UNDERSTANDING THE COGNITIVE PROCESS OF IMAGERY IN YOUNG ADULTS WITH SOCIAL ANXIETY

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by

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DECLARATION

I hereby declare that the thesis entitled “Understanding The Cognitive Process of Imagery in Young Adults With Social Anxiety” is my original my own work except for quotations and summaries which have been duly acknowledged. And to the best of my knowledge, it does not contain any materials that was previously published or written by others except where resources are properly acknowledged in the text; and that it has not been submitted in part or in whole to fulfil the requirements of any other course or to any other university or institute for the purpose of publications. In making this declaration, I hereby understand and acknowledge that any breaches of the declaration constitute an academic misconduct which may lead to certain penalties.

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LIST OF ABBREVIATIONS

ACT	Acceptance and Commitment Therapy
APA	American Psychiatric Association
CBT	Cognitive Behavioural Therapy
CBT-I	Imagery-Based Cognitive Behavioural Therapy
GAD	Generalized Anxiety Disorder
HPUSM	Hospital Pakar Universiti Sains Malaysia
IR	Imagery Rescripting
LSAS	Liebowitz Social Anxiety Scale
LSAS-SR	Liebowitz Social Anxiety Scale-Self Report
MDD	Major Depressive Disorder
NSI	Negative Self-Imagery
OCD	Obsessive- Compulsive Disorder
Psi-Q/PSIQ	Plymouth Sensory Imagery Scale
PTSD	Post-Traumatic Stress Disorder
SA	Social Anxiety
SAD	Social Anxiety Disorder
SEMs	Sensory Experience Memories
SPSS	Statistical Package of Social Science
SUIS	Spontaneous Use of Imagery Scale
TnG	Touch N Go
USM	Universiti Sains Malaysia
UPSI	Universiti Pendidikan Sultan Idris
VVIQ	Vividness of Visual Imagery Questionnaire

LIST OF SYMBOLS

H_0	Null Hypothesis
H_1	Alternative Hypothesis
=	Equal
<	Less than
>	More than
( )	Bracket
*	Asterisks; indicates statistical significance
%	Percentage
Min	Minimum
Max	Maximum
df	Degree of freedom
M	Mean
Md	Median
SD	Standard deviation
SE	Standard error
N	Total number
D	Cohen's *d*; indicates effect size
r	Pearson's *r*; indicates effect size
CI	Confidence Interval
α	Cronbach's alpha
F	F-distribution test statistic
p	Probability value
t	T-test statistic
U	Mann-Whitney U test statistic
Z	Z-score

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ABSTRAK

Kebimbangan sosial merujuk kepada ketakutan yang berterusan untuk dinilai atau dipandang negatif dalam situasi sosial, yang sering mengakibatkan tingkah laku mengelak dan tekanan emosi. Imejan mental, iaitu keupayaan untuk membayangkan pengalaman seperti pengalaman deria tanpa rangsangan sebenar, didapati memainkan peranan penting dalam kebimbangan sosial. Walaupun kajian lepas menunjukkan bahawa imejan mental menyumbang kepada kebimbangan sosial, penemuan masih tidak konsisten berkaitan dengan tahap kejelasan (*vividness*) dan kekerapan imejan tersebut, khususnya dalam kalangan dewasa muda dan populasi bukan klinikal di Malaysia. Kajian ini bertujuan untuk mengkaji bagaimana tahap kebimbangan sosial yang berbeza mempengaruhi tiga aspek utama imejan mental: kejelasan (*vividness*) imejan visual, kejelasan (*vividness*) imejan deria, dan kekerapan penggunaan imejan mental dalam kalangan dewasa muda di Malaysia. Kajian ini membandingkan dua kumpulan peserta pada satu masa tertentu. Seramai 137 pelajar universiti berumur 18 hingga 26 tahun yang memenuhi kriteria setelah disaring menggunakan Liebowitz Social Anxiety Scale–Self-Report (LSAS-SR) dan dibahagikan kepada kumpulan kebimbangan sosial tinggi dan kebimbangan sosial rendah. Peserta turut melengkapkan soal selidik *Vividness of Visual Imagery Questionnaire* (VVIQ), *Plymouth Sensory Imagery Questionnaire* (Psi-Q), dan *Spontaneous Use of Imagery Scale* (SUIS). Data telah dianalisis menggunakan ujian Welch's t dan ujian Mann–Whitney U. Hasil kajian menunjukkan perbezaan yang signifikan dalam kejelasan (*vividness*) bagi kedua-dua imejan visual dan imejan deria, di mana peserta dengan tahap kebimbangan sosial yang rendah melaporkan kejelasan (*vividness*) yang lebih tinggi. Namun, tiada perbezaan yang signifikan ditemui dalam kekerapan penggunaan

