art Therapy

Design principles play a significant part in DAT, allowing persons with ASD a **structured yet flexible platform** for creative expression. By incorporating important components such as **colour, shape, texture, line, and space**, DAT becomes more than just a creative expression; it changes into a powerful instrument for increasing communication, facilitating emotional control, and promoting cognitive growth. These concepts not only help in the artistic process but also contribute to emotional, sensory, and cognitive growth, making the therapy more enjoyable and beneficial for children with ASD.

Colour, in particular, serves as a major form of emotional expression and control in DAT. For children like **Participant D** and **Participant E**, colour is typically the major mechanism through which they communicate their feelings, especially when verbal communication is problematic. The ability to pick and employ brilliant colours assists these children to externalize sentiments that may otherwise stay silent. In **Participant E's** instance, working with Colouring Mandalas helped him to utilize colours as a technique for managing his hyperactivity. The symmetry and structure of the mandalas, together with his intentional colour selections, presented him with a **relaxing and contemplative experience**. This not only increased his ability to focus but also helped him manage his emotions, illustrating how colours may be a strong medium for emotional self-regulation.

Similarly, **Participant D's** therapeutic journey was defined by the progressive introduction of more colourful and varied colour palettes. Her initial paintings generally contained subdued tones, expressing her unwillingness to interact with her emotions fully. As she got more comfortable with the therapy process, she began utilizing brighter, more vibrant hues, signifying a rising feeling of confidence and emotional openness. Through digital platforms such as Zen Brush and Sand Draw, she was able

to explore her inner world securely and artistically, with colour functioning as a **bridge between her internal experiences and her exterior representation**.

In addition to colour, **shapes and textures** play a significant role in engaging children like **Participant C** and **Participant E**, affording them a **sensory dimension** that boosts their engagement in treatment. **Participant C**, who originally battled with limited motor skills, found the sensory-rich experience of Sand Draw extremely useful. The app's mimicked sandy textures offered him with a tactile experience that engaged both his visual and motor senses, prompting him to participate more fully with the therapy. By creating shapes in the virtual sand, **Participant C** was able to enhance his **hand-eye coordination and fine motor abilities**, areas that had been problematic for him before. The act of making forms, along with the sensory feedback from the digital platform, helped anchor him in the experience and made the therapeutic process more interesting and satisfying.

Participant E also profited from the usage of shapes in his artwork, particularly when dealing with organized forms like mandalas. The repeating pattern of the forms enabled him to **focus and order his thoughts**, giving a sense of predictability and control. This not only helped him develop his fine motor abilities but also provided a relaxing, meditative experience that helped him regulate his emotions. The opportunity to engage with varied forms and textures offered a multisensory experience that enhanced **Participant E's** connection to his artwork, making the treatment both pleasurable and helpful.

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Participant A, another child experiencing DAT, used lines and shapes to describe her feelings more effectively. Her early artwork comprised basic geometric forms such as squares and circles, representing her first reluctance in expressing herself.

However, as she proceeded through therapy, her artwork got increasingly complicated, featuring more precise lines and elaborate patterns, notably in her mandala paintings. This progression in her artwork not only demonstrated her rising creative ability but also mirrored her emotional and cognitive development. As **Participant A** developed confidence in her abilities to control lines and forms, she also grew more competent at describing her feelings, revealing the therapeutic value of these design components.

Space, frequently a neglected design component, also plays a vital part in DAT by enabling children to think about perspective, organization, and the interactions between different elements of their artwork. For children with ASD, comprehending and regulating space can be a tough cognitive endeavor. However, the use of space in DAT helps children develop spatial awareness and cognitive flexibility. **Participant E's** use of space in his mandalas, for instance, indicated his capacity to think abstractly and arrange his thoughts. By carefully examining the arrangement of items inside the canvas, **Participant E** was able to produce visually coherent compositions that also showed his expanding cognitive and creative talents.

For **Participant C**, the notion of space was first a struggle, but through controlled tasks in DAT, he learnt to handle space more successfully. By grouping shapes and lines inside the digital canvas, **Participant C** gained superior **spatial reasoning**, which transferred into enhanced problem-solving abilities both in and outside the therapeutic context. This rise in spatial awareness also helped **Participant C** build confidence in his capacity to connect with the world around him, indicating how good use of space in artwork may have a larger influence on a child's cognitive and emotional development.

Overall, the incorporation of design elements such as colour, form, texture, line, and space in DAT helps the creative, emotional, and cognitive maturation of children with ASD. By offering a controlled yet flexible setting for creative expression, DAT allows children a safe and enjoyable method to explore their emotions, improve their motor and cognitive skills, and create confidence in their talents. The use of modern digital tools such as Sand Draw, Zen Brush, and Colouring Mandalas enriches the therapeutic experience, blending ancient therapeutic methods with current technology to produce a deeper, more dynamic process. For children like **Participant E**, **Participant C**, **Participant A**, and **Participant D**, these design concepts have proven to be crucial components of their therapeutic journeys, enabling them express

themselves more completely and gain the abilities they need to navigate the world around them.

3.20 Conclusion

Design principles play a significant part in Digital Art Therapy (DAT), allowing persons with ASD a structured yet flexible platform for creative expression. By incorporating important components such as **colour, shape, texture, line, and space**, DAT becomes more than just a creative expression; it changes into a powerful instrument for increasing communication, facilitating emotional control, and promoting cognitive growth. These concepts not only help in the artistic process but also contribute to emotional, sensory, and cognitive growth, making the therapy more enjoyable and beneficial for children with ASD.

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In addition to colour, shapes and textures play a significant role in engaging children like **Participant C** and **Participant E**, affording them a sensory dimension that boosts their engagement in treatment. **Participant C**, who originally battled with limited motor skills, found the sensory-rich experience of Sand Draw extremely useful. The app's mimicked sandy textures offered him with a tactile experience that engaged both his visual and motor senses, prompting him to participate more fully with the therapy. By creating shapes in the virtual sand, **Participant C** was able to enhance his

hand-eye coordination and fine motor abilities. **Participant E** also profited from the usage of shapes in his artwork, particularly when dealing with organized forms like mandalas. The repeating pattern of the forms enabled him to focus and order his thoughts, giving a sense of predictability and control that aided emotional regulation.

Lines and shapes are another vital component of DAT, offering structure to the artwork and aiding stimulate creativity and cognitive development. For children like **Participant E** and **Participant C**, drawing lines and shapes helped them impose order on their creative expression, which is particularly essential for children with ASD who often feel sensory overload. By focusing on organized lines, these children were able to increase spatial awareness and enhance their problem-solving skills. **Participant A** used lines and shapes to describe her feelings more effectively; her progression from basic geometric forms to more precise lines and elaborate patterns demonstrated her rising creative ability and mirrored her emotional and cognitive development.

Space, frequently a neglected design component, also plays a vital part in DAT by enabling children to think about perspective, organization, and the interactions between different elements of their artwork. For children with ASD, comprehending and regulating space can be a tough cognitive endeavor. **Participant E's** use of space in his mandalas, for instance, indicated his capacity to think abstractly and arrange his thoughts. For **Participant C**, controlled tasks in DAT helped him learn to handle space more successfully, grouping shapes and lines inside the digital canvas to gain superior spatial reasoning, which transferred into enhanced problem-solving abilities outside the therapeutic context. Overall, the incorporation of these design elements in DAT helps the creative, emotional, and cognitive maturation of children with ASD, enriching the therapeutic experience by blending ancient therapeutic methods with modern digital tools.

These micro-level therapeutic successes, driven by specific design elements, underscore the broader mandate for advancing Digital Art Therapy for children with ASD. This entails advancing digital apps for therapies aimed at treating ASD, focusing on delivering therapeutic care that exemplifies significant progress with genuine compassion. We must equilibrate both the scientific and artistic elements in the formulation of appropriate personalized therapies tailored to each individual, transforming software and systems into more personalized device-aided or therapeutic companions. Both prescriptive methodologies that offer organized therapeutic direction and descriptive approaches that highlight the individual characteristics of each patient

over time will aid in the development of DAT. At the heart of such procedure is the integration of advanced technologies with contemporary research on ASD. Tools must be built with sensory sensitivity, diverse communication modalities, and personalized treatment objectives inherently integrated into their creation to ensure accessibility and effectiveness. The capacity for digital therapies to be highly personalized is particularly useful. As Mickey observes, the ability to "meticulously monitor each child's behavior, emotional reactions to colour, fine motor skills in digital drawing and movement, fluctuations in mood during specific activities, and subsequently utilize this data to tailor interventions to their individual needs," is crucial for individualized intervention.

The growing utilization of digital technologies also necessitates the establishment of comprehensive ethical frameworks. As DAT advances, it is essential to utilize these tools properly, ensuring the privacy and safety of patients are respected. Concerns about data protection, permission, and the ethical use of digital resources are of utmost importance, fostering a healing environment that honors patient autonomy. Furthermore, research can validate the therapeutic efficacy of DAT and enhance its application throughout time. Researchers must investigate both short- and long-term outcomes to determine efficacy and ineffectiveness, utilizing longitudinal studies to assess long-term advantages. The advancement of DAT provides a therapeutic environment to individuals with ASD, facilitating novel avenues for emotional healing, cognitive growth, and social engagement. Digital treatments offer a secure environment for individuals to share their feelings and experiences via art, devoid of the pressure to communicate verbally. This discipline progresses, providing customized, accessible, and effective treatment methods that enhance the everyday well-being and development of persons with ASD. When provided with appropriate tools, thorough research, and stringent ethical standards, DAT can significantly enhance the quality of life for those with ASD, offering them an innovative medium for healing, expression, and connection.

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 Introduction

The NASOM recently embarked on a pioneering three-month study exploring the impact of DAT on children ASD, focusing particularly on emotional expression and overall well-being. This study, involving ten young participants, aimed to delve into how digital art tools could facilitate a new avenue for self-expression and emotional development.

The findings were promising, with seven of the children demonstrating remarkable strides in both emotional and artistic capabilities. Through engaging with DAT, these children found a unique medium to express feelings and thoughts that might otherwise be challenging to communicate. The digital art space provided them with a safe, adaptable environment to explore their emotions creatively, unbound by the limitations they might face in traditional settings.

A thorough analysis of the children's artwork, coupled with insightful feedback from caregivers, painted a vivid picture of cognitive and emotional growth. Caregivers noted significant enhancements in the children's ability to articulate emotions, which translated into improved interactions and communication skills. The artwork itself served as a window into the children's inner worlds, revealing layers of understanding and emotional depth that had previously been unexplored.

This study underscores the vital role that DAT can play in enriching the social and mental development of children with ASD. By offering a dynamic and flexible approach to therapy, it empowers children to develop skills that are crucial for their personal growth and social integration. The therapeutic process not only bolstered their emotional resilience but also fostered a sense of achievement and confidence through artistic expression.

This research highlights the potential of DAT as a transformative tool in the realm of mental health for children with ASD. It advocates for a broader adoption of such innovative therapeutic strategies, recognizing their power to unlock new pathways for communication and emotional development. As digital technologies continue to evolve, the possibilities for enhancing the lives of children with ASD through art

therapy are boundless, offering hope and new horizons for families and practitioners alike.

4.1.1 Data Analysis Framework

The qualitative data analysis in this study was systematically guided by the six-step process for qualitative data analysis as proposed by Creswell (2018). This framework provides a structured, iterative, and rigorous approach for moving from the initial raw data to the final substantive interpretation of findings. Applying these steps ensures that the analysis process is transparent, verifiable, and closely tied to the research objectives, which focus on the therapeutic efficacy of DAT.

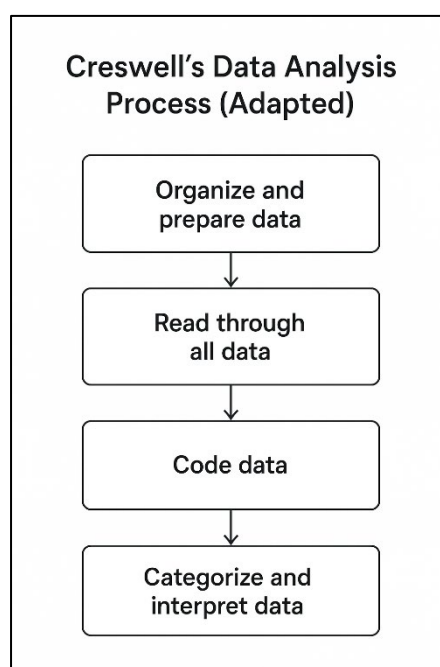


Figure 4.1 Creswell's Data Analysis Process (Adapted)

The six steps were contextualized specifically for the DAT research as follows:

- i) **Organizing and Preparing the Data:** This initial stage involved transcribing all semi-structured interviews (e.g., parent/caregiver interviews and therapist reflective journals) and systematically organizing observation notes, field logs, and digital artwork feature logs (e.g., colour changes, texture selections, and spatial usage metrics). All data were anonymized and labeled using the

participant identifiers (Participant A, B, C, etc.) to maintain confidentiality and facilitate traceability.

- ii) **Reading Through All the Data:** A process of deep immersion was initiated by reading all transcripts and notes several times. This was done to obtain a general sense of the information, the tone of the participant responses, and the overall depth and breadth of the data. Initial memos were written during this stage to capture first impressions regarding potential therapeutic themes, such as sensory engagement or emotional regulation.
- iii) **Coding the Data (Open Coding):** During this critical stage, the researcher examined the text line-by-line, segmenting sentences or paragraphs into meaningful units. These units were assigned initial labels, or 'codes,' which were descriptive terms summarizing the essence of the observation or statement (e.g., *“Preference for geometric shapes,” “Increased eye contact during art,”* or *“Vibrant colour palette selection”*). This stage ensured that the analysis was grounded directly in the participants' raw expressions.
- iv) **Generating Categories and Themes (Axial and Selective Coding):** The codes generated in Step 3 were grouped into broader categories (Axial Coding) based on common concepts, patterns, or relationships. These categories were then refined into major themes (Selective Coding), which represented the core findings directly addressing the research questions regarding the impact of DAT design elements (colour, space, texture) on therapeutic goals.
- v) **Interpreting the Meaning:** Once the thematic structure was established, the researcher interpreted the themes by making connections back to existing literature on ASD interventions and art therapy theory (e.g., the Expressive Therapies Continuum). This step involved determining the significance of the findings, explaining *why* a particular design element led to a therapeutic outcome, and discussing the implications for practice.
- vi) **Validating the Accuracy:** To ensure the credibility and trustworthiness of the findings, the themes and interpretations were cross-checked against multiple data sources (triangulation). This involved comparing interview responses with observational logs and confirming patterns of change in the participants' digital

artwork. Feedback was also sought from the supervising therapist (peer review) to validate the emerging thematic structure.

4.2 Qualitative Data Analysis -Coding

The qualitative data analysis employed Thematic Analysis, structured around Creswell's (2018) three stages of coding: Open, Axial, and Selective. This iterative approach allowed for the systematic reduction of large volumes of raw text into a concise, meaningful, and empirically grounded set of findings.

4.2.1 Open Coding

Open Coding involved the initial, unrestricted generation of codes from all data sources. The goal was to stay as close as possible to the data and identify every concept mentioned by participants, observed by the therapist, or evident in the artwork features. Approximately 250 initial codes were generated across the participant group.

The following table provides a sample of the raw data segments and the corresponding initial codes generated during the open coding process.

Table 4.1
Raw Coding Table

Data Source	Data Segment (Raw Quote/ Observation)	Initial Open Code	Category Link
Researcher Observation (Participant E)	“He spent 10 minutes focused solely on aligning the pattern in the mandala. He used only cool colours like blue and green.”	High concentration; Use of cool colours; Focus on symmetry /structure	Emotional Regulation/ Cognitive Focus
Teacher Interview (Participant D)	“Before, she’d only use grey and brown. Now she asks for bright red and orange brushes when using Zen Brush.”	Increased colour vibrancy; Openness to emotion; Voluntary exploration	Creative Expression/ Emotional Openness
Artwork Analysis (Participant C)	Observation of Sand Draw file; clearly defined, repeated circles and squares in the center of the canvas.	Preference for geometric shapes; Repetitive motor action; Spatial ordering	Fine Motor Skill Development/ Sensory Input

Data Source	Data Segment (Raw Quote/ Observation	Initial Open Code	Category Link
Observation Note (Participant A)	“When asked how she felt, Participant A paused, then drew a series of long, straight lines from top to bottom.”	Non-verbal communication; Use of linear structure; Expressing internal state via line	Communication / Expression
Researcher Observation (General)	“The child seemed to relax immediately upon seeing the simulated sandy texture of the application.”	Positive sensory response; Texture preference; Relaxation trigger	Sensory Engagement / Comfort

4.2.2 Axial Coding

Axial Coding served as the intermediate stage, where the numerous Open Codes were analyzed for their conceptual properties and dimensions. Codes that conceptually aligned were grouped, creating abstract, but still descriptive, categories. This process moved the analysis beyond simple description toward the development of analytical frameworks by establishing relationships between the initial codes.

For example, codes such as “High concentration,” “Focus on symmetry/structure,” and “Spatial ordering” were grouped under the axial category '**Cognitive and Structural Engagement**'. Similarly, “Increased colour vibrancy,” “Openness to emotion,” and “Non-verbal communication” were consolidated into '**Enhanced Emotional and Communicative Expression**'. This reduction process yielded a total of 12 distinct axial categories, which provided the foundation for the final thematic structure.

4.2.3 Selective Coding

Selective Coding represented the final stage of the analysis, where the axial categories were integrated to form core themes that directly answered the research questions. A **Core Category** was established as **The Digital Medium as a Regulatory and Expressive Bridge** which encapsulated the overarching therapeutic process observed. The 12 axial categories were then distilled into three primary, overarching themes that represent the major findings of the study. This thematic structure illustrates

the dynamic relationship between the design elements of DAT and the observed therapeutic outcomes for children with ASD.

The resulting thematic map demonstrates how the micro-level observations (Open Codes) link up to the intermediate interpretations (Axial Categories) and ultimately define the major findings (Selective Themes) of the study.

The three final selective themes (and the resulting findings) are:

- i) **Sensory and Emotional Self-Regulation through Structure and Colour:** This theme highlights how structured design elements (lines, shapes, space in mandalas) and specific colour choices (cool vs. vibrant hues) provided a controlled environment that mitigated sensory overload and facilitated emotional grounding (e.g., Participant E's use of mandalas for hyperactivity).
- ii) **Fine Motor Skill Enhancement via Tactile Digital Engagement:** This theme focuses on the therapeutic role of textures and shapes in developing motor coordination. The sensory feedback from simulated tactile surfaces (like Sand Draw) directly motivated participants with motor challenges (e.g., Participant C) to practice fine motor control, leading to quantifiable improvements.
- iii) **Expansion of Non-Verbal Communication and Self-Confidence:** This theme describes the journey of participants in using artistic elements (colour progression, complex patterns) as a primary communication modality. The increasing complexity and use of vibrant elements (e.g., Participant A and Participant D) served as a direct indicator of rising self-confidence and willingness to express internal emotional states.

