# Am I dreaming, or does it just feel like it?: The impact of induced dissociation on sleep quality and memory consolidation.

A thesis submitted for a degree in a Master of Science (By Dissertation) in Psychology

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Date submission: 8th of February 2026

Word count: 28,857

(Excluding abstracts, acknowledgements, table of contents, tables, and references.)

Abstracts:

The aim of this study was to determine if induced dissociative states impacts memory function and sleep. We induced dissociative states by using the Mirror Gazing Task (MGT), an effective method of eliciting altered states and anomalous experiences, similar to those experienced in individuals with depersonalization-derealization disorder, in controlled settings in non-clinical samples of participants (Caputo et al., 2021).

Study 1 was a pilot study to compare different MGT procedural protocols and measures of dissociative states to find the strongest and longest-lasting dissociative state induction. A total of 52 participants were separated into three groups, engaging in the MGT for 10 minutes (literature-recommended amount of time), 30 minutes, or 3 times for 10 minutes each. Anomalous experiences and dissociative states were measured immediately after MGT, and 30 minutes and 1 hour after leaving the lab. Based on findings from Study 1, Study 2 used 30 minutes of MGT compared to control gazing to investigate how induced dissociation impacts different types of memory (autobiographical, episodic, working and procedural memory) when tested shortly after MGT and following a night of sleep. Memory and dissociative state measures of 22 participants were obtained before MGT, after MGT and after waking up. We also measured dissociative experiences during dreams.

We present preliminary evidence that the consolidation of episodic memory (but not autobiographical memory, procedural memory, working memory capacity and dreaming) are affected by induced dissociation. The findings from these studies enhance our understanding of the mechanisms of induced dissociation as a model for informing clinical dissociative disorders, make optimal protocol suggestions, and show potential indices of how acute dissociative states may impact memory encoding, sleep, dreaming, and memory consolidation.

Index:

## Acknowledgements

I want to give my greatest appreciation towards Helge, for her immense patients; As well as all of the lab technicians at the university lab, for aiding me through this year. To my father, Otto, and mother, Pia, for their unconditional support. To my friends, who accompanied me throughout this whole process. Finally, to my partner, Pato, I wouldn't have been able to do this without you.

# Chapter 1: Literature Review

## 1.1 Dissociation

Descriptions of dissociative states, such as depersonalization (for clinical description, see *chapter 1.2*), has been found as early as the 19th century, as there is reported cases of physicians who studied the mind and assistant patient with overcoming their mental "alienation". In 1838, German doctor Albert Zeller recounts five participants that complained about "total lack of sensations, as if they were dead … they claimed they could think clearly, and properly about everything, but the essential was lacking even in their thoughts" (Sierra, 2009, p. 8; Simeon & Abugel, 2023, p. 20); However, during this time many of the individuals that described dissociative symptoms were being treated for, or diagnosed with, other pathologies (Sierra & Berrios, 2000.). The French psychiatrist Jacques Moreau de Tours was the first to use the term dissociation -or '*déségrégation'*- when referring to the concept of '*division*' and '*multiplication*' of the personality around 1845 (Dorahy, M. 2022, chapter 1). He described the phenomena as the 'splitting off' or isolation of ideas, these isolated sectors when integrated would then become part of the normal harmonious whole. Although his initial interest was the psychological effects of hashish, his work went on to study the effects of chemically induced dissociative states, subsequently leading to the studies of hysterical psychosis, and other psychological phenomena (Dorahy, M. 2022, chapter 1).

Pierre Janet is often coined as the first individual to use the term "dissociation", he was however the first to conceptualize and systematically study and traumatic memories (Ludwig, 1983), as well as presented the most detailed and articulate account of the connection between division in "*déségrégation"* and hysteria (Dorahy, M. 2022, chapter 1). Janet drew upon traumatic memories to explain the distinction between mental stigmata and the mental accidents that characterize hysteria, emphasizing that mind and body are one and the same, he did not make any distinction between dissociation of the mind and dissociation of the body in

mental stigmata and mental accidents (Dorahy, M. 2022, chapter 1). He viewed dissociation to be an unconscious, automatic, defensive coping response to highly aversive events (Lynn et al., 2025), maintaining that dissociation represented the fundamental mechanism underlying pathological condition like multiple personality, somnambulism, fugue and psychogenic amnesia (Ludwig, 1983). According to Janet, the more an individual is traumatized, the greater the individual's personality fragments (Dorahy, M. 2022, chapter 1). His 1980's "*déségrégation*" theory, dissociation was described the disintegration of two or more mental processes, that by assumption should be integrated into our consciousness, awareness, memory or identity (Cardeña, 1994). Leading on the understanding that at its broadest term, dissociation represents a process in which certain mental functions which are ordinarily integrated with other functions operate in more compartmentalized way, outside of the sphere of conscious awareness or memory recall (Ludwig, 1983).

Most psychoanalytical literature defends the posture on dissociation is that it's a defence mechanism, to minimize the impact of internal and external stressors (Sierra, 2009. Simeon & Abugel, 2023), with no single accepted theory among traditional psychodynamics on depersonalization (Simeon & Abugel, 2023). The father of psychoanalysis first believed that depersonalization and derealization's were counterparts and explained them as double conscious or split personality, used to push unwanted memories from our ego (); In 1893, Freud proposed that dissociation was an ego defence against the intense effect that manifested in hysterical paralysis and withheld the belief that childhood trauma and abuse to be a core etiological role in hysteria (Dorahy, M. 2022, chapter 1). One of his most famous cases, known as the 'wolf man', goes into complex and detailed account on his psychotherapeutic process of trying to treat the "*the veil*" separating his patient from the real world (Simeon & Abugel, 2023), the mention of a vail leads us to believe his patient was suffering from depersonalization. Freuds writing on depersonalisation were limited although were briefly revisited in 1912 when

describing multiple centres of consciousness (Dorahy, M. 2022, chapter 1), and in 1919 essay devoted to the "uncanny" (*Das Unheimliche*; Simeon & Abugel, 2023). Contemporary theorists currently agree that dissociation as a whole is more than just a mere defence mechanism, but a subjective sates-of-mind or self-state, in which these states can be utilized as a severe defence purpose (Simeon & Abugel, 2023).

Dissociation can be described as both pathological and non-pathological forms (i.e. normative). Pathological dissociation refers to dissociative states that are either produced by, or are of, psychiatric nature; whilst normative dissociation describes a state of consciousness that are alterations are temporary in natures are organically induced (Dorahy, M. 2022, chapter 5; Butler, 2004, 2006). Pathological dissociation encompasses disorders such as depersonalization, amnesia, and/or dissociative symptoms of other pathologies like depression or PTSD. On the other hand, Normative dissociation encompasses dissociative experiences such as absorption, daydreaming, imaginative production, and meditation. individual's complete attention, thus, dislodging them from a state of conscious awareness (Butler, 2006; Caputo, 2019). Although normative dissociation pertains to a range of psychologically healthy socially adaptive states, it can under the right conditions become maladaptive, hindering interpersonal or vocational functioning. A common example of a normative dissociative state becoming maladaptive is with maladaptive daydreaming (Somer, 2002). Maladaptive daydreaming is a distinct clinical condition that involves extensive addictive-compulsive immersion in intense fantasy absorption, it has to hinder important areas of functioning and cannot be better explained by substance use or another condition for it to be clinically significant (Dorahy, M. 2022, chapter 34).

The versatile somatosensory presentation of dissociation has led Bernstein & Putnam (1986) to create the dissociative continuum, where one end has the minor dissociative experiences of everyday life (e.g., mind wandering), and the other end has the more extreme

psychopathological dissociative disorders (e.g., dissociative amnesia). Experiences would be sampled across the continuum depending on their duration and severity, the extent of the impact on functioning, or the conditions that precipitate them and their incidence over a lifetime (Bernstein & Putnam, 1986; Butler, 2004). It is important to illustrate that the continuum is neither time nor intensity dependent, as normative dissociation is usually located on the continuum the furthest from pathologies, although they happen daily and can sometimes last for long periods of time. Dissociative experiences that occur after a highly stressful or traumatic event would not necessarily be placed on the far end of the continuum, seeing that these reaction would be deemed a natural way to react it would be placed near the centre; when these disorienting experiences become long-term posttraumatic pathologies, we would start considering it to be the further ends of the continuum (Butler, 2004).

## 1.2 Dissociative disorders

The 5th edition of the Diagnostic and Statistical Manual of mental disorder (DSM-5) defines dissociation as the "disruption of and/or discontinuity in the normal integration of consciousness, emotion, memory, identity, perception, body representation, and or motor control" (American Psychiatric Association, 2013). It recognises five distinctive dissociative disorders (DD): 1) dissociative identity disorder (DID), involving the disruption of identity characterised by two or more personality states (or an experience of possession) and recurrent episodes of amnesia; 2) dissociative amnesia, an inability to recall important autobiographical information, usually of a traumatic nature. It is important to also mention that dissociative fugue is characterised as a sub-type of dissociative amnesia instead of its own disorder due to its rarity (Zona, 2014); 3) depersonalisation/derealisation disorder (DP/DR), involving persistent or recurrent experiences of unreality or detachment with respect to one's thoughts, feelings, sensations, body, actions, and/or surroundings; 4) Other specified dissociative disorder individuals are diagnosed with if they present symptoms of other disorders, but do not

meet full criteria; 5) Unspecified Dissociative Disorder, which individuals are temporarily diagnosed with as they present with symptoms but there is insufficient information to make a more specific diagnosis (American Psychiatric Association, 2013).

It is generally believed that dissociative disorders are underdiagnosed and under-researched, although they tend to have the same prevalence as other psychiatric conditions such as schizophrenia. DP/DR has an estimated prevalence of around 1% in the general population (Lynn et al., 2025; Sierra, 2009), and around 5% within psychiatric outpatient samples (Hunter et al., 2017). DID falls between 1-2% for the general population and was found to have higher rates, around 1 to 9.6% in inpatient settings (Lynn et al., 2025), as well as an estimate lifetime prevalence of around 1.5% (Fedai & Asoğlu, 2022). Lastly, dissociative amnesia seems to vary more with the overall population being <1% in China to around 7.3% in Turkey (Lynn et al., 2019, 2025). Although the research suggests otherwise, there is a general belief that dissociative disorders are rarer than they are, making it harder for patients to get diagnosed in a timely manner and access appropriate treatment quickly. It is estimated that in the UK, an individual goes through multiple misdiagnoses and spends between 7 to 12 years before getting appropriately diagnosed (Hunter et al., 2017). This directly results in financial loss for both the individual and the UKs National Health Service (NHS).

Dissociative symptoms tend to invade and interfere with the person's continuity of normal psychological functioning, corrupting conscious experience, thoughts or action (Spiegel et al., 2013), degrading the quality of life and permeating into diverse and severe manifestations of psychopathologies, such as recurrent hospitalisations, self-mutilating behaviour, suicidal tendencies, substance abuse and higher rates of disability (Lynn et al., 2025) . Dissociative symptoms can be separated into two categories, the somatosensory symptoms and psychic symptoms. Somatosensory dissociation describes the lack of somatosensory components of experience, reactions and functions represent alterations in sensation of pain

(analgesia, kinaesthetic anaesthesia), painful symptoms, alterations of perception, motor inhibition, loss of motor control, gastrointestinal symptoms and other. On the other hand, dissociative symptoms on the psychic level emerge as memory losses, fragmentation of knowledge of the self and experience, splitting of emotional and/or cognitive aspects of experiences, numbing of affect, psychological escape from unpleasant stimuli, trance-like states, increased suggestibility and greater hypnotisability (Bob, 2008). Those who experience dissociative symptoms often exhibit affective dysregulation, intrusions of traumatic memories, cognitive impairments, and behavioural disturbances (Putnam, 1991), as well as hallucinations, and sleep problems (Lynn et al., 2019). Dissociative disorders and dissociative symptoms have such a high comorbidity with other psychopathologies and medical conditions that they have rarely been reported on their own. They are commonly found with acute stress disorder (ASD), anxiety, avoidant and obsessive-compulsive personality disorder, conversion disorder, eating disorders, depression, post-traumatic stress disorder (PTSD), and schizophrenia (Fedai & Asoğlu, 2022; Lynn et al., 2019; Zona, 2014). Furthermore, individuals who suffer from migraines, head trauma or temporal lobe epilepsy also have a higher tendency to experience dissociation (Hunter et al., 2017; Sierra, 2009).

Even though traumatic or stressful events are not a part of the diagnostic criteria, research demonstrates that dissociative symptoms have a very intimate relationship with PTSD and anxiety. Since Janet's conceptualisation of dissociative disorders, one of the leading theories on dissociation is that it serves as a psychobiological response to threat and danger, protecting the individual from physical and psychological pain, as well as traumatic memories by separating the individual's consciousness during and after the traumatic event (Lynn et al., 2025; McKinnon et al., 2016). This theory is known as the posttraumatic model (PTM). Research has also demonstrated a relationship between dissociative symptoms in trauma-related psychiatric conditions, with individuals experiencing altered states of consciousness,

identity fragmentation, and cognitive dysfunction (McKinnon et al., 2016). The development of trauma can look, feel and present itself in very different ways, usually developing after psychologically stressful events, either from experiencing the event, witnessing it, or even being the perpetuator (van der Kolk, 2014). The DSM-5 (American Psychiatric Association, 2013) explains under criterion A1 to A4 of the PTSD diagnosis that a traumatic event involves an exposure to actual or threatened death, sexual violence, or serious injury. These events can occur from firsthand exposure; witnessing it happen to someone else in person; learning that it occurred to a close family member or friend (for death, it must not be due to natural reasons, it must have a violent or accidental); or repeated exposure or extreme indirect exposure in the course of occupational duties, through being exposed to grotesque details of an event. Spiegel (1997) understood trauma as the experience of being made into an object, a thing, the victim of someone else's rage, of nature's indifference and traumatic stress as the ultimate experience of helplessness and loss of control over one's body.

Peritraumatic dissociation (PD), is defined as dissociative state that occurs immediately after a traumatic event, or shortly (hours or few days at most) thereafter (Dorahy, M. 2022, chapter 28). Individuals who experience peritraumatic dissociation report emotional numbing, altered sense of time, reduced awareness of surroundings, depersonalisation, and amnesia (Cardeña & Spiegel, 1993). A large percentage of individuals experience dissociative and related phenomena after the time of trauma, usually these naturally dissipate over time once the individual is considered to be safe (Dorahy, M. 2022, chapter 28). Research has also demonstrated that trauma induced dissociative states can lead to chronic inability to perceive physical pain (Bob, 2008). PTM theory suggests that dissociation is most likely increasing the pain threshold as a defence mechanism until the threat has passed; once the individual is safe, they will later recall the painful information (Bob, 2008). Following this theory, a dissociative disorder would thus develop when the brain cannot perceive that the danger has passed, leaving

the individual perpetually stuck in a dissociative “fight or flight” (Bob, 2008). For example, some theorists and psychologists who follow the PTM believe that DID develops from repeated exposure to traumatic events during childhood, which leads the individual to compartmentalise the experiences and memories into distinct personalities (Blihar et al., 2020; Boysen, 2011; Lynn et al., 2025). When it comes to DID, the socio-cognitive model (SCM), an alternative model of dissociative disorders to PTM, proposes that it is a consequence of social learning of expectancies, proposing that DID results from inadvertent therapist cueing, media influences, and sociocultural expectations regarding the presumed clinical features of DID (Blihar et al., 2020; Boysen, 2011). DID is found to be more prevalent in Western Cultures than in non-Western cultures; this is one of the reasons why therapist and philosophers who support SCM believe DID to be heavily influenced by culture (Blihar et al., 2020; Boysen, 2011; Lynn et al., 2025).

Regarding DPDR disorder, PTM supporters explain that experience of the self and the environment detach to create a reality of unfamiliarity and ‘un-realness’ as a mean of distracting and protecting the individual from adverse events or stressors and reminders of the trauma (Lynn et al., 2025). Simeon & Abugel (2008) found that childhood trauma was significantly elevated in the DPDR, especially for those who experienced emotional maltreatment such as abuse and neglect. Lastly, for Dissociative Amnesia and its subtype Dissociative Fugue, which has been traditionally conceptualised as a deficit in memory retrieval, describing a failure of integration rather than a reflection of the contents of the fragments (Spiegel, 1997), it is commonly believed that traumatic stress interferes with the consolidation of consciously accessible narrative memory, thus resulting in those memories being stored differently to other memories and thus creating the reported discontinuity in experiences (Kihlstrom, 2005).

## 1.3 Mirror Gazing

One of the leading deterrents in researching dissociative states is the ethical implications behind provoking an adverse reaction on the individuals diagnosed with a disorder the field knows little of, this has led researchers to find alternative ways of investigating dissociative states on 'healthy' individuals instead, even if results cannot be held at a clinical standard. However, there is current standardised protocol to research dissociative states, much less *induced* dissociative states (Brake et al., 2025), it is imperative that a uniform standard be determined to fill in the current literature gaps. Brake et al. (2025), compared different methods of inducing dissociative states, some methods were based on the alteration of awareness (e.g. mirror gazing), whilst others used stressors (e.g. sleep deprivation or trauma stimuli). The result of their meta-analysis favoured mirror gazing test (MGT) for its ability to induce dissociative states, whilst minimizing adverse reactions (Brake et al., 2025).

The mirror gazing task (MGT) is a paradigm designed to induce acute states of dissociation under controlled laboratory conditions (Caputo et al., 2021; Sleight et al., 2025; Bremner 1998). In its essence, MGT consists of gazing upon one own mirror image under low illumination for approximately 10 minutes (Caputo, 2010a), during which the participants are asked to maintain a fixation on their eyes or nose. The sustained visual fixation in low illumination promotes anomalous perceptual of reality, anomalous perception of body-self, and anomalous experience of identity-self; inducing effects that emulates naturally occurring experiences in individuals with DPDR, DID and body dysmorphic disorder (BDD; Caputo, 2021, 2023).

During MGT, individual experience what are known as anomalous self-experiences (AEs; Cardeña et al., 2013), out-of-body experiences (OBEs; Caputo 2010b, 2023), and strange-face illusions (SFIs; Caputo, 2010a, 2023). AEs specifically refer to various phenomena that distorts the external reality, as well as one's appearance and sense of self

(Caputo, 2021; Cardeña, 2001). OBEs has been described by Caputo (2010b, 2023) as a subjective sense of identification with an externalised or duplicated self; the other self was further reported in his work as having a perceived different identity, producing a transient dissociation of their identity, and feeling as if the "other-self" was gazing back upon them from the mirror (Caputo, 2023). Lastly, SFIs have a distinctive visual character, and are specific of the dysmorphic perceptions of one's own face (Caputo, 2013), this illusions can occur equally no matter which area of the face the individual is asked to look at (Caputo, 2010a), and usually start occurring after the first minute of MGT (Caputo, 2013). Both OBEs and SFIs have similar experiences of disconnection to the self, however OBEs are more closely linked to the disconnection between the self-identification of the self (e.g. not recognising one's own body as their own), whilst SFIs are more closely related to dissociation (Caputo, 2010a; Caputo et al., 2012).

Caputo's 2010a paper found that around 60% of individuals who partake in the MGT report experiencing SFIs striking deformations of their own face, 28% report seeing the face of an unknown individuals whilst 18% report seeing the face of relative, among other SFIs. In 2021, Caputo proposed that these where not simple perceptual distortions, but a phenomenon produced from the alterations of interacting processes such as visual perception, multisensory integration of the bodily self, and identity-related processes. However, psychological traits and baseline mental states, such anxiety, depression and stress, are reported to modulate the intensity and susceptibility of the MGT. Caputo et al. (2021) found that traits such as empathy and fantasy-proneness correlate with AEs during mirror gazing; whilst Fonseca-Pedro et al. (2015), induced self-face illusions present more frequently in lowered sensory stimulation, these anomalies of self-experience are related with increased schizotypal phenotypic expressivity and suggested that experimentally induced self-face illusions (like those experienced in MGT), could serve as proxy measure to test anomalies of subjective experience

(a central feature of schizotypal experiences) during developmental periods. However, more research into this is needed to assess its full potential.

MGT has also been used to study the impact of induced dissociation on attention and memory, as dissociative states have been hypothesised to impede learning and memory. Growing body of research also demonstrates that dissociative states have a pattern of disrupting memory; for example, when investigating the impact of dissociation on emotional memory, results indicated that higher traits of dissociation have a higher tendency to make spontaneous commission error when reporting events that did not occur (Merckelbach et al., 2007). OBEs have been reported to interrupt the encoding and integration of the environmental details into episodic memory, thus suggesting that long-term memory requires a sense of bodily self (McKinnon et al., 2016). Brewin & Mersaditabari (2013), found that induced dissociation does not appear to produce an effect on immediate recall of a narrative, however, seem to produce a significant decrement in delayed recall (10 minutes later) compared to the deterioration of the control group. Demonstrated that induced dissociation impaired visual memory in healthy participants, suggesting that the cognitive effects produced are beyond just a perceptual distortion (Brewin & Mersaditabari, 2013).