imejan mental antara kedua-dua kumpulan. Dapatan ini mencadangkan bahawa kebimbangan sosial mungkin menjejaskan kejelasan (*vividness*), tetapi bukan kekerapan imejan mental. Kajian ini menyumbang kepada model kognitif sedia ada mengenai kebimbangan sosial dan menyokong pembangunan penilaian psikologi serta intervensi yang lebih khusus dan berasaskan bukti bagi membantu individu muda, terutamanya pelajar institusi pengajian tinggi, yang mengalami kebimbangan sosial.

Kata kunci: Kebimbangan sosial, proses kognitif, imejan mental, imejan visual, imejan deria

ABSTRACT

Social anxiety is characterized by a persistent fear of being judged or negatively evaluated in social situations, often leading to avoidance behaviours and emotional distress. Mental imagery, defined as the ability to generate sensory-like experiences in the absence of external stimuli, has been found to play a critical role in social anxiety. Although previous research highlights the significance of mental imagery in maintaining social anxiety, findings remain inconsistent regarding the vividness and frequency of these mental images, especially among young adults and non-clinical populations in Malaysia. This study aimed to investigate how different levels of social anxiety affect three key aspects of mental imagery: vividness of visual imagery, vividness of sensory imagery, and frequency of mental imagery among Malaysian young adults. A cross-sectional comparative design was employed. A total of 137 university students aged 18 to 26 participated after being screened using the Liebowitz Social Anxiety Scale–Self-Report (LSAS-SR) and categorized into high and low social anxiety groups. Participants completed the Vividness of Visual Imagery Questionnaire (VVIQ), the Plymouth Sensory Imagery Questionnaire (Psi-Q), and the Spontaneous Use of Imagery Scale (SUIS). Data were analyzed using Welch's t-tests and Mann–Whitney U tests. The results revealed statistically significant differences in the vividness of both visual imagery and sensory imagery, with individuals in the low social anxiety group reporting higher vividness. However, no significant difference was found in the frequency of mental imagery between the groups. These findings suggest that social anxiety may impair the clarity, but not the frequency of mental imagery. This study contributes to existing cognitive models of social anxiety and supports the advancement of tailored psychological assessments and evidence-based

interventions for socially anxious young adults, particularly those in higher education settings.

Keywords: Social anxiety, cognitive process, mental imagery, visual imagery, sensory imagery

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter presents the foundation of the current study. It begins by explaining the background and importance of mental imagery and social anxiety, particularly in young adults. The chapter then outlines the problem statement and rationale behind conducting this research, followed by the research questions and objectives that guide the study. It further highlights the significance of the study in contributing to psychological theory and clinical practice. Key variables examined in this study are defined both conceptually and operationally, and the hypotheses are presented to establish the direction of the analysis. Together, these components provide a clear understanding of the research focus and its relevance.

1.2 Background of study

Mental imagery refers to the process of creating a mental representation of something that is not currently being perceived by the senses. It involves the vivid reconstruction of sensory experiences in the mind, such as visualizing a scene, hearing a song in one's head, or feeling a touch without any external stimulus (Moriya, 2018). It is a fundamental aspect of human cognition, deeply intertwined with emotions ranging from negative feelings such as grief and fear to positive ones like joy (Blackwell, 2019). This cognitive process is more pronounced during intense emotional experiences, often ignores logical reasoning and can trigger physiological responses.

Additionally, mental imagery is not only retrospective, recalling past memories, but also prospective, envisioning future scenarios that can evoke both pleasant and distressing emotions. Intrusive mental images, particularly of traumatic events, are symptomatic of posttraumatic stress disorder (PTSD) but are also prevalent in other psychological disorders such as obsessive- compulsive disorder (OCD), social anxiety disorder (SAD), body dysmorphic disorders, and depression (Hales et al., 2011; Schwarz & Stangier, 2023). Hence, mental imagery has been measured within clinical psychology, emphasizing its significance across these various disorders. Previous research acknowledged the relevance of these disorders in the context of mental imagery while also noting other conditions where imagery plays a crucial role (Pearson et al., 2013).