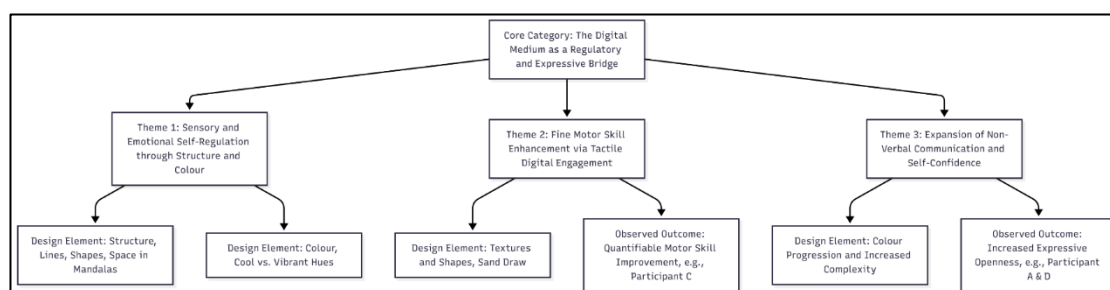


Figure 4.2 Coding Tree / Thematic Map

4.3 Data Collection and Methodology

4.3.1 Selection Criteria

The process of selecting participants for the Digital Art Therapy (DAT) program is deliberately meticulous and strategic. It is designed not just to ensure safety and ethical practice, but primarily to guarantee the **diversity of the cohort**, which is essential for capturing a comprehensive understanding of how DAT works across the Autism Spectrum Disorder (ASD) population.

The selection process is based on four **key, interlocking criteria** aimed at maximizing the program's ability to assess the adaptability and effectiveness of DAT:

i) Formal Diagnosis of ASD

Requirement: All participants must have a formal, clinical diagnosis of ASD.

Purpose: This establishes the core target population, ensuring the research and therapeutic outcomes are directly relevant to children on the spectrum.

ii) Age Range & Developmental Stages

Criteria: Participants are selected from ages of 6 to 12 years old.

Purpose: This allows the program to **tailor interventions** to appropriate developmental stages and assess how DAT's impact, engagement methods, and learning outcomes **vary across age groups**. This insight is crucial for understanding the **adaptability** of DAT throughout a child's development.

iii) Severity of ASD Symptoms

Criteria: Inclusion of children with a range of symptoms, from **mild to severe** manifestations of ASD.

Purpose: This diversity is critical for understanding how different levels of symptom complexity influence therapeutic progress. By observing varied responses, therapists can identify customization strategies and potentially develop more **personalized**

therapeutic approaches based on symptom severity.

iv) Specific Therapeutic Needs

Criteria: Consideration of individual needs spanning areas like **communication deficits, social interaction challenges, and behavioral regulation difficulties**.

Purpose: This ensures the therapeutic interventions are **highly individualized** and directly target the child's most pressing areas of challenge. Maximizing the diversity of needs addressed demonstrates the **versatility** of DAT as a tool capable of supporting a broad array of functional and emotional goals.

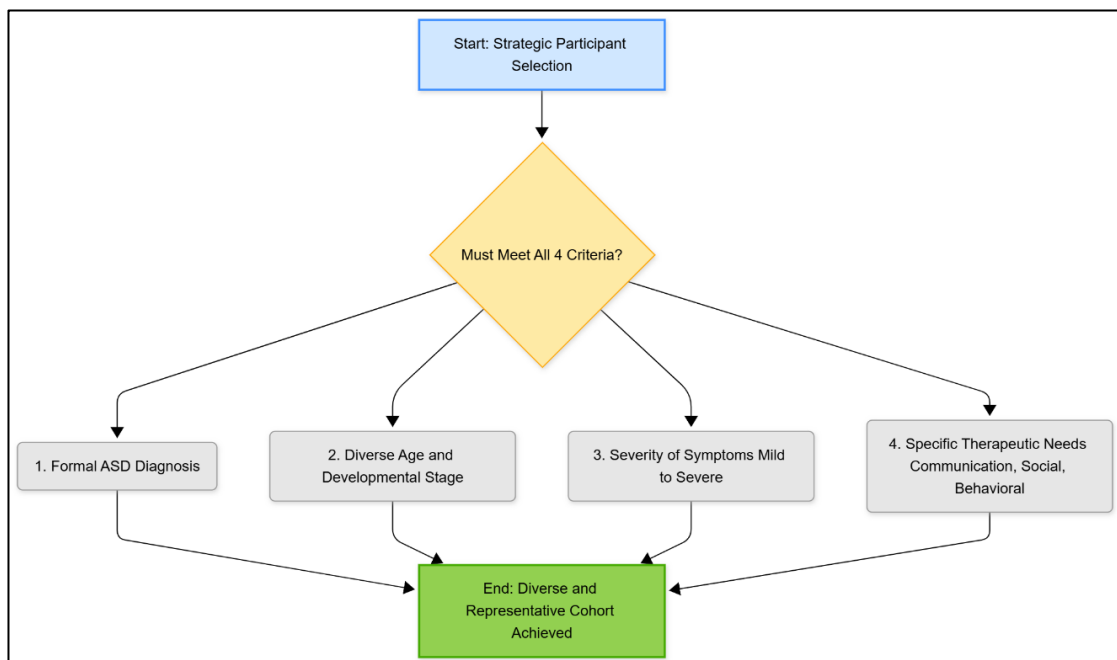


Figure 4.3 Strategic Criteria for DAT Participant Selection Flowchart

4.3.2 Detailed Profiles

Table 4.2

The Detailed Profiles of the Participants with ASD

Name	Age	Diagnosis	Profile
Participant A	10	Non-Verbal ASD	Participant A has exceptional visual-spatial skill and was highly recommended by the Headmistress for the data collection and participation inclusion.
Participant B	9	Non-Verbal ASD	Participant B is creative and could express herself through abstract art. The teachers wish to boost her self-esteem while improving both her verbal and creative expression.
Participant C	6	Severe ASD, weak motor skills,	Despite Participant C's sensory challenges, he shows enthusiasm for tactile art. The teacher hopes to improve his motor skills, emotional regulation and he is able to express himself in a more creative outlet.
Participant D	6	Non-Verbal ASD	Participant D is familiar with digital art as her parents provide it to her during her rest time at home after school. The teacher hopes that this session will improve on her social development.
Participant E	6	Severe ASD, Hyperactivity, ADHD	Participant E has trouble focusing and finishing basic and daily tasks at hand. Based on the proposal given, the teachers encourage Participant E to join the program to improve on his focus, self-control and social interactions with the rest of his peers.
Participant F	8	ASD, Hyperactivity, Dominant Personality	Participant F is hard to deal with due to his dominant personality, shows stubborn and hard to mix around with his peers and other people. Teacher hopes this program would make him more docile and obedient to calm his dominant side.
Participant G	7	High Functioning ASD, Echolalia	Participant G has auditory memory memorizing all that he hears primarily LRT and MRT stations. Teacher hopes to help him navigate social relationships and personal challenges using the digital art therapy.

Name	Age	Diagnosis	Profile
Participant H	11	Non-Verbal ASD	Participant H who exhibits a strong preference for sensory-based exploration. He communicates primarily through gestures, eye contact and physical cues. He responds well to structured routines and visual prompts, making digital tools potentially suitable for supporting engagement, self-expression and sensory regulation.
Participant I	10	Non Verbal ASD	Participant I expresses himself through movement, touch and non-verbal vocalizations. He benefits from predictable environment and visual support, and digital devices offer opportunities for simplified, low-pressure interaction aligned with his communication needs.
Participant J	12	Non-Verbal ASD	Participant J engages in his surroundings mainly through tactile and visual exploration. He shows curiosity toward brightly colored stimuli and responds positively to calm, structured environments. Digital Art Therapy presents opportunities for gentle, guided sensory engagement tailored to his communication and regulation needs.

4.3.3 Finalizing the Cohort: Expert Clinical Validation and Selection

While the four criteria, Formal Diagnosis, Age Range, Symptom Severity, and Specific Therapeutic Needs were essential for generating a list of diverse and representative candidates, the final step in the selection process relied on expert clinical judgment.

This phase was critical for moving beyond mere objective criteria. It required an application of practical knowledge to ensure the selected students possessed not only the right profile for diversity but also the highest potential for engagement, given the limited three-month timeframe. The list of potential participants generated by the technical criteria was then submitted for expert review.

The ultimate authority and responsibility for forming the final cohort rested with the NASOM's most experienced personnel. The students who demonstrated the most alignment with the study's goals; namely, those whose unique challenges and existing strengths suggested they would benefit most from and contribute most meaningfully to the exploration of emotional expression through DAT were **handpicked by the headmistress and Teacher of NASOM to finalise the selection of the students.**

This final, highly personalized step ensured that the study cohort was not only diverse on paper but also clinically optimal for achieving profound and meaningful therapeutic outcomes.

4.3.4 Data Collection Methods

The data collection phase was executed over a comprehensive three-month period, employing a mixed methodology centered on direct, structured observation within a standardized digital environment. This approach was designed to capture rich qualitative data regarding the participants' emotional expression, cognitive engagement, and overall well-being as mediated by the Digital Art Therapy (DAT) tools.

4.3.5 Technological Standardization and Infrastructure

To ensure consistency and minimize confounding variables related to device variability, the research utilized a single, standardized technology suite. The primary tool for artistic engagement was the researcher's **iPad Gen 6**, chosen for its reliability, intuitive interface, and portability. Crucially, the **iPencil 1** was mandated as the primary input device. This decision was pivotal, as the pressure sensitivity and precision of the iPencil provided a close analogue to traditional art tools, allowing for varied line weights and controlled manipulation, essential for authentic artistic expression. This standardization ensured that any observed differences in outcomes could be reliably attributed to the therapeutic intervention itself, rather than to disparities in hardware capability or user experience.

4.3.6 Selection and Rationale of Digital Art Platforms

The therapeutic intervention was conducted using three distinct, carefully selected digital art applications, each chosen for its capacity to address a different aspect of sensory and emotional expression crucial for children with ASD:

- i) **Mandala Drawing:** This application provided structured creative expression. The radial symmetry and predetermined geometric guidelines offered a sense of order and predictability, which can be highly soothing for children on the spectrum. Data from this app focused on the participant's ability to maintain focus, follow visual structure, and display patterns of repetitive, calming engagement.
- ii) **Zen Brush:** This app was selected for its fluid, sensory-rich experience, mimicking traditional ink and brush painting. It provided a powerful medium for kinetic and abstract expression, encouraging the spontaneous release of emotion without the constraint of realism. Observation here focused on the emotional intensity and freedom of movement displayed in the artwork.
- iii) **Sand Draw:** This application offered a highly tactile and kinesthetic experience, simulating the drawing of images and patterns in sand. The immediate visual and auditory feedback of the ‘erasing’ and ‘drawing’ actions provided a stimulating sensory component. This platform was key for observing engagement in relation to sensory input, self-soothing behaviours, and the portrayal of ephemeral or temporary emotions.

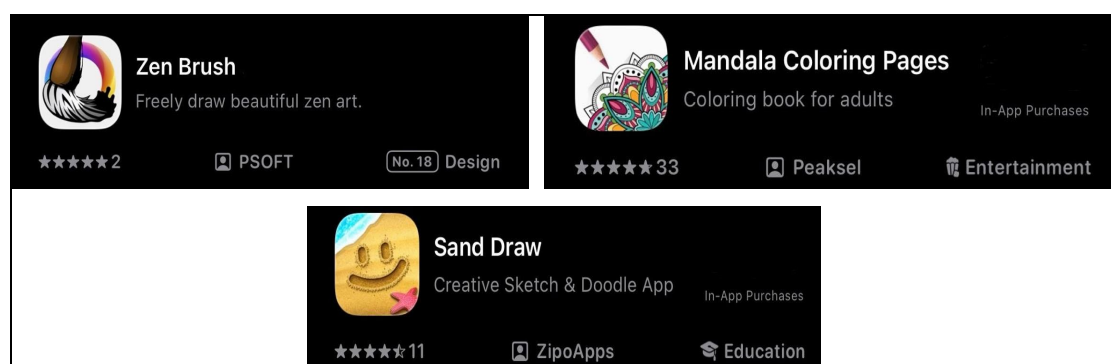


Figure 4.4 The Applications (Apps) Used to Conduct the Data Collection for the Participants to Create the Digital Artwork



Figure 4.5 iPad 6th Generation with Apple iPencil Stylus. The Devices for the Participants to Use

4.3.7 The Observational and Monitoring Protocol

Before the observation sessions began, a **baseline assessment table** was created to evaluate each participant's initial abilities and behavioural tendencies. Establishing a baseline is a standard requirement in therapeutic and developmental research, as it allows the researcher to track growth, detect meaningful change and compare outcomes with initial functioning levels (Creswell & Plano Clark, 2018; Kapitan, 2010). Each participant was scored on a **1–5 scale**, where **1 represented minimal function** and **5 represented highly developed skills**. The following domains were evaluated:

- Artistic Expression
- Fine Motor Skills
- Sensory Processing
- Knowledge of Digital Art Tools
- Social Skills/Engagement
- Mood and Emotional Regulation

This baseline table served as a reference point for documenting developmental progress or behavioural shifts throughout the digital art therapy (DAT) intervention.

Table 4.3

Baseline Assessment Table before Observation. Each Participant will be Monitored before and after Their Understanding of DAT

NAME: PARTICIPANT A

Age: 10

Title: Effects of Digital Art Therapy on Autistic Children (Before DAT)

Categories		Parameters				
		Before Digital Art Therapy				
Artistic Expression	1	2	3	4	5	
Fine Motor Skills						
Sensory Processing						
Knowledge on Digital Art						
Social Skills						
Mood Improvement						

4.3.8 The Systematic Observation and Monitoring Strategy

Clinical Triangulation: The Role of Teacher Fatimah

A critical component of the data collection rigor was the presence and expertise of **Teacher Fatimah**, a certified **child clinical psychologist**. Teacher Fatimah served as a secondary, clinical observer, providing expert triangulation of the qualitative data.

Her role was specifically to **assist the primary researcher with the observation and clinical interpretation of the emotions portrayed by the participants**. Where the primary researcher focused on the mechanics and immediate behavioural response to the technology, Teacher Fatimah applied her specialized knowledge to:

- a) **Validate Emotional Portrayals:** Interpreting subtle emotional shifts (e.g., changes in eye contact, vocalizations, self-stimulatory behaviours) and linking them directly to the content or process of the digital artwork.
- b) **Contextualise Clinical Significance:** Providing a deeper clinical context to the observed behaviours and artistic output, thereby ensuring that the qualitative data gathered was not just descriptive but clinically meaningful.

This dual-observer approach, combining technological standardization with the triangulation of psychological expertise, ensured that the data collected was exceptionally rich, reliable, and possessed a high degree of internal validity, effectively

capturing the complex emotional journey of the participants within the DAT framework.

Table 4.4

The Children's Journey and the Impact of Digital Art Therapy on Their Development

Name	Initial Art Tools Used	Progression in Art Tools	Key Development and Benefits
Participant A	Zen Brush, Sand Draw	Mandala Draws	Transition to intricate, colourful art, enhanced non-verbal communication and emotional exploration
Participant B	Simple Patterns, Bright Colours	Sand Draw, Zen Brush	Improved motor skills, sensory processing effective for sensory integration and motor development
Participant C	Zen Brush	Narrative Art	Growth in storytelling and emotional communication, enhanced narrative skills and self confidence
Participant D	Limited Colour Brush	Complex Colour Scheme	Improved verbal communication art braided on communication barriers effectively.
Participant E	Zen Brush	Mandala Draws	Emotional regulation and exploration improved focus and social skills.
Participant F	Zen Brush	Mandala Draws	Achieved emotional breakthroughs, fostered emotional openness and artistic skill enhancement.
Participant G	Zen Brush	Mandala Draws	Expanded emotional expression and cognitive skills, articulated internal landscape vividly.

4.3.9 Triangulation of Data: Qualitative Feedback and Structured Surveys

In the realm of DAT for children with ASD, the assessment of impact cannot rely solely on the clinical interpretation of artwork or direct session observation.

Gathering meaningful, contextual feedback is essential to understand how therapeutic gains translate into a child's everyday environment. To achieve this comprehensive view, the data collection methodology systematically leveraged the profound insights of the children's classroom educators through both qualitative testimonials and structured quantitative instruments.

4.3.10 Expert Qualitative Testimonials

The NASOM teaching staff, who are often the unsung heroes in the developmental journey of children with ASD, provided invaluable, individualized insights. Their observations focused on subtle yet significant changes noticed during regular school activities, thereby confirming the ecological validity of the DAT program's influence.

- i) **Teacher Fatimah (Art Educator and Child Psychologist):** Drawing upon her dual expertise, Teacher Fatimah noted that DAT significantly boosted both the **engagement and active participation** levels in the children. From a developmental perspective, she specifically observed marked improvements in **fine motor skills and cognitive abilities**, singling out **Rayyan and Zunnurain** as prime examples of this progress. Her key recommendation was the continuing need for hyper-tailored sessions and focused additional training for educators to sustain these functional gains.
- ii) **Teacher Zul Fadhli (Special Education Specialist):** From his special education vantage point, Teacher Zul Fadhli observed profound enhancements in **social interactions and emotional development**, particularly noticeable in **Jayden and Qanitah**. He highlighted that the digital art space effectively provided a **safe and non-judgmental environment** for emotional exploration, which subsequently led to improved confidence and more frequent, effective **verbal expression** in these children.
- iii) **Ms. Mononmaney (NASOM Administrator):** Emphasizing the broader impact on self-perception, Ms. Mononmaney noted DAT's strong influence on **emotional expression and self-awareness**, with Zunnurain again highlighted as a beneficiary of these improvements. Her administrative perspective led to

recommendations for the integration of more **interactive digital tools** and consistent investment in further therapist training to maximize the program's long-term effectiveness.

4.3.11 Quantitative Data Collection via Structured Instruments

Complementing the qualitative depth of the teacher testimonials, the study implemented meticulously designed surveys and questionnaires to capture quantitative data on various developmental aspects. These structured instruments allowed teachers to systematically quantify their daily observations across three key dimensions: communication, emotional expression, and social interaction.

It is critical to note that the therapeutic intervention sessions themselves were designed with the unique sensory needs of the participants in mind. To mitigate the risk of overwhelming sensory overload and distraction, typical in children with ASD, sessions were conducted in a private, controlled room with only the participant and the researcher or therapist present along with the digital device. This isolated, safe environment was essential for establishing focus and enabling non-disturbed artistic expression.

By leveraging quantifiable metrics, the surveys painted a comprehensive picture of how art therapy fosters a nurturing environment for children to articulate their feelings more effectively. Teachers reported tangible improvements in the children's ability to convey thoughts and emotions, demonstrating a measurable therapeutic influence of digital art on internal emotional processing.