### 1.4 Memory and Sleep

Forming and retrieving memory is one of the basic functions for living organisms, granting us the ability to solve problems by adjusting our behaviour or improving our performance (F. Wang, 2020). Memory consolidation refers to the process by which temporary, labile memory is transformed into a more stable, long-lasting form (Squire et al., 2015). Multiple brain areas are associated with the process of memory consolidation, all of them working together to strengthened and integrate them into the pre-existing memory networks, however, memory is mostly dependent on three functions: encoding, consolidation and extraction (Wang, 2020). New memory traces are formed by the perception of stimuli during

encoding; however, these traces are not stable, so during consolidation the memory traces are stabilized (Wang, 2020). Memory types are commonly divided into declarative (explicit memory, or memory for facts), and procedural memories (implicit memory, or memory for skills and habits), before being further divided into subcategories (Hornung et al., 2007; Torabi Nami, 2011). Declarative memories are split into episodic (specific events of one's past) and semantic memories (general information and knowledge); whilst, procedural memory is divided into multiple sub-categories, such as procedural skills, motor skills and cognitive skills (Hornung et al., 2007; Paller & Voss, 2004; Torabi Nami, 2011).

Sleep plays an essential 'up-keeping' role for many functions for our overall health, being beneficial for restoring physical and mental functions (Kim & Kim, 2025; Wang et al., 2024), and being vital for memory consolidation (Boutin & Doyon, 2020; Ellenbogen et al., 2006; Wilhelm et al., 2011). Sleep has also been linked with cognition, as poor sleep quality impairs daytime functioning, as prolonged exposure to poor sleep quality is associated to elevated risk of mild cognitive impairment (MCI) and has even been linked to dementia in longitudinal studies (Kim & Kim, 2025). Kim & Kim (2025), defines sleep quality by its latency, duration, nocturnal awakening, sleep depth, subjective restfulness, and general sleep satisfaction.

During sleep the brain goes through different cycles of neural and metabolic activity, these cycles are comprised from REM and NREM (non-REM) sleep (Hornung et al., 2007; Torabi Nami, 2011; Wang, 2020). NREM is comprised of 4 sleep stages, starting in W (Wakefulness), N1, N2, and N3; REM is defined by the '*The American Academy of Sleep Medicine*' (AASM; Troester et al., 2023) as a EOG eye movements that have initial deflection usually lasting < 500 msec, and consisting of irregular, sharply peaked eye movements, when sleep scoring REM sleep is usually referred to as R stage.

The AASM determines states that W or wakefulness to range from full alertness through to early stages of drowsiness. W is scored when more than 50% of the epoch (measured in 30s segments) contains posterior dominant rhythms (also known as alpha rhythm, is an EEG pattern of sinusoidal 8 to 13 Hz activity), over the occipital region when the individual has closed eyes. The AASM also categories W if reading eye movements (sequence of eye movements consisting of slow phase followed by a rapid phase in the opposite directions), eye blinks, and/or rapid eye movements associated with normal or high muscle tone can be found. Sleep onset (when sleep begins) is calculated until we see the first epoch of any other stage then W, for most individuals this would be N1 (Troester et al., 2003). N1 is usually scored when more than 50% of the epoch the posterior dominant rhythm has been replaced by low amplitude, mixed-frequency (LAMF; EEG activity that is predominantly 4 to 7 Hz) activity.

When scoring, the AASM (Troester et al., 2023) indicates that N2 begins when one or more sleep spindle (train of distinct sinusoidal waves with frequency between 11-16 H, that last ≥ 0.5 seconds, and whose maximal in amplitude are usually in the central deviation), or/and non-arousal K-complexes (a sharp wave of well-delineated EEG item, starting in a negative dip immediately followed by a positive peak, with total duration ≥ 0.5 seconds). N3 is scored when ≥ 20% of the epoch consists of slow wave sleep (SWS; a wave frequency of 0.5 to 2 Hz and peak-to-peak amplitude > 75 μV, measured over the frontal regions referenced to the contralateral ear to mastoid). It's important to note that eye movements are not typically seen during this stage of N3 sleep, and that sleep spindles and K complexes are still persistent during this stage. Finally, R sleep is staged when the epoch contains all the following: LAMF activity without K-complexes or sleep spindles; low chin EMG tone for the majority of the epoch and concurrent with REMs; and REMs at any position within the epoch (Troester et al., 2023). REM is also mostly associated with R sleep; however, some individuals do not produce REM, in those cases the AASM has other indicators to score R sleep. R scoring ends the moment that

we see a transition into W or N3, an increase in chin EMG, if arousal interrupts stage R, a body movement followed by slow eye movements (SEM; reasonably regular, sinusoidal eye movements with an initial deflection that usually lasts >500 msec), or one or more non-arousal associated K complexes or sleep spindles are present in the first half of the epoch

It's important to note that there is some variance in some of the electrophysiological and psychophysiological marker that is more commonly found during sleep, this can be due to a myriad of reasons and the AASM contain alternative recommendation on how to score every sleep stage; for conciseness these intricacies have not been aforementioned.

For more than three decades, memory and sleep consolidation has been investigated (Hornung et al., 2007), demonstrating the immense importance of sleep for learning and memory (Paller & Voss, 2004), as sleep has been shown to improve a broad range of perceptual and procedural tasks, as well as enhance declarative memory for emotional words and pictures (Brewin & Mersaditabari, 2013). More specifically, procedural and emotional memories are believed to be enhanced during late stages of sleep (REM); whilst on the other hand, declarative memory is believed to benefit from earlier stages of sleeps, where SWS are more prevalent (Backhaus et al., 2007; Hornung et al., 2007). Research has also indicated that the optimal condition for memory consolidation is achieved when SWS proceeds REM sleep during sleep (Born et al., 2006; Hornung et al., 2007). Sleep spindles have been linked to aid with brain plasticity and consolidation of both declarative and procedural memories; it has also been linked to consolidation of motor memory (Boutin & Doyon, 2020; Schabus et al., 2004; Wei et al., 2018). Abnormalities in sleep spindles have been correlated with poorer executive function, and memory, apart from being associated with a plethora of different psychological disorders, such as schizophrenia (Manoach & Stickgold, 2019).

When investigating the relationship between sleep, memory, and dissociation, Koffel and Watson (2009), found that dissociative experiences were linked to sleep related phenomena, such as nightmares, when comparing clinical and nonclinical samples. The link between dissociation and nightmares has been corroborated by others (Levin & Fireman, 2002; Van Der Kloet et al., 2013). Serrano-Sevillano et al., found that individual with high levels of dispositional dissociation tend to score higher on suggestibility, alexithymia, sleep-related experiences, neuroticism, and openness to experience, and lower on conscientiousness (2017).

### 1.5 Current Study

MGT represents a potential valuable laboratory tool for studying dissociative states, however several critical gaps in the literature are still at present. There is no literature reflecting the current decision behind the procedural method for inducing dissociative states through mirror gazing task (MGT), let alone if it's the best procedural method for inducing the strongest dissociative change from before and after the MGT. The overarching goal of this study is to better understand if inducing dissociation by MGT could be considered a safer way of studying dissociation states, without the need potentially endanger the hard-to-reach clinical samples.

This study is separated into two separate sections, intertwined but investigated separate hypothesis. The first study, also referred to as the pilot study, aims to determine if modifications to the time of the MGT procedure will result in a seen difference in dissociative state change, as well as the duration of the induced dissociative states after MGT. Furthermore, we aim to test different personality-trait scales as well as different dissociative scales, in hopes of determining which scales could be used to better investigate dissociative states and better understand how other pathologies interact with the MGT.

The second study (also referred to as the sleep study) is interested in determining if inducing dissociative states by MGT before overnight sleep affect memory retention and

consolidation. We are interested in comparing the effects of learning autobiographical, episodic, working, and procedural memory on immediate recall and recall after sleep (memory consolidation); Hypothesising that memory retention will worsen for the individuals that performed the MGT, compared to a control group. The results from the pilot study will determine the procedure we use for the MGT.

## Chapter 2: Pilot Study

### 2.1 Introduction

The current standard method of testing MGT, which is 10 minutes exposure, is set by Caputo, 2010a; however, there is no accompanying literature to further corroborate the decision behind the 10 minutes exposure, or if it was proven as the optimal method of inducing dissociative states. Brewin & Mersaditabari (2013) found that with the standard procedure of MGT participants induced dissociative symptoms dissipated after 15 minutes. In this experiment, we will be testing three different groups, changing the interval of time spent during MGT. Group 1 will engage in mirror gazing for 10 minutes, group 2 will for 30 minutes uninterrupted, and lastly group 3 will do three sets of 10 minutes MGT. Before the experiment participants will complete a series of trait-specific and state-specific scales. Trait specific questionnaire includes traits to measure trait dissociation (ČEFSA, MID-60), depression (PHQ-9), anxiety (GAD-7), and self-concept (OPD-SQ, SCC, SPQ). State-specific scales included SFQ-R, CADSS and CDS-S, were also completed immediately after mirror gazing as well as 30 minutes and 1 hour after the MGT, helping us to understand how long the effects of induced dissociation last for participants. It was important for this experiment to include different scales, so that we could better determine which scales demonstrated a bigger impact. Specifically, no study has tested the effect of MGT on symptoms specific to depersonalisation and derealisation before, which we probed using the CDS-S, in addition to the more commonly used CADSS and the SFQ-R. We are expecting to find that all three groups have a dissociative

change after the MGT, however we are also expecting that group 2 or 3 might have a more long-lasting effect than group 1, 30 to 1 hour after the MGT because they experienced dissociative states and SFIs for longer.

## 2.2 Method Section

### *2.2.1 Participants*

Ethical approval for this study was obtained from the University of Essex faculty of Science and Health Ethics Sub Committee 1 (ETH2425-0170). Using G*Power (Erdfelder et al., 2009; Faul et al., 2007), an a priori power analysis was conducted to determine the sample size required to detect a significant (*one-tailed*) correlation between scales used to determine participants' mental wellbeing and pre-disposition to dissociating. The analysis suggested that we would need between 13 (coefficient of determination $\rho^2$= .5) and 25 (coefficient of determination $\rho^2$= .3) participants to detect a large to medium effect size with an alpha level of $\alpha = 0.05$ and power of $1-\beta = 0.9$. medium to large effect size is expected based on existing literature, Paetzold found a large positive effect when correlating self-concept clarity with DP and DR, finding an effect size of 0.525 (2021).

Another a priori power analysis was conducted using G*Power (Erdfelder et al., 2009; Faul et al., 2007), to determine the total sample size required for detecting a significant change in scores on a state dissociation scale as a result of mirror gazing across three different durations of mirror gazing procedure. The analysis suggested that we would need between 24 (coefficient of determination $\rho^2$= .14) and 54 (coefficient of determination $\rho^2$= .06) participants to detect a large to medium effect size with an alpha level of $\alpha = 0.05$ and power of $1-\beta = 0.9$.

We tested a total of 52 participants (38 women, 14 men), ranging between 19 to 32 years of age with a mean age of 23.44 (SD = 3.25). Participants were separated into 3 groups: Group 1 had a total of 17 participants (15 women, 2 men; 20 to 32 years of age, mean age of 24.64 years (SD = 3.72), Group 2 had 18 participants (12 women, 6 men; 19 to 27, years of

age, mean age of 22.56 years (SD = 2.64), and Group 3 had 17 participants (11 women, 6 men; 19 to 30 years of age, mean age of 23.18 years (SD = 3.15). Participants were recruited through word-of-mouth and local advertisement. Participants were required to have normal or corrected-to-normal vision, and no medical history of any dissociative disorder.

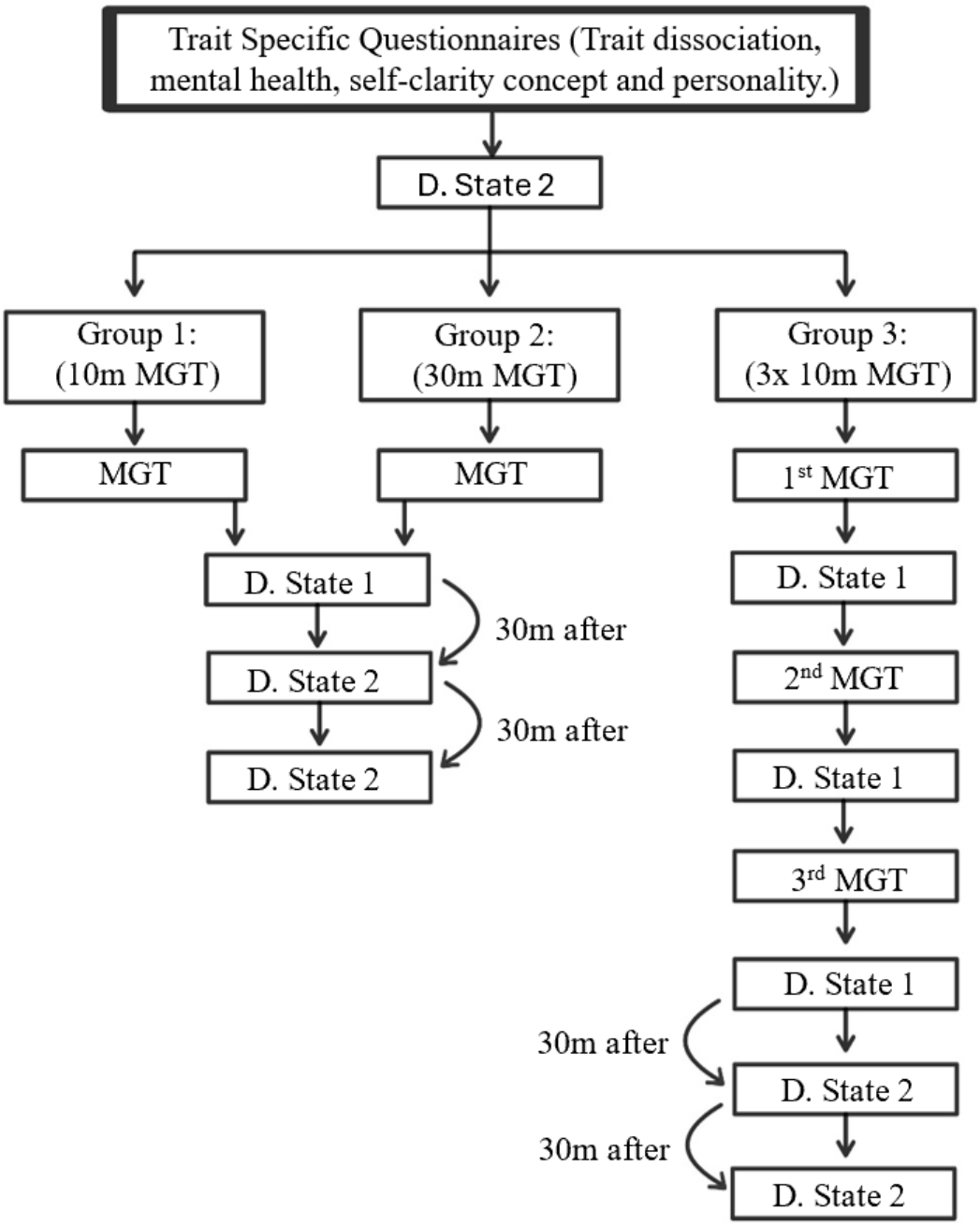
*2.2.2 Apparatus & Procedure*

At the beginning of the experiment, participants were given a participant information leaflet, signed the consent form, and then completed demographic, trait dissociation, mental health, self-concept and personality measures. We also inquired if they had ever been diagnosed or treated for a mental or physical condition that might affect or distort one's self-perception (including dissociative disorders, body dysmorphic or eating disorders), as well as if they had ever been diagnosed with any other type of mental health condition. We used this as a form of exclusion criteria, as a participant that was currently being treated for DDs would not be eligible to do the experiment for the concern that the experience might be too intense, as well as the possibility of their disorder skewing the results to report stronger dissociative change then really produced by the MGT. Individuals who had indicated that they had been treated for a condition that affected their self-perception in the mirrors and individuals who had been diagnosed with personality disorders, or treated with PTSD, were all given the chance to test the experimental booth before the experiment. They were briefed in-depth on the experimental procedure, and warned that the experience might be distressing or heighten their symptom, we also encouraged them to leave the experimental booth at any moment if they no longer felt comfortable. Same considerations were taken for individuals who had previously been diagnosed with an eating disorder (ED); however, any individuals who was currently in treatment for an ED or BDD was not allowed to participate, with the goal of protecting their wellbeing. At the end, we had one participant withdraw before the experiment, and no adverse experience was reported by any other participant.

Participants were mostly randomly allocated* to one of the 3 groups; the group each participant was allocated to would dictate the experimental design they experienced (see *Figure 1)*: Group 1 participants were indicated to look at themselves in the mirror for 10 minutes during the MGT; Group 2 for 30 minutes; and Group 3 was asked to perform the MGT 3 times, each one lasting 10 minutes.

*Figure 1: Overview of the experimental design*

* After 45 participants the screening data was checked to ensure there was no imbalance in age, gender, and mental health / personality / self-concept variables between group, and the remaining 7 participants where strategically allocated to ensure such a balance.




The mirror-gazing task took place within a sound-proof experimental booth. Inside the booth participants sat at a desk with a 25cm x 21.5cm mirror. The mirror had a sleeve with a face-shape cut-out of approximately 13cm X 10cm. Participants were indicated to align the mirror cut-out with the outline of their face, as seen in *Figure 2*. Then they were asked to keep their face in approximate 30 cm distance from the mirror and participants were instructed to look into their eyes or in-between their brows. Behind the participant a night light was placed

on the floor approximately 60 cm behind the participant's chair, which illuminated the booth to 0.8 Lux, as measured in the space between participants' face and the mirror using a Lux meter (measured using *PeakTech Multi-function environment tester*).

*Figure 2: Mirror Gazing Task setup*


*2.2.3 Measures Table 1* indicated how we grouped the different measures used during this experiment into questionnaire sets. You can use this table to cross reference it to *figure 1* to better understand what is measured at each stage of the experiment. These groupings will be further explained underneath.

(Table 1: Measures in each questionnaire set)

| Trait dissociation, mental health, self-concept, and personality | Dissociation State 1 | Dissociation State 2 |
|---|---|---|
| - ČEFSA<br>- PHQ-9<br>- GAD-7<br>- MID<br>- OPD<br>- SCC<br>- SPQ | - SFQ<br>- CADSS<br>- CDS-S | - CDS-S<br>- CADSS |

*2.3.4 Trait-specific measures*

Trait measures tested trait dissociation (ČEFSA, MID-60), depression (PHQ-9), anxiety (GAD-7), self-concept (OPD-SQ, SCC) and personality (SPQ).

ČEFSA

The Černis Felt Sense of Anomaly Scale (ČEFSA) is a 35-item questionnaire used to measure common dissociative experience that share a core phenomenological experience of a felt sense of anomaly (FSA; Černis et al., 2021). Statements such as "I feel disconnected from the world around me." are rated on a 0-5 point Likert scale where 0 = never, 1 = rarely, 3 = sometimes, 4 = often, 5 = always. The total is obtained by summing all 35 items, with higher scores connoting higher levels of FSA-dissociation. ČEFSA is further separated into seven factors, made from five items each: 'Anomalous Experience of the Self' (summing items 1, 8, 15, 22, and 29), 'Anomalous Experience of the Self' (summing items 2, 9, 16, 23, and 30), 'Altered Sense of Familiarity' (summing items 3, 10, 17, 24, and 31), 'Anomalous Experience of Emotion' (summing items 4, 11, 18, 25, and 32). 'Altered Sense of Connection' (summing items 5, 12, 19, 26, and 33), 'Sense of Agency' (summing items 6, 13, 20, 27, and 35) and 'Altered Sense of Reality' (summing items 7, 14, 21, 28, and 34).

MID-60

The Multidimensional Inventory of Dissociation (MID; Kate et al., 2021) is a self-report instrument that assesses the full range of dissociative symptoms for all DSM-5 dissociative disorders. The MID-60 is the 60-item version of the MID. It's important to note that it is a screening tool and is not used to diagnose. It asks the individual to rate from 0 to 10 how often they experience the following items, such as "Being told of things that you had recently done, but with absolutely no memory of having done those things.", when they are not under the influence of alcohol or drugs. MID scores are calculated by summing all items and then dividing them by 6. The scores range from 0 to 100 and are interpreted as the percentage of time the person reports having a dissociative experience (Kate et al., 2021). The MID-60 cutoff score for identifying clinical levels of dissociation is 21, with the risk of excluding a small number of participants who experience mild DD. Scores between 0 and 7 indicate that the individual has no dissociative experiences. Scores between 7 and 14 indicate few diagnostically significant dissociative experiences. Scores between 15 and 20 indicate mild DDs (amnesia, and DPDR) or PTSD symptoms. Scores between 21 and 30 may indicate the possible presence of DD and/or PTSD. Scores between 31 and 40 may indicate possible DD (OSDD-1 or DID) and PTSD. Scores between 41 and 64 indicate the possibility of a severe DD, DID, *and* PTSD. Lastly, scores above 64 indicate severe DD and PTSD symptoms. As specified by Kate et al. (2021), (Kate et al., (2021)high scores may also be indicative of neuroticism, attention-seeking behaviour, exaggeration or malingering of symptoms, or psychosis.