Social anxiety, often known as social phobia refers to the experience of discomfort, fear, or apprehension in social situations where one might be scrutinized or judged by others (Shin et al., 2022). It is a common emotional response that can manifest in various degrees of intensity and is often characterized by feelings of nervousness, self-consciousness, and worry about potential embarrassment or negative evaluation, affecting cognitive and emotional functioning (Alomari et al., 2022). This condition might appear in several social settings, like public speaking, job interviews, or meeting new people, causing distress and avoidance behaviours. Social anxiety can be seen as a spectrum, where mild forms are typical and can be adaptive, helping individuals navigate social interactions cautiously. However, when these feelings become excessive and persistent, they may develop into Social Anxiety Disorder (SAD), a chronic psychiatric disorder marked by significant functional impairments in personal, academic, and professional domains (American Psychiatric Association [APA], 2022). A significant number of individuals develop this illness in their early teens, usually around the age of thirteen (Kessler et al., 2005). Hence, the current research aims to specifically investigate social anxiety, that is commonly found in young adults.

Understanding the cognitive process of imagery including the vividness of visual imagery, vividness of sensory imagery and frequency of mental imagery is crucial in delineating the impact of these processes on social anxiety. Therefore, this research aims to comprehensively investigate the cognitive processes of imagery, focusing on the vividness of visual imagery, vividness of sensory imagery and frequency of mental imagery in young adults with varying levels of social anxiety. This will help to fill the research gap by systematically examining these aspects of imagery,

thereby providing a deeper understanding of the cognitive processes underlying social anxiety. By examining these dimensions, the study seeks to elucidate the mechanisms through which imagery contributes to the maintenance and exacerbation of social anxiety, ultimately informing more effective therapeutic interventions (Chapman et al., 2020).

1.3 Problem Statement and Study Rationale

Social anxiety is a prevalent condition that can severely impact the cognitive and emotional functioning of young adults. Cognitive models of social anxiety suggest that negative self-imagery plays a pivotal role in maintaining the disorder, with socially anxious individuals often generating distorted, negative images of themselves in social situations, which heightens their anxiety and impacts their social performance (Chapman et al., 2020; Hirsch & Holmes, 2007; Leigh et al., 2020).

Studies have shown that socially anxious individuals often experience more negative, observer-perspective images, which are linked to higher anxiety levels and poorer social performance (Chapman et al., 2020; Leigh et al., 2020). Research also has shown that these negative images are not only more frequent but also more vivid and emotionally charged compared to those experienced by individuals with lower levels of social anxiety (Homer & Deeprose, 2017). However, the extent to which these images vary in vividness and frequency between individuals with high and low levels of social anxiety is still not well understood.

Furthermore, the phenomenology of these images, including their sensory modalities and emotional impact, is crucial for understanding their role in social anxiety. For instance, Homer and Deeprose (2017) found that socially anxious individuals report more frequent and emotionally intense intrusive images, which are often based on negative episodic memories and involve multiple sensory modalities. Additionally, Chiu et al. (2022) also claimed that the vividness of these images has been shown to predict concurrent and prospective social anxiety symptoms, suggesting a potential causal relationship.

The role of imagery in social anxiety is further supported by Moriya's (2018) findings that socially anxious individuals exhibit a preference for visual over verbal processing, which enhances emotional processing and contributes to the maintenance of anxiety. Additionally, early visual processing biases, such as the exaggerated perception of social threats, have been identified as cognitive vulnerabilities that can precipitate further cognitive abnormalities and the onset of social anxiety disorder (Meynadasy et al., 2019). The impact of negative self-imagery on social interactions has been experimentally demonstrated, with high socially anxious individuals reporting increased anxiety and poorer performance when holding negative images in mind (Leigh et al., 2020; Vassilopoulos, 2005). This is consistent with findings that negative self-imagery can distort individuals' perceptions of their anxious appearance and lead to the use of avoidant safety behaviours, further maintaining the social anxiety (Leigh et al., 2020). Despite these insights, there is a lack of studies exploring adolescents' and young adults' experiences of spontaneous imagery in social anxiety, highlighting a significant gap in the literature (Ghita et al., 2021).

