THE ROLE OF EMOTIONAL REGULATION IN THE RELATIONSHIP BETWEEN ANXIETY AND PROSPECTIVE MENTAL IMAGERY AMONG YOUNG ADULTS IN MALAYSIA

NORSYAFIRA BINTI SA'AD

UNIVERSITI SAINS MALAYSIA

UNIVERSITI PENDIDIKAN SULTAN IDRIS

2025

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By

NORSYAFIRA BINTI SA'AD

Thesis submitted in fulfilment of **Master of Psychology (Clinical)** integrated program

Universiti Sains Malaysia

2025

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious, the Most Merciful

All praise is due to Allah, the Almighty, for granting me the strength, patience, wisdom, and good health to complete this final year project and to successfully fulfill the requirements of the Master of Psychology (Clinical) program. Without His divine guidance and mercy, this journey would not have been possible.

First and foremost, I would like to express my deepest appreciation to my research supervisor, Dr. Hafidah Umar, for her unwavering support, insightful guidance, and sincere dedication throughout this research process. Her encouragement and thoughtful feedback have been a constant source of motivation, giving me the strength and confidence to complete this research project, especially during times when I faced uncertainty and self-doubt. Dr. Hafidah has been more than a supervisor where she has been a source of inspiration through her resilience, diligence, and belief in her students. I am truly grateful for the opportunity to work under her supervision.

My heartfelt thanks also go to my family, particularly my beloved parents, Mr. Sa'ad bin Hassan and Mrs. Norlaila binti Mohamad Nor, and my brother, Mohamad Hafizi bin Sa'ad, my sister in law and my niece, for their endless love, sacrifices, and unwavering support. Your prayers, financial assistance, emotional encouragement, and constant belief in me were the pillars that held me to motivate myself throughout this journey. I am forever indebted to you all.

To my Cohort 6 batchmates and colleagues from clinical placements, thank you for walking this path with me. Your companionship, shared struggles, laughter, and words of encouragement turned challenges into cherished memories. Your insights and thoughtful feedback have greatly enriched both this research project and my clinical learning. May our paths cross again in future collaborations.

A special note of gratitude to the participants of this study. Thank you for your openness and trust in sharing your experiences. Your contributions are the heart of this research, and I am deeply honoured to have the opportunity to gain new insight of this study. This study would not have been possible without your contributions, and I hope the insights gained will be meaningful and valuable not only to the academic field but also to the broader understanding of the issues explored

Lastly, to all those who supported me in ways seen and unseen, through kind words, silent prayers, or simple acts of kindness. This research project is not just the result of academic effort, but also a reflection of the support I received from many people.

May Allah bless and reward each of you abundantly.

Thank you.

DECLARATION

I hereby declare that the research work entitled "The Role of Emotional Regulation in the Relationship Between Anxiety and Prospective Mental Imagery Among Young Adults in Malaysia" is a record of original work of my own. In making this declaration, I wholly understand the presence of my breaches off the declaration constitute academic misconduct may lead to certain penalties.

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(NORSYAFIRA BINTI SA'AD) **Date:** 20th August 2025

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LIST OF ABBREVIATIONS

AD	Anxiety Disorder
BAI	Beck Anxiety Inventory
CR	Cognitive Reappraisal
DASS-21	Depression Anxiety and Stress Scale-21
ER	Emotional Regulation
ES	Expressive Suppression
ERQ	Emotional Regulation Questionnaire
ERQ-CA	Emotional Regulation Questionnaire for Children and Adolescents
GAD	Generalized Anxiety Disorder
IFES	Impact of Future Events Scale
IFES-N	Impact of Future Events Scale–Negative
JEPeM	Jawatankuasa Etika Penyelidikan Manusia
MI	Mental Imagery
MDQ	Mood Disorder Questionnaire
PIT	Prospective Imagery Task
PMI	Prospective Mental Imagery
PSIQ	Plymouth Sensory Imagery Questionnaire
PTSD	Post-traumatic Stress Disorder
RIES-C	Revised Impact of Event Scale
SAD	Social Anxiety Disorder
SPSS	Statistical Product and Service Solution
UPSI	Universiti Pendidikan Sultan Idris
USM	Universiti Sains Malaysia