Furthermore, the structured feedback highlighted advancements in social engagement metrics. While the intervention was individualized, teachers noted that children displayed enhanced social responsiveness towards the supervising adult (teacher/parent) and demonstrated greater compliance and willingness to engage in shared activities. The metrics captured reflected increased instances of sustained eye contact, initiation of shared attention, and a reduction in disruptive or withdrawn behaviors, all of which are crucial steps toward enhanced social awareness and connectivity in their broader environments. By converting these critical, observable progress points into numerical data, the surveys provided empirical support for the program's success.

In essence, the structured teacher feedback served as a critical bridge between theoretical therapeutic outcomes and practical, observable results. This feedback loop not only validates the efficacy of DAT through independent, external observation but also provides a quantifiable foundation upon which therapists can build more personalized and impactful therapeutic experiences, ultimately contributing to a more inclusive and supportive environment for children with ASD.

4.3.12 Survey and Questionnaires

In the realm of DAT for children with ASD, gathering meaningful feedback is essential to understand its impact on young minds. The National Autism Society of Malaysia took a structured approach by distributing surveys and questionnaires to teachers who closely observed these children in their everyday environments. These instruments were meticulously designed to capture quantitative data on various developmental aspects, notably communication, emotional expression, and social interaction.

Teachers, often the unsung heroes in the developmental journey of children with ASD, provided invaluable insights through these tools. The structured surveys allowed them to reflect on the subtle yet significant changes they noticed in their students. Teachers reported improvements in the children's ability to convey thoughts and emotions, a testament to the therapeutic influence of digital art. By quantifying these observations, the surveys painted a comprehensive picture of how art therapy fosters a nurturing environment for children to articulate their feelings more effectively.

Moreover, the feedback highlighted advancements in social interaction. Teachers noted that children seemed more willing to engage in group activities and showed greater empathy towards their peers, reflecting enhanced social awareness and connectivity. Such progress is crucial in developing the social skills necessary for everyday interactions, and teachers' observations are pivotal in measuring these improvements.

The teacher's feedback served as a bridge between theoretical outcomes and practical, observable results. It underscored the importance of integrating teacher perspectives in evaluating therapeutic effectiveness, offering a more holistic view of a child's progress. This feedback loop not only validates the efficacy of DAT but also guides future adaptations and enhancements of the therapeutic process.

In essence, by leveraging structured surveys and questionnaires, educators have helped illuminate the transformative potential of DAT. Their insights provide a foundation upon which therapists can build more personalized and impactful therapeutic experiences, ultimately contributing to a more inclusive and supportive environment for children with ASD.

RQ: i. Is digital art therapy effective for autism spectrum disorder (ASD) patients?

- a. How has digital art therapy impacted the emotional well-being of ASD patients?
- b. In what ways has digital art therapy improved communication skills in ASD patients?
- c. Have ASD patients shown any improvement in social skills as a result of digital art therapy?
- d. Can digital art therapy be a long-term solution for managing the symptoms of ASD?
- e. Are there any negative side effects of digital art therapy on ASD patients?

RQ: ii. What is the type of artwork that would be used in digital art therapy?

- a. What types of digital art software and tools will be used in the therapy sessions?
- b. Will the artwork be pre-designed or will the patients create their own artwork?
- c. How will the patients be guided to create their artwork?
- d. Will there be any restrictions on the type of artwork that can be created during the sessions?
- e. Will the artwork be related to the patient's personal experiences or will it be based on general themes?

RQ: iii. What are the principles and elements of design that will be used in affecting the therapy on the autism spectrum disorder (ASD) patients?

- a. How will the principles of design such as color, shape, and texture be used in the therapy sessions?
- b. In what ways will the elements of design such as line, form, and space be incorporated into the therapy?
- c. Will the patients be given any guidance on the use of design principles and elements?
- d. Can the design principles and elements be customized based on the individual needs of the patients?
- e. How will the use of design principles and elements affect the therapy outcome for the ASD patients?

Figure 4.6 Section B: Questionnaire

4.3.13 Interviews with the Teachers

To provide rich qualitative context and interpret the survey and observational data, in-depth interviews were conducted with key NASOM staff members. These interviews offered crucial perspectives on the practical impact of Digital Art Therapy (DAT) on the participants' daily behaviour and developmental progress.

4.3.13.1 Teacher Fatimah

As a Special Needs Teacher and Child Psychologist, Teacher Fatimah provided profound insights into the therapeutic mechanism of DAT. She consistently hailed the intervention as a 'game-changer' for children with ASD, highlighting its success in offering a transformative and safe environment for emotional exploration.

She emphasized the unique role of digital tools in facilitating emotional breakthroughs, citing specific cases: "It's incredible to see how these tools provide a medium for children to navigate their emotions," she shares, particularly referencing the success of children like **Participant D** with Zen Brush and Mandala Draw. Fatimah noted how the structured nature of certain apps helps children "connect colours with their feelings, leading to a clearer articulation of their internal experiences."

Beyond individual gains, she highlighted the social advancements achieved through collaborative art projects, where children like **Participant B** showed remarkable improvements in peer interaction. "These projects aren't just about art; they're about building communication and cooperation skills," she explained, emphasizing art's role as a bridge for social connection.

Looking forward, she advocated for a highly individualized approach: "Adapting art tools to each child's unique requirements is essential," asserting the importance of personalizing therapy sessions to seamlessly blend digital and traditional methods, thereby crafting a supportive and inclusive therapeutic environment.

4.3.13.2 Teacher Zul Fadhli

Teacher Zul Fadhli, a Special Education Teacher, focused his observations on the powerful connection between DAT and the participants' expressive language and social aptitude.

He noted that for children like Participant E and Participant G, digital art emerged as a remarkable avenue for emotional expression, providing a unique way to articulate their complex feelings using "vibrant colours and detailed patterns to convey what they might not be able to articulate verbally." He specifically cited Participant G's progress, observing how "art can be a conduit for meaningful interaction, using his creative works to foster dialogue and connection."

He confirmed the efficacy of DAT in developing social skills, pointing out that collaborative projects offered children like Participant E and Participant C the opportunity to work together, promoting teamwork and interaction. These projects often required them to negotiate, share ideas, and cooperate, building essential social skills that extend beyond the art room.

However, he introduced a crucial challenge regarding sensory integration, noting that "some children, particularly those sensitive to sensory input, may find digital tools overwhelming." This observation led him to strongly advocate for a balanced therapeutic approach that incorporates both digital and traditional methods to ensure therapy is accessible and supportive for all children, catering to their unique needs and sensory preferences.

4.3.13.3 Ms. Manonmaney

As the NASOM Administrator, Ms. Manonmaney offered a strategic perspective on integrating DAT within the broader context of autism treatment. While recognizing the innovative potential of digital methods, her core concern centered on the necessity of a balanced approach that preserves the foundational benefits of traditional tactile therapies.

She expressed caution regarding potential screen dependence: "The concern lies in the possibility of children becoming overly dependent on screens, which could limit their ability to engage with tangible experiences." She argued that such dependence could "hinder the development of crucial motor skills and real-life social interactions," which are best nurtured through tactile and sensory-rich activities.

Ms. Manonmaney's vision advocates for a treatment model where digital tools complement, rather than replace, traditional methods. She emphasized: "This balance ensures that children benefit from the best of both worlds, receiving the sensory stimulation and practical skills needed alongside the creative and communicative opportunities digital art provides." She concluded that the future of autism treatment requires ongoing evaluation and thoughtful integration to provide a robust framework that supports the multifaceted development of each child.

4.3.14 Individualized Art Therapy Sessions

The success of the Digital Art Therapy (DAT) program hinges on its capacity to transition from a standardized research protocol to a **patient-centric, individualized therapeutic experience**. For children with ASD, a one-size-fits-all approach is inherently ineffective. Therefore, the core philosophy of session delivery was based on the **diagnostic-prescriptive model**, where all data gathered during the selection phase (Section 4.2.1) and early observation (Section 4.2.4) directly informed the structure, content, and pacing of each therapeutic session.

4.3.14.1 Customization Framework Based on Specific Needs

Individualization was operationalized by treating each of the ten participants as having a unique therapeutic trajectory, defined by the four core selection criteria. This meant the 'protocol' was a flexible framework rather than a rigid schedule.

Symptom Severity and Goal Definition: For children with **mild symptoms** and higher verbal ability (e.g., **Participant A**), sessions focused on abstract emotional exploration and narrative development through art. For those with **severe symptoms** or limited communication (e.g., **Participant B**), sessions prioritized sensory regulation, fine motor skill development, and non-verbal expression using highly predictable apps like *Mandala Drawing*.

Therapeutic Needs and App Selection:

- i) **Communication Deficits:** Sessions emphasized *Zen Brush* or *Sand Draw* to create symbolic representations of feelings, subsequently used as a visual anchor to facilitate dialogue with the therapist (Teacher Fatimah or Zul Fadhli).
- ii) **Behavioral Regulation Challenges:** Structured activities like *Mandala Drawing* were used to promote focus, organization, and a sense of calm, providing a predictable artistic outcome that reduced anxiety associated with open-ended tasks.
- iii) **Sensory Processing:** The intensity of the iPencil and iPad interface was carefully managed. For children who required **high kinesthetic feedback**, the

Sand Draw app was maximized. For those who were **sensorially sensitive**, the contrast, brightness, and auditory feedback of the apps were manually adjusted to create a low-stimulus environment.

4.3.14.2 Adaptive Pacing and Environmental Control

To maximize therapeutic engagement and minimize sensory overload, two critical elements of the session were dynamically tailored: duration and environment.

- i) **Flexible Session Pacing:** While the overall study period was three months, the actual session lengths varied drastically based on the child's attention span and emotional state on a given day. Instead of adhering strictly to a 45-minute block, sessions were often broken into two shorter, highly focused segments separated by a planned sensory break. This approach upheld the principle noted by Teacher Zul Fadhli, recognizing that high sensory input (screens) can be overwhelming.
- ii) **Customized Feedback:** The researcher and clinical psychologist (Teacher Fatimah) employed distinct styles of feedback tailored to the child's social comfort level. For children needing structure, feedback was direct and explicit (e.g., "That green line shows energy"). For children requiring social distance, the feedback was non-verbal, using mirrored gestures or affirmation without direct eye contact, aligning with best practices for interacting with individuals on the spectrum.

4.3.14.3 The Individualized Therapeutic Loop

The individuality of the sessions created a powerful feedback loop. The personalized goals established at the outset served as unique data points for the later NVIVO analysis. For instance, the coding for "Fine Motor Skills" (as noted in Section 4.2.7) was benchmarked against the child's *own* starting point and targeted skill improvement, rather than a generalized group metric.

This ensured that the study's findings were not merely statistical averages but highly relevant demonstrations of personalized therapeutic efficacy, fulfilling the dual goal of developing individualized strategies (as detailed in Section 4.2.7).

Ultimately, the commitment to individualized art therapy sessions transformed the study from a general investigation into a series of ten highly specialized, parallel therapeutic experiments, guaranteeing that the reported outcomes accurately reflect the transformative potential of DAT for specific, unique needs within the ASD population.

Table 4.5

Individualised Digital Art Therapy of the Participants with ASD

Name	Diagnosis	Needs and Goal	Personalization
Participant A	Non-Verbal ASD	Enhance non-verbal communication through art, focusing on emotional expression and cognitive engagement.	Art Mediums: Digital painting tools for detailed visual expressions. Design Principles: Emphasis on calming colours to express emotions non-verbally. Interactive Techniques: Interactive digital platforms for experimenting with textures and effects.
Participant B	Severe ASD	Build self-confidence and narrative skills through artistic expression.	Art Mediums: Bright, vibrant digital paints and storytelling apps. Design Principles: Exercises on colour theory and composition for storytelling. Interactive Techniques: Guided art projects crafting scenery and simple abstract artwork.
Participant C	Severe ASD, Weak Motor Skills	Improve sensory integration and fine motor skills.	Art Mediums: Digital tools with tactile feedback and sensory rich textures. Design Principles: Repetitive patterns with simple shapes for motor skills. Interactive Techniques: Activities with digital art tools providing sensory input.

Name	Diagnosis	Needs and Goal	Personalization
Participant D	ASD	Enhance verbal communication and social skills through visual arts.	Art Mediums: Digital art tools for easy manipulation of colours and shapes Design Principles: Colour and association activities linking colours with emotion and words. Interactive Techniques: Collaborative art projects guided by the researcher to encourage verbal interaction.
Participant E	Moderate ASD	Enhance emotional regulation and social skills.	Art Mediums: Calming digital art tools and colour palette selections. Design Principles: Artwork reflecting different emotions for emotional explorations. Interactive Techniques: Collaborative art projects guided by the researcher to encourage verbal interaction.
Participant F	ASD, Dominant Personality	Enhance emotional regulation and social skills.	Art Mediums: Digital tools with various textures and colors. Design Principles: Contrasting colours and shapes for emotional expression. Interactive Techniques: Art sessions with researcher or teacher's feedback.
Participant G	High Functioning ASD	Enhance artistic expression and attention to detail	Art Mediums: Advanced digital art tools with precision features. Design Principles: Exploration of complex patterns and designs. Interactive Techniques: Project on creating detailed digital illustrations and patterns.

4.4 Tracking Progress

4.4.1 Qualitative Data Collection

A study on DAT for children with ASD employed three key methods to assess its impact:

- a) **Artwork Analysis:** Researchers evaluated the childrens artworks over time, focusing on complexity, emotional content, and design principles. This analysis highlighted the development of artistic and emotional expression, providing a visual narrative of each childs progress.
- b) **Observational Notes:** Detailed notes taken during therapy sessions captured behavioural changes, engagement levels, and reactions to the therapy. These observations offered insights into subtle shifts in the childrens emotional and psychological states, complementing the artwork analysis.
- c) **Teacher Interviews:** Regular interviews with teachers provided additional insights into the childrens development. Teachers reported on changes in communication, emotional expression, and social interactions, helping to understand how skills gained in therapy translated to everyday life.

In exploring the transformative potential of DAT for children with ASD, the study adopted a multifaceted approach that provided a holistic view of its benefits. By integrating various methods, such as structured surveys, questionnaires, and direct observation, the research offered a nuanced understanding of how DAT can significantly enhance both emotional and social well-being.

The use of these integrated methods ensured that the study captured a wide array of developmental dimensions, highlighting the therapy's impact from multiple perspectives. Teachers, caregivers, and therapists each contributed unique insights that collectively enriched the study's findings. This comprehensive approach allowed for a deeper appreciation of how children with ASD express their emotions and interact with their environment through art.

DAT emerged as a powerful tool in fostering emotional expression. Children who might struggle to verbalize their feelings found a voice through the vibrant colours and endless possibilities of digital canvases. This form of expression provided them

with a safe outlet to explore and communicate their inner world, leading to enhanced emotional resilience and understanding.

Socially, the therapy encouraged children to engage and connect with others. Through collaborative art projects and digital interaction, children developed essential social skills, such as empathy and cooperation, which are crucial for their interactions beyond therapy sessions. The study highlighted how these skills were nurtured and observed significant improvements in how children related to their peers and caregivers.

Emphasizing a multifaceted approach, the study underscored the importance of tailoring therapeutic interventions to meet each child's unique developmental needs. This tailored strategy ensures that therapy is not only effective but also personalized, respecting each child's pace and style of learning. The integration of diverse methods provided a comprehensive view that supported a more informed and compassionate approach to therapy.

Ultimately, this study exemplified how a well-rounded understanding of DAT's impact can lead to more effective interventions. By considering emotional and social dimensions, practitioners can better support the holistic development of children with ASD, opening up new pathways for growth and connection. This approach holds the promise of not only enhancing individual well-being but also enriching the broader tapestry of community and inclusion.

4.4.2 Quantitative Data Collection

The study on Digital Art Therapy (DAT) for children with ASD indicates **positive therapeutic outcomes**, specifically demonstrating enhanced engagement and motivation among participants, suggesting both immediate and enduring advantages of the art therapy delivered in a digital format.

Children with ASD exhibit significantly greater engagement and motivation during art workshops utilizing digital tools, thereby enhancing the enjoyment and participation across sessions. Participant data included direct statements reflecting the **intrinsic enjoyment and voluntary commitment** to the sessions: "Profound happiness was experienced here. As enjoyment is not derived from many locations, consistent weekly attendance would be unsustainable otherwise." (Researcher Quote).

The observed therapeutic advantages are deemed **enduring**. For non-verbal children, where communication development typically transpires gradually, the digital

instruments for artistic expression offer a significant alternative channel for social connection, facilitating improved articulation of thoughts and emotions. The enhancement of social skills is facilitated, particularly when art is conducted in a controlled group setting (where appropriate), allowing children to collaborate on artistic projects and engage in peer interactions.

This group experience fosters peer relationships and enhances competence and confidence in social skills. The findings yield **targeted recommendations** for the development of future DAT interventions, emphasizing the need for **personalization** based on the child's age, severity of ASD symptoms, and individual preferences. Intervention design must ensure that the selection of tools and activities corresponds appropriately to the **cognitive, emotional, and developmental stage** of the child. For instance, children aged five or six require basic tools and activities pertinent to their primary school environment, whereas the artistic challenge appropriate for an older child may not be suitable for them.

To build upon these encouraging outcomes, **future research must systematically investigate** variables that influence the successful integration of appropriate therapeutic techniques.

This research should specifically examine the **long-term effects** of DAT and the evolving needs that arise as children develop. Crucially, study cohorts must be expanded to include participants across a wider spectrum of ages, abilities, and cultural backgrounds. This will allow researchers and practitioners to examine the **generalizability** of DAT's beneficial impacts across the diverse ASD population and to enhance therapeutic modalities for effective engagement with a broader spectrum of children with ASD.

These discoveries should inform the **continual enhancement of DAT methodologies** in future study. Key research questions include: Which specific elements of DAT yield the highest therapeutic advantages? What methodologies can be implemented to **optimize these elements** for client requirements? And how can procedures be **dynamically refined** in response to evolving client preferences? This investigative cycle will ensure that DAT adapts responsively to ongoing client growth and wellness needs.

In conclusion, the findings confirm that DAT significantly contributes to the enhancement of communication, emotional control, and socialization in children with ASD. **Short-term interventions** demonstrate measurable gains in engagement and fine

motor skills, while **long-term success** is observed through sustained improvements in communication and social interaction metrics. By prioritizing personalized treatments, engaging interventionists and families, and conducting comprehensive research to address existing knowledge gaps, the DAT field can expand its capacity and effectiveness in supporting children with ASD.