Despite the clear link between imagery and social anxiety, there is a paucity of research specifically investigating the vividness and frequency of visual and sensory imagery in young adults with varying levels of social anxiety. Young adults are in a crucial phase of their personal and professional growth. Despite widespread international interest in the role of mental imagery in social anxiety, studies focusing on Malaysian young adults remain limited. Some local research has explored cognitive-emotional variables linked to social anxiety. For instance, a study by Muhamad Johan and Roseliza-Murni (2021) found that body image dimensions and self-esteem significantly predict social anxiety among Malaysian university students. However, none of these studies have examined the vividness or frequency of mental imagery, suggesting a gap in understanding the cognitive underpinnings of social anxiety in Malaysian young adults.

Gaining insight on how social anxiety affects young adults' mental imagery can help in creating strategies to improve their social functioning, confidence, and overall quality of life (Arnett, 2000). Furthermore, studying the relationship between social anxiety and mental images can also enhance the awareness of the basic cognitive processes involved in social anxiety in young adults. This insight can enhance theoretical models of social anxiety and provide helpful direction for future research (Hirsch & Holmes, 2007).

Additionally, by recognizing the impact of social anxiety on mental imagery, it can also help clinicians improve therapeutic interventions. Clinicians can create focused therapies that target specific aspects of imagery, including reducing the intensity of negative imagery and enhancing the sensory and positive aspects of constructive

imagery (Hackmann et al., 2000). Overall, the findings of this study have the potential to improve the understanding, diagnosis, and treatment of social anxiety in young adults, resulting in more effective therapy, a higher quality of life, and a more profound theoretical knowledge of the illness (Holmes & Mathews, 2010)

1.4 Research Questions

There are three research questions derived from the problem statement to be answered through this current study:

1) Are there differences in the vividness of visual imagery between young adults with high social anxiety level and low social anxiety level?

2) Are there differences in the vividness of sensory imagery between young adults with high social anxiety level and low social anxiety level?

3) Are there differences in the frequency of mental imagery between young adults with high social anxiety level and low social anxiety level?

1.5 Objectives of Study

1.5.1 General Objective

The general objective of the current study is to investigate how different levels of social anxiety (high vs. low) influence the cognitive process of mental imagery in young adults.

1.5.2 Specific Objective

The three specific objectives of the current study are as below:

1) To compare the vividness of visual imagery between young adults with high social anxiety level and low social anxiety level.

2) To compare the vividness of sensory imagery between young adults with high social anxiety level and low social anxiety level.

3) To compare the frequency of mental imagery between young adults with high social anxiety level and low social anxiety level.

1.6 Significance of Study

Social anxiety is a growing concern among young adults in Malaysia, where university students frequently report high levels of anxiety due to academic demands, social expectations, and transitioning into adulthood (Hamzah et al., 2023; Isa et al., 2021; Shamsuddin et al., 2013). However, social anxiety is often underrecognized and inadequately treated in Malaysia, in part due to stigma and limited access to culturally responsive psychological interventions (Ibrahim et al., 2019).

From a theoretical standpoint, this study would enhance existing cognitive models of social anxiety by examining how individuals with different levels of social anxiety experience mental imagery in terms of vividness and frequency. Research has shown that mental imagery, particularly negative, vivid, and intrusive imagery plays a critical role in maintaining social anxiety symptoms (Lloyd & Marczak, 2022; (Thunnissen et al., 2024). Yet, there remains limited empirical data in Malaysia addressing how these imagery processes differ among young individuals with low and high social anxiety.

Practically, the study would provide valuable insights for Malaysian clinical settings as well as university or higher education institution settings. Findings may help clinicians identify maladaptive cognitive patterns related to imagery and develop tailored interventions, such as imagery-based cognitive behavioural therapy (CBT), to reduce distress and improve functioning (Holmes et al., 2015). At the institutional level, the study supports efforts to design targeted psychoeducational programs and student wellness initiatives aimed at enhancing emotional regulation and mental resilience (Aris

& Othman, 2022). This study would offer meaningful contributions to the understanding of cognitive processes underlying social anxiety, particularly focusing on mental imagery. Additionally, by focusing on Malaysian young adults, the study contributes to a growing but still limited body of local psychological research, addressing both culturally specific factors and universal psychological processes.