ABSTRACT

This study investigates the relationship between anxiety and prospective mental imagery (PMI) moderated by emotion regulation strategies among young adults in Malaysia. Mental imagery (MI) is a higher-order cognitive process that involves creating and manipulating mental representations of sensory experiences without direct external stimuli. MI is a broad field of study, typically categorized into three main areas, which are cognitive imagery, general uses of imagery, and clinical imagery, where it has been called PMI. PMI is the capacity to vividly imagine future events, where it plays a key role in planning and anticipating outcomes, and anxiety is proposed to intensify this process, often resulting in more intrusive and emotionally charged imagery. Thus, emotion regulation strategies may influence this dynamic by modifying the emotional impact of imagined future events. This study employed a cross-sectional correlation, using a convenience sampling method, and was conducted via online questionnaires that consisted of the Beck Anxiety Inventory (BAI), the Emotion Regulation Questionnaire (ERQ), and the Impact of Future Events Scale (IFES). A total of 207 participants met the inclusion criteria and were aged between 18 to 29 years old. A correlation analysis revealed that anxiety positively correlated with the PMI (ρ= .610). Emotion regulation strategies, particularly expressive suppression also shown positive correlation with PMI (ρ= .273), while cognitive reappraisal did not significantly correlate with PMI. Moderation analysis result found out that neither expressive suppression nor cognitive reappraisal moderate the relationship between anxiety and PMI *(p>.05).* This finding highlights the importance of considering mental imagery as a cognitive feature that may contribute to the maintenance or intensity of anxiety symptoms. However, as the sample consisted of non-clinical participants, findings may not

generalize to clinical populations. Future research should investigate anxiety subtypes and clinical samples to further delineate these relationships.

Keywords: anxiety, prospective mental imagery, emotion regulation strategies, young adult, moderation

ABSTRAK

Kajian ini meneliti hubungan antara kebimbangan dan gambaran mental prospektif yang dimoderasi oleh strategi regulasi emosi dalam kalangan belia di Malaysia. Gambaran mental adalah proses kognitif tahap tinggi yang melibatkan pembentukan dan manipulasi representasi pengalaman mental deria tanpa rangsangan luaran secara langsung. Ia merupakan bidang kajian yang luas dan biasanya dibahagikan kepada tiga bidang utama, iaitu gambaran kognitif, penggunaan umum gambaran, dan gambaran klinikal, di mana ia juga dikenali sebagai gambaran mental prospektif. Gambaran mental prospektif merujuk kepada keupayaan untuk membayangkan peristiwa masa hadapan secara jelas, yang memainkan peranan penting dalam proses merancang dan menjangka sesuatu hasil. Kebimbangan dipercayai boleh menguatkan proses ini, dan seterusnya menghasilkan gambaran masa hadapan yang lebih mengganggu dan sarat dengan emosi. Oleh itu, strategi regulasi emosi berkemungkinan mempengaruhi hubungan ini dengan memodifikasi kesan emosi yang dirasai terhadap gambaran peristiwa masa hadapan. Kajian ini menggunakan reka bentuk keratan rentas korelasi dengan kaedah persampelan mudah dan dilaksanakan melalui soal selidik atas talian yang merangkumi *Beck Anxiety Inventor*y (BAI), *Emotion Regulation Questionnaire* (ERQ), dan *Impact of Future Events Scale* (IFES). Seramai 207 orang peserta yang memenuhi kriteria penyertaan dan berumur antara 18 hingga 29 tahun telah diambil sebagai peserta kajian. Analisis korelasi menunjukkan bahawa kebimbangan berkorelasi positif dengan gambaran mental prospektif (ρ= .610). Strategi regulasi emosi, terutamanya penekanan ekspresif, turut menunjukkan korelasi positif dengan gambaran mental prospektif (ρ= .273), manakala penilaian semula kognitif tidak berkorelasi secara signifikan dengan gambaran mental prospektif. Hasil analisis moderasi mendapati bahawa kedua-dua penekanan ekspresif mahupun penilaian semula

kognitif tidak memoderasi hubungan antara kebimbangan dan gambaran mental prospektif ($p > .05$). Dapatan ini menekankan kepentingan gambaran mental sebagai ciri kognitif yang mungkin menyumbang kepada keterusan atau intensiti simptom kebimbangan. Namun begitu, memandangkan sampel terdiri daripada populasi bukan klinikal, hasil kajian ini tidak boleh digeneralisasikan kepada populasi klinikal. Kajian akan datang disarankan untuk meneliti subjenis kebimbangan dan populasi klinikal bagi memahami hubungan ini dengan lebih mendalam.

Kata kunci: kebimbangan, gambaran mental prospektif, strategi regulasi emosi, belia, moderasi

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will provide an overview of the background of the study that includes information from previous studies, problem statement, objective, hypothesis, significance of the study, conceptual and operational definitions as well as its operational and conceptual framework.