MID-60 also has 12 subscales to further aid the initial assessment of each DD: "Amnesia" (summing items 42, 45, 48, and 58, then dividing by .4; its clinical cut-off is 10), "Subjective awareness of alter personalities and self-states" (summing items 3, 36, 39, 49, and 57, then dividing by .5; its clinical cut-off is 20), "Angry Intrusions" (summing items 28, 33, 35, 46, and 60, then dividing by .5; its clinical cut-off is 18), "Persecutory Intrusions" (summing

items 22, 37, 44, 56, and 59, then dividing by .5; its clinical cut-off is 18), "DP/DR" (summing items 2, 7, 9, 13, 25, 47, 50 and 53, then dividing by .8; its clinical cut-off is 20), "Distress about severe memory problems" (summing items 1, 8, 20, 38, 43, and 52, then dividing by .6; its clinical cut-off is 30), "Loss of autobiographical memory" (summing items 16, 19, 24, 29, and 34, then dividing by .5; its clinical cut-off is 34), "Flashbacks" (summing items 4, 15, 31, 40, and 54, then dividing by .5"; its clinical cut-off is 16), "Body symptoms" (summing items 5, 10, 14, and 18, then dividing by .4; its clinical cut-off is 10), "Psychogenic nonepileptic seizures" (multiplying item 26 by 10; its clinical cut-off is 10), "Trance" (summing items 21, 27, 30, 32, 41 and 51, then dividing by .6; its clinical cut-off is 11.7) and "Self-confusion" (summing items 6, 11, 12, 17, 23 and 55, then dividing by .6; its clinical cut-off is 33.3).

PHQ-9

The PHQ-9 encompasses the 9-items used for the depression module from the full Patient Health Questionnaire (PHQ; Kroenke et al., 2001). The questionnaire asks individuals to score the items such as "Little interest or pleasure in doing things?" depending on how often within the last 2 weeks they had experienced the item. Items were rated from 0 = "Not at all", 1 = "Several days", 2= "More than half the days", to 3= "Nearly every day". To obtain the severity measure of PHQ-9 all items are summed together, with scores ranging from 0 to 27. Scores between 0 and 4 indicate no depression, scores between 5 and 9 indicate mild depression, scores between 10 and 14 indicate moderate depression, scores between 15 and 19 indicate moderately severe depression, and scores between 20 and 27 indicate severe depression (Kroenke et al., 2001).

GAD-7

GAD-7 tests for symptoms of generalized anxiety disorder in a 7-item questionnaire. The questionnaire asks individuals to score items such as "Trouble relaxing", depending on

how often they had experienced the item within the last 2 weeks (Spitzer et al., 2006). Items were rated from 0 = “Not at all”, 1 = “Several days”, 2 = “More than half the days”, to 3 = “Nearly every day”. To obtain the severity measure of GAD-7 all items are summed together, with scores ranging from 0 to 21. Scores between 0 and 4 indicate no anxiety, scores between 5 and 9 indicate mild anxiety, scores between 10 and 14 indicate moderate anxiety, scores between 10 and 14 indicate moderately severe anxiety, and scores between 15 and 21 indicate severe anxiety (Metzger, 1976).

OPD-SQ self-other confusion subscale

The self-other confusion subscale of the Operationalized Psychodynamic Diagnosis-Structure Questionnaire (OPD-SQ; Rohde et al., 2019), a self-report based on the assessment measure of the multiaxial OPD scales (Sole, 2014). This subscale has previously been related to dissociative symptoms in borderline personality disorder (Sole, 2014) and to depersonalisation-derealisation (Gillmeister et al., 2024). It is comprised of seven statements describing different personal characteristics such as “Sometimes I’m afraid that the boundary between me and others will disappear”, which are rated using a 5-point Linkert scale, where 0 = “Fully Disagree”, 1 = “Partly Disagree”, 2 = “Neither Agree nor Disagree”, 3 = “Partly Agree”, and 4 = “Fully Agree”. The total is obtained by summing all items, with higher scores being indicative of greater self-other confusion.

SCC

Self-Concept Clarity (SCC; Campbell et al., 1996) is a 12-item questionnaire, that measures the extent to which structural aspects of self-concepts, or self-beliefs, are clearly and confidently defined, internally consistent, and stable. Statements such as “my beliefs about myself often conflict with one another” are rated on a 5-point Likert scale where 1 = “Strongly Disagree”, 2 = “Disagree”, 3= “Neither Agree nor Disagree”, 4 = “Agree”, and 5 = “Strongly

Agree". Items 1, 2, 3, 4, 5, 7, 8, 9, 10, and 12 are reversed-scored. The total is obtained by summing all items, with higher scores indicative of greater self-concept clarity.

SPQ

Schizotypal Personality Questionnaire (Raine, 1991) is a 74-items self-report that assesses schizotypal traits modelled on DSM-3-R criteria for schizotypal personality disorder. Statements such as "If others know a lot about me, I often feel somehow controlled or observed." were rated using a 2-point Likert scale, where 0 = "no" and 1 = "Yes". To obtain the total score for SPQ we added all 74 items, with higher values reflecting more schizotypal traits.

The questionnaire also contains 9 subscales for the 9 identified schizotypal traits (Raine, 1991). Items 1, 10, 19, 28, 37, 45, 53, 60, and 63 were summed to obtain the subscale "Ideas of reference". Items 2, 11, 20, 29, 38, 46, 54, and 71 were summed to obtain "Social anxiety". Items 3, 12, 21, 30, 39, 47, and 55 were summed to obtain "Magical thinking". Items 4, 13, 22, 31, 40, 48, 56, 61, and 64 were summed to obtain "Unusual Perception". Items 5, 14, 23, 32, 67,70, and 74 were summed to obtain "Odd Behaviour". Items 6, 15, 24, 33, 41, 49, 57, 62, and 66 were summed to obtain "No close friends". Items 7, 16, 25, 34, 42, 50, 58, 69, and 72 were summed to obtain "Odd Speech". Items 8, 17, 26, 35, 43, 51, 68, and 73 were summed to obtain "Constrained Affectivity". Items 9, 18, 27, 36, 44, 52, 59, and 65 were summed to obtain "Suspiciousness". Lastly, three broader sub-scales made from combing the previous grouping. Subscale "Cognitive Perceptual" is made from summing "Ideas of Reference", "Magical Thinking", "Unusual Perception" and "Suspiciousness". Subscale "Interpersonal" is made from summing "Social Anxiety", "No close friends", "Constrained Affectivity" and "Suspiciousness". Subscale "Disorganisation" is made from summing "Odd Behaviour" and "Odd Speech".

*2.3.5 State-specific measures*

State dissociation was measured before (As seen on *table 1* as 'Dissociative State 2'; CADSS, CDS-S) and after (as 'Dissociation State 1'; SFQ-R, CADSS, CDS-S) each instance of mirror gazing, as well as 30 minutes and 1 hour following the last instance of mirror gazing (as 'Dissociative State 2'; CADSS, CDS-S).

SFQ-R

The Strange Face Questionnaire Revised (SFQ-R; Caputo, 2023) compromises 34 items, 33 of which describe anomalous experiences (item 19 is a control item). The response to item such as "Did you see the face of a child?" concerns the frequency of experiences described by the item and anchored on a 5-point scale: 0 = Did not experience, 1 = Rarely experience, 2 = Somewhat frequent, 3 = Often experienced, 4 = Extremely Frequent, this would be slightly altered then the original SFQ-R. . The total score of SFQ-R is calculated by summing all items (excluding item 19) and ranges between 0 and 132 (Caputo, 2023). There are 3 defined subscales: Visual Face Deformation (FD) that comprises the summed items 1, 8, 11, 16, 31, 32, and 34, Bodily Face Detachment (BD) that comprises the summed items 15, 17, 22, 23, 24, 30, and 33, and Dissociative Identity (DI), calculated by summing 5, 10, 14, 21, 25, 26, and 27. Subscale scores range from 0 to 28.

CADSS

The Clinician-Administered Dissociative State Scale (CADSS; Bremner & colleagues (1998) is a scale originally developed to assess dissociative states that occurred in a limited timeframe during a structured interview. It contains 27 items, the first 19 of which are subjective items, and the last 8 are observers' items, which were not used in this study. In this experiment we used the CADSS as a self-assessment questionnaire, were participants reported on dissociative states like "Do things seem to be moving in slow motion?" on a 5-point Likert

scale; 0 = “Not at all”, 1 = “Slightly”, 2 = “Moderately”, 3 = “Considerably”, to 4 = “Extremely”. The CADSS score is calculated by summing the first 19 items only, with scores ranging from 0 to 76. It is important to note that when the CADSS is administered without the supervision of a clinician, the results are not liable to be held to clinical standard. We continued to use this scale as it has been used almost like procedural protocol with all of Caputo’s MGT (2023, 2010a, 2010b). The CADSS was further subdivided by Caputo (2023)into three subscales: CADSS-Amnesia (summing items 14 and 15), CADSS-Depersonalization (summing items 3 through 7), and CADSS-Derealization (summing items 1, 2, 8 through 13, and 16 through 19).

CDS-S

The Cambridge Depersonalization Scale-State Version (CDS-S; Michal et al., 2004) measures the self-rated frequency and duration of depersonalization and derealization symptoms experienced over the duration of the last 2 weeks. However, we adapted this to better fit our experiment where we asked participants to “mark the present intensity of each following experience”. It has 22 DPDR experiences such as “My body is feeling very light now, as if I were floating on air.”, capturing the intensity by using a semantic differential slider scale from 0% to 100%. To obtain the total CDS-S score we summed all the items together, with higher values reflecting stronger DPDR symptoms.

## 2.3 Results

### *2.3.1 Demographic / trait differences.*

Before analysing the data, we tested differences in demographic, dissociation, mental health, self-concept and personality characteristics between the 3 groups using either one-way ANOVAs, Mann-Whitney U tests, or chi-squared tests. We first conducted a one-way between-group ANOVA for participants’ age, where we found no statistically significant difference

between the groups, $F$ (2, 49) = 1.966, $p$ = .151, partial $\eta^2$ = .074. A chi-squared goodness-of-fit test was then performed to evaluate whether the number of women and the number of men were similar between the groups. As seen in Figure 4, we found no statistically significant difference in the groups for both women, $X^2(2, N = 38) = .684$, $p$ =.710, and men, $X^2(2, N = 14) = 2.286$, $p$ =.319.

*(Table 2: chi-square goodness-of-fit test for the gender of the participant)*

| | | Observed *N* | Expected *N* | Residual |
|---|---|---|---|---|
| Women | Group 1 | 15 | 12.7 | 2.3 |
| | Group 2 | 12 | 12.7 | -.7 |
| | Group 3 | 11 | 12.7 | -1.7 |
| | Total | 38 | | |
| Men | Group 1 | 2 | 4.7 | -2.7 |
| | Group 2 | 6 | 4.7 | 1.3 |
| | Group 3 | 6 | 4.7 | 1.3 |
| | Total | 14 | | |

Participants were asked if they had ever been diagnosed or treated for a mental or physical condition that might affect or distort one's self-perception (including dissociative disorders, body dysmorphic or eating disorders). A chi-square goodness-of-fit test was conducted to determine if there was a statistically significant difference between groups in participants diagnosed or treated for disorders that may impact their perception in the mirror or not *(see table 3)*. No statistically significant difference was found, $x^2(1, N = 3) = .333$, $p$ =.564. Furthermore, we did not find a statistically significant difference between groups when a chi-

square goodness-of-fit test was conducted for the participants who had not been treated, $x^2$(2, *N* = 49) = .286, *p* = .867. Group 1 had two participants that were diagnosed with an eating disorder, and in group 3 a participant indicated that they had been treated in 2021 for a condition that affected/distorted one's self-perception however did not specify what.

(*Table 3: chi-square goodness-of-fit test for "previously been diagnosed/treated for a mental or physical condition that might affect or distort one's self-perception")*

| | | Observed *N* | Expected *N* | Residual |
|---|---|---|---|---|
| Yes *(Had been previously diagnosed)* | Group 1 | 2 | 1.5 | .5 |
| | Group 2 | 0 | - | - |
| | Group 3 | 1 | 1.5 | -.5 |
| | Total | 3 | | |
| No *(Had not been previously diagnosed)* | Group 1 | 15 | 16.3 | -1.3 |
| | Group 2 | 18 | 16.3 | 1.7 |
| | Group 3 | 16 | 16.3 | -.3 |
| | Total | 49 | | |

Participants were also asked if they had ever been diagnosed with any other type of mental health condition, this included depression, anxiety, or ADHD. We conducted a chi-square goodness-of-fit test to evaluate whether the groups different in how many participants had been diagnosed with another disorder, and found no statistically significant difference, $x^2$(2, *N*=14) = .143, *p* =.931. We found a similar non-significant difference between groups in

the number of participants who had not been previously diagnosed with another mental health disorder, $x^2(2, N = 38) = .053$, $p = .974$ (see table 4).

Group 1 had a total of five participants that indicated they had previously been treated with a mental health disorder, of these five only one indicated that they had only been treated for PTSD whilst the other four had one to three comorbidities. The most common being anxiety (N = 4), followed by depression or a depressive episode (N = 2), two indicated they had personality disorder (borderline personality disorder and obsessive-compulsive disorder), one indicated that they had adjustment disorder, and lastly another participant indicated that they had attention deficit hyperactivity disorder (ADHD). Afterwards, Group 2 only had five participants who had been previously diagnosed with a disorder, of which only one indicated having ADHD, whilst the other ones either have depression (N = 1), anxiety (N = 1), or a comorbidity of both (N = 2). Lastly, Group 3 had a total of four participants that indicated having either anxiety (N = 1) or a comorbidity of anxiety and depression (N = 3). In conclusion, anxiety was the most common mental health disorder, followed by depression or the comorbidity of both or either one with another disorder.

(*Table 4: Chi-square goodness-of-fit test for "previously been diagnosed with a mental health disorder")*

| | | Observed *N* | Expected *N* | Residual |
|---|---|---|---|---|
| Yes *(Had been previously diagnosed)* | Group 1 | 5 | 4.7 | .3 |
| | Group 2 | 5 | 4.7 | .3 |
| | Group 3 | 4 | 4.7 | -.7 |
| | Total | 14 | | |
| No | Group 1 | 12 | 12.7 | -.7 |
| | Group 2 | 13 | 12.7 | .3 |

| | | | | |
|---|---|---|---|---|
| *(Had not been previously diagnosed)* | Group 3 | 13 | 12.7 | .3 |
| | Total | 38 | | |

Then, a series of one-way between subject ANOVAs was conducted to compare the groups for all nine trait-specific questionnaires and their respective sub-categories. Throughout the analysis of the demographic scales, we have grouped them into sub-categories for clearer eligibility when reporting our findings. The first group are '*dissociative scales*' comprised of MID, and ČEFSA. We then grouped PHQ-9 and GAD-7 to form the subcategory of '*common mental health disorders*', and lastly, SPQ, OPD-SQ and SCC were grouped to form the subcategory of '*cognitive self*'.

We found no statistically significant difference between groups for the overall score for the two dissociative scales ČEFSA, $F$ (2, 49) = .532, $p$ = .591, or any of its subscales, (F (2, 46) ≤ 2.997, p ≥ .060); and MID score, $F$ (2, 49) = .022, $p$ = .978, or any of its subscales, (F (2, 49) ≤ .589, p ≥ .565). See *method section* for subscales.

No differences were found between groups in the scales measuring common mental health disorders, as indicated by the results for PHQ-9, $F$ (2, 49) = .577, $p$ = .565, and GAD-7, $F$ (2, 49) = 2.019, $p$ = .144.

There were also no differences between group for the scales measuring cognitive self, as indicated by the results of OPD-SQ self-other confusion subscale, $F$ (2, 48) = 1.049, $p$ = .358, and SCC, $F$ (2, 47) = 1.795, $p$ = .177. There was also no statistically significant difference between groups for SPQ overall score, $F$ (2, 47) = 2.397, $p$ = .102, or for most of its sub-scales, (F (2, 47) ≤ 2.719, p ≥ .076). The only sub-scales that differed were "*Odd behaviour*", $F$ (2,

47) = 5.062, $p$ = .010; and "*No close friends*", $F$ (2, 47) = 3.602, p = .035. SPQ also has three broader sub-scales (C*ognitive perceptual, Interpersonal, Disorganisation*) made up from the previous subscales, we were unable to find a statistically significant difference between groups in any of the broader sub-scales, (F (2, 47) ≤ 2.848, p ≥ .068). See *method section* for subscales.

As previously mentioned, our three participant groups were tailored through screening to ensure that they differed the least amount in age, sex and mental health and related variables. Although we were mostly successful, the only scale where we could not ensure a balance was SPQs sub-category "O*dd behaviour*" and "*No close friends*". This can help us determine that any results from MGT are not due to previous schizotypal symptoms of delusional thinking or poor reality testing.

*2.3.2 Correlations between trait-specific questionnaires.*

A Kolmogorov-Smirnov test of normality was first conducted to determine if the responses from the demographical scales were normally distributed. The only scales that were normally distributed were OPD-SQ, D (46) = .103, $p$ = .200, and SPQ, D (46) = .079, $p$ = .200. MID, D (46) = .155, $p$ = .007, and ČESFA, D (46) = .176, $p$ = .001, PHQ-9, D (46) = .158, $p$ = .006, GAD-7, D (46) = .156, $p$ = .007, and SCC, D (46) = .135, $p$ = .035, were not normally distributed. As most of the scale scores were not normally distributed, *Spearman's* non-parametric test of correlation was our test of choice. Furthermore, to determine an adequate α-level cut off for our correlations, we employed a multiple comparison Bonferroni correction:

$$\frac{\alpha_{original}}{n} = \alpha_{new}$$

The Bonferroni correction adjusts the $\alpha$-level by dividing the original alpha (0.05) by the numbers of tests being conducted ($n$). As we conducted 21 correlations between our trait measures, only correlations found at or underneath the threshold of .002 will be reported as significant (0.05/21= 0.00238).

To determine if the dissociative scales in the demographic questionnaire correlated between each other a non-parametric Spearman's correlation was conducted, it indicated that there was a positive and statistically significant correlation between MID and ČEFSA, $r$ (49) = .708, $p$ <.001, suggesting that higher scores on one dissociative scale were strongly correlated with higher scores on the other dissociative scale.

(Table 5**: *Correlation between all dissociative scales used in the demographic questionnaire*)

| | | MID |
|---|---|---|
| ČESFA | Spearman's Correlation | .708** |
| | Sig. *(1-tailed)* | <.001 |
| | *N* | 49 |

** Correlation is significant at the 0.02 level (*1-tailed*).

* Correlation is significant at the 0.05 level (*1-tailed*).

Afterwards, we conducted another Spearman's correlation to determine if the scales for '*common mental health disorders*' correlated between each other, as well if they correlated with the dissociative disorders. We were able to find a positive and significant correlation between PHQ-9 and GAD-7, $r$ (52) = .597, $p$ <.001, suggesting that higher depression was linked with higher anxiety. PHQ-9 also positively correlated with MID, $r$ (52) = .458, $p$ <.001, and ČEFSA, $r$ (49) = .425, $p$ = .001. On the other hand, we were only able to find a positive and statistically significant correlation between GAD7 and MID, $r$ (52) = .432, $p$ = .001. This suggests that dissociative symptoms were associated with depression, but not always with anxiety.

**Due to technical error, there is some missing data for some participants in some questionnaires.

(Table 6**: C*orrelation between 'common mental health disorders' scales and dissociative scales used in the demographic questionnaire*)

| | | MID | ČESFA | PHQ-9 |
|---|---|---|---|---|
| PHQ-9 | Spearman's Correlation | .458** | .425** | |
| | Sig. *(1-tailed)* | <.001 | .001 | |
| | *N* | 52 | 49 | |
| GAD-7 | Spearman's Correlation | .432** | .306* | .597** |
| | Sig. *(1-tailed)* | <.001 | .016 | <.001 |
| | *N* | 52 | 49 | 52 |

** Correlation is significant at the 0.02 level (*1-tailed*).

* Correlation is significant at the 0.05 level (*1-tailed*).

We then conducted a Spearman's correlation to determine if the scales for *'cognitive self'* correlated between each other, and if they correlated with dissociative symptoms. We were able to find a negative, statistically significant correlation between SCC and SPQ, $r$ (50) = -.570, $p$ <.001, and OPD-SQ self-other confusion subscale, $r$ (49) = -.605, $p$ = <.001. Furthermore, SPQ also had a positive correlation between OPD-SQ self-other confusion subscale, $r$ (49) = .567, $p$ <. 001, suggesting that higher levels on one self-concept measure are linked with higher scores on another self-concept measure, and that worse self-concept (less clarity and more self-other confusion) is linked with higher levels of schizotypal traits.

OPD-SQ self-other confusion subscale was positively correlated with both MID, $r$ (51) = .603, $p$ <.001, and ČEFSA, $r$ (48) = .722, $p$ = <.001. This suggests that worse self-concept is

associated with stronger dissociative traits. On the other hand, SCC had a negative and statistically significant correlation with MID, $r$ (50) = -.655, $p$ = <.001; and ČEFSA, $r$ (47) = -.723, $p$ <.001. Whilst, SPQ had a positive and statistically significant correlation with MID, $r$ (50) = .638, $p$ <.001, and ČEFSA, $r$ (47) = .701, $p$ = <.001. This suggests a link between schizotypal and dissociative traits.

(Table 7**: C*orrelation between 'cognitive self' scales and dissociative scales used in the demographic questionnaire*)

| | | MID | ČESFA | SPQ | SCC |
|---|---|---|---|---|---|
| SPQ | Spearman's Correlation | .639** | .701** | | |
| | Sig. *(1-tailed)* | <.001 | <.001 | | |
| | *N* | 50 | 47 | | |
| SCC | Spearman's Correlation | -.655** | -.723* | -.570** | |
| | Sig. *(1-tailed)* | <.001 | <.001 | <.001 | |
| | *N* | 50 | 47 | 50 | |
| OPD-SQ | Spearman's Correlation | .603** | .722** | .567** | -.605** |
| | Sig. *(1-tailed)* | <.001 | <.001 | <.001 | <.001 |
| | *N* | 51 | 48 | 49 | 49 |

** Correlation is significant at the 0.02 level (*1-tailed*).

* Correlation is significant at the 0.05 level (*1-tailed*).