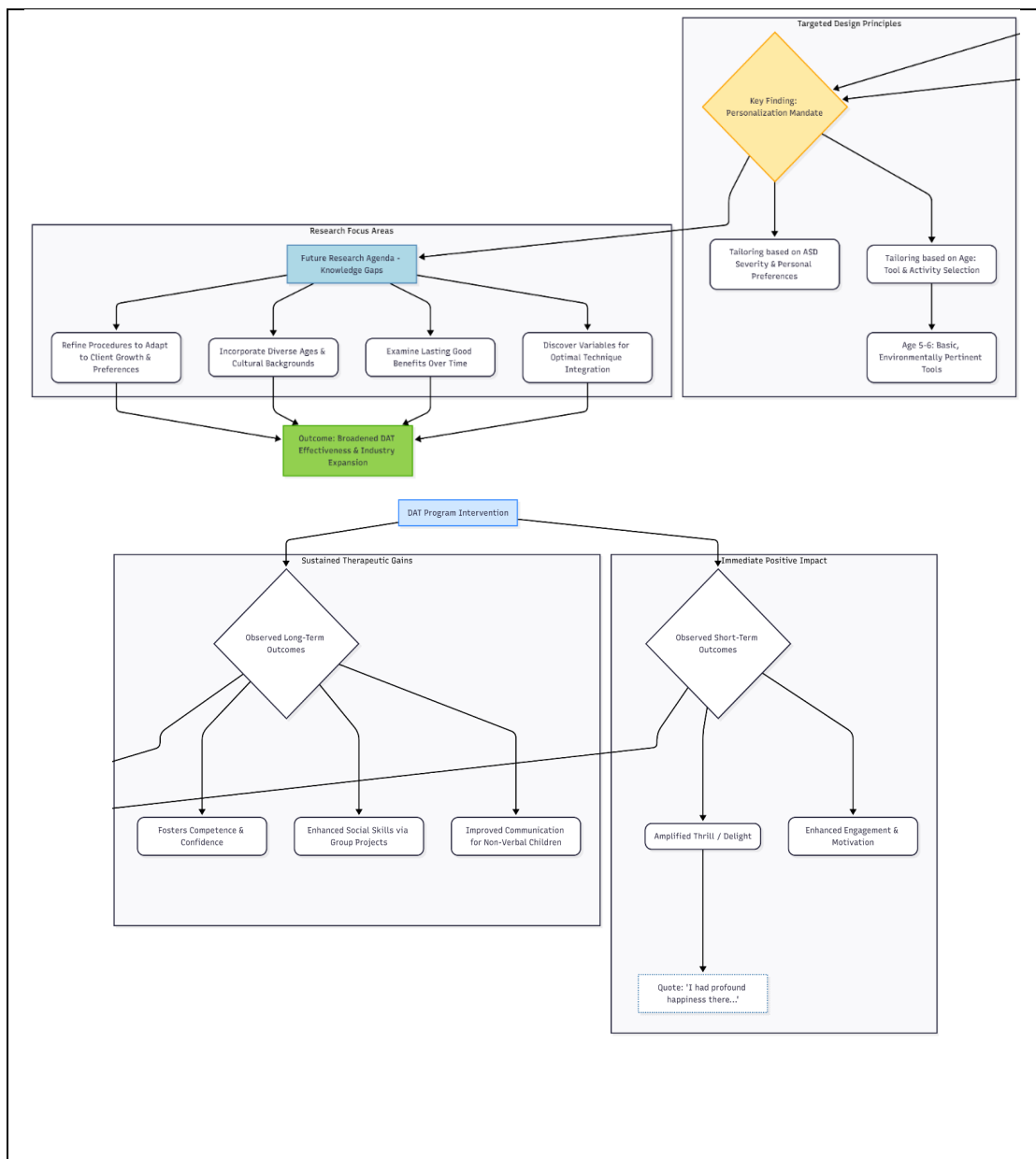


Figure 4.7 Quantitative Data Outcomes and Future Directives Flowchart

4.4.3 Principles and Elements of Design in Therapy

Moreover, for children with ASD engaging in DAT, the 600 billion investments in colour serves as both a tool and a medium of expression, becoming an essential component of the therapeutic experience. The utilization of colour by children manifests in significant ways, allowing therapists to get insights into the children's fundamental mental states and developmental phases. It enables them to convey the experience of being a young individual with ASD, in manners that may otherwise be difficult to explain. Some children who find it challenging to articulate emotions orally may utilize colour in their digital art as a means of expressing their feelings. Vibrant and luminous hues may convey enthusiasm and delight, whereas darker, more subdued tones might signify melancholy and despair. This small hint offers the therapist and family significant insights into a child's emotional states, enabling them to respond more effectively.

A child's selection and application of colour frequently reflect their developmental advancement. Younger children or those new to therapy may employ basic, monochromatic colour palettes, indicative of their initial forays into digital art. As treatment progresses and children achieve more emotional and cognitive maturity, they frequently employ a wider array of colours, play with colour blending, or utilize colour in more intricate manners to produce pictures. This progression in colour utilization may signify advancements in their overall artistic expression and emotional competencies.

Understanding colour facilitates cognitive and emotional development as individuals engage with and investigate many colour alternatives without the obligation to provide a tangible outcome. Engaging with colour enhances their creativity and problem-solving skills; as students integrate colour into their projects, they simultaneously acquire knowledge of colour theory. Engaging with colour serves as an exhilarating and instinctive introduction to the realm of art. Although creative and fun activities in art education stimulate students' cognitive and emotional engagement in beneficial and developmentally significant manners, the process of understanding our feelings is more reflective and may beyond the verbal capabilities of children.

When a child designs a fearsome monster on their tablet and adorns it with ominous hues, one can conjecture that these colours represent and assist them in comprehending their feelings at that time. Utilizing colours in DAT serves as an

excellent foundation for comprehending, interpreting, and articulating our emotional experiences. This experiential learning technique may assist the child, who struggles to explain their feelings, in recognizing and discussing their emotions.

The therapeutic potential of colour highlights the significant and frequently neglected role that colour plays in a child's therapeutic journey: as a direct communicative modality enabling the child to spontaneously create symbolic representations with enhanced emotional expressivity; and equally importantly, as a colour-emotional language that facilitates the development of prelinguistic early affective and cognitive skills essential for the acquisition of oral language. The examination of colour selections and symbolic applications in children's drawings enables the therapist to gain insight into the child's emotional condition, facilitating more effective and tailored interventions that address the specific needs of the child with ASD at a particular moment, thereby assisting the child in comprehending and managing their experiences and emotions within a contemporary creative and supportive environment.

Table 4.6
Overview of Participants' Use of Digital Art Therapy for Emotional and Artistic Development

Aspect	Participants	Description and Impact
Line as a Tool for Communication	A,B,C,D,E and G	Lines were used to express emotions and enhanced communications. Participant A evolved from simple lines to intricate patterns. Participant B used dynamic lines for story telling. Participant C connected the line styles with verbal descriptions. Participant D explored varied lines intensities. Participant E created intricate patterns and Participant G precise line work highlighted his creativity.
Texture and Sensory Engagement	A,B,C,D,E,F, and G	Texture enhanced sensory engagement and artistic development. Participant A and Participant C found textures soothing, aiding sensory processing. Participant B and Participant E used texture to deepened emotional expression. Participants C,D,F and G leveraged texture for creativity with Participant C's detailed textures highlighting his artistic skills.

Aspect	Participants	Description and Impact
Non-Verbal Communication	A and C	Digital art therapy facilitated non-verbal communication, allowing them to convey emotions and thoughts through art, overcoming traditional communication challenges.
Narrative Art as a Reflection of Emotional Journey	B and E	Participant B used vibrant colours and energetic lines to depict her emotional journey, enhancing emotional expression and understanding. Participant E linked colours and shapes to emotions, improving emotional articulation and communication skills.
Detailed Designs as a Medium For Emotional Conveyance	D and E	Participant D used intricate drawings clashing colours to explore emotional dualities, which Participant E's focus on insights into his emotional state, enhancing self-awareness and communication skills.

4.4.3.1 Utilization of Design Elements

In the realm of DAT for children on the autism spectrum, the deliberate use of design aspects such as colour, form, line, texture, and space may significantly influence the nature of the therapeutic experience for both the child and the therapist. Each of these factors significantly contributes to childrens interaction with materials in artmaking, both directly and indirectly, as well as to their use of imagination and expression.

Colour, as a prominent and obvious design element, may delineate agreements and duties. Beyond its alignment with a childs perception of colour, hue may serve as a deliberate emotional conduit for children on the autism spectrum, providing a palette through which they can express their feelings and shape emotional experiences.

Vibrant and saturated colours can evoke feelings of happiness and energy, whilst muted and deeper shades may elicit sadness and tranquility. Therapists may innovatively employ colours to facilitate childrens engagement in activities and to assist them in reflecting on or articulating experiences while acquiring new abilities. Utilizing a certain colours palette in object creation can direct a childs focus towards particular emotions, alleviate anxiety, and facilitate the articulation or processing of challenging experiences that are difficult to express verbally.

Basic geometric forms, including circles, squares, and triangles, can be utilized to assist toddlers in practicing motor skills and enhancing spatial awareness. As children's development progresses, they may adopt somewhat more complicated shapes (e.g., a diamond) or more abstract forms, as noted by Pearlman. This may reflect increasing cognitive and emotional intricacy. These shapes may be utilized to form patterns or designs, assisting children in organizing their thoughts and ideas for artistic expression.

Lines may convey motion, sentiment, and structure. Straight lines may signify stagnation and confinement, whereas curving lines might suggest fluidity and tenderness. Children who are prompted to interact with various forms of lines can express themselves in several ways. My sons may depict the same household things, such as a horse or a dinosaur, in manners that reflect their prevailing emotional conditions on any particular day. A jagged line may represent an internal state of tumultuous flux, whereas a smooth, continuous line may convey a sense of tranquility. One need not be Freudian to see that children's language usage provides significant insights into their inner worlds and developmental paths.

Digital art may exhibit textural realism by employing mimetic approaches and technologies. For example, although digital tools may not replicate real texture such as the tactile sensation of a cat's hair or sandpaper, they can convey visual textures that evoke the perception of various surfaces (rough, smooth, fuzzy, bumpy, etc.). Utilizing digital tools to investigate various textures enables students to enhance the sensory interaction of their creations. They can produce creations that are more intricate and consequently more gratifying. A child may employ textured brushes to convey tactile feelings onto the canvas, with brushes of varying roughness or smoothness, so embodying their sensory experiences inside their artwork.

The utilization of space pertains to the positioning of elements within the composition and the manner in which the audience interacts with the artwork. Comprehending and managing space fosters perceptual awareness, and spatial organization is a competency that transcends several learning areas. In therapy, children may be prompted to utilize positive and negative space to achieve equilibrium in their composition of shapes on the page. Children may be prompted to arrange their items or figures on the canvas in certain manners to facilitate their understanding of proportion, depth, spatial sense, juxtaposition, and the organization of their intended expressions.

Incorporating these aspects in DAT not only cultivates an aesthetic in the child's creations but also advances their therapeutic objectives. Utilizing colour, form, line, texture, and space enables children to manage their emotions, enhance their motor and cognitive development, and express themselves in a more comprehensive and enriched manner. DAT engages children in expressive modalities that extend beyond the artwork itself.

Design components are selected and applied according to each child's individual requirements and reactions; specific colours, shapes, textures, or lines may be more beneficial for one child than another. Dalou, the co-founder of the Tactile theater, articulated that the theater provided them with both the adaptability and the autonomy to address each child's requirements.

Their created approaches enabled them to remain present, grounded, and sensitive to the improvements, environment, and guidance of their young clients. Parents sometimes start their inquiries with statements such as, 'My child has a preference for a specific type of tunnel/ball/ colour...' when seeking to customize these alternatives for each child. How might our emotions alter in an environment capable of such responsiveness?

All design elements shown significant potential to aid children with ASD in their emotional and cognitive development through their engagement with digital art. The meaningful and impactful transformation of parts into experiences may be facilitated by the deliberate and suitably structured use of design components.

Table 4.7
Systematic Observation Record of Participant A's Emotional and Artistic Expression During Digital Art Therapy Sessions

Observation Grid: Digital Art Therapy Effect on Autistic Patients

Location: NASOM Titiwangsa		Start Time: 2:30 pm	Stop Time: 3:30 pm
Area of Observation	Sand Draw	Colouring Mandalas	Zen Brush
Artistic Expression	The lines are clear and prominent, which facilitates easy identification of the figures.	The abstract depiction of the cat may inspire the observer's imagination, prompting them into envision the specifics according to their own experience and perspectives.	The cat is represented in an abstract manner focusing on its overall form and large ears.

Area of Observation	Sand Draw	Colouring Mandalas	Zen Brush
Type of Artwork			
Motor Skills	Very good motor skills	Very good motor skills	Very good motor skills
ASMR Response	She was very focused when it comes to listening to the sound of the sand being dragged and drawn on	She was very focused when it comes to listening to the sound of brush being dragged on a digital canvas	She was very focused when it comes to listening to the sound of watercolour being dapped and dragged on the digital watercolour paper
Therapeutic Behavior	She is very excited and laughing whenever she picks up the stylus	She exhibits great enthusiasm and laughter every time she is handed the stylus	Her eyes become very peaceful and she is even delighted when she goes back to the sketching app
Attune To Digital Art Material	Very attuned to digital art material	Very attuned to digital art material	Very attuned to digital art material
Hand-Eye Coordination	Very good hand-eye coordination	Very good hand-eye coordination	Very good hand-eye coordination

Table 4.8

Integrated Analysis: Alignment of Design Principles (Elements and Principles) with the Artistic-Psychological Manifestations in Participant A's Digital Artwork

Sand Draw	Colouring Mandalas	Zen Brush
Analysis of the Principles and Elements of Design in Participant A's Artwork	Lines: Continuous, prominent lines forming figures Texture: Sandy/ grainy background contrasts with clean lines, enhancing tactility and depth. Contrast: High visibility from black lines against the light sandy backdrop Balance: Asymmetrical (large cat	Minimalist and Shape: Abstract depiction focusing on general shape and prominent ears; simplicity emphasizes the subject Space: Skillful use for negative space to outline form, creating depth Color: Dark purple against a light background for stark contrast, directing focus

Sand Draw	Colouring Mandalas vs. smaller figure)	Zen Brush Balance: Perfectly balanced, providing a feeling of solidity
Analysis of the Artistic Psychological Aspect of Design in Participant A's Artwork	Evokes innocence and youthful enthusiasm. The visual equilibrium created by contrast promotes a feeling of peace and calmness. Cartoonish style inspires nostalgia and ease	Emphasizes artistic expression over reality using forceful strokes. Bright purple (mystery creativity) may evoke emotions and atmosphere. Simple lines and exaggerated features (oversized ears/ eyes) stimulate the viewer's imagination.

4.4.3.2 Implications for Digital Art Therapy

DAT has become a beacon of hope for children ASD, offering a unique blend of creativity and technology to support their development. This therapeutic approach is particularly beneficial in enhancing communication, emotional expression, and social skills areas where children with ASD often face challenges.

At its core, DAT leverages the power of visual storytelling and artistic creation to help children's express emotions that might otherwise remain unspoken. The digital medium provides a non-verbal outlet where colours, shapes, and forms come together to tell a story, allowing children to communicate feelings and thoughts in a way that feels safe and accessible. This can be transformative for those who struggle with traditional modes of communication, enabling them to connect with the world around them more effectively.

The therapy's impact on social skills is equally profound. Through collaborative digital projects, children learn essential skills such as sharing, turn-taking, and empathy. These interactive experiences are designed to encourage positive social interactions, helping children to build relationships and engage with their peers in meaningful ways. The digital platform also provides a controlled environment where children can practice social scenarios, boosting their confidence and readiness for real-world interactions.

Individualized approaches are critical to the success of DAT. Recognizing that each child with ASD has unique needs and preferences, therapists tailor sessions to fit the individual profiles of participants. This customization ensures that therapy is not only effective but also engaging, capturing the child's interests and imagination. Design principles are thoughtfully integrated into the therapy, making the digital experience

intuitive and enjoyable, which further enhances the child's engagement and potential for growth.

The adaptability of DAT means it can evolve alongside the child, adapting to their changing needs and developmental stages. This flexibility ensures that therapy remains relevant and impactful over time, providing continuous support in the child's journey towards improved communication and social skills.

In essence, DAT offers a multifaceted therapeutic experience that is as dynamic as the children it serves. By blending creativity with personalized strategies, it empowers children with ASD to explore their emotions, enhance their communication skills, and build meaningful connections, laying a foundation for enriched personal development and social integration.

4.4.3.3 Emotional Expression

The qualitative data overwhelmingly demonstrated that Digital Art Therapy (DAT) served as a crucial non-verbal conduit for emotional expression for the participants, successfully bridging the gap between internal emotional experience and external articulation. This finding is particularly significant given the challenges individuals with ASD often face in verbalizing complex affective states. The analysis revealed that participants used the digital medium not merely to represent objects, but to symbolize and convey their dynamic emotional journeys through the strategic manipulation of design elements.

The translation of internal emotion into visual output primarily occurred through the elements of Color, Line, and Complexity, directly supporting the framework of the Affective/Symbolic level of the Expressive Therapies Continuum.

The Use of Color and Clashing Hues

The most direct mechanism for emotional conveyance was the application of color. Participants demonstrated a clear evolution in their color palettes, moving from initially restrictive or muted tones to more varied and vibrant selections as they progressed through the therapy. As evidenced by the detailed findings on Participant D and Participant B, color choice became synonymous with emotional identification.

- **Emotional Dualities and Self-Awareness:** Participant D, for example, utilized clashing colors and intricate drawings specifically to explore and map out emotional dualities. This deliberate confrontation with opposing or highly saturated colors acted as a visual language for complex or ambivalent feelings, enhancing self-awareness and the capacity to tolerate and express a wider affective range.
- **Narrative Expression:** Similarly, the vibrant colors used by Participant B were directly linked to energetic lines, producing a narrative reflection of their emotional journey. This demonstrated an increasing confidence in externalizing feelings that would have otherwise remained concealed or difficult to articulate. Participant E further confirmed this connection by systematically linking specific colors and shapes to different emotional states, thereby enhancing their articulation and communication skills.

Line as a Tool for Affective Storytelling

The evolution of line use served as a developmental marker of emotional progression and complexity. For participants across the cohort (A, B, C, D, E, and G), line was instrumental in enhancing communication and emotional depth.

- **From Simple to Intricate:** The use of line evolved from simple strokes to highly intricate and dynamic patterns. Participant B, in particular, used dynamic lines for storytelling, suggesting that as emotional experiences became clearer, the visual method used to describe them became more detailed and narrative-rich.
- **Line Intensity and Feeling:** The capacity to explore varied line intensities, as noted in Participant C's work, indicated a growing ability to control and modulate the physical expression of emotion. The shift towards intricate, controlled line work—such as the creation of detailed designs by Participant D and E—signified enhanced self-regulation alongside the conveyance of internal emotional states.

In essence, the digital art medium provided a safe, non-judgmental space where the participants' internal emotional landscape could be externalized, examined, and communicated through the purposeful selection and manipulation of design elements,

leading to measurable growth in emotional self-expression and affective communication.