1.2 Background of Study

Mental imagery (MI) is a higher-order cognitive process that involves creating and manipulating mental representations of sensory experiences without direct external stimuli (Hallford et al., 2020; Renner et al., 2019). Researchers suggest it is an important mental event for memory, planning, navigation, and decision-making (Pearson et al., 2015). People use MI to flash back events, such as childhood memories and future events involving upcoming positive or negative images. Besides, it plays a crucial role across psychopathology, influencing various psychological disorders (Tallon et al., 2020). In addition, MI is a broad field of study, typically broken down into three main areas which are how our minds process images (cognitive aspects), how we use and experience imagery in our daily lives (general uses of imagery), and its use in a clinical setting, especially when imagining future events, where it has been called as prospective mental imagery (PMI) (Pearson et al., 2015).

Cognitive aspects of imagery refer to the mental processes involved in generating, maintaining, inspecting, and manipulating mental images. It is also considered to be separate processing modules or sub-abilities that contribute to the overall function of imagery. Besides, general imagery focuses on several key areas. It examines a person's ability to create mental images using different senses and their overall capacity to become fully absorbed in these sensory experiences. This area also measures how often a person uses imagery in their daily life and looks for any difficulties they might have in controlling what they visualize. Clinical imagery, on the other hand, deals with mental health concerns. This includes issues like re-experiencing traumatic events, intrusive thoughts, and PMI (imagining future events), as well as

cognitive biases that influence how people think and feel (Pearson et al., 2015)

Generally, MI serves as a crucial adaptive function by allowing individuals to anticipate future events and modify their behaviour accordingly (Landkroon et al., 2022). This process involves the combination of past experiences and existing knowledge to form a novel mental representation. Specifically, episodic threat memories are vital for survival, as they facilitate learning and behavioral adaptation to future threats (Endhoven et al., 2025). However, when mental representations of threats are disproportionately exaggerated, this process can become maladaptive, potentially contributing to the maintenance of anxiety and avoidance behaviors (Du et al., 2022; Szota et al., 2024).

Previous studies have stated that individuals with anxiety frequently experience negative mental images (Chapman et al., 2020; Dobinson et al., 2020; Chiu et al., 2022). The negative images often focus on worst-case scenarios, potential threats, or failures, and can significantly amplify anxious feelings and behaviours. These distressing mental images can create a cycle of anxiety by reinforcing avoidant behaviour and unhelpful coping strategies. However, anxiety can be managed through helpful ways to manage feelings, such as ER. Hence, it is pivotal to understand the interplay between the level of anxiety, the ER used, and how these factors influence cognitive processes, such as PMI (e.g., imagining future events), to address young adults' mental health needs effectively. Studies also indicate that anxiety levels vary depending on demographic factors such as age, gender, and socioeconomic status. While anxiety can influence future MI, the relationship between anxiety and cognitive processes is complex, with individual differences and situational contexts playing important roles.

The researcher will specifically examine two emotion regulation (ER) strategies, cognitive reappraisal (CR) and expressive suppression (ES), which are seen as crucial for reducing the negative effect of anxiety on how people imagine their future. Lastly, it is critical to comprehend the prevalence of psychological morbidity among young adults because research indicates that cognitive, behavioural, and mindfulness interventions can effectively lower anxiety and depressive symptoms in these populations.

1.3 Problem statement

Anxiety and depressive disorders are among the most debilitating psychological conditions globally, with a high prevalence in young adults during a critical period of development (Bell et al., 2022; Murray et al., 2020). One of the factors that maintains anxiety is PMI, which is the ability to simulate future events mentally. Research shows that highly anxious individuals often generate vivid, negative images of future failures or disasters, which in turn intensifies their anxiety and worry (Caruso et al., 2025; Du et al., 2022; MacLeaod, 2025). This process can trigger a vicious cycle of anticipatory anxiety and passive problem-solving, suggesting a critical link between MI and coping mechanisms (Liera & Newman 2020).

Even though MI and anxiety are known to be linked, a significant research gap exists. The interplay between imagining future events and anxiety is still underexplored (Du et al., 2022), with previous studies being limited almost exclusively to Western populations (Du et al., 2022; Tallon et al., 2020). Therefore, this study aims to address

the existing research gap by investigating the relationship between PMI and anxiety among young adults in Malaysia. Furthermore, researchers have highlighted the need for more studies to investigate how MI processes differ between anxious and non-anxious individuals and how this influences clinical outcomes (Rinaldi et al., 2017).

The issue is further complicated by the influence of the ER strategies used. Although strategies such as CR and ES are known to influence emotional responses to past experiences (Iyadurai et al., 2018), their specific role in moderating the relationship between PMI and anxiety has not been thoroughly investigated (Boccaccio et al., 2024). This oversight is particularly significant given that anxiety in young adults is strongly related to the unhelpful ER strategies used (Kenwood et al., 2022). Understanding this relationship better could lead to more effective interventions in public health and clinical psychology. These new strategies could use MI to help people imagine future behaviors, which in turn could motivate them to change their actions and improve their lives (McIntyre et al., 2024).