**Due to technical error, there is some missing data for some participants in some questionnaires.

Lastly, we conducted a Spearman's correlation between the scales for 'common mental health disorder' and the scales for 'cognitive self'. We were unable to find any statistically significant correlation between SPQ and the 'common mental health disorder'. On the other hand, SCC had a negative and statistically significant correlation with PHQ-9, $r$ (50) = -.612, $p$ < .001 and GAD-7, $r$ (50) = -.404, $p$ = .002. Suggesting that the higher depression the individuals report he least self-clarity they have.

(Table 8**: C*orrelation between 'cognitive self' scales and 'common mental health disorders' scales used in the demographic questionnaire*)

| | | PHQ-9 | GAD-7 |
|---|---|---|---|
| SPQ | Spearman's Correlation | .252* | .159 |
| | Sig. (1-tailed) | .039 | .134 |
| | N | 50 | 50 |
| SCC | Spearman's Correlation | -.612** | -.404** |
| | Sig. (1-tailed) | <.001 | .002 |
| | N | 50 | 50 |
| OPD-SQ | Spearman's Correlation | .312* | .287* |
| | Sig. (1-tailed) | .013 | .021 |
| | N | 51 | 51 |

** Correlation is significant at the 0.02 level (*1-tailed*).

* Correlation is significant at the 0.05 level (*1-tailed*).

In conclusion, most trait-specific scales were strongly correlated with each other. Correlation between dissociative and other common mental health symptoms is well documented (Černis et al., 2023), but here we also show links with measures of the cognitive self, such as self-concept and schizotypy (see Gillmeister et al., 2024, for links between self-other confusion and depersonalisation-derealisation).

*2.3.2 Differences in baseline dissociative states before the MGT.*

We conducted a one-way between-subjects ANOVAs to compare the difference in dissociative states and DPDR experiences between groups before doing the MGT. These scores can be found in *Table 1*, and the differences between groups can be found in *Figure 2*.

The first ANOVA for CDS-S total score found no statistically significant difference between groups, $F$ (2, 49) = .076, $p$ = .927. Bonferroni-corrected post-hoc tests found no statistically significant differences between groups 1 and 2 ($p$ = 1), groups 1 and 3 ($p$ = 1), or groups 2 and 3 ($p$ = 1).

The same was true for CADSS total score, $F$ (2, 49) = 1.458, $p$=.243. We then conducted similar ANOVAs for all CADSS sub-scales: subscale "*DP*" showed no significant difference between groups, $F$ (2, 49) = 1.842, $p$ = .169. The same was true for subscale "*DR"*, $F$ (2, 49) = 1.283, $p$ = .286, and for subscale "*amnesia"*, $F$ (2, 49) = 1.201, $p$ = .310.

Bonferroni-corrected post-hoc tests found no difference between the total CADSS in groups 1 and 2 ($p$ = 1), groups 2 and 3 ($p$ = 1), and groups 2 and 3 ($p$ = .282), and the same was true for all group comparisons for each subscale (all $p \geq .200$).

In conclusion, groups did not differ in dissociative states before undertaking the MGT. This allows us to conclude that any future differences between groups are likely to arise as a result of differences in mirror gazing protocol rather than due to a-priori differences between groups.

2.3.3 *Differences between groups in dissociative states after the MGT.*

We conducted a one-way between-subjects ANOVAs to compare the difference in dissociative states and DPDR experiences between groups after doing the MGT. It is important to note that these ANOVA include the result for all the times group 3 filled in the scales that measure dissociative states and DPDR experiences, which is 2 more times than group 1 and 2. These scales can be found *on table 1*, and the difference between groups can be found in *figure 1*.

A one-way ANOVA for CDS-S total score after the MGT found no statistically significant difference between groups, F (2, 49) = .673, $p$ = .515. We then employed Bonferroni-corrected post-hoc tests to see if there were any significant differences between the participant groups and found no statistically significant differences between groups 1 and 2 ($p$ = .760), groups 1 and 3 ($p$ = 1), or groups 2 and 3 ($p$ = 1).

A one-way ANOVA for CADSS total score after the MGT found no significant statistical difference between groups, $F$ (2, 49) = .765, $p$ = .471. A similar ANOVA for all CADSS subscales found no statistically significant differences between groups for any of the 3 sub-scales: *DP*, $F$ (2, 49) = .815, $p$=.449; *DR*, $F$ (2, 49) = .261, $p$ = .771; and *Amnesia*, F (2, 49) = 1.391, $p$ = .258. Bonferroni-corrected post-hoc test found no significant differences between groups for CADSS total score: group 1 and 2 ($p$ = .692), groups 2 and 3 ($p$ = 1), and groups 2 and 3 ($p$ = 1), and the same was true for all group comparisons for each CADSS subscale (all $p \geq .630$).

We also conducted a one-way ANOVA for the total score of SFQ-R after MGT. It is important to note that group 3 performed the MGT 3 distinct times, thus has multiple SFQ-R responses. In this ANOVA we only compared group 3's first SFQ-R answer. We found no statistically significant difference in SFQ-R total score between the groups, $F$ (2, 49) = 1.527,

*p*=.227. One-way ANOVAs for every SFQ-R sub-category found no statistically significant effect for FD, $F$ (2, 49) = 1.562, $p$ = .220; for BD, $F$ (2, 49) = 1.536, $p$ = .225; and for DI, $F$ (2, 49) = .730, $p$ = .487.

Bonferroni-corrected post-hoc tests measured any significant differences in SFQ-R score between each of the three participant groups. We found no significant differences between groups 1 and 2 ($p$ = .264), groups 1 and 3 ($p$ = .938), or groups 2 and 3 ($p$ = 1), and the same was true for all group comparisons for each SFQ-R subscale (all $p \geq .261$).

Similar to before, we can conclude that there is no difference between groups after undertaking the MGT. This allows us to determine that the groups behaved similarly after their MGT protocol, however the extent of the within-group changes in dissociative states from before to after MGT will be analysed separately in section '*2.4.5*'.

*2.3.4 Perceptual Time Contraction.*

During this experiment we were also interested in the perceived contraction of time experienced during the MGT, as Caputo (2019) previously hypothesised that time contraction is specifically correlated to depersonalization, whilst time dilation is not. It was hypothesised that the presence of anomalous experiences (AEs) might be linked to the perceived 'loss' of self-agency during MGT, which is what is thought to cause time contraction (Caputo, 2021). We are expecting to find that groups with larger perceived time contraction will have higher levels of depersonalization in the SFQ-R questionnaire. Participants were not disclosed on the exact amount of time they would stay in the lab, and were asked to estimate the time (in minutes) they were doing the MGT.

*Table 9* shows the descriptive statistics of how each group perceived time during mirror gazing; here we are able to better decipher which of the groups perceived the most time contraction. An independent *t*-test was conducted to determine if there was a statistically

significant difference in time perception between group 1 and group 3's first MGT (10 minutes). There was no significant difference between groups, $t$ (27) = 1.504, $p$ = .072. A second independent $t$-test was performed compared group 2, and the sum of all three times group 3 performed the MGT (30 minutes). The results indicated that there was no statistically significant difference between time perception in group 2 and the sum of group 3, $t$ (29) = -1.610, $p$ = .059.

(Table 9: *Descriptive of time perception during MGT in minutes*)

| MGT Group | | *N* | Mean | Std. Dev | Minimum | Maximum |
|---|---|---|---|---|---|---|
| Group 1 | 10 Minutes | 12 | 15.19 | 16.01 | 3 | 60 |
| Group 2 | 30 Minutes | 14 | 20.88 | 7.57 | 10 | 30 |
| Group 3 | 1st 10 Minutes | 17 | 8.96 | 5.26 | 5 | 20 |
| | 2nd 10 Minutes | | 16.02 | 27.06 | 3 | 120 |
| | 3rd 10 Minutes | | 11.84 | 7.16 | 5 | 30 |
| | Means Summed | | 36.82 | 36.29 | 13 | 170 |

To determine if larger perception of time contraction correlated with higher levels of depersonalization for the mean scores of SFQ-R BD subscale (as this is the subscale with the most items pertaining to time contraction and DP, as indicated in Caputo, 2023), CADSS DP subscale and CDS-S, a spearman's non-parametric correlation test was conducted (*Table 10*). First, we converted all time estimation into a percentage by dividing the total sum of perceived times by the minutes spend during MGT. We then employed a multiple comparison Bonferroni correction (0.05/3= 0.017), determining an α-level cut off of 0.017. As seen on table 10, there

was no subscale that passed the Bonferroni threshold; however, the current data may indicate a possible trend for the CADSS DP subscale, justifying to Caputo's (2019) hypothesis.

(Table 10: C*orrelation between time perception and depersonalisation)*

| | | Time perception |
|---|---|---|
| SFQ-R BD | Spearman's Correlation | -.246 |
| | Sig. (1-tailed) | .056 |
| | N | 43 |
| CADSS DP sub score | Spearman's Correlation | -.295* |
| | Sig. (1-tailed) | .027 |
| | N | 43 |
| CDS-S | Spearman's Correlation | -.106 |
| | Sig. (1-tailed) | .250 |
| | N | 43 |

* Correlation is significant at the 0.01 level (*1-tailed*).

*2.3.5 General lineal models of dissociative state changes from before to after MGT.*

We conducted a series of general linear model (GLM) to determine if there were statistically significant differences in CDS-S total score before versus immediately after the MGT. It is important to note that this GLM only includes the scores for the first time that group

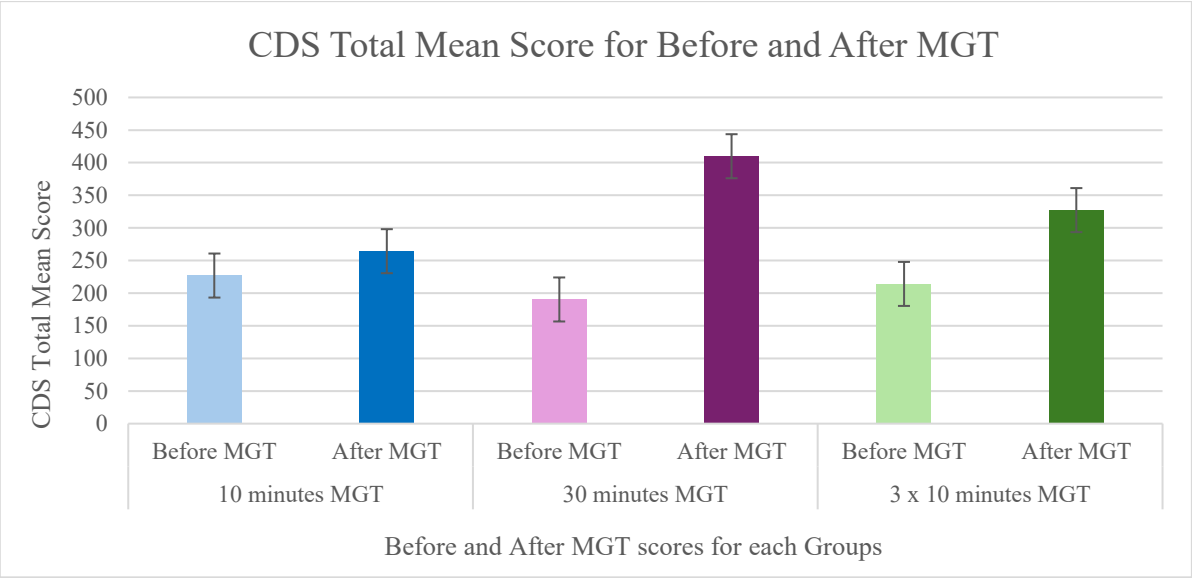
3 completed the MGT. The changes in CDS-S scores f*or each group* can be found in *Table 11* and *Figure 3*.

There was a significant main effect of time (before vs. immediately after MGT), F (1, 49) = 9.508, p = .003; partial $\eta 2$ = .163, as CDS-S scores increased as a result of mirror gazing. The interaction between time and group was not significant, $F$ (2, 49) = 1.768, $p$ = .181, partial $\eta 2$ = .067, suggesting that the increase in CDS-S scores did not differ between groups. When inspecting the estimated marginal means of each level of time for each group separately, we found that group 1 had no statistically significant difference in CDS-S scores from before to after MGT, $F$ (1, 49) = .285, $p$ = .596, partial $\eta 2$ = .006. The same was true for group 3, $F$ (1, 49) = 2.616, $p$ = .112, partial $\eta 2$= .051. However, Group 2 showed a statistically significant difference, $F$ (1, 49) = 10.436, $p$ = .002, partial $\eta 2$ = .176: following 30 minutes of MGT this group more than doubled their CDS-S scores from 190.3 to 409.9.

(Table 11: *Descriptive Statistics for CDS total score before and after the MGT*)

| MGT Group | | Mean | St. Deviation |
|---|---|---|---|
| 10 minutes MGT | Before MGT | 227 | 397.521 |
| | After MGT | 264.353 | 362.026 |
| 30 minutes MGT | Before MGT | 190.333 | 212.299 |
| | After MGT | 409.889 | 345.091 |
| 3 x 10 minutes MGT | Before MGT | 214.176 | 199.047 |
| | After MGT | 327.294 | 408.802 |

(Figure 3: *CDS total mean scores before and after MGT for each group. Please note that for Group 3 bar charts represent the first of three measurements.*)

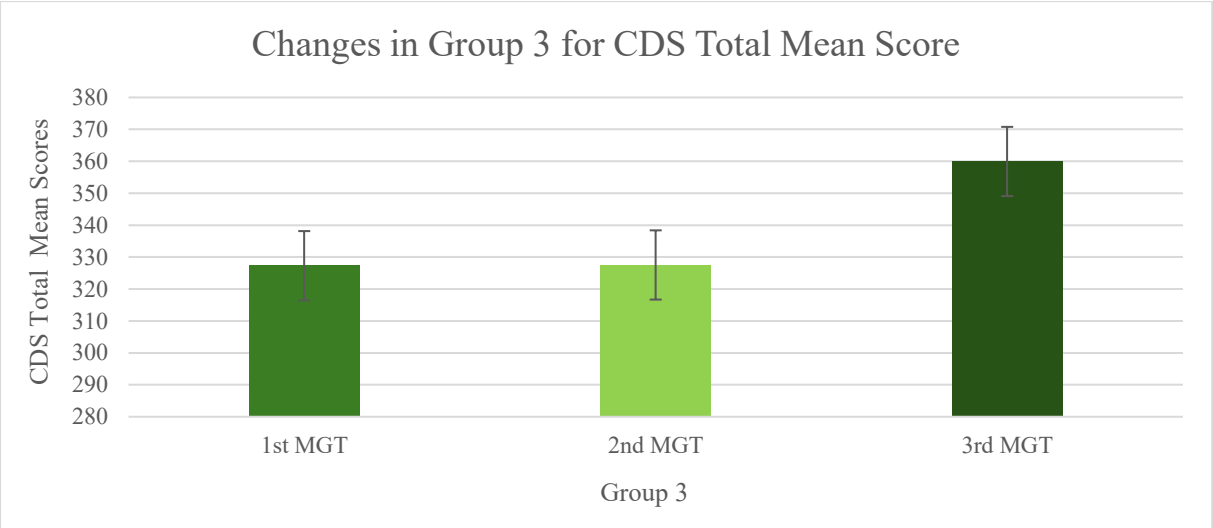



We also conducted a GLM to determine if group 3's CDS-S total score changed after each time they completed the MGT. There was no significant difference in score as time progressed, $F$ (2, 32) = .485, $p$ = .620, partial $\eta^2$ = = .029. Pairwise comparisons between each of the three time points found no significant differences in CDS-S scores ($p \geq .559$).

(Table 12: *Descriptive Statistics for group 3 CDS total score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 327.294 | 408.802 |
| 2nd MGT | 327.529 | 371.967 |
| 3rd MGT | 359.941 | 395.727 |

(Figure 4: *Changes in Group 3 for CDS Total Mean Score*)



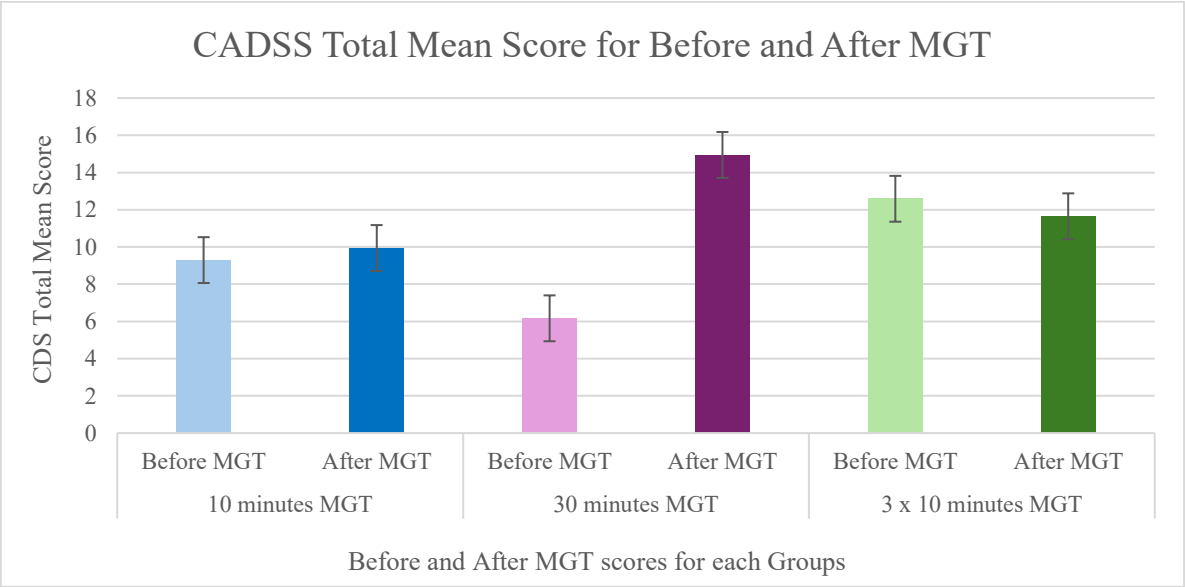

A GLM was conducted to determine if there was a statistically significant difference between the groups in CADSS total score before versus immediately after the MGT. This includes only the scores for the first time that group 3 completed the MGT.

Similarly to the CDS-S, there was a significant main effect of time (before vs. immediately after MGT) in CADSS scores, F (1, 49) = 5.424, p = .024; partial $\eta 2$ = .100, as CADSS scores increased as a result of mirror gazing. The interaction between time and group was also significant, $F$ (2, 49) = 6.258, $p$ = .004, partial $\eta^2$ = .203, suggesting that the increase in CADSS scores differed between groups. When inspecting the estimated marginal means of each level of time for each group separately, we found no statistically significant differences in group 1, $F$ (1, 49) = .093, $p$ = .762, partial $\eta^2$ = .002, and group 3, F (1, 49) = .197, $p$ = .659, partial $\eta^2$ = .004. However, CADSS scores in group 2 changed significantly, $F$ (1, 49) = 181.103, $p$ <.001, partial $\eta^2$ = .270, more than doubling from before (6.2) to after 30 minutes of MGT (14.9). (Table 13: *Descriptive Statistics for CADSS total score before and after the MGT*)

| MGT Group | Mean | St. Deviation |
|---|---|---|

| | | | |
|---|---|---|---|
| 10 minutes MGT | Before MGT | 9.294 | 14.915 |
| | After MGT | 9.941 | 13.988 |
| 30 minutes MGT | Before MGT | 6.166 | 6.930 |
| | After MGT | 14.944 | 11.053 |
| 3 x 10 minutes MGT | Before MGT | 12.588 | 10.253 |
| | After MGT | 11.647 | 11.390 |

(Figure 5: *CADSS total mean scores before and after MGT for each group. Please note that for Group 3 bar charts represent the first of three measurements at the point 'after'.)*



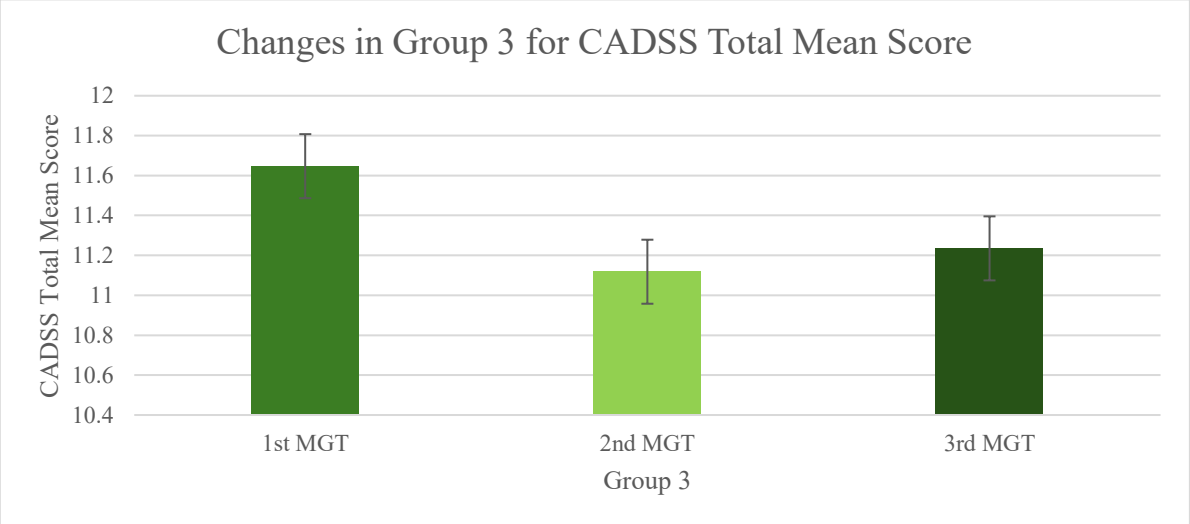

It's important to note that group 1 (10 minutes of MGT) had participants that had previously diagnosed with stronger mental health conditions and personality disorders (such as BPD, OCD, and PTSD). Our results indicate that they reported the least amount of dissociative state change after the MGT; Furthermore, it was the group with the lowest change in CADSS scores after performing the MGT. This gives us an assurance that the inclusion of these individuals did not skew the results of group 1, and that changes we found in dissociation was not led by previously diagnosed disorders. We also conducted a GLM to determine if group 3's

CADSS total score changed after each time they completed the MGT, which was not the case, $F$ (2, 32) = .057, $p$ = .945, partial $\eta^2$ = = .004. Pairwise comparisons found no CADSS score differences between any of the time point pairings (all $p$ = 1) (*see Table 14 and Figure 6*).