Table 4.9

This Table Highlights the Unique Ways Each Child Used Digital Art Therapy to Explore and Communicate Their Emotions, Demonstrating the Therapeutic Potential of Digital Art for Children with ASD

Aspect	Participants	Description and Impact
Line as a Tool for Communication	A,B,C,D,E and G	Lines were used to express emotions and enhanced communications. Participant A evolved from simple lines to intricate patterns. Participant B used dynamic lines for story telling. Participant C connected the line styles with verbal descriptions. Participant D explored varied lines intensities. Participant E created intricate patterns and Participant G precise line work highlighted his creativity.
Texture and Sensory Engagement	A,B,C,D,E,F, and G	Texture enhanced sensory engagement and artistic development. Participant A and Participant C found textures soothing, aiding sensory processing. Participant B and Participant E used texture to deepened emotional expression. Participants C,D,F and G leveraged texture for creativity with Participant C's detailed textures highlighting his artistic skills.
Non-Verbal Communication	A and C	Digital art therapy facilitated non-verbal communication, allowing them to convey emotions and thoughts through art, overcoming traditional communication challenges.
Narrative Art as a Reflection of Emotional Journey	B and E	Participant B used vibrant colours and energetic lines to depict her emotional journey, enhancing emotional expression and understanding. Participant E linked colours and shapes to emotions, improving emotional articulation and communication skills.
Detailed Designs as a Medium for Emotional Conveyence	D and E	Participant D used intricate drawings clashing colours to explore emotional dualities, which Participant E's focus on insights into his emotional state, enhancing self-awareness and communication skills.

4.4.3.4 Practical Apps

DAT facilitates emotional expression and language development in children with ASD by providing a non-threatening medium for communication and expression. This technique supports emotional and behavioural management by meeting children at their developmental readiness. For example, the *Sand Draw* program allows children to explore sensory strategies while shaping their motor movements into expressive patterns.

Zen Brush encourages emotional regulation and calm breathing, whereas *Mandala Colouring* strengthens fine motor coordination. In more advanced systems, a human–robot therapist can tailor digital tools in real time, ensuring that therapeutic activities remain developmentally appropriate and engaging for each child.

Through colouring tasks, children are able to perceive, interpret, and communicate the full spectrum of emotions connected to their identities and lived experiences. Participant A expresses emotions ranging from anger to calmness through vividly coloured mandala compositions. Participant B, meanwhile, finds tranquillity in abstract colour choices, using these visual decisions to reflect a growing sense of emotional awareness.

This intimate relationship with colour enables these children to externalise their emotional states in a truthful, meaningful, and liberating manner.

However, emotional articulation represents only one component of DAT’s effectiveness. Its digital tools also promote self-regulation and relaxation. Soft, flowing lines in *Zen Brush* and *Sand Draw* encourage children to create calming, aesthetically gentle drawings. The fluidity of movement provides a soothing rhythm ideal for moments when a child requires emotional grounding. Participant C, who began with non-representational mark-making, gradually transitioned to forming recognisable figures enriched with patterns and colours.

This progression allowed Participant C to engage in communication across multiple levels. Additionally, DAT supports children with ASD through sensory integration. Participant D interacts with *Sand Draw* for sensory exploration, experimenting with textures in a predictable, low-stimulus environment that reduces the likelihood of sensory overload. While enhancing sensory processing, Participant D simultaneously develops fine motor skills. With therapeutic guidance, this child’s

motivation and confidence continue to increase as each artistic exploration becomes a moment of mastery and emotional stability.

DAT also fosters confidence and cognitive development. Through consistent digital art creation, children witness the completion of meaningful work, reinforcing competence and strengthening self-esteem. Participant E, whose hyperactivity often disrupts focus, experiences improved self-control through structured lines and calming colour sequences. Slow-paced breathing and purposeful pauses incorporated into the drawing process further assist in building concentration and emotional stability.

Participant E often depicts vehicles and dynamic scenes, combining movement with structured patterns that challenge and develop cognitive organisation. Participant F, in contrast, channels assertive energy into purposeful digital paintings. Control over digital strokes and compositions empowers Participant F, enhancing confidence and emotional agency.

These compositions flow across the screen like evolving thoughts as the exercises in cognition, coordination, and self-awareness that support improved social engagement and reflective thinking.

Ultimately, DAT encourages holistic growth across emotional, social, sensory, and cognitive domains. Its adaptable digital nature makes it possible to tailor therapeutic sessions to each child's developmental stage, resulting in interventions that are consistently relevant and effective.

As Participants A through G engage in DAT, the progress they demonstrate extends beyond artistic skill, encompassing emotional understanding, improved communication, and strengthened social relationships.

Digital Art Therapy empowers children with ASD by equipping them with accessible tools that transform therapeutic processes into enjoyable, meaningful experiences. These technologies reinforce therapeutic goals while motivating children to take ownership of their creative journeys. DAT is steadily emerging as a vital therapeutic modality for ASD intervention, fostering self-expression, connection, and developmental progress.

In this way, DAT serves not only as a playful creative outlet but also as a significant therapeutic mechanism through which children cultivate life skills, emotional resilience, and self-awareness that will support them into adolescence and adulthood. Through the tiny strokes of *Zen Brush*, the tactile exploration of *Sand Draw*,

and the expansive geometry of *Mandala Colouring*, children with ASD can move beyond developmental constraints and into meaningful, empowered growth.

4.4.3.5 Future Research Directions

Future research into DAT for children with ASD is poised to introduce transformative advancements in therapeutic art practices and the wider art community. DAT is an evolving medium that will increasingly address the requirements of children with ASD, serving as a distinctive avenue for their expression and growth.

Longitudinal studies possess significant promise and the remarkable ability to monitor the long-term impacts of DAT. In contrast to the aforementioned short-term evaluations, longitudinal studies track participants over an extended period, offering insights into the effects of DAT on the development of essential abilities such as communication, emotional expression, and socialization over time.

By examining the progression of children with ASD through therapeutic stages during intervention, researchers can gain a comprehensive understanding of the mechanisms that facilitate lasting change. This includes insights into how extended, exploratory engagement in digital art fosters emergent communication, enabling children to articulate their thoughts more effectively, and how long-term digital art projects contribute to emotional resilience, enhancing children's capacity to navigate their emotions with confidence and clarity.

Additionally, DAT may be assessed over time to determine its effects on social skills. Researchers may evaluate children's essential social behaviors, such as empathy, collaboration, and relationship-building skills, over time while they cooperate on digital art, enabling future treatments to successfully enhance involvement in social communities.

Beyond the therapeutic environment, the findings of longitudinal research can also foster innovation within the artistic sector. As our understanding of the therapeutic benefits of digital arts expands, we may better motivate artists and educators to innovatively employ artistic practices and digital technology to foster diversity, creativity, and engagement among many cultures and individuals.

The principal conclusion of these findings, which emphasizes the enduring good benefits and possibly transformative potential of DAT for children with ASD, offers a beacon of hope and opportunity for future research in this field.

However, when we consider the longer-term gains and continued monitoring that technology allows, we start to see the potential of digital art therapy (DAT) for the improvement of other aspects of children's lives. Further to this, digital therapeutics are increasingly focusing on the need for continued care to maintain therapy gains. For example, suppose a child showed substantial improvements in communication, emotional regulation and biological regulation as a result of attending art therapy. These changes had also had positive secondary effects, such as improved fine motor skills and mood. However, six months after the child terminated therapy, the gains made had largely eroded. This raises the question: how can these changes be maintained? An obvious answer here would be that we would need to continue monitoring things longer.

As children grow, long-term observation allows the developmental trajectory of children with ASD to come into focus. This enables therapists and caregivers to understand whether the interventions are still helpful or perhaps need refreshers. For instance, the early gains Hana had made in managing her intense emotionality and being able to express herself through art might shift as she aged, and the tools that previously supported her in early childhood need to be adapted to support her throughout adolescence. Similar changes for Rayyan's movement and sensory improvements could evolve as his needs grew in complexity. For these children, by continuing to monitor them, therapists can ensure that all their buoys can continue to support their evolution in their behavioural, emotional and sensory needs as they grow as individuals. This is not just a responsive approach to therapy. It is a keenly individualised approach.

Finally, there are efforts to increase the diversity of participant cohorts in DAT studies. ASD is highly variable and no two children experience the condition in the same way; thus, 'one size fits all' is not a possibility, and therapy must be adaptable and individualised accordingly. We need the right therapy for the right child, at the right time. Current studies are often conducted with small, relatively homogeneous groups, which limits what we can learn about how DAT can benefit children with different backgrounds, abilities and needs. Future studies will benefit from increased diversity in participants, such as a range of ages, ethnicities, and severity of condition, so that researchers can understand the implications for tailoring DAT to different people.

For example, strict timings and activities work well for structured kids such as Zunnurain, who are clear on the activities and maintain their engagement due to active, dynamic sessions. On the other hand, children such as Jayden who prefer soft colour palettes and quiet, passive and controlled activities, are comforted with controlled

experience, soft touch, psychology dolls and photos. While studies on these differences can help us formulate universally applicable rules, they also allow us to understand specific strategies for tapping individual strengths and overcoming challenges.

Alongside the push for more diversity, establishing best practices and standardizing elements of DAT will be necessary to enable broad dissemination. At present, the lack of structure that allows therapists to tailor each MD/DA interaction to the bootstrapping needs of the particular child sitting in front of them is an important part of the intervention's flexibility. But for a field devoted to intentional, direct social interaction, we are currently struggling mightily with issues of consistency and measurement. Methodologically robust research will allow us to begin fashioning a framework of best practices that marries the need for personalised interventions with the advantages of standardised care and intervention. Such guidelines would allow therapists to work from stable evidence-based protocols while still maintaining the high degree of flexibility that has proven crucial for children with ASD, who often require extremely high variability in their care. It will also make it easier to accept DAT into more formalised medical and educational systems, allowing for dissemination into more mainstream programmes and approval for insurance coverage, making it available to more families.

Creative tools such as colour and narrative are further areas in which there's great opportunity for future study in DAT. Colour is a crucial aspect of emotional expression, especially for ASD children, who don't always have the verbal skills needed for communication, so a deeper understanding of the relationship between colour and mood could enable therapists to design more effective interventions to help children to channel their emotions and repair their moods using art. A child who is anxious, for example, might be helped by calming colours; a child who is lacking in motivation or mood could be more engaged by vibrant, energetic colours. Since children such as Jayden have shown that the colours they select in their art reflect their emotional state, therapists can more readily gain a window into a child's inner life without having to ask them questions.

Similarly, the narrative power of art has turned out to provide a good fit with many aspects of the emotional and social experience of children with ASD. Raisya, for instance, also started to include people and scenes with them as part of her images. She began to create visual narratives pictures in which the elements of a scene were ordered to tell a story about what was happening and what might happen next. Narrative art

enables children to express themselves, but also to develop their capacity to structure and make sense of their experience. In looking at this way that narrative works in art, we might well develop other, more obviously narrative forms of art that promote the development of narrative capacity in therapeutic contexts.

The bigger aim of these research initiatives is to improve the quality of life for children with ASD. Giving therapists better tools, more research and more insight puts us one step closer to a better therapeutic experience, one that's enriching, meaningful and as specific to the individual as possible. When therapists fine-tune their approach, children get more opportunities to express themselves and build self-efficacy and belief in their own capacities. The simple act of expression offered in the form of art becomes a gateway to self-expression, giving children more than just a therapeutic experience but a voice in the world.

In the longer term, the growing legitimacy of DAT could mean that, as their skills develop in therapy, they can also be included more in the wider art world, through exhibiting their work, collaborating with peers or working towards a career in the arts. This kind of inclusion would address not only the creative needs of children with ASD but also some of the attitudinal barriers to greater inclusion more generally, by challenging stigma and further raising mainstream awareness and appreciation of neurodiversity as part of the wider human condition.

Overall, the future of DAT is promising and holds great hope for the children on the autism spectrum. If the focus shifts to long-term monitoring, increasing participants' diversity, establishing best practices, and exploring other creative elements such as colour or storytelling, it holds the potential for improving the effectiveness of DAT. Moreover, it will equip children with autism with tools to communicate, connect and flourish not only in therapy sessions but in their lives as a whole. DAT will continue to evolve over time, impacting the lives of individuals for the better.

4.5 Summary

DAT stands out as a powerful and transformative force for children with ASD, offering a unique platform to significantly enhance communication, emotional expression, and social skills. , while also fostering their creative potential, emotional resilience, and capacity to engage with their environment. The main goal is for the subsequent generation of autistic children to be equipped with the appropriate resources

to partially realize this objective. DAT offers potential benefits for those on the autism spectrum or with other impairments through tailored therapies that can provide enduring effects and facilitate skill enhancement across several communication mediums. The latest data shown that this new art therapy medium significantly enhanced the verbal communication, social interaction, emotional expression, and both emotional and creative capabilities of the majority of the participants, who were children with ASD. Hana, experienced selective mutism and autism, which significantly hindered her ability to express her emotions and confront her distressing feelings. As she adhered to the established emotions in her digital drawing grid as prompts, she simultaneously included new feelings that she experienced in her own life.

Each artwork illustrates the potential impact of DAT and indicates that its fluid, immediate, and diverse characteristics are significant advantages in engaging with the autistic community. Verbal communication has posed a significant challenge for both Hana and Rayyan. The utilization of digital art as a vehicle for expressing feelings and concepts that are otherwise hard to articulate has yielded exceptional outcomes for the children. One of Hana's initial creations pertained to felines. She repeatedly rendered her disordered and repetitious cat pictures on the iPad, gradually including colours, beginning with pink and green, followed by yellow and blue. In the subsequent weeks, her sketches evolved into a multitude of new patterns, executed with greater confidence and assurance, indicating a more intricate emotional landscape. Rayyan is another child who struggled to articulate the majority of his fears and thoughts. He started his classes by sketching fundamental forms, like circles and straight lines, while also reiterating basic geometric shapes. Shortly thereafter, they starting incorporating greater diversity, indications of motion, and broader colour palettes. As Rayyan's motor and sensory abilities improved throughout the months, he was able to expand his repertoire and exhibit greater flexibility in both his drawings and interactions with others.

Raisya and Qanitah have experienced DAT sessions. The security and immediacy of the digital tools afforded the children an opportunity to interact with their feelings, express them via sketching and painting, and start their exploration. For Raisya, who had tendencies towards temper tantrums and emotional upheavals, digital painting provided a secure outlet for her negative feelings as even on days when she opted for silence, she could produce abstract artworks composed of lines and forms. Initially hesitant, she was persuaded to incorporate further elements into her works until they evolved into elaborate scenarios populated by eccentric individuals. The tale of her

emotions was conjured by her work. As she continued to explore her emotions, her awareness of her sentiments and their regulation increased. Simultaneously, Qanitah, who frequently experienced frustration and was unable to finish a painting without abandoning or damaging it, started her art sessions by illustrating charming figures with large, endearing eyes. Qanitah then elucidated that she (almost instinctively) depicted these round eyeballs to prevent her mother from reprimanding her. Drawing to soothe her mother may have been Qanitah's method to evade confrontation, a behavior she internalized from her own mother. Following her participation in more digital art workshops, Qanitah was prompted to compose a short essay detailing her therapeutic experience.

DAT has enabled Jayden and Zunnurain to improve their social skills, an essential aspect of their treatment regimens. Jayden has low attention and a tendency towards hyperactivity. Additionally, his sensitivity to bright light is significantly higher than the average for boys of his age. Zunnurain has poor attention and social quotient (SQ), leading him to react impulsively to external threats. Furthermore, Zunnurain favors a structured and subdued environment, indicating that any disturbance causes his autonomic nervous system to vacillate from its effective fight-or-flight response as it rapidly evaluates the new stimuli and adapts accordingly. This vigorous start-leadrepeat approach activates the hypothalamus, a command center for the nervous system that provides detailed information on every action and expression to many branches of the neurological system. Both boys are increasing their social skills, an essential feature of any therapeutic programs. Through collaborative digital art projects, both boys may now engage in cooperation and interpret the experience as cooperative rather than just social. Jayden's internal organizational system harmonizes with exact colour palettes and algorithmically organized lines, allowing him to generate art with a relaxing cadence and rhythm that considerably alleviates anxiety, regardless of whether the work achieves a masterpiece level of beauty. Participating in a collective of similarly vocal persons, despite being a cause of stress, evolves into a more agreeable experience when their sounds are rhythmically coordinated, therefore becoming predictable and harmonic with his own rhythms. Due to DAT, he now demonstrates an increased predisposition to express his creativity and participates more consistently in discourse, showing greater social awareness and participation in his connections with others. In contrast to some kids with neurological disorders, Zunnurain gains advantages from a

more energetic, lively art session, which boosts his capacity to manage organized, dynamic, quick, and somewhat unpredictable surroundings.

Noah's experience with DAT further highlights the therapeutic potential of this technology. Noah's exceptional attention to detail and his tendency for building detailed and highly elaborate designs enabled DAT to operate as a channel for sentiments he could not convey vocally. Noah's artwork, being a direct expression of his inner reality, allowed each component to provoke specific feelings. This has been a crucial factor in Noah's capacity to articulate himself through art as a primary mode of self-expression satisfying an artistic necessity while also delivering considerable therapeutic benefits, enhancing his interpersonal relationships, and offering a soothing and enjoyable activity he frequently pursues for pleasure.

Over the three-month data collection period at NASOM, the children's communication abilities, emotional control, and interpersonal relationships steadily improved, as indicated by their drawings. The versatility of DAT allows the therapist to construct highly individualized treatments, customizing the session speed precisely for each children. The children may partake in art-making, regardless of their ability level, as the materials are diverse and conveniently supervised. Primarily, DAT has helped these children to stay totally involved and boost their capacity to communicate themselves, form connections with others, and control their emotions. The children's progress has been plainly measured inside a little three months. They have exhibited substantial development in their communication abilities, interpersonal relationships, and emotional management. Art not only increases emotional well-being but also reconnects individuals with their higher selves. Moreover, such therapies encourage researchers to thoroughly analyze their therapeutic delivery techniques and assess long-term modifications.

The future of DAT has enormous potential for assisting persons with ASD, as subsequent research will improve and extend these strategies, making treatment more inclusive and successful as therapists continue to evolve their practice using digital art. It is envisaged that as new research emerge, DAT will acquire wider acceptability and incorporation into mainstream discourse, becoming a widely employed and acknowledged therapeutic strategy for children with ASD. Considering that much existing research focuses on the establishment and enhancement of standardized forms of DAT practice, alongside a deeper comprehension of the enduring advantages of therapy, there exists potential within this research domain for DAT to be delineated

more distinctly, facilitating its further integration into formal therapeutic and educational environments. This can aid society in being more accepting of children with ASD, therefore boosting their possibilities for fulfillment in therapy and throughout their life.