1.7 Definition of Variables

1.7.1 Conceptual definition

Conceptual definitions are crucial in psychological research for ensuring clarity and consistency in the study of abstract constructs. A conceptual definition specifies what a concept means in theoretical terms, distinguishing it from related constructs and helping guide the measurement and interpretation of results. Adcock and Collier (2001) claimed that establishing accurate conceptual definitions is essential for enhancing construct validity and ensuring that researchers study the same phenomenon precisely and consistently. In mental health research, for example, clearly defining constructs like "social anxiety" or "mental imagery" ensures that interventions and theoretical models are based on a shared understanding.

Social anxiety: In the current study, social anxiety is defined as a marked and persistent fear of one or more social or performance situations where the individual is exposed to unfamiliar people or possible scrutiny by others. This fear often leads to the

individual worrying that they will act in a way that will be humiliating or embarrassing, or that they will show visible signs of anxiety, resulting in negative evaluation by others. Some common situations that trigger social anxiety include public speaking, attending parties, meeting strangers, and interacting with authority figures (Al-Ali et al., 2011).

Low social anxiety level: In this study, low social anxiety level refers to individuals who experience mild to moderate fear and avoidance in social situations but do not meet the criteria for clinically significant social anxiety disorder (SAD). These individuals may feel nervous or uncomfortable in certain social interactions, such as speaking in front of a group or meeting new people, but their anxiety does not significantly interfere with their daily functioning (Russell & Shaw, 2009).

High social anxiety level: High social anxiety level is a degree of social anxiety that substantially affects individuals' daily interactions and activities. These individuals may exhibit heightened fear of social judgment, leading to avoidance behaviours in social and performance situations (Hofmann et al., 2004).

Vividness of Visual Imagery: Vividness generally refers to the clarity and detail with which mental images resemble actual percepts, involving both subjective intensity and specificity (Fazekas, 2023). This concept is crucial in understanding individual differences in cognitive tasks such as visual working memory, where higher imagery vividness correlates with better performance (Slinn et al., 2023).

Vividness of Sensory Imagery: The vividness of sensory imagery refers to the clarity and detail with which mental images are experienced across different sensory

modalities, such as visual, auditory, olfactory, gustatory, tactile, and kinesthetic (Andrade et al., 2013). For instance, when someone imagines the taste of a lemon, the vividness of sensory imagery would be how strongly they can almost "taste" the sourness in their mind.

Frequency of Mental Imagery: The frequency of mental imagery refers to the measurement of how often individuals experience mental images, such as when they remember past events or imagine future scenarios (Holmes et al., 2015). According to Holmes et al. (2015), assessing how often these images occur can provide valuable insights into the severity and nature of the emotional distress experienced by individuals with psychological disorders.

1.7.2 Operational definition

An operational definition in research refers to the specific process or set of procedures used to measure or identify a variable or concept within a study. It provides a clear, precise, and measurable definition of a concept or variable used in a study or research. This is crucial as it provides clarity and ensures that the research can be replicated and validated by others (O 'Regan, 2023).

Social anxiety: In this study, social anxiety is operationally defined by the scores assessed using the Liebowitz Social Anxiety Scale-Self Report Version (LSAS-SR; Liebowitz, 1987), which quantifies both fear and avoidance in social interactions. It will

be used in this present study to measure the severity of social anxiety in young adults (Liebowitz, 1987).

Low social anxiety level: Based on the Liebowitz Social Anxiety Scale-Self-Report version (LSAS-SR; Liebowitz, 1987)**,** participants with scores classified within the "mild social anxiety" and "moderate social anxiety" range fall under the category of low social anxiety level.

High social anxiety level: Using LSAS-SR, participants scoring within the "marked social anxiety" and "severe social anxiety" range are included in this category of high social anxiety level. social anxiety, which significantly affects their daily interactions and activities.

Vividness of Visual Imagery: In the present study, the vividness of visual imagery is operationally defined by the scores obtained from the Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973). The scale will be used to measure how clear and vivid young adults can visualize images in their mind (Runge et al., 2017).