(Table 14: *Descriptive Statistics for group 3 CADSS total score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 11.647 | 11.390 |
| 2nd MGT | 11.118 | 11.390 |
| 3rd MGT | 11.235 | 10.491 |

(Figure 6: *Changes in CADSS Total mean scores for every time Group 3 completed the MGT.*)



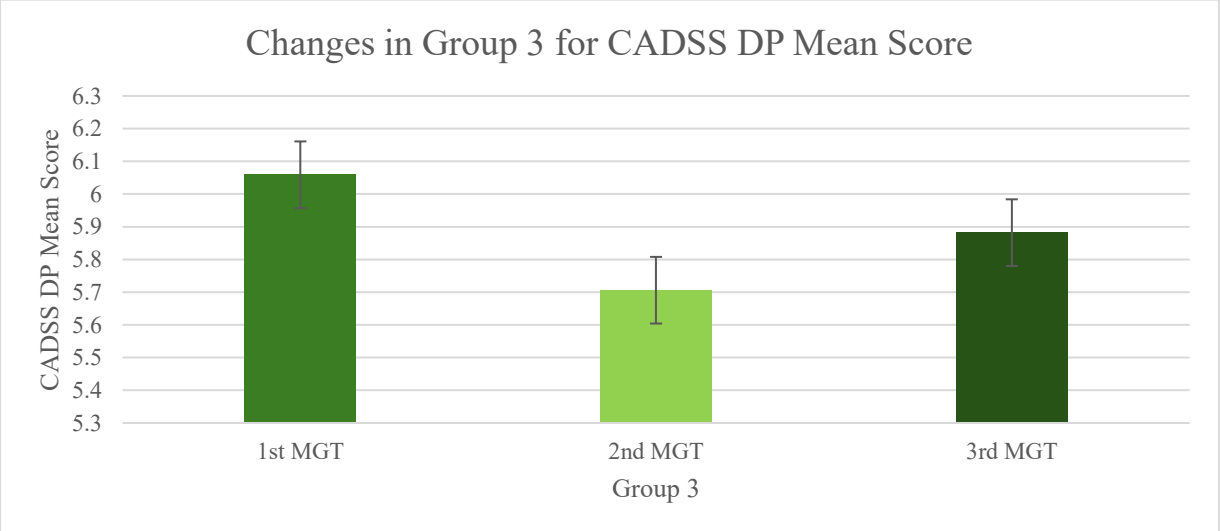

The same non-significant differences were found for all the CADSS subscales in a series of GLMs and pairwise comparisons of time point pairings: Subscale *DP*, $F$ (2, 32) = .069, $p$ = .934, partial $\eta^2$ = = .004, pairwise comparisons all $p$ = 1; see *Table 15* and *Figure 7*;

Subscale *DR*, *F* (2, 32) = .504, *p* = .609, partial $h^2$ = .031, pairwise comparisons all *p* = 1; see *Table 16* and *Figure 8*; Subscale *Amnesia*, F (2, 32) = .574, *p* = .569, partial $h^2$ = .035, pairwise comparisons all *p* = 1; see *Table 17* and *Figure 9*.

(Table 15: *Descriptive Statistics for group 3 CADSS DP score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 6.059 | 6.408 |
| 2nd MGT | 5.706 | 6.469 |
| 3rd MGT | 5.882 | 6.585 |

(Figure 7: *Changes in CADSS DP mean scores for every time Group 3 completed the MGT.*)

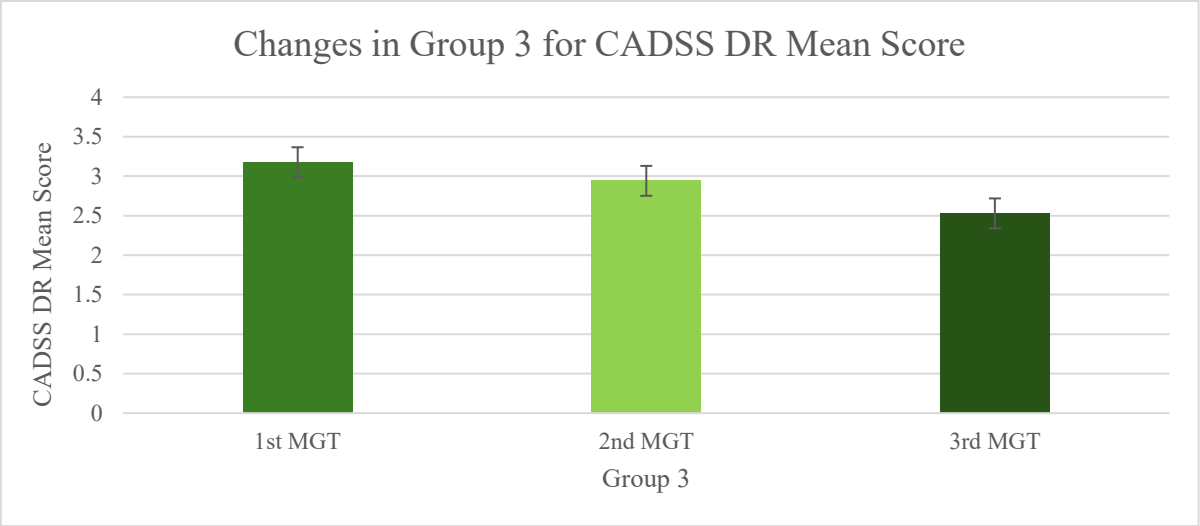



(Table 16: *Descriptive Statistics for group 3 CADSS DR score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|

| | | |
|---|---|---|
| 1st MGT | 3.177 | 3.861 |
| 2nd MGT | 2.941 | 3.929 |
| 3rd MGT | 2.529 | 2.528 |

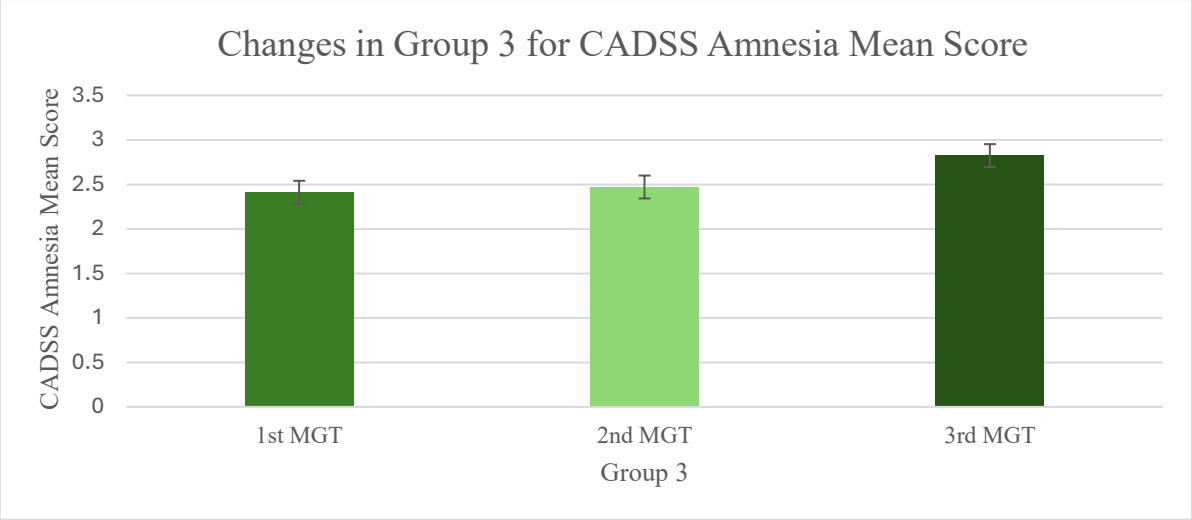
(Figure 8: *Changes in CADSS DR mean scores for every time Group 3 completed the MGT.*)




(Table 17: *Descriptive Statistics for group 3 CADSS Amnesia score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 2.412 | 2.152 |
| 2nd MGT | 2.471 | 1.772 |
| 3rd MGT | 2.824 | 2.455 |

(Figure 9: *Changes in CADSS Amnesia mean scores for every time Group 3 completed the MGT.*)

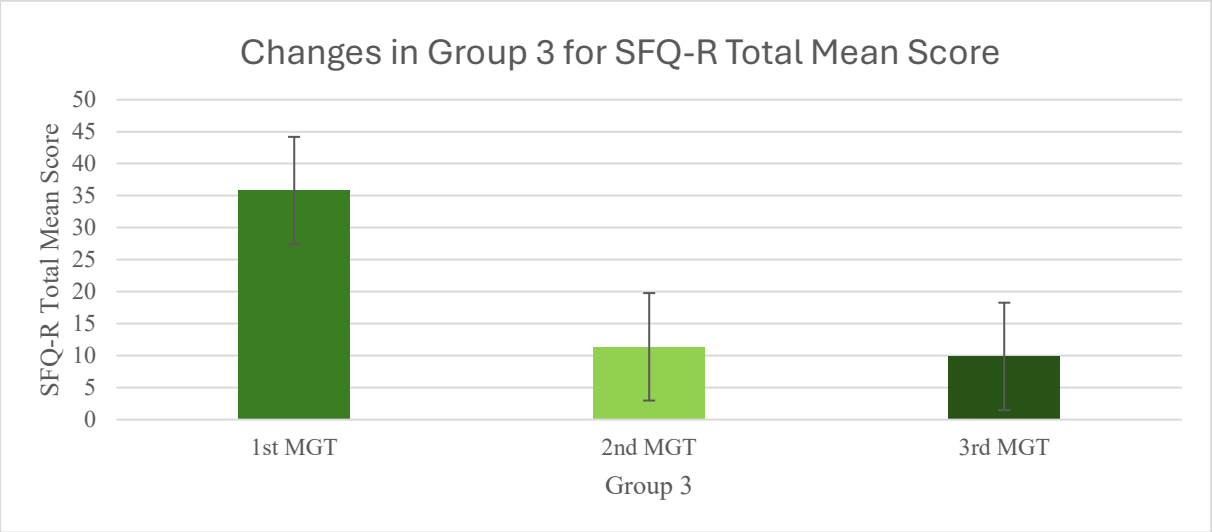



We also conducted a GLM to determine if SFQ-R total score changed significantly between the three times group 3 completed the MGT. SFQ-R total score changed as time progressed, $F$ (2, 102) = 47.493, $p$ = <.001, partial $\eta^2$ = = .482. Pairwise comparisons of each time point pairing found that scores reduced from 1st MGT when compared with 2nd MGT by 24.40% ($p$ <.001) and when compared with 3rd MGT by25.90% ($p$ <.001), while the comparison between 2nd and 3rd MGT did not differ ($p$ =.327). This suggests that dissociative experiences as captured by the SFQ rapidly reduce after the first 10 minutes of mirror gazing (*see Table 18 and Figure 10*).

(Table 18: *Descriptive Statistics for group 3 SFQ-R total score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 35.79 | 25.485 |
| 2nd MGT | 11.38 | 22.045 |
| 3rd MGT | 9.88 | 20.402 |

(Figure 10: *Changes in SFQ-R total mean scores for every time Group 3 completed the MGT.*)

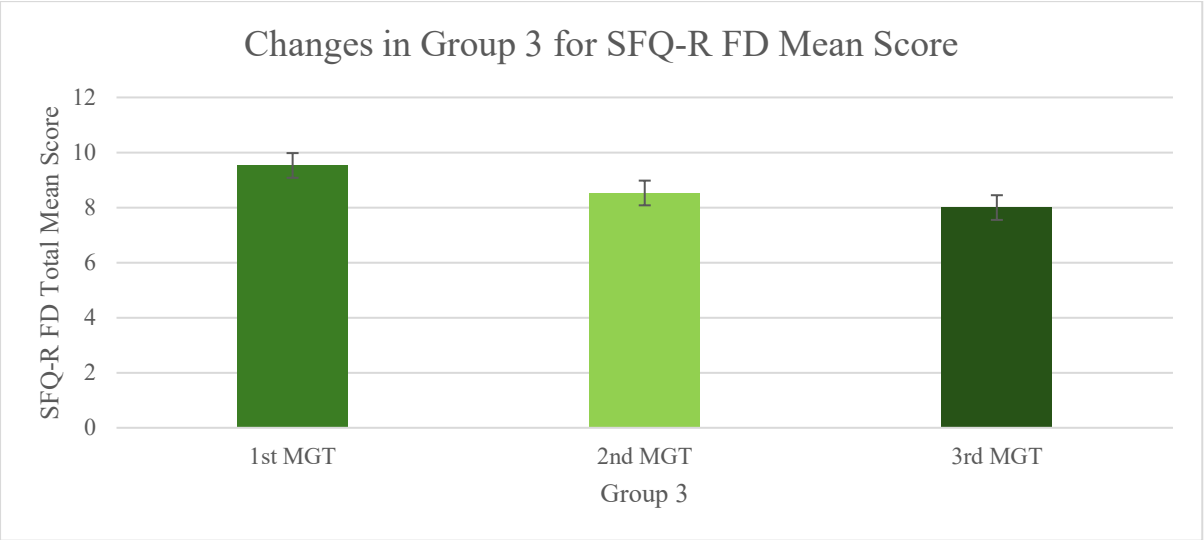



The same non-significant differences were true for two of the SFQ-R subscales in a series of GLMs and pairwise comparisons of time point pairings: Sub-scale *FD*, F (2, 32) = .805, $p$ = .456, partial η2 = .048, pairwise comparisons all $p \geq .970$; see *Table 19* and *Figure 11*; Subscale *BD*, F (2, 32) = 2.309, $p$ = .116, partial η2 = .126, pairwise comparisons all $p \geq .086$; see *Table 20* and *Figure 12*.

(Table 19: *Descriptive Statistics for group 3 SFQ-R FD score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 9.53 | 7.349 |
| 2nd MGT | 8.53 | 8.754 |
| 3rd MGT | 8.00 | 8.047 |

(Figure 11: *Changes in SFQ-R FD mean scores for every time Group 3 completed the MGT.*)




(Table 20: *Descriptive Statistics for group 3 SFQ-R BD score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 10.71 | 6.835 |
| 2nd MGT | 8.76 | 7.421 |
| 3rd MGT | 8.53 | 8.678 |

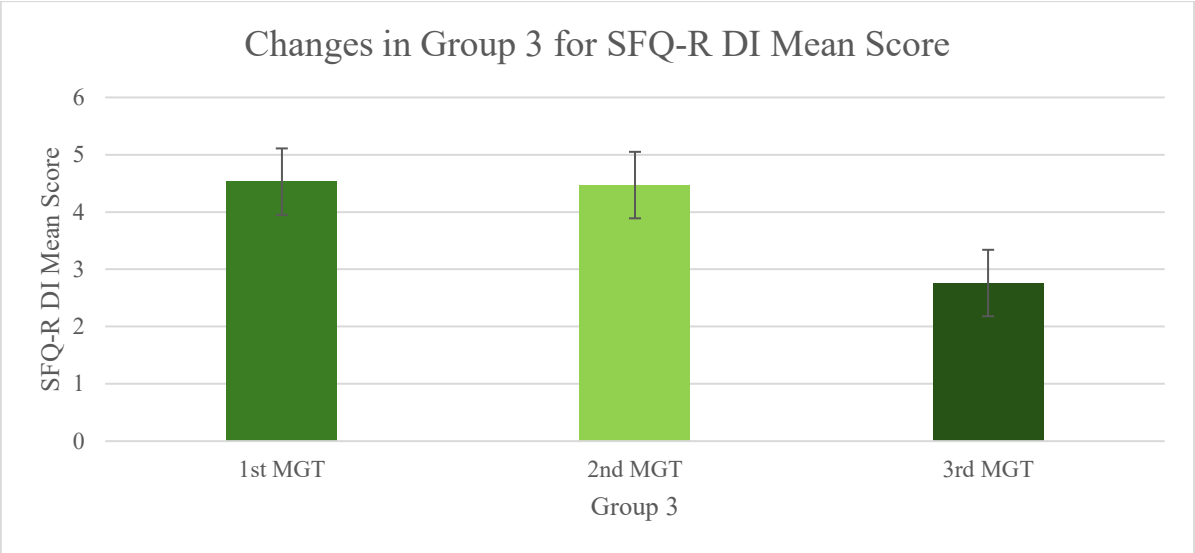
(Figure 12: *Changes in SFQ-R BD mean scores for every time Group 3 completed the MGT.*)


However, the GLM for subscale *DI* indicated that there was a significant change in scores overall as scores reduced over time, especially for the third MGT, $F$ (2, 32) = 5.760, $p$ = .029, partial $\eta^2$ = .265 (see *Table 21* and *Figure 13*). Pairwise comparisons showed that 1st MGT and 2nd MGT did not differ ($p$ = 1). The same was true when comparing 1st MGT and 3rd MGT ($p$ = .087), and 2nd with 3rd MGT ($p$ = .067), showing that despite the overall reducing in DI scores, neither of the simple main effects were statistically robust.

(Table 21: *Descriptive Statistics for group 3 SFQ-R DI score after every MGT*)

| Group 3 MGT times | Mean | St. Deviation |
|---|---|---|
| 1st MGT | 4.53 | 5.173 |
| 2nd MGT | 4.47 | 5.713 |
| 3rd MGT | 2.76 | 3.649 |

(Figure 13: *Changes in SFQ-R DI mean scores for every time Group 3 completed the MGT.*)




*2.3.6 Dissociative states 30 min after and 1 hour after MGT.*

We conducted a series of one-way ANOVAs to compare the difference in dissociative states and DPDR experiences between groups at 30 minutes and at 1 hour after MGT.

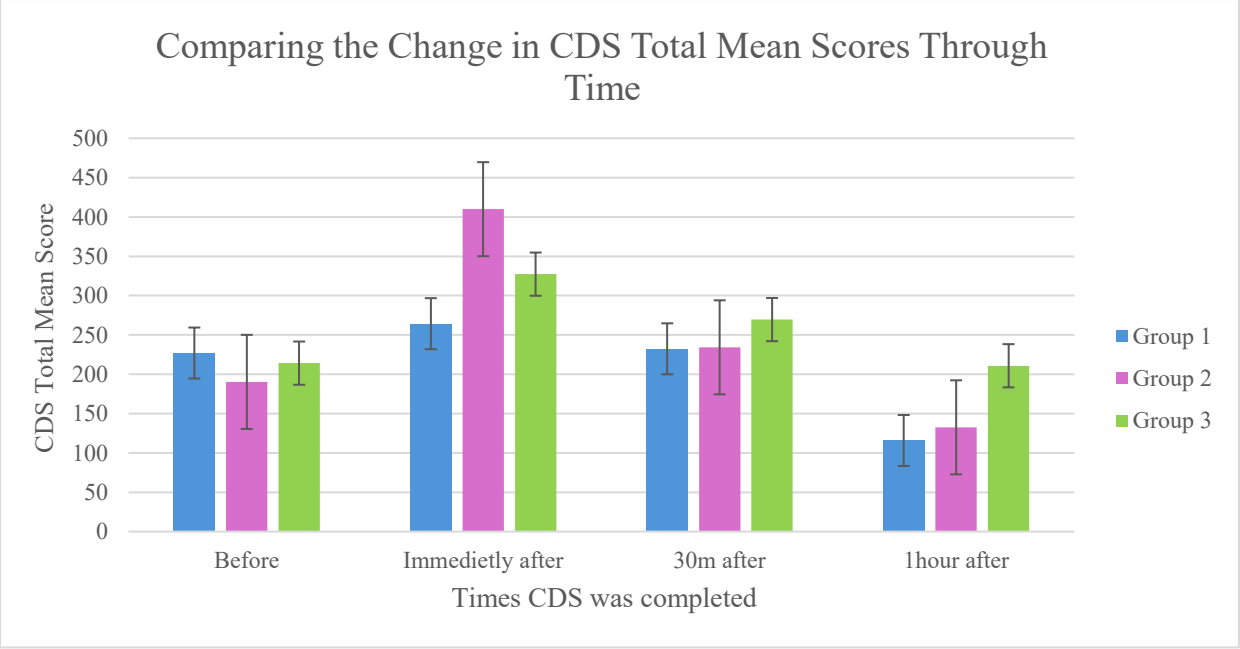
CDS-S total score at 30 minutes after the MGT did not differ between groups, $F$ (2, 49) = .074, $p$ = .929, partial $\eta 2$ = .003. The same was true at 1 hour after the MGT, $F$ (2, 49) = .512, $p$ = .602, partial $\eta 2$ = .020. Bonferroni-corrected post-hoc test for the CDS-S at 30 minutes showed no significant differences between groups 1 and 2 ($p$ = 1), groups 1 and 3 ($p$ = 1), or groups 2 and 3 ($p$ = 1). For the CDS total score at 1 hour we also found no differences between groups 1 and 2 ($p$ = 1), groups 1 and 3 ($p$ = 1), or groups 2 and 3 ($p$ = 1) (see *Table 22* and *Figure 14*).