Therefore, the purpose of this study is to address this critical gap by investigating the relationship between anxiety, PMI, and ER strategies among young adults in Malaysia. By examining this combination of variables, this research aimed to provide additional findings to the existing literature. The results of this research will inform the development of more effective therapeutic and educational interventions. By identifying the ER strategies used that are most successful in counteracting the negative effects of PMI, this study aims to make a significant contribution to improving psychological well-being in this population.

1.4 Research Questions

1. What is the relationship between anxiety and PMI among young adults in Malaysia?
2. What is the relationship between ER strategies and PMI among young adults in Malaysia?
3. Do ER strategies moderate the relationship between anxiety and PMI among young adults in Malaysia?

1.5 Objective

1.5.1 General Objective

To investigate the relationship between anxiety and PMI, and how ER strategies moderate this relationship among young adults in Malaysia.

1.5.2 Specific Objectives

1. To examine the relationship between anxiety and PMI among young adults in Malaysia.
2. To examine the relationship between ER strategies and PMI among young adults in Malaysia.
3. To examine the moderating effect of ER strategies on the relationship between anxiety and PMI among young adults in Malaysia.

1.6 Hypothesis

H_i1: There is a significant relationship between anxiety and PMI among young adults in Malaysia.

H_i2: There is a significant relationship between ER strategies and PMI among young adults in Malaysia.

H_i2a: There is a significant relationship between CR and PMI among young adults in Malaysia.

H_i2b: There is a significant relationship between ES and PMI among young adults in Malaysia.

H_i3: The relationship between anxiety and PMI among young adults in Malaysia is moderated by ER strategies.

H_i3a: The relationship between anxiety and PMI among young adults in Malaysia is moderated by CR.

H_i3b: The relationship between anxiety and PMI among young adults in Malaysia is moderated by ES.

1.7 Study Rationale

The findings from this study may contribute to implications for mental health interventions. This is because MI is fundamental for evidence-based psychological treatment like imagery rescripting or imaginal exposure therapy (Hoppe et al., 2021; Landkroon et al., 2022; Pile et al., 2020). Besides, MI is effective in treating depression and anxiety by reducing the frequency and vividness of negative images while

increasing positive ones (Holmes et al., 2016). This suggests that encouraging positive future mental events, such as imagining pleasurable events, has the potential to mitigate the impact of stressors and enhance the psychological well-being of individuals with anxiety (Marciniak et al., 2023). Finally, this study will contribute to the existing literature on anxiety, MI, and ER, providing new insights and filling the gap in current research. This finding can serve as a foundation for future studies, especially in the Malaysian context, helping to build a comprehensive understanding of these psychological phenomena.

1.8 Definition of Variable

1.8.1 Conceptual Definition of Anxiety

Anxiety is a physiological reaction to stress, manifesting as psychological states of tension and worry, accompanied by physical symptoms such as shortness of breath, rapid heart rate, muscle tension, and trembling (Dalawi et al., 2023). Even though it is a normal body reaction and can serve as an adaptive function towards stress and perceived threat, it can be problematic when it is intense, persistent, and excessive, which can lead to an anxiety disorder (AD) (Newman & Liera, 2011; Newman et al., 2013). In such a case, anxiety may interfere significantly with daily activities, interpersonal relationships, and job performance, and may be classified as a psychological disorder (Nutt et al., 2008).

1.8.2 Operational Definition of Anxiety

For this study, anxiety is operationally defined as the severity of general anxiety symptoms experienced by an individual. This includes a range of physical, cognitive, and affective symptoms that are commonly associated with anxiety, such as feelings of dread, worry, restlessness, palpitations, and trembling (Beck et al., 1988). This focuses on the general experience of anxiety rather than a specific AD. For this study, anxiety will be assessed using the Beck Anxiety Inventory (BAI), a 21-item self-report measure. The total score, which can range from 0 to 63, is used to determine the severity of anxiety, with higher scores reflecting more severe symptoms in daily life.

1.8.3 Conceptual Definition of Prospective Mental Imagery

PMI is the spontaneous ability to project oneself into the future and mentally simulate upcoming events (Palacio-Gonzalez et al., 2019; Pile & Lau, 2020). Besides, this process often occurs involuntarily and may include intrusive future-oriented images and vivid mental representations of future scenarios that come through the mind without deliberate intention (Deeprose et al., 2011). Unlike the memories, which involve the re-experiencing of past experiences, PMI allows individuals to pre-experience imagined future events, often accompanied by sensory and emotional details (Schacter et al., 2007).