Consequently, following three months of data collection at NASOM, we discover that DAT is effective in treating children with ASD and encourages their growth and development. The case studies of Hana, Rayyan, Raisya, Qanit Zunnurain, and Noah show the transformational potential of DAT for children with ASD. This breakthrough therapy afforded these kids a comfortable and inventive place for selfexpression. Children experience difficulties that restrict their growth and communication, independent of their connection with the computer. DAT projects accomplished their presentation criteria while also encouraging the development of crucial social and emotional skills for life. The children undertook new chores, including starting computers for their friends and obtaining sound files. Children anticipated DAT projects culturally, as they were able to doodle and partake in their sessions without limits. As DAT for children with ASD expands, driven by technological advancements and increasing acceptance of innovative therapeutic modalities, there is optimism that more therapists will engage in research to create new DAT initiatives and provide their perspectives to this burgeoning profession.

DAT have the power to influence children and people with ASD worldwide. Ultimately, DAT's pioneering approach to treating children with ASD and equipping them with supplemental developmental talents through a socially interactive cognitive-affective treatment implies a positive possibility for the future of children with special needs. If cultures and nations can accept and grasp DAT, it may work as a catalyst for establishing a more sympathetic environment for children with ASD.

CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter synthesizes the findings from the study, reflecting on the implications of DAT in children with ASD. The discussion encapsulates the significance of the research, the observed outcomes, and the potential future directions in this domain. The study's results are contextualized within the existing literature, highlighting the contribution of this research to the broader understanding of art therapy in ASD.

5.2 Main Findings

In recent years, DAT has emerged as a revolutionary therapeutic approach for individuals with ASD, providing innovative mechanisms for the development of skills and affective expression. This essay explores the multidimensional effects of DAT on individuals with ASD, with a particular emphasis on its capacity to improve motor skills, enrich the comprehension of digital art, and improve affective communication. Furthermore, it investigates the potential of Expressive Art Treatment (EXA) to facilitate communication for non-verbal autistic patients and investigates the ways in which design principles in DAT can have a beneficial impact on Malaysian society and the art sector.

DAT is especially important for individuals with ASD, as traditional communication methods frequently fail to meet their needs. One of the primary research objectives is to assess the influence of DAT on the communication abilities and affective expression of ASD patients. An interactive medium through which individuals can investigate and articulate complex emotions is provided by digital tools such as Zen Brush, Mandala Colouring, and Sand Draw. Digital art offers a non-verbal medium for children with ASD to express their emotions through colour, shape, and form, as they may encounter difficulty with verbal communication. Not only does this modality facilitate emotional expression, but it also improves communication skills, enabling

clinicians to develop a more profound comprehension of their patients emotional landscapes.

For example, a child who initially employs muted colours and repetitive shapes may gradually progress to more vibrant hues and intricate designs as they develop the ability to articulate their emotions. This progression may be indicative of an increasing level of self-awareness and familiarity with emotional exploration. Similar to Zen Brush, these tools enable children to interact with sensory experiences by means of vibrant colours and repetitive patterns, which aid in emotional regulation and establish a sense of stability.

Furthermore, DAT has demonstrated the potential to enhance motor skills and kinaesthetic movements, which are essential for a significant number of individuals with ASD. The development of fine motor skills can be facilitated by the tactile engagement of digital platforms, as users manipulate tools such as styluses to create intricate designs. This procedure fosters kinaesthetic awareness and motor coordination, thereby enhancing cognitive and physical development. DAT offers a comprehensive approach that simultaneously addresses multiple dimensions of development by incorporating these skills into therapy.

Another essential component of this therapeutic landscape is EXA, particularly for non-verbal autistic patients. EXA provides a structured yet adaptable environment for self-expression, utilizing the creative process to encourage communication and emotional release. Non-verbal individuals can engage in meaningful exchanges without the necessity of words through activities such as digital painting or collaborative art projects. This therapy not only enhances communication skills but also fosters social engagement and confidence, enabling patients to establish a more profound connection with others. For instance, children can engage with their peers through shared creative experiences and communicate visually by collaboratively creating digital murals in a group setting.

The therapeutic experiences of ASD patients are significantly influenced by the design principles and elements in DAT. Therapists can generate more engaging and effective therapeutic sessions by integrating design concepts that correspond with the sensory preferences of individuals with ASD. The implementation of repetitive patterns, interactive elements, and soothing color palettes can facilitate the regulation of sensory experiences and foster a sense of stability and control. For example, children who exhibit an increased sensitivity to specific colors may experience a greater sense of

relaxation and openness to investigating their emotions by incorporating soothing blues and greens into their digital art sessions. These design considerations are not only therapeutic, but they also pave the way for innovative art practices that could impact the broader Malaysian art sector.

The integration of DAT into Malaysia's healthcare framework offers a distinctive opportunity to improve mental health services and contribute to the well-being of society. Malaysia can establish itself as a leader in digital therapeutics by implementing this innovative strategy, which will cultivate a culture of inclusivity and innovation. The potential societal benefits are vast, encompassing heightened awareness and acceptance of mental health issues to improved mental health outcomes. The capacity of DAT to revolutionize the lives of individuals with ASD becomes increasingly evident as it continues to develop, providing a more resilient and promising future for mental health care in Malaysia.

Incorporating DAT can improve the perception and comprehension of mental health issues in Malaysia from a cultural perspective. Public art exhibitions that exhibit the work of individuals in therapy can challenge stereotypes and cultivate empathy, demonstrating the breadth of creativity and emotional intelligence that individuals with ASD possess. In terms of economics, the advancement of DAT tools and platforms generates opportunities for collaboration among artists, clinicians, and technology developers, thereby fostering innovation and potentially contributing to the expansion of Malaysia's creative economy.

In summary, DAT is a revolutionary development in the field of therapeutic strategies for individuals with ASD. This method provides a comprehensive solution to the distinctive challenges encountered by the ASD community by addressing critical research objectives, including the improvement of communication and motor skills, the enhancement of affective expression, and the incorporation of effective design principles. Malaysia's adoption of this innovative therapy not only enhances its art sector but also promotes a more inclusive society, where individuals with ASD can flourish and make a meaningful contribution to the cultural and social fiber. The comprehensive integration of DAT not only aligns with global trends toward more inclusive and technologically advanced mental health care solutions, but also supports individual growth.

5.3 Is Digital Art Therapy Effective for ASD Patients?

DAT has been demonstrated to be effective in fostering the development of motor skills, communication, and affective expression in individuals ASD. Research conducted by Jalambadi and Zeinab (2019) underscores the fact that digital platforms offer a more interactive and adaptable environment than conventional methods, rendering them especially advantageous for individuals with autism. The adaptability of digital mediums enables patients, particularly those who are non-verbal or have limited verbal abilities, to convey themselves through art, thereby overcoming the obstacles they typically encounter in verbal communication. The utilization of color, form, and texture in digital art allows patients to visually express their emotions and thoughts, which not only improves their emotional regulation but also strengthens the relationship between the therapist and patient by providing a deeper understanding of the patient's emotional state.

These findings are further substantiated by the research conducted by Cheng et al. (2020), which emphasizes the importance of digital tools, including virtual reality (VR) and drawing applications, in enhancing both affective and sensory processing, which are frequently impaired in individuals with ASD. Cheng's research emphasizes the extent to which these instruments accommodate the sensory preferences of autistic patients, thereby fostering a greater degree of engagement and participation in therapy sessions. In the end, the digital tools provide a stimulating environment that enables individuals to interact with sensory elements in a manner that traditional media may not, resulting in improved therapeutic outcomes. Digital art therapy is a critical component of therapeutic success for individuals with ASD, as it enables patients to work at their own tempo and engage multiple senses, thereby facilitating emotional exploration, sensory regulation, and focused attention.

Furthermore, digital art therapy has been demonstrated to be effective in the development of a personalized therapeutic environment that is customized to the unique requirements of each ASD patient. These results are consistent with Durrani's (2014) assertion that the non-invasive nature of digital art tools, in conjunction with the adaptability of digital platforms, creates a secure and creative environment for autistic individuals. As patients progressively gain confidence in their capacity to express emotions through art, this environment fosters cognitive processing and emotional regulation. Digital art therapy facilitates patients' emotional exploration through a

structured yet adaptable medium, thereby enabling them to engage more thoroughly with the therapeutic process and achieve long-term enhancements in their cognitive and emotional development.

5.4 What Type of Artwork is Used in Digital Art Therapy?

Integrating DAT employs a diverse selection of artwork that is meticulously tailored to meet the patients' unique needs and sensory preferences. Digital platforms offer a unique advantage that can be customized to the cognitive abilities and affective states of each patient by facilitating the creation of dynamic compositions, abstract designs, and geometric shapes. Structured and repetitive patterns are frequently preferred by children with ASD to provide a sense of emotional stability and control during their therapeutic journey, as research has consistently proved.

Numerous individuals on the autism spectrum benefit significantly from structured designs. These patterns' predictability contributes to the creation of a secure environment in which the children can express themselves without feeling overburdened. For example, the development of their fine motor skills and the enhancement of their focus and concentration can be facilitated by the use of fundamental geometric shapes and repetitive motifs. These structured elements empower children to participate in art-making with assurance as they process their emotions through recognizable visual frameworks.

Children frequently transition to the creation of more intricate and vibrant artworks as they progress through therapy. As it is indicative of their expanding cognitive and affective capacities, this progression in artistic expression is crucial for their development. Sensory-stimulating activities, such as painting, sculpting, and drawing with digital tools, are particularly beneficial to children with ASD, as per Durrani (2014). These activities provide therapeutic benefits and enable them to explore a diverse array of textures, colors, and forms in a non-restrictive manner, thereby fostering their creativity.

The research conducted in 2024 at NASOM Titiwangsa emphasizes the specific digital instruments that participants utilized during their therapy sessions. Sand Draw,

Colouring Mandalas, and Zen Brush were particularly effective in enabling emotional exploration and artistic expression. The unique texture and interaction of Sand Draw allow children to create intricate designs on a digital sand surface, thereby

fostering tactile engagement and creativity. Coloring Mandalas offer a structured yet artistic expression, enabling children to engage in a repetitive coloring process that can be both creatively fulfilling and tranquil. Finally, Zen Brush allows for fluid brush strokes, which encourages children to express their emotions through freeform painting while investigating a diverse array of color palettes and techniques.

Furthermore, the reviewed studies indicate that digital mediums enable a gradual and incremental therapeutic approach. For example, preliminary sessions may involve simple coloring or drawing exercises that emphasize fundamental colors and shapes. Sessions can incorporate more complex, personalized designs that are in alignment with the patient's developmental needs and emotional experiences as therapy advances. The child's cognitive and emotional development is also facilitated by this incremental approach, which also enhances their artistic abilities. Therapists can offer more effective support for children's emotional regulation and social interaction skills by allowing them to express themselves through more detailed and vibrant artworks.

In summary, digital art therapy utilizes a diverse array of artwork that is meticulously designed to align with the developmental stages of the children. The development and affective expression of individuals with ASD are significantly influenced by each phase of artistic engagement, which ranges from the creation of structured patterns to the development of more complex works. The therapeutic experience is further enriched by the adaptability of digital tools, which enables children to investigate and express their emotions in a way that may not be feasible with conventional art forms. The adaptability of digital art therapy in addressing the distinctive requirements of children with ASD is illustrated by the inclusion of specific tools such as Sand Draw, Colouring Mandalas, and Zen Brush in the NASOM Titiwangsa research.

5.5 What Are the Influences of Design Principles and Elements in Digital Art Therapy on ASD Patients?

The efficacy of digital art therapy for individuals with ASD is significantly influenced by design principles and elements, including color, shape, texture, and composition. The emotional and cognitive responses of the patients are substantially influenced by these elements, which also function as instruments for creative expression. Research suggests that specific colors and shapes are closely associated

with emotional states. This relationship can be leveraged to improve the therapeutic process and promote emotional regulation.

For example, the utilization of vivid colors in digital art therapy has been demonstrated to captivate patients on a sensory level, thereby enabling emotional expression and fostering a sense of tranquility during periods of agitation. Bright and dynamic compositions can effectively captivate the attention of individuals who experience hyperactivity, as these visually stimulating elements are frequently more engaging than subdued or monochromatic designs. Conversely, individuals who are experiencing difficulty with emotional regulation may find that structured patterns and balanced compositions offer a sense of stability and control. This interaction between color and emotional response can be particularly advantageous in assisting patients in the process of self-discovery and emotional expression.

The therapy is further enhanced by the tactile and sensory experiences that are associated with interacting with digital instruments. Customizable digital brushes and touch-sensitive displays allow patients to manipulate design elements in a manner that is intuitive and responsive to their individual requirements. This multi-sensory experience not only fosters creative exploration but also enhances fine motor skills and promotes cognitive development—areas that are frequently difficult for individuals with ASD. Patients are able to experiment with a variety of design elements by interacting with the digital medium in a tactile manner, which fosters a sense of ownership over their artistic process and promotes self-confidence.

Additionally, the perception and interaction of patients with their creations can be influenced by the composition of the artwork, which refers to the arrangement and relationship of its components. Chaotic arrangements may elicit feelings of disarray, while balanced compositions can conjure feelings of harmony and stability, thereby reflecting the patient's emotional state. This dynamic interaction between emotional experience and composition can be a powerful tool for self-reflection, enabling patients to investigate and articulate their emotions through visual art.

In conclusion, the principles and elements of design not only enable patients to articulate themselves but also directly impact their sensory and emotional experiences during digital art therapy. Therapists can establish an environment that is conducive to the overall efficacy of therapy and is consistent with the individual therapeutic objectives of each patient by strategically integrating these design elements. This considerate incorporation of design principles improves the cognitive and motor skills

of patients, thereby enriching their therapeutic experience, and enhances their ability to engage with their emotions.

5.6 Research Contributions

5.6.1 Theoretical Contributions

This investigation makes a substantial contribution to the field of art therapy by broadening the comprehension of the efficacy of digital art therapy in assisting individuals with ASD. The research provides a novel theoretical framework for the investigation of sensory engagement and affective expression in children with autism by providing a comprehensive analysis of the interaction between design principles including color, shape, and texture and therapeutic interventions.

The incorporation of design principles into digital art therapy sessions enables a customized approach that is tailored to the individual sensory requirements and emotional states of each child. For example, the strategic application of color can elicit specific emotional responses, thereby facilitating the expression of emotions that children may find difficult to articulate verbally. Vibrant tints can elicit feelings of enthusiasm and engagement, while softer tones can encourage contemplation and relaxation. The shapes and forms employed in artwork can also serve as a nonthreatening platform for emotional exploration, thereby facilitating the exploration of personal experiences and identity.

This study develops upon previous research, including that of Mirabella (2015), by offering empirical evidence of the beneficial effects of digital mediums in therapeutic environments. It emphasizes the potential of digital tools to improve the creative process, rendering it more engaging and accessible for children with ASD. The adaptability of digital art platforms allows therapists to create sessions that are tailored to the changing interests and requirements of their patients.

Additionally, the investigation contributes to the ongoing discourse regarding nonverbal communication strategies for individuals with ASD. Digital art therapy offers a compelling alternative to conventional verbal therapies, enabling children to express their thoughts and emotions through visual means. This method not only encourages patients to express themselves more freely, but it also cultivates a more profound comprehension of their emotional landscapes. Children can enhance their overall

therapeutic experience by expressing complex emotions that may be challenging to articulate through the use of digital art as a form of communication. The results of this study significantly contribute to the theoretical development of Expressive Art Treatment (EXA) by demonstrating the potential of digital art as a productive platform for non-verbal patients to improve their cognitive functioning, emotional regulation, and communication skills. The research emphasizes the distinctive capabilities of technology to promote emotional health and cultivate meaningful interactions among individuals who may struggle with conventional forms of communication by demonstrating the potential of digital art therapy as a powerful medium for expression.

The focus of conventional EXA practices has frequently been on physical art forms, including painting, drawing, and sculpting. Nevertheless, this investigation expands the current framework by incorporating digital tools into the therapeutic process. The flexibility and interactivity of digital mediums facilitate a more dynamic engagement, allowing patients to explore their creativity in a manner that traditional art forms may not fully accommodate. An intuitive experience that can engage patients at a deeper sensory level is provided by touch-sensitive displays and customizable digital brushes, for instance. This interaction not only enables artistic expression but also enhances cognitive abilities and fine motor skills.

Additionally, the research broadens the multisensory art therapy paradigm to include the utilization of digital tools, providing a contemporary perspective on the ways in which sensory modulation can be improved through technology. Digital art therapy establishes an immersive environment that simultaneously stimulates multiple senses by integrating elements such as sound, contact, and visual stimuli into the art-making process. This multisensory approach is especially advantageous for individuals with ASD, as it enables them to process information through a variety of channels, resulting in enhanced affective expression and communication.

The results underscore the importance of digital art in the facilitation of nonverbal communication. It can be a daunting challenge for many non-verbal patients to articulate their thoughts and emotions. Nevertheless, digital art provides a unique method of expressing emotions and ideas, enabling these individuals to visually express their experiences. This can considerably improve their capacity to communicate with caregivers and therapists, thereby nurturing a more comprehensive comprehension of their emotional needs and preferences.

Furthermore, the study reiterates the significance of affective regulation in the context of EXA. Patients are able to investigate their emotions in a secure and regulated setting by participating in digital art. The act of generating art can be therapeutic in its own right, providing a means of expressing feelings of anxiety, sorrow, or frustration. Therapists can assist patients in utilizing their artwork as a tool for self-reflection and emotional management by incorporating design principles such as color and composition.

In summary, the results of this study not only contribute to the theoretical framework of Expressive Art Treatment but also establish a more sophisticated comprehension of the ways in which digital art can improve therapeutic outcomes for non-verbal patients. Ultimately, this research benefits individuals with ASD and other communication challenges by enriching the dialogue around innovative approaches to affective expression and communication by incorporating technology as a vital component of multisensory art therapy.

5.6.2 Methodical Contributions

This study utilizes a mixed-methods approach, integrating qualitative case studies, observational data, and quantitative measures to assess therapeutic outcomes. The study integrates diverse methodologies to examine how digital tools enhance the therapeutic experience for individuals with ASD (Creswell, 2014).

The integration of digital platforms, including drawing tablets and virtual reality (VR), represents a significant methodological advancement in art therapy. These technologies facilitate a more interactive and immersive experience, which is especially advantageous for children with ASD. Drawing tablets offer a tactile and visually engaging medium, allowing patients to produce artwork in a familiar and interactive format. VR technology can immerse patients in various environments, promoting exploration and creativity in ways that traditional art forms may not enable (Lehman et al., 2017). This engagement enhances the artistic process and fosters a deeper connection between the patient and their therapeutic journey.

The mixed-methods design facilitates the creation of a customized therapeutic approach, allowing for precise monitoring of individual patient engagement. Qualitative case studies offer detailed insights into individual patient experiences, emphasizing their distinct challenges and achievements within the therapeutic context (Stake, 2010).

Data gathered through observation during sessions can enhance understanding of behavioral patterns, interactions with technology, and emotional responses triggered by different art-making activities. The observations provide critical insights into patient responses to digital art therapy and identify techniques that produce the most favorable outcomes (Barker et al., 2016).