(Table 22: *Descriptive Statistics for CDS total score 30 minutes and 1 hour after the MGT*)

| MGT Group | | Mean | St. Deviation |
|---|---|---|---|
| | 30 minutes after MGT | 232.35 | 339.659 |

| | | | |
|---|---|---|---|
| 10 minutes MGT | 1 hour after MGT | 115.824 | 235.128 |
| 30 minutes MGT | 30 minutes after MGT | 234.278 | 251.138 |
| | 1 hour after MGT | 132.556 | 212.513 |
| 3 x 10 minutes MGT | 30 minutes after MGT | 269.529 | 359.111 |
| | 1 hour after MGT | 210.824 | 399.299 |

(Figure 14: CDS total mean scores over time for each mirror gazing group. Please note that for Group 3 bar charts represent the first of three measurements at the point 'immediately after'.)




A one-way ANOVA for CADSS total score found no significant differences between groups at 30 minutes, $F$ (2, 47) = .022, $p$ = .979, partial $\eta 2$ = .001, and at 1 hour after the MGT, $F$ (2, 41) = .029, $p$ = .972, partial $\eta 2$ = .001. Bonferroni-corrected post-hoc tests at 30 minutes showed that there were no significant differences between groups 1 and 2 ($p$ = 1), groups 1 and

3 ($p$ = 1), or groups 2 and 3 ($p$ = 1). We also found no differences at 1 hour between groups 1 and 2 ($p$ = 1), groups 1 and 3 ($p$ = 1), or groups 2 and 3 ($p$ = 1) (see *Table 23* and *Figure 15*).

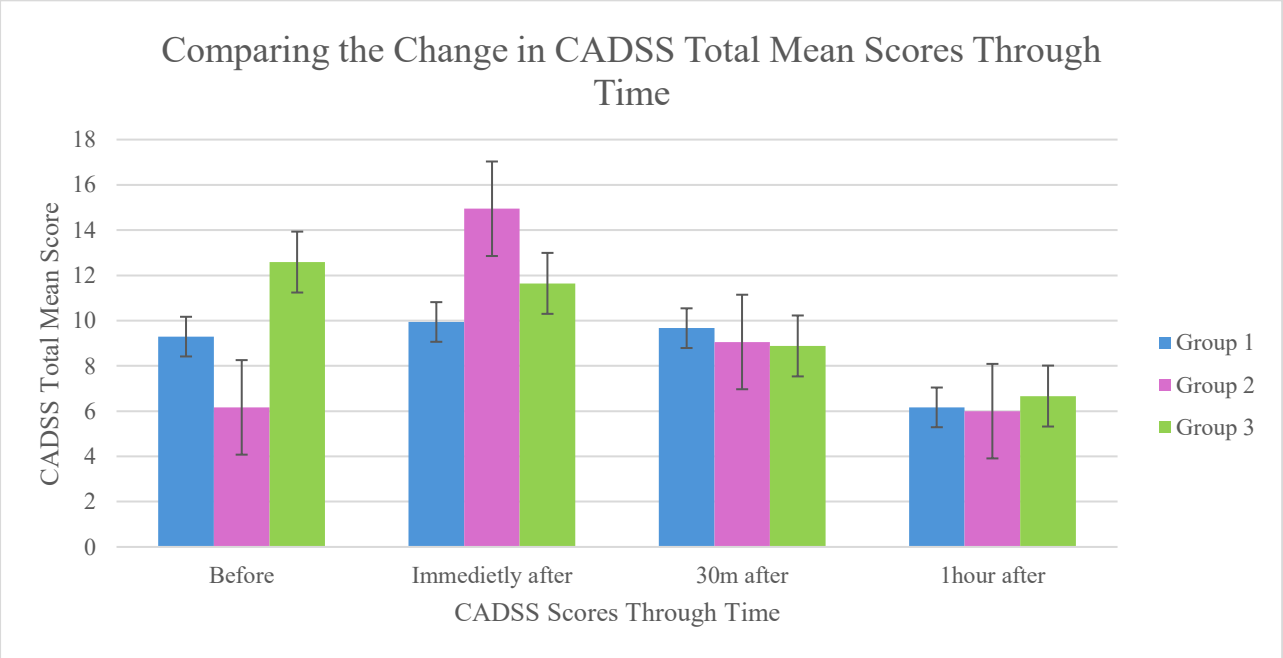
We then conducted one-way ANOVAs for all CADSS subscales for 30 minutes and 1 hour after MGT, and we found no statistically significant result in any of the 3 sub-scales: at 30 minutes: *DP*, $F$ (2, 49) = .038, $p$ = .963, partial $\eta 2$ = .002; *DR*, $F$ (2, 47) = .294, $p$ = .746, partial $\eta 2$ = .012; *Amnesia*, $F$ (2, 41) = .004, $p$ = .996, partial $\eta 2$ = .000; at 1 hour: *DP*, $F$ (2, 41) = .034, $p$ = .966, partial $\eta 2$ = .002; *DR*, $F$ (2, 41) = .131, $p$ = .878, partial $\eta 2$ = .006; *Amnesia*, $F$ (2, 41) = 2.598, $p$ = .087, partial $\eta 2$ = .112.

Bonferroni-corrected post-hoc test on CADSS subscales at 30 minutes and 1 hour after MGT found no differences between any of the pairs of groups at any of the CADSS subscales at any of the time points (all $p \geq .128$), (see *Tables 24* to *26* and *Figures 16* to *18*).

(Table 23: *Descriptive Statistics for CADSS total score 30 minutes and 1 hour after the MGT*)

| MGT Group | | Mean | St. Deviation |
|---|---|---|---|
| 10 minutes MGT | 30 minutes after MGT | 9.667 | 13.162 |
| | 1 hour after MGT | 6.167 | 7.396 |
| 30 minutes MGT | 30 minutes after MGT | 9.056 | 10.536 |
| | 1 hour after MGT | 6 | 8.023 |
| 3 x 10 minutes MGT | 30 minutes after MGT | 8.882 | 9.597 |
| | 1 hour after MGT | 6.667 | 8.567 |

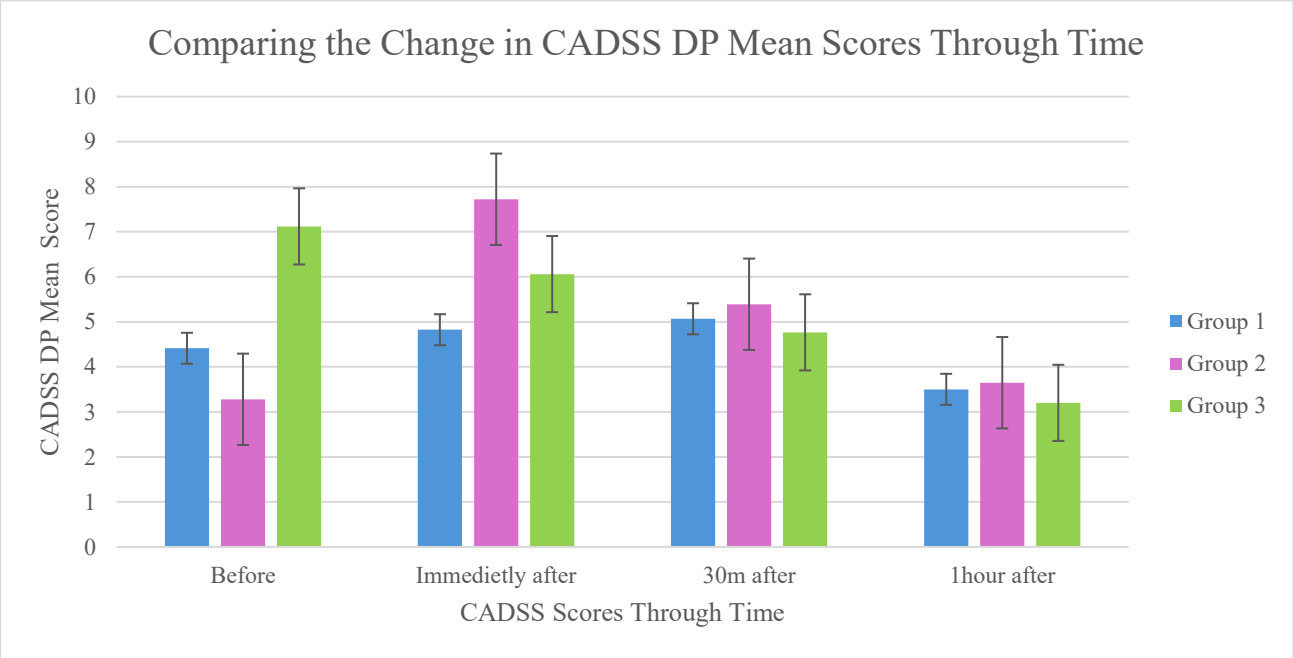
(Figure 15: CADSS total mean scores over time for each mirror gazing group. Please note that for Group 3 bar charts represent the first of three measurements at the point 'immediately after'.)




(Table 24: *Descriptive Statistics for CADSS DP score 30 minutes and 1 hour after the MGT*)

| MGT Group | | Mean | St. Deviation |
|---|---|---|---|
| 10 minutes MGT | 30 minutes after MGT | 3.92 | 5.79 |
| | 1 hour after MGT | 3.50 | 3.92 |
| 30 minutes MGT | 30 minutes after MGT | 5.59 | 7.02 |
| | 1 hour after MGT | 3.65 | 5.51 |
| 3 x 10 minutes MGT | 30 minutes after MGT | 5.07 | 6.39 |
| | 1 hour after MGT | 3.20 | 4.80 |

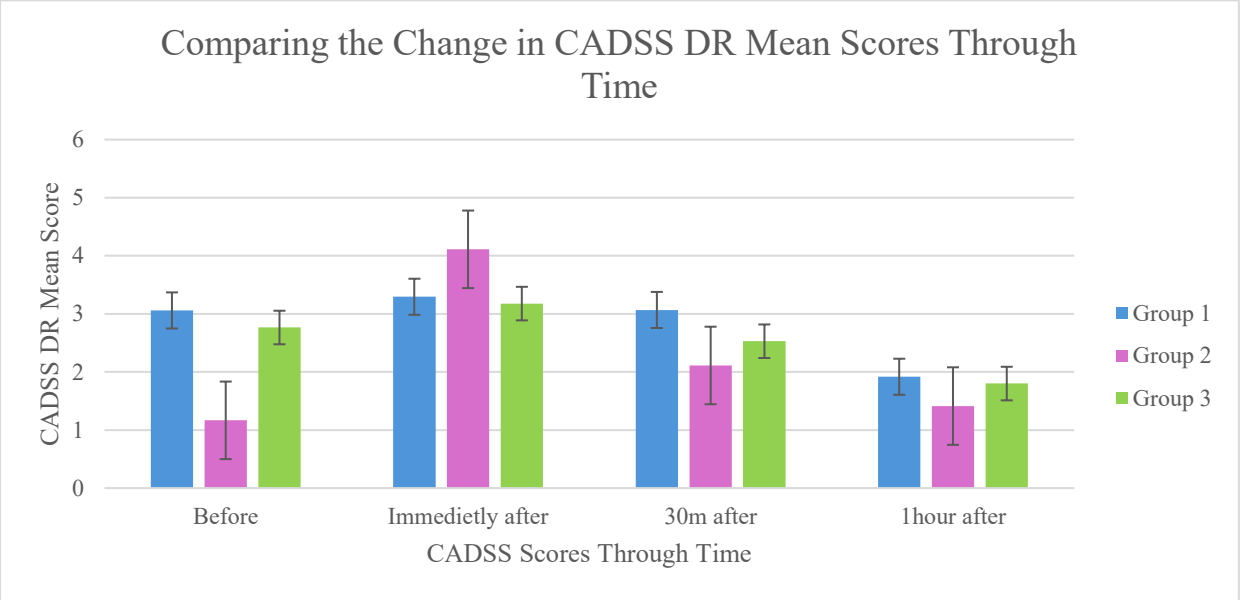
(Figure 16: CADSS DP mean scores over time for each mirror gazing group. Please note that for Group 3 bar charts represent the first of three measurements at the point 'immediately after'.)




(Table 25: *Descriptive Statistics for CADSS DR score 30 minutes and 1 hour after the MGT*)

| MGT Group | | Mean | St. Deviation |
|---|---|---|---|
| 10 minutes MGT | 30 minutes after MGT | 2.50 | 3.29 |
| | 1 hour after MGT | 1.92 | 3.29 |
| 30 minutes MGT | 30 minutes after MGT | 2.18 | 2.92 |
| | 1 hour after MGT | 1.41 | 2.32 |
| 3 x 10 minutes MGT | 30 minutes after MGT | 2.67 | 3.52 |
| | 1 hour after MGT | 1.80 | 2.79 |

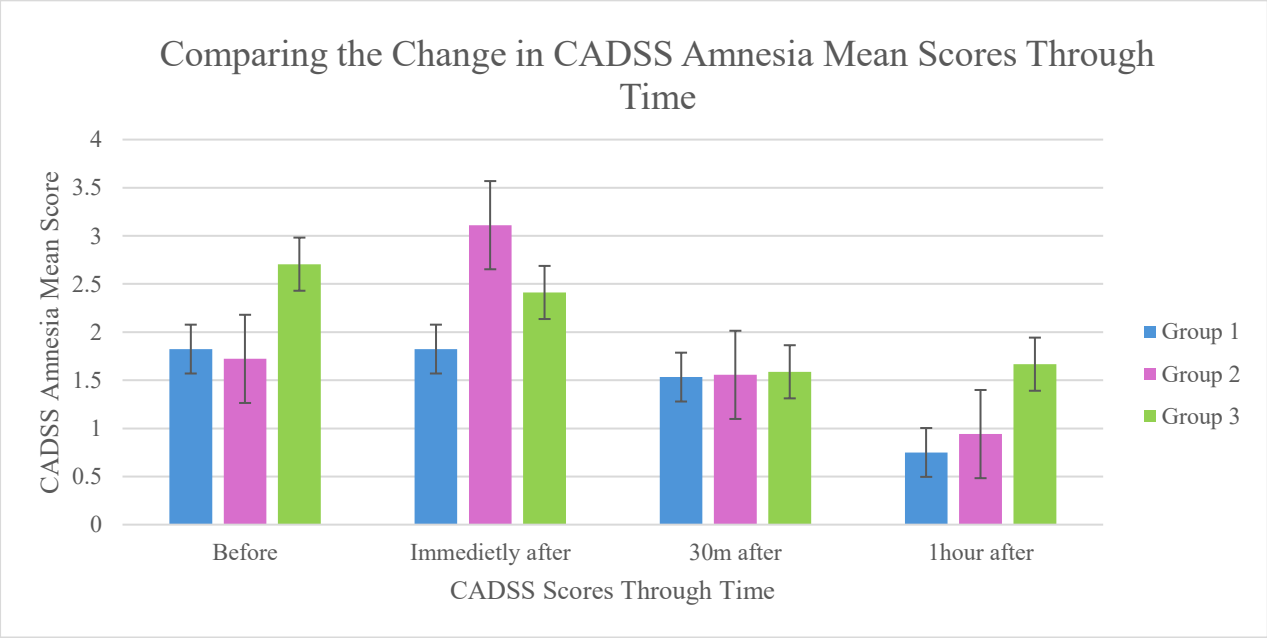
(Figure 17: CADSS DR mean scores over time for each mirror gazing group. Please note that for Group 3 bar charts represent the first of three measurements at the point 'immediately after')




(Table 26: *Descriptive Statistics for CADSS Amnesia score 30 minutes and 1 hour after the MGT*)

| MGT Group | | Mean | St. Deviation |
|---|---|---|---|
| 10 minutes MGT | 30 minutes after MGT | 1.33 | 1.67 |
| | 1 hour after MGT | .75 | .87 |
| 30 minutes MGT | 30 minutes after MGT | 1.59 | 1.73 |
| | 1 hour after MGT | .94 | .90 |
| 3 x 10 minutes MGT | 30 minutes after MGT | 1.67 | 1.54 |
| | 1 hour after MGT | 1.67 | 1.50 |

(Figure 18: CADSS Amnesia mean scores over time for each mirror gazing group. Please note that for Group 3 bar charts represent the first of three measurements at the point 'immediately after')




As *Figures 14* and *15* show, CDS-S and CADSS scores changed over time. So far, we have shown that this is reflected in statistical analyses demonstrating significant increases in dissociative state scores from before to immediately after MGT. The largest increases in dissociative states occurred in group 2, who were exposed to 30 minutes of mirror gazing.

Another set of GLMs was conducted to test how long these increases in dissociative states lasted. In other words, we wanted to determine if dissociative state scores reduced again over time at measurement points 30 minutes and 1 hour after MGT, and whether this differed between groups.

CDS-S total score at 30 minutes after MGT was significantly reduced when compared to the CDS-S score immediately after the MGT (only including the scores for the first time that group 3 completed the MGT), as shown by a significant main effect of time (immediately after vs. 30 minutes after MGT), $F(1, 49) = 7.445$, $p = .009$, partial $h^2 = .132$. This effect did not

interact with group, F (2, 49) = .319, p = .575, partial $h^2$ = .006. Pairwise comparison of the effects of time at each level of group showed that there were no significant differences for group 1, F (1, 49) = .319, p = .575, partial $h^2$ = .006, and group 3, F (1, 49) = 1.039, *p* = .313, partial $h^2$ = .021 Group 2's CDS-S total score, however, reduced significantly from immediately after MGT to 30 minutes after MGT, F (1, 49) = 10.164, p = .002, partial $h^2$ = .172.

Another GLM was conducted to determine if CDS-S total score at 30 minutes was comparable to the CDS-S score before mirror gazing, to test if participants' dissociative states as measured by CDS-S at 30 minutes post-MGT had returned to baseline. There was no effect of time (before vs. 30 minutes after MGT), F (1, 49) = .945, p = .336, partial $h^2$ = .019, nor a significant interaction between time and group, F (2, 47) = .175, p = .840, partial $h^2$ = .007. Pairwise comparison of the effects of time at each level of group showed that there were no significant differences for either of the groups, F (1, 49) ≤ .778, p ≥ .382, partial $h^2$ ≤ .016. This suggests that at 30 minutes after MGT, dissociative states had returned to baseline for all participants.

Interestingly, CDS-S total scores appeared to reduce further, as a GLM comparing scores at 30 minutes and at 1 hour after MGT found a main effect of time, *F* (1, 49) = 7.988, *p* = .007, partial $h^2$ = .140, without an interaction with group, F (2, 49) = .277, p = .759, partial $h^2$ = .011. On the other hand, a GLM comparing CDS-S scores at 1 hour after MGT with baseline scores (before MGT) did not find a main effect of time, *F* (1, 49) = 1.376, *p* = .246, partial $h^2$ = .027, similarly without an interaction with group, F (2, 49) = .397, p = .675, partial $h^2$ = .016. This suggests that CDS-S total scores reduced between 30 minutes and 1-hour post-MGT and numerically (but not statistically) undercut those measured before the MGT. In other words, the longer-term (1 hour later) effects of mirror gazing may be a reduction in dissociative states relative to baseline. Pairwise comparisons of the effects of time at each level of group showed that these reductions at 1 hour post-MGT were significant for the groups that had least

exposure to MGT. CDS-S scores in Group 1 (10 minutes MGT) reduced between 30 minutes and 1 hour post-MGT ($F (1, 49) = 4.164$, $p = .047$, partial $h^2 = .078$), while the other two group's scores did not ($F (1, 49) \leq 3.359$, $p \geq .073$, partial $h^2 \leq .064$. We were unable to find a similar effect of time for each group when comparing CDS-S scores at 1-hour post-MGT to baseline, $F (1, 41) \geq .002$, $p \leq .969$, partial $h^2 \geq .000$.

CADSS total score at 30 minutes after MGT was significantly reduced compared to the CADSS score immediately after the MGT (only including the scores for the first time that group 3 completed the MGT), as shown by a significant main effect of time (immediately after vs. 30 minutes after MGT), $F (1, 47) = 9.866$, $p = .003$, partial $h^2 = .173$. This effect did not interact with group, $F (2, 47) = 1.410$, $p = .254$, partial $h^2 = .057$. Pairwise comparison of the effects of time at each level of group showed that there were no significant differences for group 1, $F (1, 47) = .652$, $p = .423$, partial $h^2 = .014$, and group 3, $F (1, 47) = 2.208$, $p = .144$, partial $h^2 = .045$. Group 2's CADSS total score, however, reduced significantly from immediately after MGT to 30 minutes after MGT, $F (1, 47) = 10.605$, $p = .002$, partial $h^2 = .184$.

Another GLM was conducted to determine if CADSS total score at 30 minutes was comparable to the CADSS score before mirror gazing, to test if participants' dissociative states as measured by CADSS at 30 minutes post-MGT had returned to baseline. There was no effect of time (before vs. 30 minutes after MGT), $F (1, 47) = .240$, $p = .627$, partial $h^2 = .005$, nor a significant interaction between time and group, $F (2, 47) = 2.938$, $p = .063$, partial $h^2 = .111$. Pairwise comparison of the effects of time at each level of group showed that there were no significant differences for either of the groups, $F (1, 47) \leq 3.578$, $p \geq .065$, partial $h^2 \leq .071$. This suggests that at 30 minutes after MGT, dissociative states had returned to baseline for all participants.