Vividness of Sensory Imagery: In this current study, vividness of sensory imagery is operationalized by the scores obtained from the Plymouth Sensory Imagery Questionnaire (Psi-Q; Andrade et al., 2013). In the previous research, Psi-Q's relevance has extended to various fields, including sports and physical training, health, and education, as noted by Pérez-Fabello and Campos (2020), who emphasized the need for measures like the Psi-Q to understand how vivid these mental images are for different senses. This scale will be used to measure the vividness across different sensory

modalities in young adults. This questionnaire helps researchers understand how vivid these mental images are for different senses (Clark & Maguire, 2020; Kharlas & Frewen, 2016).

Frequency of Mental Imagery: In the current study, the frequency of mental imagery is operationally defined as the scores obtained from the Spontaneous Use of Imagery Scale (SUIS; Reisberg et al., 2003). This questionnaire will be used to measure the frequency and tendency of young adults to use visual mental imagery in their daily lives (Nelis et al., 2014).

1.8 Hypotheses of Study

The three hypotheses for this research study are as below:

Hypothesis 1:

Null Hypothesis (H_0): There is no significant difference in the vividness of visual imagery between young adults with high social anxiety level and low social anxiety level.

Alternative Hypothesis (H_1): There is a significant difference in the vividness of visual imagery between young adults with high social anxiety level and low social anxiety level.

Hypothesis 2:

Null Hypothesis (H_0): There is no significant difference in the vividness of sensory imagery between young adults with high social anxiety level and low social anxiety level.

Alternative Hypothesis (H_1): There is a significant difference in vividness of the sensory imagery between young adults with high social anxiety level and low social anxiety level.

Hypothesis 3:

Null Hypothesis (H_0): There is no significant difference in the frequency of using mental imagery between young adults with high social anxiety level and low social anxiety level.

Alternative Hypothesis (H_1): There is a significant difference in the frequency of using mental imagery between young adults with high social anxiety level and low social anxiety level.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing literature related to mental imagery and social anxiety, providing the theoretical and empirical foundation for the present study. The chapter begins by discussing the nature of mental imagery and its significance in the context of social anxiety. It then differentiates between clinical and non-clinical populations, highlighting how mental imagery presents across these groups. Following this, the literature on the vividness and frequency of mental imagery, both visual and sensory, in relation to social anxiety is explored in detail. Gaps of knowledge in the current literature are identified to justify the need for this study. The chapter concludes with an overview of the conceptual framework illustrating the relationships among the study variables.

2.2 Mental Imagery in Individuals with Social Anxiety

Individuals with social anxiety often experience distressing and recurrent imagery of past events where they felt embarrassed or judged, which contributes to the maintenance of the disorder (Ashbaugh et al., 2019; Shin et al., 2022). These mental images usually adopt an observer perspective, meaning the individual sees themselves from an external viewpoint, which has been shown to have a causal impact on anxiety levels. The fear and avoidance in social anxiety are not just about the present situations and experiences but are also significantly influenced by these negative mental images. The imagery in social anxiety often reflects a previously experienced event, suggesting a strong link between past social experiences and current social anxiety symptoms. Morrison et al. (2011) discovered that individuals with social anxiety have difficulties generating mental images of neutral objects, like letters, compared to those without social anxiety, raising questions about their ability to generate emotional or self-relevant imagery such as self-image. Meanwhile, Hackmann et al. (2000) found that individuals with social phobia often experience distressing and recurrent imagery of past events where they felt embarrassed or judged, which contributes to the maintenance of the social anxiety.

The study of mental imagery in social anxiety has been relatively limited compared to other psychological disorders. Research has consistently shown that negative self-imagery plays a crucial role in maintaining social anxiety, as evidenced by its association with increased anxiety, lower social performance ratings, and lower

implicit self-esteem (Chapman et al., 2020; Homer & Deeprose, 2017). However, the majority of studies have focused on adults, leaving a gap in understanding the role of imagery in children and adolescents. For instance, Chapman et al. (2020) highlighted the need for more robust psychometric measures and conclusive evidence to understand imagery's role in younger populations.