1.8.4 Operational Definition of Prospective Mental Imagery

In this study, PMI is operationally defined as the experience of intrusive and distressing mental images of future events. This construct will be measured using the Impact of Future Events Scale (IFES). The IFES is a 24-item self-report questionnaire that assesses three key symptom clusters related to this type of imagery: intrusive thoughts, avoidance behaviors, and hyperarousal. It captures the subjective experience of MI through self-reported responses, without the use of technological tools or external devices. A higher score on this measure indicates a higher severity of intrusive PMI and its associated distress.

1.8.5 Conceptual Definition of Emotion Regulation

ER refers to the process where individuals influence the quality, intensity, duration, and expression of their emotional experiences both and negative emotions (Sackl-Pammer et al., 2019). It encompasses strategies that can be consciously or unconsciously employed to manage emotional responses in various contexts. The development of ER skills started at the beginning of late childhood and continues into adulthood (Pile & Lau, 2020). However, adolescence and young adulthood represent critical periods where individuals may be particularly vulnerable to difficulties in ER due to increased experience of negative emotions and stress (Ahmed et al., 2015). According to Gullone et al. (2010), ER strategies focus on two regulation strategies which are CR and ES.

These strategies can have varying impacts on emotional outcomes, with the potential to either improve or worsen the emotional well-being, depending on how they are used. ES is a response-focused strategy that inhibits ongoing emotional expression after it has been activated, and CR involves reframing an emotional situation and given different meaning of the situation (Gross & John, 2003; Gullone & Taffe, 2012).

1.8.6 Operational Definition of Emotion Regulation

ER refers to an individual's use of ER strategies in their daily life, such as CR and ES. These two domains represent the scope of ER investigated in this research. CR involves reinterpreting a situation to modify its emotional effect. In contrast, ES involves a strategy where individuals inhibit their emotional expression after an emotion has already been activated. To measure the ER strategies used by the individuals, this study uses the ER Questionnaire (ERQ). This tool provides two separate subscale scores, one for each strategy, where a higher score indicates a greater habitual usage of that particular ER strategy.

1.9 Theoretical approach

Two key theories provide a relevant framework for this study's investigation into anxiety, PMI, and ER strategies, which are Cognitive Avoidance of Worry and Emotional Processing Theory. The Cognitive Avoidance of Worry has been identified as a key feature in anxiety (Du et al., 2022). It is known as a cognitive strategy that is

used by the individual to control physiological reactions that are associated with painful memories or beliefs (Ghiasi et al., 2024). When faced with imagining future events, particularly negative events, they may experience heightened discomfort, such as an aversive level of negative emotion and physiological arousal. As a result, they tend to avoid or suppress these future-oriented thoughts, which can lead to mental images that are less vivid, detailed, or clear. This avoidance happens because they prefer not to think in a specific or concrete way about distressing future possibilities (Du et al., 2022; Sibrava & Borkovec, 2006). Research indicates that worry primarily involves thinking in words rather than forming mental images, and that these verbal thoughts tend to be vague and nonspecific (Stöber & Borkovec, 2002).

During worry, people often replace upsetting images with verbal thinking to create emotional distance from the negative content. This is supported by findings that individuals with Generalized Anxiety Disorder (GAD) often use worry to divert their attention from more upsetting emotional content (Pile & Lau, 2022; Stavropoulos et al., 2024). While this verbal style of thinking can temporarily reduce anxiety and emotional arousal, it also prevents proper emotional processing, which may lead to greater distress in the long term. Over time, the repeated use of these can help to reduce negative emotion responses, but when using it habitually, it may lead to maladaptive ways of coping with uncertain or uncontrollable future situations (Fernandes & Tone, 2021).

Furthermore, the Emotional Processing Theory (Foa & Kozak, 1986) offers a way to understand how people cope with and recover from emotionally distressing events, with a particular focus on fear and anxiety. According to the theory, individuals store emotional experiences in memory as a fear structure and process information that

includes the feared stimuli, emotional and behavioural responses, and associated beliefs. In individuals with anxiety, these structures are often activated by perceived threats and tend to contain inaccurate or exaggerated interpretations of danger (Samide & Ritchey, 2020). Effective emotional processing occurs when these fear structures are activated and then modified by new, corrective information, such as revaluations of actual stimulus threat (Wicken et al., 2021). However, individuals with anxiety often engage in avoidance strategies such as suppressing thoughts or avoiding distressing mental images, which prevent full activation and processing of the fear structure. As a result, the emotional memory remains, maintaining or even intensifying the anxiety over time (Samide & Ritchey, 2020).