Like CDS-S, CADSS total scores appeared to reduce further, as a GLM comparing scores at 30 minutes and at 1 hour after MGT found a main effect of time, $F(1, 41) = 9.168$, $p = .004$, partial $h^2 = .183$, without an interaction with group, $F(2, 41) = .361$, $p = .700$, partial $h^2 = .016$. Similarly, a GLM comparing CADSS scores at 1 hour after MGT with baseline scores (before MGT) found a main effect of time, $F(1, 41) = 5.407$, $p = .025$, partial $h^2 = .117$, without an interaction with group, $F(2, 41) = 2.265$, $p = .117$, partial $h^2 = .100$. This suggests that CADSS total scores reduced between 30 minutes and 1-hour post-MGT and both numerically and statistically undercut those measured before MGT. In other words, the longer-term (1 hour later) effects of mirror gazing may be a reduction in dissociative states relative to baseline. Pairwise comparisons of the effects of time at each level of group showed that these reductions at 1 hour post-MGT were significant for the groups that had had more exposure to MGT. CADSS scores in Group 2 (30 minutes MGT) reduced between 30 minutes and 1 hour post-MGT ($F(1, 41) = 6.220$, $p = .017$, partial $h^2 = .132$), while the other two group's scores did not ($F(1, 41) \leq 3.647$, $p \geq .063$, partial $h^2 \leq .082$, CADSS scores in Group 3 (3 x 10 minutes MGT) at 1 hour post-MGT undercut those at baseline ($F(1, 41) = 8.498$, $p = .006$, partial $h^2 = .172$), while this was not true for the other two groups ($F(1, 41) \leq 1.153$, $p \geq .289$, partial $h^2 \leq .027$).

## 2.4 Discussion

As expected, we were able to determine that mirror gazing is an effective method to induce dissociative state in 'healthy' individuals, as we were able to find a statistically significant dissociative state change, measured with CDS-S and CADSS, before vs. after the MGT. This is consistent with Caputo's findings (2010a). This interaction was led by group 2 (30 minutes MGT), helping us determine that this was the most efficient of the three MGT protocols. This was further corroborated by analysing how the three groups dissociative states reverted 30 minutes to an hour after MGT. Although all groups showed reduction in

dissociative states from the immediately after MGT to the 30 minutes, the group that showed the least amount of change was group 2 (when measured by CADSS, but not by CDS-S). Group 2 was also the group to show a reduction in dissociation below baseline at 30 minutes and 1 hour after MGT (when measured by CDS-S, but not by CADSS), suggesting that this group experienced the most effective induction of dissociative states and also the most effective rebound.

### 2.4.1 Strengths and Limitations

This experiment is one of the first experiments to explore alternative time procedures for the MGT in the hopes of finding stronger dissociative state changes. Furthermore, this is the first experiment to measure the how long these dissociative changes last once leaving the experimental room. Lastly, this is one of the only experiments that tested so many scales with the MGT, especially for the CDS-S state, expanding upon future possible methods of studying MGT and dissociative state induction in general. It is important to remember that the induced dissociation states are below the clinical level for diagnosed dissociation. We also showed for the first time that dissociative traits correlate with measures of the cognitive self. Correlations between dissociative and other common mental health symptoms like depression and anxiety are well documented (Černis et al., 2023), and one study has shown links between self-other confusion and depersonalisation-derealisation (see Gillmeister et al., 2024). The present thesis adds a documentation of relationships between trait dissociation, self-concept clarity and schizotypal personality. Specifically, we found that elevated levels of dissociation were linked with more schizotypal traits and with a less clear self-concept.

A limitation of the study is that we had some missing data from questionnaires, giving us a less complete picture of the interdependencies between mental health, dissociation, and cognitive self than we had anticipated from this study. Future research of this point in particular should generally include much larger and more diverse samples.

As previously mentioned, the CADSS should only be administered by a clinician, its inclusion was kept as it had been previously used for other MGT papers, more specifically used by Caputo (2010a). Our results however indicate that CDS-S might be a better alternative for testing dissociative state changes during MGT and would advise the potential exclusion of CADSS from future MGT papers.

Finally, it could be argued that leaving the lab after the MGT and the first (immediate) measures, to be resampled on CADSS and CDS-S outside of the lab back in daily life 30 minutes later and 1 hour later was not an optimal way to measure the duration of induced dissociated states. It is possible that remaining in the same (lab) environment for this time could have returned different results at 30 minutes and 1 hour. However, we suggest that for induced dissociation to be a meaningful paradigm, it was imperative to test its potential robustness by allowing participants to re-engage with their normal activities and probing any persistent effects this way. Our design choice avoided accidentally over-interpreting the strength and duration of the effects of MGT.

Finally, although self-reports indicated that induced dissociation had no measurable effects on self-awareness after 30 minutes, it is possible that there were other, perhaps indirect consequences of mirror gazing and induced dissociation that persisted for longer but that we did not capture with our measures. This is the subject of Chapter 3.

# Chapter 3: Sleep Study

## 3.1 Introduction

This experiment will compare the effects of induced dissociative states against a control group to have a clearer understanding on how dissociation can impact two of the most vital cognitive functions for everyday life: Sleep and Memory. Previous studies have linked the importance of sleep for memory consolidation, and Brewin et al. (2013), has demonstrated that

individuals who underwent the MGT produces a greater deterioration in what is remembered of a story read to them after induction from immediate recall to delayed recall (10 minutes later), compared to the deterioration experienced by the control group. We are interested in comparing effects of learning autobiographical, episodic (neutral, emotional), working, and procedural memory on immediate recall and recall after sleep (memory consolidation). We hypothesise that, compared to the control group, inducing dissociation will disrupt encoding and immediate retrieval of memory as well as memory consolidation and sleep. Disruptions were specifically expected for episodic memories affecting both neutral and emotional story retention, but may disproportionately affect emotional memories, as emotional numbing is a common dissociative symptom. The overnight consolidation of this and other memory types may also be affected by induced dissociation, which has not been tested before.

## 3.2 Method Section

### *3.2.1 Participants*

Ethical approval for this study was obtained from the University of Essex Ethics Sub Committee 3 (ETH2425-1278). Using G*Power (Erdfelder et al., 2009; Faul et al., 2007), an a priori power analysis was conducted to determine the total sample size required for detecting a significant (*one-tailed*) difference in the mean scores between two groups when conducting a t-test. The analysis suggested that we would need around 28 participants per group (56 in total) to detect a large effect size with a Cohen size of $d = 0.05$ and power of $1-\beta = 0.9$.

Previously, an a priori power analysis was conducted to determine the sample size required to detect a significant correlation between the scales used to determine participants' mental health wellbeing and pre-disposition to dissociating. It suggested that the analysis needed between 13 (coefficient of determination $\rho^2 = .5$) and 25 (coefficient of determination $\rho^2 = .3$) participants to detect a large to medium effect size with an alpha level of $\alpha = 0.05$ and power of $1-\beta = 0.9$.

Due to lack of time, we were only able to test a total of 21[†] participants (12 women, 9 men), ages ranging between 19 to 38 with a total mean age of 24.29 (SD = 4.027). Participants were separated into two groups, Group 1 (*Fixed Gazing group*) consisted of 10 participants (8 women, 2 men), age ranged between 21 to 38 (M = 25.4); whilst group 2 (*Mirror Gazing group*) consistent of 11 participants (4 women, 7 men), age range between 20 to 28 (M = 23.27). Participants were recruited through word-of-mouth and in-class advertisement. Participants were required to have normal or corrected-to-normal vision, and no previous history of a sleep disorder.

*3.2.2 Apparatus & Procedure*

Participants were invited to an overnight sleep experiment; they were instructed not to consume alcohol or caffeine at least 3 hours before the experiment. They were also asked to bring in nighttime essential, such as pyjamas, toothbrush and paste, etc. We encouraged term to bring any other personal item that they usually need to sleep, whether it be a stuffed animal, a specific pillow or a sleep mask. This was to create a sense of familiarity in the lab.

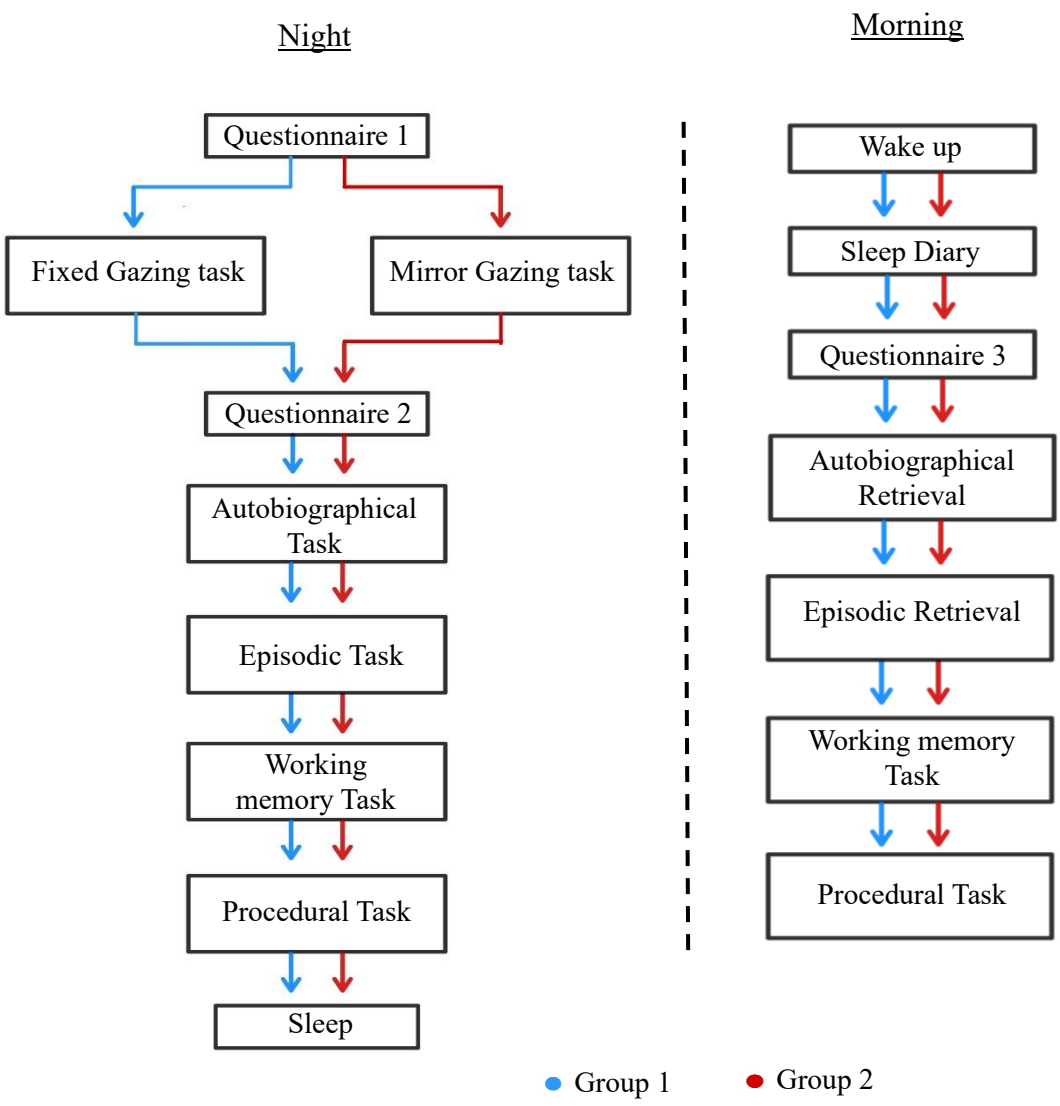
After reading through the participant information leaflet and signing the consent form, participants would then proceed to fill in the trait-specific screening questionnaires. The demographic questionnaire was designed to help us determine if participants had a history of depression, anxiety, dissociative states, dissociative tendencies, sleeping pattern as well as sleeping habits. This included the CDS-2 screening tool for possible depersonalisation-derealisation disorder (*see later*). Following the indicated cut-off from Michal et al. (2004), a score of ≥ 3 meant that participants were told that mirror gazing might not be advisable and offered to try it before committing to participate in the study. At the end there was no participant

[†] Total of 23 participant, however two participants were excluded from the overall experiment. First participant was excluded from group 1 due to them being 54 years old, and lastly the only participant from group 3 (23, non-binary).

who met the criteria for depersonalisation-derealisation disorder. All questions used in the demographic questionnaire can be seen in Table 23.

As seen in Figure 19, both conditional groups underwent a similar experimental procedure, with some varying degrees of differences. Participants in group 1 did a 30-minute mirror gazing task (MGT), as per our results from our pilot study *(see previous chapter)*. Group 2, on the other hand, did a fixed gazing task (FGT) for the same amount of time.

*(Figure 19: Experimental procedure for overnight sleep study)*

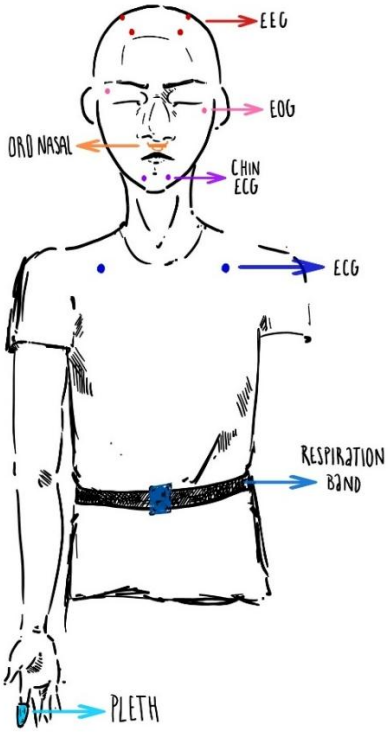


After each participant was allocated to their group, participants were instructed to enter a pop-up black tent that was 27,360 $m^3$, this tent was done to recreate the experimental booth used in the pilot study for the MGT. Inside the tent there was a tablet armchair with the same mirror. We used the same instructions and set up as the pilot study with the only exception being that the luminosity of the tent was at 0.17 lux, instead of 0.08 lux, due to the reflective material of the inside of the tent. The room where the tent was set up was kept in darkness to prevent any external light of making a difference in luminosity inside the tent and the room was kept at a temperature between 19 to 20 degrees Celsius to prevent overheating within the tent. Participants in the FGT were instructed to look at a 1x1cm cross placed on the back of the sleeve used to cover the mirror, distance to the mirror was kept as the same as for the MGT. Individuals who did the MGT that had a previous mental health conditions, such as BPD or individuals with PTSD symptoms, were given the chance of testing the experimental tent before the experiment, they were also talked more in-depth about the MGT in more depth and what they might experience. They were also encouraged to withdraw from the experiment if at any moment it was too intense.

Afterwards participants filled in a post-gazing task questionnaire (see *Table 23*) before starting the series of five tasks testing the participants' autobiographical, episodic (neutral, emotional), working, and procedural memory (s*ee Figure 20 for the order of the tasks).*

After completing the tasks, participants were instructed to finish their nighttime routine before attaching all the equipment for the overnight polysomnography recording (See Figure 20). Participants were given eight hours to sleep, giving participants the chance to wake up earlier if desired. Once awake, participants responded to questions about their dreams, if they had any. Before going home they did the memory tasks again, as indicated in *Figure 21*.

(Figure 20: *Sleep set up*)



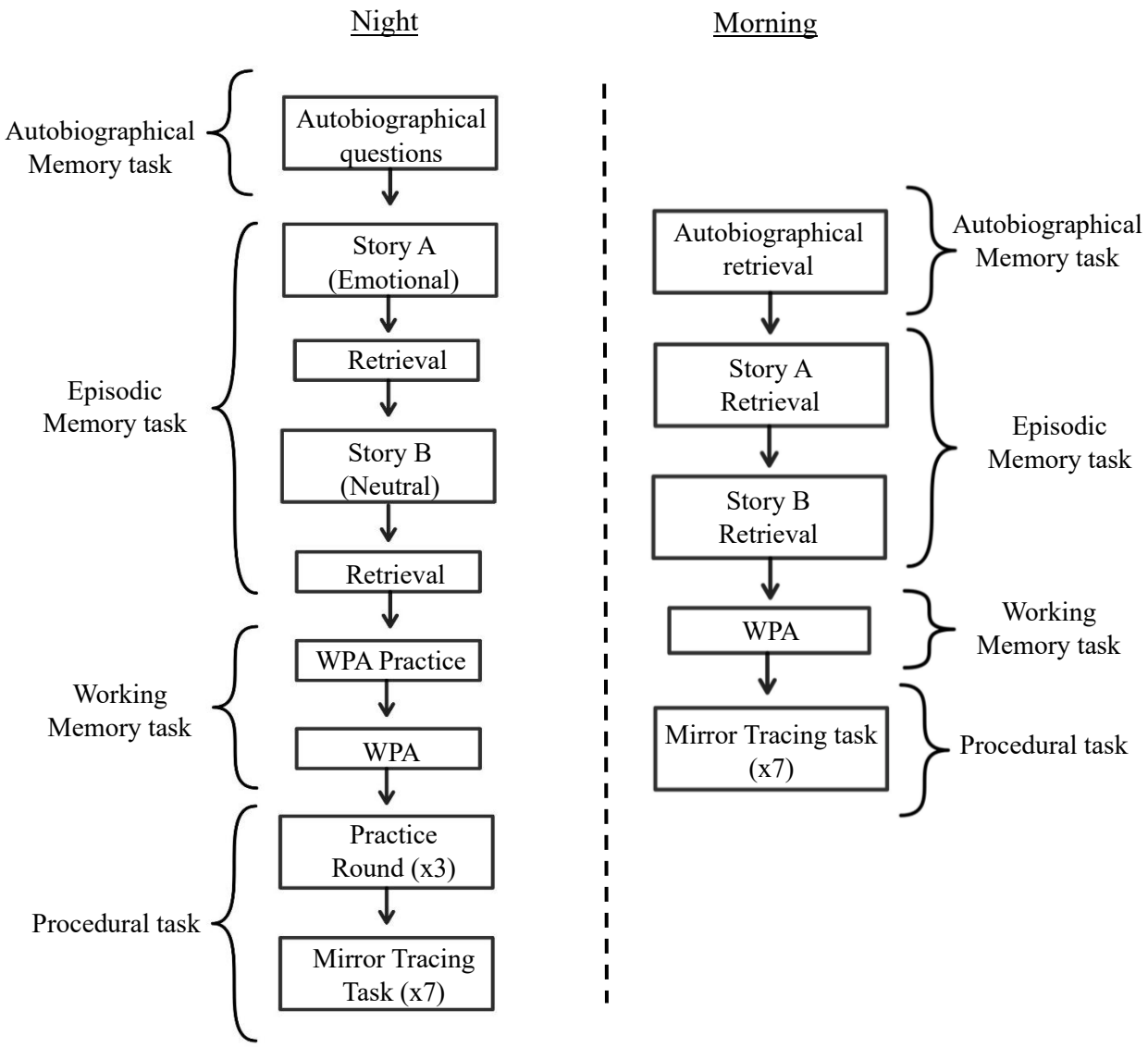

*3.3.3 Memory tasks*

The task used to test autobiographical memory were taken from Aly & Moscovitch (2010), where twelve standardised, personal questions regarding the participant's day, were asked the night of the experiment, the next morning participants were asked to recall all of the questions and the answersfrom the night before. We scored the participant for every time they were able to repeat their own answer, and another was given if they were able to either recall the question or give the same amount of detail as the night before. For example, the participant was asked if they listened to the news that morning, when recalling they would gain a point for remembering the question and another for their answer, if they only remembered their answer, the second point would be granted on the level of detail. These would then be added up to obtain the total score.

To test episodic memory, participants were told two stories from the Wechsler memory scale – revised (WMS-R; Elwood, 1991). It's important to note that the WMS-R is a cognitive battery ment to be performed by a clinician, we used one of their tasks as a standardised test;

thus, results have to be taken with a grain of consideration. They are then instructed to repeat the story with the same number of details. The two stories were told once during the night, were they had to complete an immediate recall, and the morning after. One of the stories is considered to be emotionally charged, whilst the other was neutral. This task was scored in accordance with the WMS-R manual (Elwood, 1991).