The quantitative measures of therapeutic outcomes provide a systematic approach to assessing the effectiveness of digital interventions. The research utilizes standardized assessments and metrics to quantify enhancements in communication skills, emotional regulation, and cognitive functioning (Durlak et al., 2011). The integration of qualitative and quantitative data enhances the validity of the findings and offers a thorough understanding of the therapeutic process.

The methodology of the study significantly advances the field of art therapy research by providing a comprehensive framework for the application of digital tools in therapeutic environments. This highlights the significance of incorporating technology into conventional art therapy methods, indicating that these advancements may increase patient engagement, promote emotional expression, and enhance therapeutic results (Karkou & Sanderson, 2006). This research documents the efficacy of a mixed-methods approach, facilitating future studies to expand on these findings and investigate new methods for integrating digital technology into art therapy.

This research demonstrates the effectiveness of a mixed-methods approach, highlighting the benefits of integrating qualitative and quantitative methodologies to enhance the understanding of digital art therapy for patients with ASD. This study's insights can guide practitioners and researchers, establishing a foundational framework for future inquiries into technology's role in therapeutic practices, thereby enhancing strategies for supporting individuals with autism (Malchiodi, 2012).

5.6.3 Practical Contribution

This study offers significant practical contributions, delivering valuable insights for healthcare practitioners, art therapists, and educators who support individuals with ASD. This research primarily emphasizes the effective integration of digital art therapy into therapeutic interventions, especially for patients experiencing difficulties with verbal communication. The findings indicate that the use of digital tools, including interactive applications and advanced drawing software, establishes a flexible and

accessible environment conducive to emotional expression and cognitive development. These tools enable patients to interact with their emotions in a nonthreatening way, which may be especially advantageous for individuals who perceive traditional communication methods as overwhelming or difficult (Koplowitz et al., 2019).

The study highlights the significance of design principles in structuring therapy sessions. Therapists can effectively integrate elements such as color, shape, and texture into the art-making process to design structured or spontaneous activities tailored to the specific needs of each patient. Employing vibrant colors may stimulate emotional engagement, whereas structured shapes can offer a sense of stability and predictability for patients needing a more controlled environment. The strategic application of design principles enhances the therapeutic experience and empowers therapists to effectively guide patients through their emotional journeys (Karkou and Sanderson, 2006).

The study advocates for healthcare practitioners and art therapists to integrate traditional therapeutic methods with contemporary digital tools, promoting a more holistic approach to therapy. This integration expands the therapeutic options for professionals and aligns with current trends in mental health treatment, emphasizing the growing significance of technology. Utilizing digital art therapy enhances emotional regulation and social interaction in patients, thereby creating a more supportive and engaging therapeutic environment (Baker et al., 2020).

The research underscores the efficacy of digital art therapy in aiding students with ASD within educational environments. Integrating art therapy into educational curricula promotes emotional expression and improves students' engagement with peers, thereby fostering a more inclusive learning environment. Educators may collaborate with therapists to implement digital art initiatives that align with educational objectives, promoting both academic achievement and emotional wellbeing in students with ASD (Higgins et al., 2019).

5.7 Practical Implications

The study outlines practical implications for art therapists and healthcare professionals, emphasizing methods to improve therapeutic practices for individuals with ASD:

5.7.1 Integration of Digital Tools

The integration of digital tools, including drawing tablets, virtual reality (VR), and diverse design applications, can enhance the therapeutic experience considerably. These technologies provide interactive and adaptive platforms that enable children with ASD to express their emotions non-invasively. Studies demonstrate that digital art mediums effectively capture and sustain the attention of hyperactive children, thereby enhancing engagement during therapeutic sessions (Durrani, 2014). Therapists can employ these tools to establish immersive environments that facilitate exploration and creativity, thereby enhancing emotional expression and cognitive development (Baker & Bissell, 2020).

5.7.2 Personalized Therapy Session

The utilization of digital platforms facilitates the creation of customized therapy programs that address the distinct sensory needs and preferences of each patient. Therapists can monitor progress via digital platforms, allowing for real-time adjustments to sessions that address the unique challenges and interests of each child. This customized method promotes ownership of the therapeutic process and increases motivation and engagement. Personalized therapy facilitates enhanced emotional regulation and social interaction, allowing each child to progress at their own pace and engage in artistic expressions that are meaningful to them (Graham, 2019).

5.7.3 Design Elements in Therapy

The integration of design elements, including color theory, texture, and form, into therapy sessions can enhance emotional regulation and sensory engagement. Particular colors can induce calming effects, whereas diverse textures can offer tactile stimulation advantageous for sensory processing. The strategic implementation of these elements fosters a calming and supportive environment, which is particularly beneficial for hyperactive or emotionally dysregulated patients. Evidence indicates that intentional and systematic design in art therapy enhances focus and emotional expression, aiding children in managing their feelings more effectively (Mirabella, 2015). Equipping therapists with practical strategies for incorporating design principles can significantly

enhance the therapeutic experience, resulting in improved outcomes for children with ASD.

5.8 Conclusions of the Research Study

The research conducted concludes that digital art therapy is an effective therapeutic approach for individuals with ASD, showing significant benefits in emotional expression, communication abilities, and motor skills enhancement. Digital tools, including drawing tablets and specialized software, provide a flexible framework for therapy that addresses the distinct sensory and cognitive requirements of autistic individuals. The capacity to digitally manipulate colors, shapes, and textures offers an engaging and interactive experience that can attract even the most hesitant participants (Mirabella, 2015).

The integration of design principles, such as the strategic application of color and texture, is essential in the therapeutic process. Studies indicate that particular colors can elicit distinct emotional reactions, which may be utilized to enhance sensory regulation and emotional stability in individuals with ASD (Graham, 2019). Vibrant colors can stimulate and engage children, whereas softer hues may alleviate anxiety. The tactile feedback provided by digital tools enhances sensory experiences and supports the development of fine motor skills, which can be particularly challenging for children with ASD (Durrani, 2014).

The study highlights the importance of personalizing therapy for patients with ASD. Customizing therapeutic interventions enables children to participate in creative selfexpression via a medium that aligns with their preferences and comfort levels. Personalization enhances agency, allowing children to investigate their emotions and thoughts within a supportive context. This tailored method enhances motivation and engagement, resulting in notable advancements in communication and emotional regulation (Baker & Bissell, 2020).

Digital art therapy is a multifaceted approach that effectively addresses the needs of patients with ASD, utilizing technology to improve therapeutic outcomes. The integration of digital tools with strategic design principles enables therapists to develop interventions that enhance emotional expression, communication, and motor skill development.

5.9 Recommendations

5.9.1 For Art Therapists and Educators

- a) **Adopt Digital Tools:** Integrating digital platforms such as tablets, virtual reality (VR), and specialized art programs into treatment sessions can greatly boost emotional expression and engagement for people with ASD. The employment of digital tools not only captivates the attention of youngsters but also enables for creative discovery in a non-threatening setting. Research reveals that children with ASD typically respond positively to interactive and multimodal stimuli, making digital platforms a useful medium for encouraging communication and selfexpression (Klein et al., 2020).
- b) **Incorporate Design Elements:** The deliberate use of color, form, and texture in art therapy sessions is vital for enhancing sensory engagement and emotional regulation. Colors may provoke unique emotional reactions, and employing a range of textures can help ASD patients explore their sensory preferences, which is vital for their emotional well-being (Graham, 2019). Implementing design components helps therapists to take patients through structured exercises that can enhance emotional comprehension and regulation.
- c) **Personalized Therapy Sessions:** Tailoring therapy programs to each child's particular needs and preferences is crucial. Utilizing digital technologies enables therapists to track progress and tailor sessions based on the particular child's developmental speed. This tailored approach increases emotional expression and cognitive progress by allowing children to participate with the therapy in a manner that meets their specific learning styles and sensory requirements (Durrani, 2014). For instance, a youngster who finds comfort in brilliant colors may benefit from sessions focused on color exploration, while another who enjoys rigid shapes may interact better with geometric art projects.
- d) **Training in Digital Art Therapy:** Art therapists and educators should receive professional training in digital tools and platforms to optimize their therapeutic potential. Training programs can equip therapists with the required skills to properly utilize digital art therapy practices. By obtaining skill in these

technologies, therapists may enable patient participation more efficiently and guarantee that digital art therapy is utilized in a meaningful and helpful manner (Baker & Bissell, 2020).

5.9.2 For Health Care Providers

- a) **Integrate Digital Art Therapy into Healthcare:** Healthcare practitioners should support the integration of digital art therapy into mainstream healthcare settings for people with ASD. Facilities such as hospitals, mental health clinics, and autism centers should utilize digital platforms to give an accessible and creative outlet for individuals who may struggle with traditional communication techniques. This integration can lead to enhanced treatment outcomes, as children are given the chance to express themselves in a medium that resonates with them (Mirabella, 2015).
- b) **Collaborative Approaches:** Healthcare practitioners should work jointly with art therapists and technology developers to produce specific digital tools that cater to the unique requirements of ASD patients. By designing tools developed with flexibility and sensory engagement in mind, healthcare professionals may guarantee that the therapeutic benefits are meaningful and relevant to the patients' experiences (Klein et al., 2020). For example, engaging with tech developers to build configurable digital art applications might allow for creative expression while satisfying therapeutic aims.

5.9.3 For Policy Makers

- a) **Promote Art Therapy in Educational Policies:** Policy makers should push for the integration of digital art therapy in special education and mental health policies. By combining these novel treatment techniques into government-funded programs, policy makers may ensure that children with ASD have access to effective therapy alternatives inside schools and other public institutions. This method can assist minimize obstacles to entry and create a controlled environment for emotional and social development (Graham, 2019).

- b) **Fund Research and Creation:** Providing financing for the creation of specific digital platforms for art therapy is crucial. Policy makers should ensure that new technologies are anchored in research and developed to suit the sensory and emotional requirements of children with ASD. Investing in research and development will stimulate innovation in the sector and better therapy results, eventually helping children with ASD and their families (Durrani, 2014).

5.10 Limitations and Directions for Future Study

While this study has offered useful insights into the efficacy of digital art therapy for children with ASD, it is crucial to realize certain limitations that may affect the interpretation and generalization of the findings.

One notable restriction is the sample size employed in the case studies. The very small number of participants hinders the capacity to extrapolate the findings to a larger population. A tiny sample may not completely represent the different experiences and needs of persons with ASD. Therefore, future research should strive to include bigger and more diversified groups of ASD patients. This larger approach would strengthen the validity of the data and allow for more complete conclusions on the effectiveness of digital art therapy across diverse groups.

Another barrier concerns to access to technology. The study implies that participants have access to digital tools such as tablets and virtual reality (VR) systems, which are important to the implementation of digital art therapy. However, in lower-income settings or disadvantaged populations, access to such technologies may be severely constrained. This mismatch might restrict the application of the findings, since children who could benefit from digital art therapy may not have the appropriate resources. Future research should investigate the socio-economic aspects impacting access to technology and study how digital art therapy might be tailored to suit persons without dependable access to these tools.

Moreover, the study focuses stresses the short-term effects of digital art therapy. While initial gains in emotional expression and communication abilities were noted, there is a need for further longitudinal research to evaluate the long-term benefits of digital art therapy on emotional, cognitive, and social development in children with ASD. Tracking participants over extended periods might give greater insights into how continuous involvement with digital art therapy alters developmental trajectories,

perhaps showing enduring consequences that may not be apparent in short-term evaluations.

To alleviate these constraints, numerous options for further study might be recommended. First, it is necessary to examine long-term impacts of digital art therapy. Future research should focus on tracking how sustained engagement changes emotional control, social communication, and cognitive capacities over time. Understanding these long-term effects will enrich the body of information regarding the sustainability of benefits generated from digital art therapy, eventually determining best practices for implementation.

Second, there is a need for research incorporating various patient samples. Future research should involve a larger spectrum of participants, including those from varied socio-economic backgrounds, to evaluate how digital art therapy may be effectively adapted to different situations. This diversity will increase the understanding of the therapy's applicability and efficacy across multiple demographics, allowing for individualized methods that address the particular needs of each group.

Lastly, there is potential for the development of personalized digital tools particularly created for art therapy. Research should focus on establishing novel digital platforms that combine sophisticated features such as biofeedback technologies to assess emotional reactions and artificial intelligence for session customization. These developments might enable therapists to give a more tailored and successful therapeutic experience, adjusting sessions to the particular requirements of each patient in real-time.

By addressing these constraints and exploring the recommended options for future study, the field of digital art therapy can continue to expand, eventually boosting the therapeutic outcomes for children with ASD.

5.11 Conclusion

DAT is developing as a transforming and efficacious treatment modality for children with ASD. This research has illustrated the adaptability and innovative capacity of digital tools in customizing therapy sessions to the specific requirements of each kid. By employing digital platforms like tablets, virtual reality (VR), and other interactive technology, therapists may deliver a tailored experience that improves therapy results and increases children's participation. By incorporating essential design principles such as color, form, and texture as the therapists may establish an immersive

environment that promotes sensory engagement, cognitive growth, and emotional expression in ways that conventional treatments may not completely accomplish.

A key benefit of digital art therapy is its capacity to engage children, especially those with ASD, who may struggle to participate in traditional therapeutic environments. The interactive characteristics of digital technologies promote discovery and experimentation, which can empower youngsters who encounter difficulties with spoken communication. For several persons with ASD, linguistic expression poses a considerable challenge, hindering the straightforward communication of feelings or thoughts. Digital art therapy provides an alternate medium for expression, enabling the visualization and sharing of feelings and experiences via a synthesis of color, form, and texture. This facilitates the child's expression of emotions that could otherwise be suppressed, while also promoting a sense of agency and independence, as they are afforded the liberty to produce and modify their artwork in a secure and supportive digital environment.

The integration of digital tools like VR into treatment sessions adds a novel aspect of sensory exploration, which is especially advantageous for children with ASD, who frequently exhibit increased sensory sensitivity. The capacity to concurrently engage several senses such as visual, aural, and tactile and in a regulated setting enables therapists to create interventions that are both invigorating and therapeutic. Virtual reality may provide immersive settings that allow youngsters to engage with digital objects and locations, offering a distinctive chance to experience emotions, scenarios, and relationships in a non-threatening and controlled manner. The use of VR into art therapy sessions amplifies therapeutic efficacy by enabling children to immerse themselves in environments tailored to their emotional and cognitive requirements. The therapeutic advantages are numerous, aiding in the enhancement of motor coordination, sensory processing, and emotional control, whether they are traversing abstract landscapes or crafting digital creations in a 3D environment.

In addition to the immediate sensory and cognitive advantages, digital art therapy significantly contributes to the enhancement of social skills in children with ASD. ASD is frequently defined by challenges in social interaction and communication, hindering people's ability to establish and sustain relationships. Art, as a non-verbal medium of communication, provides a means for social interaction devoid of linguistic expression. Digital platforms facilitate collaborative art projects, enabling youngsters to collectively produce a shared artwork, so fostering collaboration, patience, and

mutual understanding. In therapeutic and educational settings, such collaborative initiatives can be enabled via shared digital canvases, allowing several children to collaborate.

The interactive quality of digital art therapy is a crucial determinant of its efficacy. Children with ASD frequently thrive in controlled and predictable situations, and digital technologies provide significant control and personalization. The use of color, line, and shape in digital art enables youngsters to investigate many design components in a manner that is both systematic and impulsive. Children can explore diverse color hues to convey distinct emotions or utilize lines and forms to visually structure their thoughts and experiences. This not only fosters the development of creative skills but also enhances cognitive growth by stimulating problem-solving and decision-making abilities.

Digital art therapy is particularly advantageous for youngsters who struggle with verbal communication, a prevalent issue among individuals with ASD. Numerous children on the spectrum encounter difficulties in vocally expressing their emotions or experiences, resulting in frustration and emotional turmoil. Digital art therapy offers a non-verbal means of communication, enabling youngsters to convey their emotions through visual pictures. This may be very liberating for those who would normally feel constrained by their communication skills. The visual characteristics of digital art enable the externalization of feelings and experiences in a manner that words frequently cannot, offering therapists significant insights into the child's emotional and psychological condition.

The application of color in digital art therapy is crucial for emotional expression and management. Studies indicate that color significantly influences mood and emotional states, rendering it a potent instrument in therapeutic practices. For children with ASD, who may struggle to understand or articulate feelings, the capacity to select and control colors in their artwork can function as a kind of emotional self-regulation. A youngster may be drawn to calming blues and greens during tranquil moments, or select vivid reds and yellows to convey enthusiasm or displeasure. Therapists can assist youngsters in cultivating a heightened awareness of their emotional states and use color as a tool for emotional regulation.

The therapeutic advantages of digital art therapy encompass not only personal emotional expression but also social and cognitive growth. Numerous youngsters with ASD have challenges in social interaction and may find it difficult to comprehend social

signs or participate in cooperative activities. Digital art therapy can facilitate social engagement within a regulated and nurturing setting. Children can engage in collaborative digital art projects, necessitating communication and cooperation with their classmates to attain a shared objective. This not only fosters social skills but also enhances confidence and self-esteem as youngsters witness the success of collaboration.

Furthermore, digital art therapy can assist youngsters with ASD in cultivating essential cognitive abilities. Creating digital art involves problem-solving, planning, and decision-making, all of which are essential cognitive processes. Children must contemplate the composition of their artwork, select suitable colors and forms, and determine how to organize their pieces. This cognitive engagement helps enhance attention, focus, and executive functioning, which are frequently challenging for children on the spectrum. Engaging in creative problem-solving via art enhances children's adaptability to new situations and fosters flexible thinking.

A notable benefit of digital art therapy is its accessibility. Digital technologies eliminate several obstacles encountered by children with ASD in conventional art therapy environments. Some children may possess tactile sensitivities that hinder their ability to manipulate physical art materials, such as paint or clay. In contrast, digital technologies provide a customizable sensory experience tailored to the individual needs of each kid. The degree of tactile interaction may be adjusted using a pen or touchscreen, while the sensory environment can be regulated by auditory and visual impacts. This degree of customization enables therapists to establish a therapeutic environment that is both comfortable and interesting for the youngster.

The integration of digital art therapy into educational and clinical environments is a significant topic. Educational institutions and therapeutic facilities may enhance their programs by integrating digital art therapy, which provides an innovative approach to engage kids with ASD and foster their cognitive, emotional, and social growth. Digital art therapy at educational institutions can foster inclusive learning environments that cater to the varied requirements of individuals on the autism spectrum. Educators might utilize digital art tools to facilitate students' expression of academic comprehension or to promote social engagement via collaborative projects. Digital art therapy can be utilized in therapy facilities in conjunction with other therapeutic treatments to offer a holistic treatment approach.

DAT in hospital environments may enhance the quality of life for those with ASD. Digital art therapy is an innovative and accessible therapeutic technique that aids

persons on the spectrum in developing coping strategies for emotional management, boosting social skills, and promoting general well-being. Moreover, digital art therapy can be employed to achieve particular therapeutic objectives, such as alleviating anxiety, enhancing concentration, or augmenting emotional awareness. The adaptability of digital tools enables therapists to customize therapy to address the unique demands of each child, guaranteeing that the intervention is both efficacious and significant.