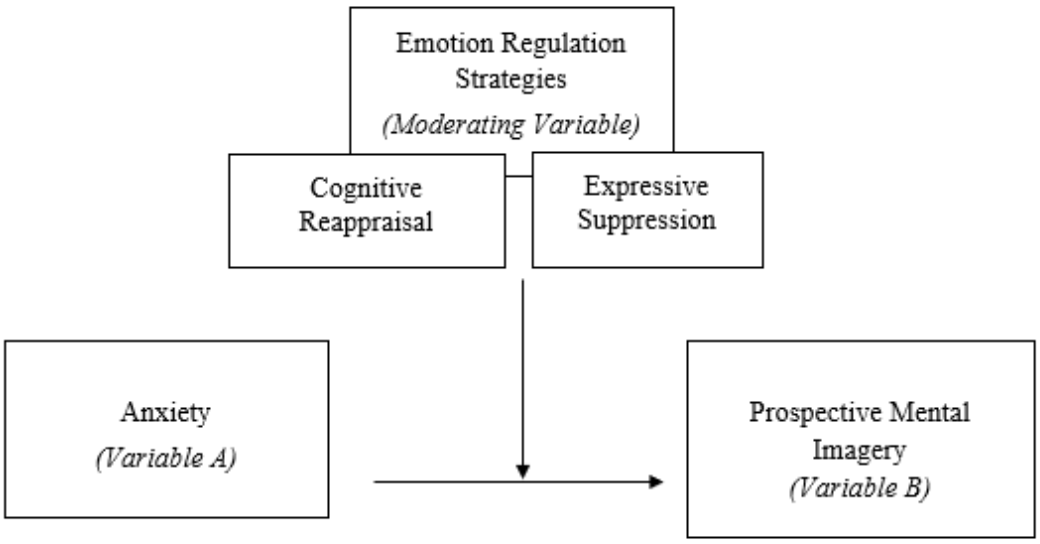
In addition, each AD contains specific pathological fear structures. These structures contain both common elements, such as physiological reactions, avoidance behaviours, and specific aspects of the disorder. For instance, in panic disorder, the fear structure involves an association with bodily sensations such as heart palpitations and fear of death, whereas post-traumatic stress disorder (PTSD) is defined by the pathological association between trauma reminders (Romano et al., 2020). Thus, fear structures differ in terms of how specifically and strongly the elements are associated in various anxiety disorders (AD), such as panic disorder, PTSD, panic disorder, Social Anxiety Disorder (SAD), and specific phobia. Evidence also indicates that when individuals are exposed to feared mental images, their physiological reactions are closely tied to the meanings they assign to those images. Additionally, behavioural reactions, emotional interpretations, and bodily responses appear to be interconnected within these fear structures (Rattel et al., 2020; Samide & Ritchey, 2020).

1.10 Conceptual Framework

Based on literature, anxiety, PMI, and ER strategies are interconnected factors. Research indicates that PMI is associated with anxiety, as people with anxiety often experience more intrusions, hyperarousal, and avoidance in response to future MI (Pile & Lau, 2020; Tallon et al., 2020). Furthermore, the research found out anxiety was positively correlated with intrusive negative imagery but negatively correlated with the perceived probability of positive outcomes (López-Pérez et al., 2018). Research indicates that ER strategies, such as CR and ES, play a moderating role in the relationship between anxiety and future mental events. Depending on the strategy used, they can either worsen or improve the effect of intrusive imagery on anxiety (Pile & Lau, 2020). It has been found that individuals who use ES exacerbate the relationship between anxiety and PMI (Eastabrook et al., 2013; Pile & Lau, 2020).

Figure 1.1

Illustration of a conceptual framework for the link between anxiety and PMI with ER strategies as a moderator effect.



This study is based on the study between anxiety, PMI, and ER strategies in youth (see Pile & Lau, 2020 for a review).

1.11 Conclusion

In summary, this study provides a better understanding on how anxiety and ER strategies have an impact on PMI. The research problem was outlined, followed by the significance of examining these variables within a Malaysian context. The chapter also presented the study objectives, research questions, and the hypotheses. Furthermore, the conceptual and operational definitions of key variables and relevant theoretical

frameworks were discussed to establish a strong conceptual foundation. Finally, the conceptual framework was introduced to guide the investigation of these psychological processes and their interrelationships.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the relevant literature concerning anxiety, ER strategies, and PMI. It discusses key findings from previous studies and theoretical perspectives that have contributed to understanding these variables. Furthermore, the chapter aims to highlight the interrelationships among the variables and how these connections form the foundation for the present study.