Additionally, while cross-sectional studies have linked imagery characteristics like vividness to social anxiety symptoms in adolescents, prospective studies are still lacking, which limits the ability to draw causal conclusions (Chiu et al., 2022). Experimental studies, such as those by Leigh et al. (2020), have demonstrated that manipulating social self-imagery can affect anxiety levels and social performance in adolescents, suggesting a causal role for negative imagery in maintaining social anxiety. Qualitative studies, like those by Ghita et al. (2021), have also highlighted the importance of spontaneous imagery in anxiety disorders among adolescents, revealing themes related to emotional responses and contextual influences. In contrast, other psychological disorders, such as PTSD and bipolar disorder, have seen more extensive research into the role of mental imagery (Brewin et al., 2010; Holmes et al., 2015).

2.3 Mental Imagery in Individuals with Social Anxiety in Clinical vs Non-Clinical Population

The differences in mental imagery between individuals with social anxiety in clinical and non-clinical populations are multifaceted, involving various dimensions of imagery and cognitive processes. Research indicates that socially anxious individuals,

both clinical and non-clinical, often experience negative mental imagery, which plays a significant role in maintaining social anxiety (Dobinson et al., 2019; Homer & Deeprose, 2017; Leigh et al., 2020). However, individuals with social anxiety disorder (SAD) frequently exhibit comorbid depression and other anxiety traits, significantly impacting their clinical presentation (Dickey et al., 2021; Rozen et al., 2022). According to Rozen et al. (2022) approximately 50% of individuals with SAD also meet the criteria for major depressive disorder (MDD).

In clinical populations of social anxiety (SAD), comorbid depression can influence the electrocortical processing of negative imagery, with depression generally reducing the processing of negative imagery (Bauer & MacNamara, 2021). Furthermore, Kuru et al. (2018) found that socially anxious individuals in clinical settings exhibit a higher prevalence of cognitive distortions, such as overgeneralization and personalization, which are closely related to their depressive symptoms and trait anxiety levels. Apart from that, some of those under clinical populations are also prescribed with medicine as part of their treatments. While the direct impact of medication on the imagery processes in SAD has not been extensively studied, it is known that medications can influence cognitive and affective processes. For instance, antidepressants, commonly prescribed for SAD, can alter neural pathways and potentially affect the generation and control of mental imagery (Wu et al., 2023).

Given the high prevalence and significant comorbid conditions in SAD and their distinct impacts on cognitive processes, this current study only focused on the individuals with social anxiety in the non-clinical populations.

2.4 Vividness of Mental Imagery in Individuals with Social Anxiety

Several studies had addressed the differences in the vividness of mental imagery between individuals with high and low level of anxiety including adolescents but the findings are somewhat fragmented. Research by Schwarz and Stangier (2023) indicates that adolescents experiencing higher levels of social anxiety report more vivid and frequent negative mental imagery, particularly related to social conflicts, which correlates with increased emotional distress and anxiety. Similarly, Chiu et al. (2022) found that observer-perspective and vividness of negative self-imagery significantly predict concurrent and prospective social anxiety symptoms in adolescents, suggesting that vividness is indeed a critical factor in social anxiety. Furthermore, Chapman et al.'s (2020) systematic review supports the notion that children and young people with higher social anxiety report more vivid, negative, observer-perspective images, although the literature is limited by methodological inconsistencies and a lack of robust psychometric measures.

On the other hand, Nagel et al. (2021) suggest that individuals with high worry, a component often associated with social anxiety, find it more difficult to engage in mental imagery, particularly after relaxation, indicating a potential avoidance mechanism rather than a difference in vividness per se. Floridou et al. (2021) also highlighted that individual differences such as age, sex, and background experience can influence the vividness and frequency of mental imagery. Collectively, these studies suggest that while there is some research on the vividness of mental imagery

in relation to social anxiety, the findings are not entirely consistent, and more focused research is needed to draw definitive conclusions about the differences in vividness of mental imagery between individuals with high and low levels of social anxiety.

2.5 Vividness of Visual Imagery in Individuals with Social Anxiety

There is also a notable gap in research specifically investigating the differences in vividness of visual imagery between individuals with high and low levels of social anxiety. While several studies have explored related aspects, such as the role of self-imagery in social anxiety and the effectiveness of interventions like imagery rescripting (IR), direct comparisons of imagery vividness across different anxiety levels remain sparse. For instance, Chiu et al. (2022) found that observer-perspective and vividness of self-imagery significantly predicted concurrent social anxiety symptoms in adolescents, suggesting a link between imagery characteristics and social anxiety, but did not directly compare vividness between high and low anxiety groups. Similarly, research on IR demonstrated significant reductions in image vividness and distress in socially anxious individuals, indicating the potential for therapeutic interventions to alter imagery characteristics, but again, did not compare these characteristics across varying anxiety levels (Lloyd & Marczak, 2022).