Future study is necessary to investigate the long-term impact of digital art therapy on children with ASD. Although current research illustrates the immediate advantages of digital art therapy, longitudinal studies are essential to comprehend the long-term effects of continued participation in digital art therapy on cognitive development, social skills, and emotional regulation. Longitudinal studies of children enable researchers to get significant insights into the impact of digital art therapy on the overall development of children with ASD and its potential influence on their future outcomes.

Furthermore, there is an increasing demand for the creation of digital tools tailored for art therapy. Although several current digital art platforms may be modified for therapeutic purposes, there exists considerable potential for the development of tools specifically designed for children with ASD. These tools could integrate features like biofeedback, enabling therapists to observe the child's physiological reactions during the art-making process, or artificial intelligence, which could offer tailored recommendations for artistic activities based on the child's emotional or cognitive condition. The creation of these sophisticated tools will augment the customization of therapy sessions and boost the overall efficacy of the intervention.

The efficacy of digital art therapy is contingent upon the participation of several stakeholders, including healthcare providers, policymakers, educators, and therapists. To effectively include digital art therapy into educational and healthcare institutions, it is imperative to promote awareness of its advantages and guarantee the availability of requisite resources and training. Policymakers may significantly influence this trend by advocating for the integration of digital art therapy into national healthcare systems and educational programs. By doing so, they can facilitate access to comprehensive and effective treatment choices for children with ASD.

Healthcare providers and therapists are essential to the efficacy of digital art therapy. Therapists must be proficient in digital technologies and comprehend the efficient integration of design concepts into therapy sessions. Healthcare practitioners

must acknowledge the significance of digital art therapy and facilitate its incorporation into treatment regimens for children with ASD. This joint initiative is crucial for the effective implementation of digital art therapy, optimizing its advantages and enhancing the quality of life for those on the spectrum.

The future of Malaysia's art industry looks promising with the introduction of the inaugural domestic digital art therapy program, a distinctive project that may substantially improve both the creative and therapeutic domains. As digital art therapy gains global prominence, especially in its country of origin, the United States, Malaysia is positioned to pioneer a Southeast Asian model that embodies the cultural, technological, and socioeconomic intricacies of the nation. This novel therapeutic method can connect technology, healthcare, and the arts, enhancing prospects for the creative industry while tackling the urgent mental health requirements of the nation.

The implementation of a Malaysia-centric digital art therapy program offers a chance to reestablish the function of art in therapeutic settings, in accordance with the nation's ambitions to become a regional frontrunner in digital innovation. By integrating the fundamental tenets of digital art therapy with local culture, beliefs, and traditions, Malaysia may develop a unique methodology that not only aids persons with ASD but also enhances the country's art and technology industries. This localized implementation of digital art therapy can function as a medium for creative expression, skill development, and emotional recovery, perhaps serving as a prototype for other Southeast Asian nations with analogous sociocultural frameworks and requirements.

DAT, which started in the United States and has demonstrated efficacy in addressing the various obstacles encountered by children with ASD, signifies an extension of this proven therapeutic approach in Malaysia's creation of its own program. Integrating digital art therapy into Malaysia's healthcare framework can provide an inclusive, progressive system that provides children with ASD enhanced possibilities for emotional control, sensory engagement, and cognitive development. The digital media inherently appeals to the current generation, and a Malaysian initiative may use the increasing proficiency with digital tools and platforms to render treatment accessible and interesting for a diverse array of individuals.

A primary advantage of implementing a Malaysian-specific digital art therapy program is the opportunity for cross-sector collaboration. This would need collaboration among the healthcare sector, educational institutions, technological firms, and the local creative arts community to establish and maintain the program. Malaysian

digital artists might partner with therapists and technologists to create culturally pertinent digital tools that include local symbols, narratives, and creative traditions, enhancing the relatability and efficacy of treatment for local children. By integrating the experience of artists and mental health experts, Malaysia might formulate a strategy that fulfills the therapeutic requirements of children with ASD while also preserving and promoting the nation's rich cultural legacy.

The incorporation of digital art therapy into Malaysia's healthcare and education systems offers substantial economic and social advantages for the wider population. With the increasing need for mental health services, especially following the global COVID-19 epidemic, there is an urgent necessity for creative treatment solutions that are scalable and cost-efficient. Digital art therapy utilizes technology to establish a scalable platform for extensive use in educational institutions, therapeutic facilities, and medical clinics. This may alleviate pressure on conventional healthcare resources while creating employment opportunities in the expanding sectors of digital treatment and creative technology. Furthermore, digital art therapy can facilitate inclusion and mitigate the stigma around mental health concerns, especially in the realm of autism treatment.

The establishment of Malaysia's inaugural digital art therapy program may help catalyze expansion in the nation's technology industry by fostering innovation in digital therapeutic instruments. With the increasing need for personalized and adaptive solutions, local technology firms may capitalize on the chance to provide specialized software, mobile applications, and virtual reality platforms tailored to the requirements of children with ASD. These technologies might integrate sophisticated functionalities such as biofeedback, artificial intelligence, and machine learning to provide more dynamic and adaptable treatment experiences. This will not only improve the efficacy of therapy sessions but also establish Malaysia as a frontrunner in the global digital health innovation sector, attracting investment and promoting job development in the technology industry.

The incorporation of digital art therapy into Malaysia's art sector might generate new opportunities for local artists and creative professionals. With the increasing popularity of digital art as a creative medium and therapeutic instrument, artists may discover innovative methods to articulate their creativity while enhancing social welfare. Through collaboration with therapists and healthcare professionals, artists may significantly contribute to the development of digital art programs tailored to the unique

emotional, cognitive, and sensory requirements of children with ASD. This partnership may result in the emergence of novel artistic genres and forms that integrate therapeutic and aesthetic components, therefore enhancing Malaysia's cultural environment.

Malaysia's foray into the digital art therapy domain may significantly influence the global art and therapeutic sectors. By creating a model specifically designed for the Malaysian environment, the nation may provide significant insights and contributions to the worldwide discourse on digital art therapy. This may result in collaborations with international art therapy organizations and provide Malaysian practitioners the opportunity to showcase their research and discoveries on worldwide forums.

Moreover, Malaysia's innovative endeavors in digital art therapy may motivate other Southeast Asian nations to pursue analogous projects, establishing the country as a regional frontrunner in the creative and mental health domains.

As Malaysia initiates the integration of digital art therapy into its healthcare, education, and art sectors, it is crucial to acknowledge the significance of ongoing research and development. Longitudinal studies will be essential in assessing the long-term effects of digital art therapy on children with ASD, offering data to advocate for its broad use. Furthermore, continuous research can enhance the treatment instruments and techniques employed, guaranteeing their relevance and efficacy when novel technologies arise. By emphasizing research and development, Malaysia can guarantee the ongoing evolution of its digital art therapy program to address the evolving demands of the public.

The efficacy of digital art therapy in Malaysia will hinge on the endorsement of policymakers who can facilitate its incorporation into national healthcare and educational systems. Government assistance will be crucial in securing the requisite financing and resources to develop the program and guarantee its sustainability. Policymakers may contribute to increasing knowledge of the advantages of digital art therapy, so promoting a culture of acceptance and comprehension about mental health and autism. By endorsing digital art therapy as a valid and efficacious treatment modality, policymakers may facilitate the provision of full assistance for children with ASD to flourish.

The initiation of Malaysia's first digital art therapy program represents a crucial advancement in the country's initiatives to enhance its healthcare and art industries, paving the way for a more comprehensive strategy to meet the mental health requirements of its citizens, especially children with Autism Spectrum Disorder

(ASD). With the increasing recognition and adoption of digital art therapy globally, Malaysia has the potential to develop a program that embodies its own cultural, social, and technical milieu. By leveraging successful programs from the United States and other countries while integrating local values and traditions, Malaysia can develop a unique digital art therapy approach that meets the needs of children with ASD and fosters the nation's artistic and technological advancement.

Children with ASD frequently have difficulties in communication, emotional expression, and social engagement. Conventional treatment approaches, although efficacious, may not consistently address the unique requirements of each child, especially those with challenges in verbal communication. Digital art therapy, emphasizing visual expression and sensory interaction, is a viable alternative. It offers youngsters a way to express their feelings, experiences, and thoughts beyond mere verbal communication. Utilizing digital instruments like tablets, styluses, and virtual reality (VR), youngsters may investigate many creative components—such as color, form, and texture—to articulate themselves in ways that are intuitive and captivating. This not only empowers individuals but also enables therapists to get profound insights into their emotional and cognitive realms.

By creating a culturally pertinent digital art therapy program, Malaysia may guarantee that the therapeutic method aligns with its populace. Local traditions, symbols, and tales can be included into the digital art tools utilized in therapy sessions, enhancing the experience's relevance and efficacy for children. Incorporating aspects of Malaysian folklore, wildlife, or historical monuments into the design of digital therapy programs may enhance children's connection to their environment and culture, so building a feeling of belonging and identity. This degree of customization might markedly improve the treatment experience, rendering it more significant and successful for children with ASD.

Furthermore, Malaysia's foray into the digital art therapy sector offers a chance to elevate its standing internationally. As countries globally acknowledge the significance of incorporating technology into healthcare, Malaysia has the opportunity to establish itself as a leader by developing groundbreaking digital therapeutic solutions. The creation of indigenous digital art therapy tools and programs may garner worldwide interest, resulting in partnerships with global healthcare entities, art therapy organizations, and technology companies. By demonstrating its proficiency in digital

art therapy, Malaysia can serve as a paradigm for other nations, especially those in Southeast Asia, seeking to establish analogous initiatives.

The implementation of a digital art therapy program in Malaysia, aside from its therapeutic advantages for children with ASD, might significantly influence the country's creative sectors. As digital art progresses as a medium, it unveils new opportunities for artistic expression and creativity. Local artists, designers, and engineers may partner with healthcare experts to develop digital tools that are both useful and visually appealing, as well as culturally relevant. The integration of art and technology may result in the emergence of novel artistic forms that combine therapeutic aspects with creative expression, so enhancing Malaysia's cultural environment and fostering the expansion of the creative economy.

Moreover, the incorporation of digital art therapy into Malaysia's healthcare and educational frameworks might provide significant social and economic advantages. Integrating digital art therapy into educational institutions and therapeutic facilities enables children with ASD to obtain essential assistance for flourishing in academic and social environments. The interactive characteristics of digital art tools facilitate the establishment of inclusive educational settings, enabling students with diverse abilities to engage meaningfully with the curriculum. This helps mitigate obstacles to schooling for children with ASD and foster a more inclusive community that celebrates and supports variety.

The advancement of digital art therapy tools and programs may catalyze growth in Malaysia's technology and healthcare industries. The increasing need for mental health services, especially for creative and scalable solutions, may provide new employment possibilities for artists, technologists, therapists, and educators through the digital art therapy program. Furthermore, local technology firms might significantly contribute to the design and development of the software and hardware utilized in digital art therapy, establishing Malaysia as a center for digital health innovation in the area.

The success of the digital art therapy initiative in Malaysia will rely on the coordinated efforts of several stakeholders. Artists, therapists, educators, and healthcare experts must collaborate to customize the curriculum according to the population's requirements while maintaining sufficient flexibility to accommodate future advancements in technology and therapy. Policymakers will be key in securing the requisite funds, resources, and regulatory backing to integrate digital art therapy as an essential element of the nation's mental health services. By cultivating a conducive

atmosphere for invention and cooperation, Malaysia can guarantee the enduring sustainability and success of its digital art therapy initiative.

Prospectively, digital art therapy holds significant promise to become an essential component of Malaysia's mental health framework, benefiting not just children with ASD but also a diverse array of persons with other mental health disorders. The flexibility of digital art therapy renders it an effective instrument for addressing many emotional, cognitive, and social issues. As investigations into the enduring impacts of digital art therapy progress, Malaysia has the potential to offer significant contributions to the international discourse on mental health and technology. By emphasizing continuous research and development, the nation can guarantee the advancement and enhancement of its digital art therapy program, so helping future generations of children with ASD and others.

The initiation of Malaysia's inaugural digital art therapy program signifies a significant advancement for the country's art, healthcare, and technology industries. By using the frameworks developed by digital art therapy programs in the United States and other nations, Malaysia can develop a distinctive, culturally pertinent methodology that caters to the special requirements of its populace. This groundbreaking therapy has the capacity to transform the lives of children with ASD, providing them with novel opportunities for emotional expression, cognitive advancement, and social interaction. Simultaneously, it can elevate Malaysia's status internationally, establishing the nation as a frontrunner in digital therapeutic innovation. By uniting artists, therapists, healthcare professionals, and politicians, digital art therapy may be established as a fundamental component of Malaysia's mental health and creative sectors, fostering a more promising and inclusive future for everyone.

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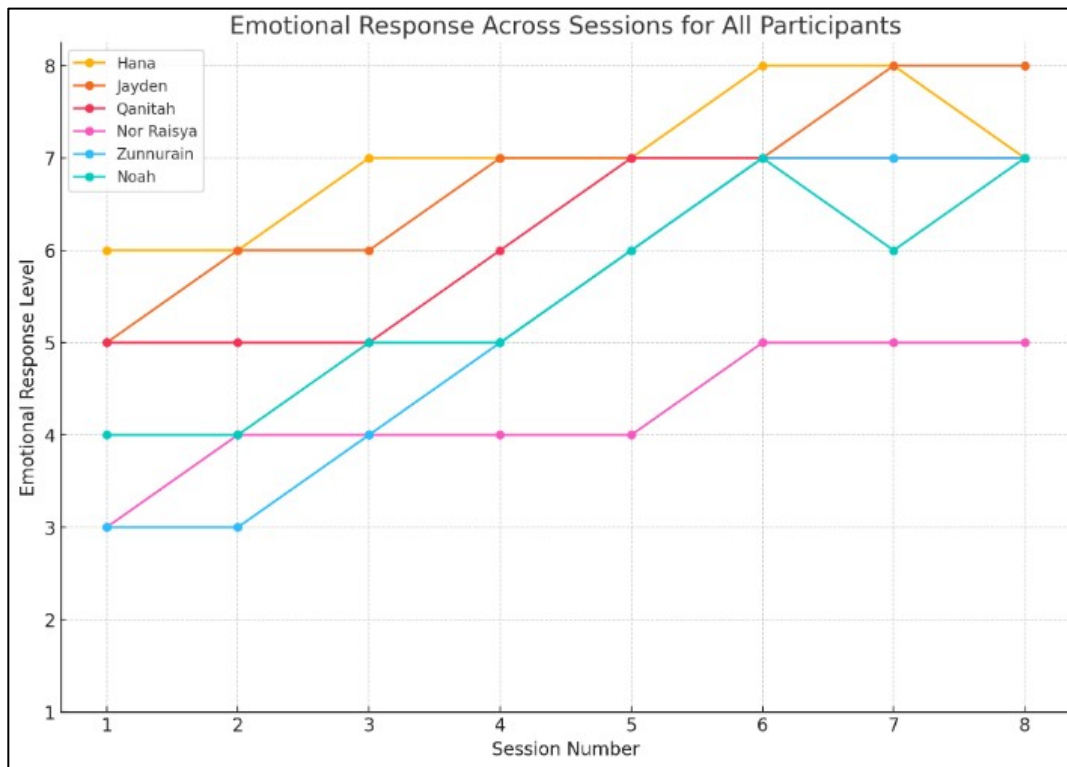
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APPENDICES

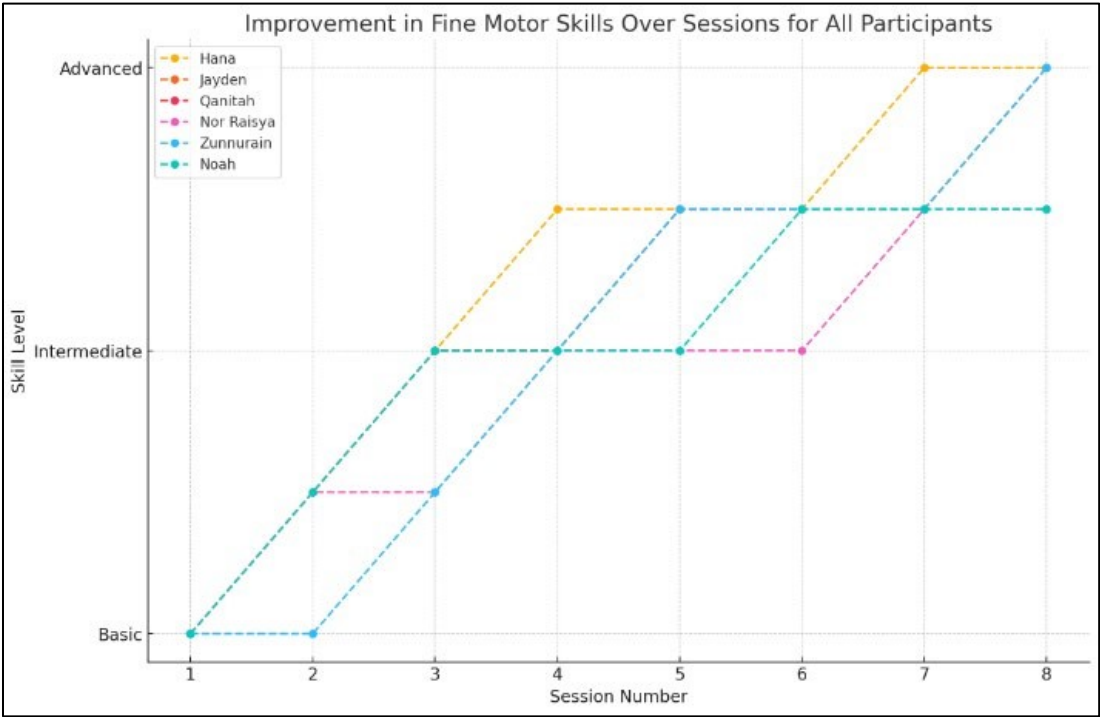
APPENDIX 1

Emotional Response Across Sessions for All Participants



APPENDIX 2

Table of Parameters Used in Improvement in Fine Motor Skills Over Sessions for All Participants



AUTHOR'S PROFILE



Sarah Binti Ahmad Rizal, a graduate with a Bachelor of Graphic Digital Media (Hons.) from University Selangor, Shah Alam in 2019, is a talented digital artist. Currently, she is engaged in several overseas digital art commissions, showcasing her exceptional skills and creativity. Her work reflects a unique blend of technical expertise and artistic vision, making her a highly sought-after and respected professional in the highly competitive digital art field. She continues to inspire emerging artists and contributes to innovative projects worldwide.

LIST OF PUBLICATIONS

Sarah, R., & Amer, Z. (2024). Exploring The Efficacy of Digital Art Therapy in Enhancing Social Communication For Autistic Individuals. *International Journal of Art and Design*, 1(1), 1-11.