2.2 Literature Review

2.2.1 Prospective Mental Imagery

For this research topic, MI that will be focused on by the researcher is PMI. PMI is defined as the spontaneous and involuntary mental projection of oneself into the future (Branch, 2023). From previous research, PMI can affect people's mood, behaviour, and motivation. Thus, the study about PMI became clinical interest because it is a possible predictor of clinical symptoms such as depression and anxiety and a target for new treatments (Du et al., 2022; Hallford et al., 2020).

Mentally simulating pleasant future activities through positive PMI can be a helpful way to enhance a person's psychological well-being. It can boost motivation and the anticipated sense of reward (Hallford et al., 2020). Conversely, negative PMI is associated with unfavourable outcomes, as opposed to positive PMI. For instance, compared to healthy controls, people with GAD reported intrusive negative imagery and more vivid and likely negative future events (Tallon et al., 2020). Previous studies reported symptoms of anxiety more closely associated with the vividness of negative MI, while the less vividness of positive PMI was more closely linked to depressive symptoms (Agren, 2023).

2.2.2 Anxiety

Anxiety is a common and serious mental health concern among young adults. It can be defined as a normal reaction to stress, while AD might involve persistent fear

(Agyapong-Opoku et al., 2023). GAD is an AD with a prevalence that is highest in high-income countries. The disorder is most common among females, individuals under 60, unmarried people, and those with lower educational levels and household incomes (Ruscio et al., 2017). Research has found that anxiety prevalence rises during the teenage years, with a notable peak occurring in individuals between the ages of 20 and 34 (Mohamad et al., 2021). Besides, people at the stage of emerging adulthood will experience quarter-life crisis, which might increase their anxiety level (Flyn, 2019).

Besides, students at universities are typically at an age where anxiety is reported to be highly prevalent. University students not only concerned about their academics, but this may include their worries about financial, social communication, tuition fees, and others (Vitsari et al., 2010). The impact of these conditions might affect academic performance, personal well-being, and overall quality of life. The common AD that has been explored are related to GAD and SAD. SAD is characterized by a persistent, irrational fear and avoidance of social or performance situations due to the worry of being scrutinized or judged by others (American Psychiatric Association [APA], 2013). In contrast, GAD is defined by persistent and excessive fear and worry which it typically begins in adolescence (Beesdo et al., 2010).

2.2.3 Emotion Regulation

During childhood, individuals express their emotions and seek external support from caregivers. During the transition into adolescence, there is a decreased dependence on parental support, and the use of internal ER is still developing. As individuals mature

into adulthood, they more effectively manage emotional experiences through these internal strategies. However, when individuals tend to use more unhelpful ER, it can contribute to the onset and persistence of anxiety and depressive disorders (Hoffman et al., 2012).

Prior studies have characterized nine conceptually distinct cognitive ER strategies that adolescents may employ to control their adverse effects of emotions which are: self-blame, rumination, catastrophizing, other blame, putting into perspective, positive refocusing, positive reappraisal, acceptance, and planning (Garnefski & Kraaij, 2018). Self-blame is defined as a thinking that attributes to oneself must be blamed for the events that happened, and other blame is characterized by a thought of blaming what one has experienced on other people. Besides, rumination refers to repeatedly concentrating on negative feelings and thoughts brought on by an event, while catastrophizing involves focusing on the terrifying aspects of an experience. Lastly, putting an event into perspective involves minimizing its significance and emphasizing its relativity in comparison to other experiences.

In addition, positive refocusing refers to concentrating on joyful and pleasant topics rather than the event itself. Positive reappraisal is a strategy of viewing an event as a positive opportunity for personal growth. Besides, acceptance involves acknowledging and accepting a negative event, while refocusing on planning is a process of considering the next steps and how to deal with the situation. However, different studies measured different types of ER strategies used. One additional ER is suppression (Gullone & Taffe, 2012). Previous studies have investigated how the experience and impact of intrusive past experiences are influenced by adults' use of

thought suppression and reappraisal. However, the relationship between these strategies and PMI has not yet been studied (Pile & Lau, 2020).

However, in some studies, researchers assess the ER strategies used, which are CR and ES. CR begins to develop in late childhood and matures to a level comparable to that seen in early adulthood (Gullone et al., 2010). However, for adults, the use of suppression is associated with a reduction in positive emotions, an increase in negative emotions, and worsening psychological well-being, which is in contrast with CR (Gross & John, 2003).