Furthermore, Chapman et al.'s (2020) review on negative self-images in children and young people with social anxiety provided some evidence of more negative, vivid imagery in higher anxiety individuals, but methodological limitations and a lack of robust psychometric measures hinder definitive conclusions. Meanwhile,

the randomized trial by Knutsson et al. (2020) comparing IR and in vivo exposure for social anxiety showed significant improvements in imagery distress and vividness post-treatment, yet did not compare these improvements between high and low anxiety groups.

Overall, these studies emphasised the significance of visual imagery in social anxiety but highlighted the need for specific studies to better understand the differences in the vividness of mental images across individuals with different levels of social anxiety. By addressing this gap, the understanding of the cognitive mechanisms that contribute to social anxiety will be able to be improved and used this knowledge to develop tailored therapy approaches.

2.6 Vividness of Sensory Imagery in Individuals with Social Anxiety

Sensory imagery refers to the mental representation of stimuli that are not physically present, encompassing various sensory modalities such as vision, sound, smell, taste, touch, body, and feeling (Andrade et al., 2013). This concept has been extensively studied in psychology, particularly in the context of visual imagery, but other sensory modalities have received less attention due to the lack of appropriate measurement scales. The Plymouth Sensory Imagery Scale (Psi-Q) has been developed to address this gap, allowing for the assessment of the vividness of multisensory imagery (Andrade et al., 2013).

In the context of mental health, sensory imagery is integral to interventions like imagery rescripting (IR), which targets distressing memories linked to negative self-imagery (NSI) in social anxiety disorder (SAD) (Lloyd & Marczak, 2022). Based on Lloyd and Marczak's (2022) and Seinsche et al.'s (2023) findings, IR has been shown to significantly reduce image and memory distress, vividness, and encapsulated beliefs, making it a promising cost-effective intervention for SAD. Despite these insights, there is a notable lack of research specifically investigating the differences in the vividness of sensory imagery between individuals with high and low levels of social anxiety. This gap is significant because sensory experience memories (SEMs) are known to contribute to various pathologies, including PTSD and anxiety, and understanding these differences could inform more effective therapeutic interventions (Emmerson, 2016).

Additionally, sensory imagery is not limited to visual experiences; it encompasses a range of modalities, including haptic, olfactive, auditory, and motoric experiences, which are crucial for understanding human perception and imagination in both everyday life and artistic contexts (Andrade et al., 2013). Therefore, addressing the research gap on vividness of sensory imagery in social anxiety could yield valuable insights for both clinical practice and broader understanding of human sensory experiences.

2.7 Frequency of Mental Imagery in Individuals with Social Anxiety

The frequency of mental imagery, which refers to the occurrence of perceptual experiences in the absence of external sensory input, varies significantly across different contexts and populations. Research indicates that mental imagery is a common cognitive function, with its frequency and vividness influenced by factors such as age, sex, and background experience in activities like sports, music, or video games (Floridou et al., 2021). For instance, according to Floridou et al.'s (2021) finding, individuals with greater experience in music and video games tend to have higher frequencies of involuntary musical imagery. In the realm of sports, imagery training frequency has been shown to impact performance, with four imagery sessions per week yielding the highest improvements in basketball shooting performance compared to three or five sessions per week (Itoh et al., 2022).

In clinical settings, mental imagery is used to treat various mental disorders, including PTSD, social anxiety disorder (SAD), and depression, with interventions like imagery rescripting (IR) and emotive imagery proving effective (Lloyd & Marczak, 2022; Schwarz et al., 2020). However, there is a remarkable gap in research specifically investigating the differences in the frequency of mental imagery between individuals with high and low levels of social anxiety. Current cognitive models of social anxiety in adults emphasize the role of negative self-images in maintaining the anxiety but studies focusing on children and young people with social anxiety are limited and methodologically inconsistent (Chapman et al., 2020). Despite this, Chapman et al. (2020) demonstrated evidence suggesting that children and young people with higher social anxiety report more frequent and negative imagery from an