2.2.4 Study between PMI and Related Disorders

MI is a key factor in both the onset and persistence of psychological disorders, including depression and anxiety (Stavropoulos et al., 2024). In fact, anxiety and depression seem to be correlated with the vividness of PMI (Agren, 2023). Past studies have stated that depression and anxiety can persist through verbal thoughts or MI (Bell et al., 2023; Yang et al., 2022). Depressive and anxious individuals may have a cognitive bias towards negative events, which can influence their responses to past, current, and future events. Thus, it can elicit a wide range of emotional reactions. Researchers have explored whether the emotional responses and cognitions in depression and anxiety are triggered by imagery differences in mental images.

A few studies have shown that dysfunction in MI has a greater effect on depression, bipolar disorder risk, and schizophrenia (Blackwell, 2021; Pile & Lau, 2020; Tallon et al., 2020). The effects of flashforwards were not exclusively linked to social anxiety symptoms as intrusive images connected to previous social situations (Blackwell, 2021). Various AD may be connected to various kinds of intrusive imagery. However, MI has been understudied in AD, including GAD compared to other disorders (Tallon et al., 2020). Thus, this literature review might provide more about the effect of depression on PMI compared to AD.

2.2.5 Prospective Mental Imagery Related to Anxiety

The Impact of Future Event Scale (IFES) and The Prospective Imagery Task (PIT) have been used to assess participants' reaction towards future events. These two scales were most strongly and widely related to measure of GAD features. PIT assessed participants' reactions to imaginings of standard future scenarios. Individual with GAD who have a lower positive orientation toward problems, for instance have lower tendency to view problems as a challenge and a lower belief in their own self-efficacy to deal with problems tend to perceive negative future events as more likely and personally relevant. Thus, their negative imagery about hypothetical scenarios may make problems seem more threatening to people with GAD, even if they are not actually happening to them (Tallon et al., 2020).

In addition, PMI differs from worry, which is characterized by negative future-related verbal thoughts, despite both having a future orientation. Results from the Pile

and Lau (2020) found out that common themes for intrusive future events among adolescents are about failure, self-harm or others and social concern, but no studies explore intrusive future events in young adult population. Cognitive theories of GAD by Borkovec et al. (2004), which is Cognitive Avoidance Theory of Worry suggested negative imagery experiences are a major factor in the continuation of worry and anxiety. According to this model, people who suffer from pathological worry may initially have aversive mental images concerning future scenarios or potential threats. These negative mental images cause cognitive avoidance, in which people engage in verbal mentation and try to suppress or dampen the images to relieve discomfort.

While limited research specifically examines the relationship between intrusive MI and anxiety, the study from Pile and Lau (2020) compared the differential impact of symptoms of GAD, depression, SAD on future imagery among the youth. The studies investigated whether having a high level of GAD has a greater impact on future imagery in terms of intrusions, hyperarousal, and avoidance than those with depression and social anxiety. This was the first study that investigated among adolescents regarding the "flash-forwards" associated with GAD. In this study, researchers measure intrusive PMI by using IFES and PIT.

From the findings, researchers found out that adolescents with generalized anxiety and depression have impact on their intrusive PMI but not in social anxiety. This can be linked to the cognitive theory, where people with generalized anxiety may find that future images have a bigger impact on them, but they may also find that these images have a stronger impact on people who use suppression as a tool for ER (Pile & Lau, 2020). Besides, this study gives an insight that a shared underlying factor of

depression and generalized anxiety may be intrusive future imagery, hyperarousal, and avoidance. Investigating this association among adolescents is vital, as the onset of GAD may appear during adolescence because of the crucial development during this phase.

Besides, the researchers investigated the comparison in MI between GAD patients and nonclinical controls. In this study, participants with a diagnosis of GAD (*n*=31) and healthy controls (*n*=32), aged 18 to 65 years from Ryerson University, were recruited in this study. Researchers used a few MI measures to measure cognitive aspects (The Image Duration Task, The Corsi Block Task and etc), general imagery use and experience (The Spontaneous Use of Imagery Scale, The Betts' Questionnaire Upon MI, and etc), clinical aspects (IFES and The Prospective Imagery Task-Modified) and proposed MI correlates (The Penn State Worry Questionnaire, The Social Problem Solving Inventory- Revised, and etc).

The findings found that there are no differences between the GAD group and the healthy group on cognitive aspects and vividness when imagining various sensory experiences (Tallon et al., 2020). However, there is a difference in the PMI between the GAD group and the healthy group. Participants in GAD group reported higher frequency of future MI compared to healthy control group. They rated imagined future negative events as more vivid, more likely to occur, as well as more intense experiences with these images, compared to healthy controls. However, there is no difference in experienced positive future images between GAD and healthy groups, except for perceiving imagined positive scenarios as less likely to occur. Research indicates that people with GAD experience intrusive, future-related mental images, which are more