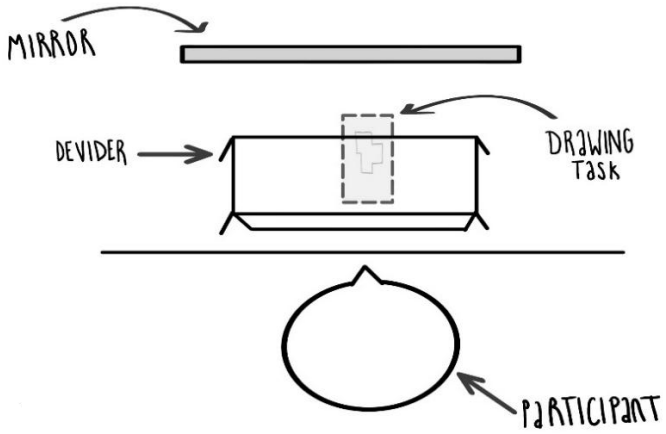
(Figure 21: *The order and procedure for the memory tasks*)




Finally, we based our working memory and procedural task on Hornung et al., 2007 paper, where participants completed a word-pair association (WPA), and a mirrored drawing

tracing task. For the WPA task participants were read 24-word pairs (i.e. chicken – submarine); then they were read the first word (i.e. chicken), and they had to repeat its pair (i.e. submarine). Participant did the task a total of three times, twice during the night (one being a practice round) and once in the morning, all the correctly remembered pairs were added to obtain the total score. The words used in the WPAs were retrieved and edited from WMS-R, however we did not replicate the task in which these words were retrieved from. For the drawing task, participants were instructed to trace inside the lines of eight drawings as quickly as possible while only able to view the drawing in a mirror. One of the drawings was used three times as a practice round; afterwards they would trace the other seven test drawings. Both the time taken to complete the task (7 test drawings) and the number of mistakes (occurrences of tracing outside the lines) were recorded. This task was done once during the night and once the morning after; however, the practice round was only done once at night. Participant were only told the time they took to complete each drawing during the practice round. To make sure that the participants would not be able to see their hands, a cardboard stand was placed in-between the sheet of paper and the participant, and a mirror was placed in front of the paper. The distance between the paper and the mirror was adjusted to each participant, to help account for the variance in participants height. All the seven drawings were done following the instructions of Hornung et al. (2007).

(Figure 22: Set up for drawing task)




*3.3.4 Scales/Measures*

We measured sleep and related concepts (SCI, MUPS, ESS), mental health including dissociation (DASS-21, ČESFA, CDS-2, CDS-T), and memory using trait surveys (SAM, CFQ) and brief tests (FMT), Measures of state dissociation were obtained before (CDS-S) and after mirror gazing (CDS-S, SFQ-R), as well as after sleep (CDS-S). Sleep and dream questions were also asked after sleep.

ČEFSA, CDS-S and SFQ-R were used exactly as in Study 1. All other measures are described as follows.

(Table 27: *measures in each questionnaire*)

| Demographics | | Post MGT | Next Morning |
|---|---|---|---|
| SCI | DASS-21 | CDS-S | Sleep Diary |
| FMT | ČESFA | SFQ-R | Dream |
| SAM | CDS-2 | | Questions |
| MUPS | CDS-T | | CDS-S |
| ESS | *(FMT* | | |
| CFQ | *recall)* | | |
| | CDS-S | | |

SCI

Sleep Condition Indicator (SCI; Espie et al., 2014) is an eight-item scale used to measure overall sleep quality, indicate a cutoff for clinically significant insomnia as well as a visual profile of night-time and daytime symptoms. Participants answer questions such as "How long does it take you to fall asleep?" in a 5-point Likert-scale; however, the 5 points are scaled differently depending on the question. All items are added to obtain the SCI total (min = 0, max = 32) with a higher score equating to better sleep.

MUPS

The Munich Parasomnia Screening (MUPS; Fulda et al., 2008) is a 21-item self-evaluation questionnaire to measure subjective experiences of 21 different parasomnias and other nocturnal behaviours, such as "Teeth grinding during the night". The parasomnias are separated into 4 sub-scales: 1) partial arousal during non-REM sleep, 2) REM Sleep parasomnias, 3) other parasomnias, and 4) other sleep related behaviour (Bosch et al., 2012). Sub-scale 1 consists of behaviours such as sleepwalking, confusional arousal, and pavor nocturnus (sleep terror). Sub-scale 2 consists of REM sleep behaviours disorders (RSBD), nightmares or sleep paralyses. Sub-scale 3 consists of other parasomnias that are not related to specific sleep stages. The lifetime history or frequency of each behaviour is assessed using a 7-point Likert-scale for the overall question "*Have you ever noticed the following behaviour*" and scored as: 1 = "No, never", 2 = "previously, years ago, but not now", 3 = "very rarely- less than once a year", 4 = "rarely – one or more times per year", 5 = "Sometimes – one or more times per month", 5 = "Frequently – one or more times per week", 6 = "Frequently – one or more times per week", and 7 = "Very frequently – every or nearly every night". MUPS usually also has a scale for "How do you know that the behaviour occurred?" to determine how the individual is aware of the behaviour, but this was replaced with adjusted instructions for the scale as "was observed by themselves or observed by others". Since there are no published scoring instructions for the MUPS, we decided to sum all items together and converting it into

a percentage, we furthermore summed all items in each of the 4 scales to obtain a score for each section as a subscale. Higher percentages indicated a greater likelihood of the participant having a parasomnia disorder.

ESS

The Epworth Sleepiness Scale (ESS; Johns, 1991), is an 8-item self-report measure for hypothetical level of daytime sleepiness, asking participants how likely they would fall asleep in scenarios such as "In a car, while stopped for a few minutes in the traffic". The scale uses a 4-point Likert-scale scored as: 1 = "*No chance of dozing*", 2 = "*Slight chance of dozing*", 3 = "*Moderate chance of dozing*", and 4 = "*High Chance of dozing*". The total score is obtained by summing all the items together, scores ranging between 0 and 24. Scores of 0-7 are considered as unlikely that the individual is abnormally sleepy, scores of 8-9 indicate that the individual has an average amount of daytime sleepiness, scores of 10-15 are indicate that one might be excessively sleepy, possibly recommended for medical attention, and scores of 16-24 are excessively sleepy and should consider seeking medical attention.

DASS-21

The depression anxiety stress scale-21 (DASS-21; Osman et al., 2012) is a 21-item version of a longer 42-item self-report measure for depression, anxiety and tension/stress. Items such as "I was aware of dryness of my mouth" are scored on a 4-point Likert-scale from 0 = "*Did not apply to me at all*", 1 = "*Applied to me to some degree, or some of the time*", 2 = "*Applied to me to a considerable degree or a good part of time*", to 3 = "*Applied to me very much or most of the time*". DASS-21 is separated into three groups in which each group contains 7 items that can be divided further into subscales (Henry & Crawford, 2005; Lovibond & Lovibond, 1995; Osman et al., 2012). The first group is depression, assessing dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest, anhedonia, and inertia

(items 3, 5, 10, 13, 16, 17, and 21 are summed and then multiplied by 2 to obtain the total score). The second group is anxiety, assessing autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experiences of anxious affect (items 2, 4, 7, 8, 9, 15, 19 and 20 are summed and then multiplied by 2 to obtain the total score). The stress scale is sensitive to levels of chronic non-specific arousal, such as, difficulty relaxing, nervous arousal and being easily upset/agitated (items 1, 6, 8, 11, 12, 14, and 21 are summed and then multiplied by 2 to obtain the total score). The cut-off for each group depends on their score as follows: Normal (*D = 0-9; A = 0-7; S = 0-14*), Mild *(D = 10-13; A = 8-9; S = 15-18*), Moderate (*D = 14-20; A = 10-14; S = 19-25*), Severe (*D = 21-27; A = 15-19; S = 26-33*), and Extremely Severe (*D = 28+; A = 20+; S = 34+*).

CDS-2

The Cambridge Depersonalization Scale-2 (CDS-2; Michal et al., 2011), is a 2-item version of the longer trait scale measuring depersonalization and derealisation (CDS-T; Sierra & Berrios, 2000), asking participants to scale from

answer questions such as “Out of the blue, I feel strange, as if I were not real or as if I were cut off from the world”. The scores are added to obtain the total, with a score of ≥ 3 being the cut-off for possible depersonalisation/derealization disorder. Participants who obtained such a score would have been asked to complete the full CDS-T; however, none of the sampled participants did.

FMT

We “created” a new false memory task (*FMT*), by selecting a 15-item world list obtained from Roediger & McDermott (1995)Click or tap here to enter text. paper. We used this task as an comparative measure of episodic memory and of false memory intrusions, however it is important to note that due to time constrainst this task was not validated, although we

recommend this for future papers. All words in the list were semantically related (i.e. Note, Instrument, Sounds). Participants were asked to tick each word as they memorized it, and they were asked to recall all items near the end of the questionnaire (*see table 27*). All correctly recalled word were converted to an overall percentage indicating episodic memory performance (0-100). The first false memory score was calculated by the number of participants who recalled the word "music" as a false memory, it was scored into 2-point Likert scale, where 0 = no music recalled and 1 = music recalled. Lastly, we summed the numbers of semantically related, but falsely recalled words (including music), as an additional false memory score.

SAM

The survey of autobiographical memory (SAM; Palombo et al., 2013), is 26-item questionnaires that assesses mnemonic capacities of future prospection, episodic autobiographical, semantic, and spatial memory, such as "I am highly confident in my ability to remember past events.". The first 8 items are for episodic events, items 9-14 are for semantic memory, items 15-20 are for spatial memory, and items 21-26 are for the future prospection. Items are scored on a 5-item Likert-scale where 1 = "Strongly disagree", 2 = "Disagree somewhat", 3 = "neither agree nor disagree", 4 = "Agree somewhat", and 5 = "Agree strongly"; except for items 1, 2, 10, 13, 17, 18, and 27, that are reversed scored. We scored SAM in accordance with Palombo et al. (2013). Higher scores indicate better self-rated mnemonic capacities.

CFQ

The Cognitive Failures Questionnaires (CFQ; Broadbent et al., 1982) is a 25-item questionnaire describing lapses in cognitive functioning, such as attention, perception, memory or motor function, that cause mishaps for everyday tasks, such as "Do you fail to notice signposts on the road?". The scale employs a scoring system quantifying the frequency and

severity of cognitive failures, that are measured on a 5-point Likert-scale from 4 = "*Very often*", 3 = "*Quite often*", 2 = "*Occasionally*", 1 = "*Very rarely*", to 0 = "*Never*". Items of the CFQ are summed together, with higher scores being indicative of a greater frequency of cognitive failure.

Sleep Diary & Dream Questionnaire

We conducted a series of questions regarding the participants' sleep and dream experiences with a particular interest in participants' connection to their self within the dream. Questions included if the participant had dreamt, how many and what types of dreams they had, and their main emotion during the dream. Most questions required participants to check boxes, or gauge an experience, except for 12 questions that related to depersonalisation-derealisation experiences within dreams, asked to slide a scale depending on the intensity of the experience, for example question 2 went from "very disconnected" to "connected to my world". The complete set of questions can be found in the Appendix.

3.4 Results

3.4.1 Trait-specific measures

Before analysing data, we conducted a series of one-way ANOVA or chi-square analysis to determine the if the demographic characteristics were equally distributed between groups. We first conducted a one-way between-group ANOVA for participant age, where we found no statistically significant difference between the groups, $F$ (1, 19) = 23.704, $p$ = .236, partial $\eta 2$ = .073. A chi-square goodness-of-fit test was then performed to evaluate whether gender was equally distributed between the groups. As seen in Table 28, we found no statistically significant difference in the groups for both women, $x^2(1, N = 12) = 1.333$, $p$ =.248, and men, $x^2(1, N = 9) = 2.778$, $p$ =.096.

*(Table 28: chi-square goodness-of-fit test for the gender of the participants)*

| | | Observed *N* | Expected *N* | Residual |
|---|---|---|---|---|
| Women | Control group | 8 | 6.0 | 2.0 |
| | MG group | 4 | 6.0 | -2.0 |
| | Total | 12 | | |
| Men | Control group | 2 | 4.5 | -2.5 |
| | MG group | 7 | 4.5 | 2.5 |
| | Total | 9 | | |

We then determined how the groups differed in anxiety, depression and stress, we were also interested in the number of participants that were above the "*severe*" threshold for their respective DASS (Depression Anxiety Stress Scale) category, as specified by Osman et al (2012). We fist conducted a one-way ANOVA for each of the subscales before conducting a chi-square goodness-of-fit test. We found no statistically significant difference for either of the three subscales: DASS-Stress, $F$ (1, 19) = .094, $p$ = .763, partial $\eta 2$ = .005; DASS-Anxiety, $F$ (1, 19) = .020, $p$ = .889, partial $\eta 2$ = .001; or DASS-Depression, $F$ (1, 19) = .979, $p$ = .335, partial $\eta 2$ = .049. Table 29 displays the means and standard deviation for DASS overall score and its sub-scales.

*(Table 29: Descriptive statistics for DASS sub-scales)*

| | | *M* | *SD* |
|---|---|---|---|
| DASS-Stress | Control group | 12.80 | 5.83 |
| | MG group | 11.82 | 8.46 |
| DASS-Anxiety | Control group | 9.60 | 4.30 |
| | MG group | 10.00 | 7.95 |
| DASS-Depression | Control group | 9.60 | 7.41 |
| | MG group | 13.45 | 10.08 |

We were unable to perform a chi-square goodness-of-fit test for DASS-anxiety as none of the participants was above the severity threshold. A chi-square goodness-of-fit test was then performed to evaluate whether severe depression was equally distributed between the groups, as seen in figure table 30, we found no statistically significant difference in the groups for both '*above the threshold*', $x^2(1, N = 4) = 1$, $p$ =.317, and '*below the threshold'*, $x^2(1, N = 17) = .059$, $p = .808$.

*(Table 20: chi-square goodness-of-fit test for the Depression of the participants)*

| | | Observed *N* | Expected *N* | Residual |
|---|---|---|---|---|
| *Above the "severe threshold".* | Control group | 1 | 2.0 | -1.0 |
| | MG group | 3 | 2.0 | 1.0 |
| | Total | 4 | | |
| *Below the "severe threshold".* | Control group | 9 | 8.5 | .5 |
| | MG group | 8 | 8.5 | -.5 |
| | Total | 17 | | |

Another chi-square goodness-of-fit test was then performed to evaluate whether the severity of the overall anxiety level was equally distributed between the groups. As seen in table 31, we found no statistically significant difference in the groups for both '*above the threshold*', $x^2(1, N = 4) = .000$, $p = 1$, and '*below the threshold'*, $x^2(1, N = 17) = .059$, $p$ = .808.

*(Table 31: chi-square goodness-of-fit test for the Anxiety of the participants)*

| | | Observed *N* | Expected *N* | Residual |
|---|---|---|---|---|
| *Above the "severe threshold".* | Control group | 2 | 2.0 | .0 |
| | MG group | 2 | 2.0 | .0 |
| | Total | 4 | | |
| *Below the "severe threshold".* | Control group | 8 | 8.5 | .5 |
| | MG group | 9 | 8.5 | -.5 |
| | Total | 17 | | |

Then, a series of one-way between subject ANOVA was conducted to compare the variance between groups for all 11 screening questionnaires and their respective sub-categories. We first conducted a one-way between-subjects ANOVA for all the scales that had no sub-scales SCI (Sleep Condition Indicator), ESS (Epworth Sleepiness Scale), CFQ (Cognitive Failure Questionnaire), ČEFSA (Černis Felt Sense of Anomaly Scale), CDS-2 and CDS-S (Cambridge Deperzonalisation Scale - State). The means and standard deviations for every scale are presented in table 32. We found no statistically significant difference between groups for SCI, $F$ (1, 19) = .215, $p$ = .648, , partial $\eta 2$ = .011; ESS, $F$ (1, 19) = 4.028, $p$ = .059, partial $\eta 2$ = .175; ČEFSA, $F$ (1, 19) = .785, $p$ = .387, partial $\eta 2$ = .040; and CDS-2, $F$ (1, 19) = .068, $p$ = .798, partial $\eta 2$ = .004;. In contrast we found a statistically significant difference for CFQ total score, $F$ (1, 19) = 5.593, $p$ = .029, partial $\eta 2$ = .227, as the participants allocated to the MG group reported more cognitive failures than the control group.

*(Table 32: Descriptive statistics for scales SCI, FMT, ESS, CFQ, ČESFA, CDS-2 and CDS-S)*

| | | *M* | *SD* |
|---|---|---|---|
| SCI | Control group | 6.22 | 2.04 |
| | MG group | 5.80 | 2.13 |
| ESS | Control group | 7.10 | 3.00‡ |
| | MG group | 9.82 | 3.19 |
| CFQ | Control group | 61.90 | 8.25 |
| | MG group | 75.36 | 16.16 |
| ČESFA | Control group | 10.00 | 5.33 |
| | MG group | 13.36 | 10.86 |

‡ Value has been rounded up to the second decimal; exact value was 2.998.

| | | | |
|---|---|---|---|
| CDS-2 | Control group | .20 | .63 |
| | MG group | .27 | .65 |

A one-way between-subjects ANOVA was conducted for the overall MUPS (Munich Parasomnia Scale) score and its subscales, were we found no statistically significant difference between the groups for the overall score, $F$ (1, 19) = .033, $p$ = .857, partial $\eta 2$ = .002, or any of its subscales: '*non-REM parasomnias*', $F$ (1, 19) = .044, $p$ = .836, partial $\eta 2$ = .002; *'REM-parasomnias'*, $F$ (1, 19) = 2.568, $p$ = .126; '*other-parasomnias'*, $F$ (1, 19) = .046, $p$ = .832, partial $\eta 2$ = 119; and '*other sleep related behaviour*', $F$ (1, 19) = .001, $p$ = .971, partial $\eta 2$ = .000. Table 33 displays the means and standard deviation for MUPS overall score and its sub-scales.

*(Table 33: Descriptive statistics for MUPS, and it's sub-scales)*

| | | *M* | *SD* |
|---|---|---|---|
| MUPS overall score | Control group | 20.70 | 10.22 |
| | MG group | 21.45 | 8.74 |
| non-REM parasomnias | Control group | 2.70 | 1.77 |
| | MG group | 2.91 | 2.66 |
| REM-parasomnias | Control group | 2.90 | 1.91 |
| | MG group | 4.00 | 1.18 |
| other parasomnias | Control group | 10.10 | 5.26 |
| | MG group | 10.55 | 4.23 |
| other sleep related behaviour | Control group | 3.50 | 3.14 |
| | MG group | 3.54 | 2.42 |

Another one-way between-subjects ANOVA was conducted for the correctly remembered FMT (False Memory Test) prompt words ('*FMT-Correct'*), and the false memory measures. Table 34 displays the means and standard deviation for these. We did not find a statistically significant difference between the groups for the overall FMT-correct scores, $F$ (1, 19) = 2.458, $p$ = .133, partial $\eta 2$ = .115, or for '*FMT-False memory (music)*', $F$ (1, 19) = 2.436,

$p$ = .135, partial $\eta 2$ = .114, or '*FMT-False memory (other)*', $F$ (1, 19) = 1.430, $p$ = .246, partial $\eta 2$ = .070.

*(Table 34: Descriptive statistics for FMT, and it's sub-scales)*

| | | *M* | *SD* |
|---|---|---|---|
| *FMT-Correct* | Control group | 3.90 | 2.60 |
| | MG group | 5.55 | 2.21 |
| *FMT-False memory (music)* | Control group | .50 | .53 |
| | MG group | .18 | .40 |
| *FMT-False memory (other)* | Control group | 1.70 | 1.70 |
| | MG group | 1.00 | .89 |

The last one-way between-subjects ANOVA was then conducted for the overall SAM score and its subscales. *Table 35* displays the means and standard deviation for SAM overall score and its sub-scales. We found no statistically significant difference between the groups for the overall score, $F$ (1, 19) = 1.872, $p$ = .187, partial $\eta 2$ = .090, or most of the SAM subscales: Episodic memory, $F$ (1, 19) = .703, $p$ = .412, partial $\eta 2$ = .036; Semantic memory, $F$ (1, 19) = 2.215, $p$ = .153, partial $\eta 2$ = .104; and Future memory, $F$ (2, 47) = .136, $p$ = .716, partial $\eta 2$ = 007. The only subscale that had a statistically difference between the groups was Spatial memory, $F$ (1, 19) = 4.609, $p$ = .045, partial $\eta 2$ = .195.

*(Table 35: Descriptive statistics for SAM, and it's sub-scales)*

| | | *M* | *SD* |
|---|---|---|---|
| SAM overall Score | Control group | 99.91 | 14.25 |
| | MG group | 92.16 | 11.71 |
| Episodic memory | Control group | 100.86 | 12.99 |
| | MG group | 95.72 | 14.88 |
| Semantic memory | Control group | 99.74 | 4.45 |
| | MG group | 97.58 | 1.80 |
| Spatial memory | Control group | 105.27 | 10.03 |

| | | | |
|---|---|---|---|
| | MG group | 91.55 | 17.77 |
| Future memory | Control group | 95.75 | 13.60 |
| | MG group | 93.84 | 10.05 |

Our two participant groups were tailored through screening to ensure that they differed the least amount in age, sex and mental health and related variables. Although we were mostly successful, the only scale where we could not ensure a balance was for SAM sub-scale Spatial memory, as well as the CFQ total score.

3.4.2 Correlations between screening measures

All scales and performance measures were entered into one Bonferroni-corrected correlational analysis. However, the measures were grouped into categories for better legibility when reporting our findings. The first group is *'Mental wellbeing scales'*, compromised of DASS-21's subscales DASS-stress, DASS-anxiety, and DASS-depression. Afterwards, we have '*Dissociative scales*' compromised of, CDS-2, and ČESFA. Group *'Sleep scales'* is comprised of SCI, MUPS, and ESS. The last group is *'Memory Scales'*, and it's comprised of FMT-correct, CFQ, and SAM subscales: SAM-episodic, SAM-semantic, SAM-spatial, and SAM-future.

A Kolmogorov-Smirnov test of normality was first conducted on the questionnaire responses. For the *'Mental wellbeing scales'* all scales were normally distributed: DASS-stress, $D(21) = .149$, $p = .200$; DASS-anxiety, $D(21) = .155$, $p = .200$; and, DASS-depression, $D(21) = .137$, $p = .200$. In the *'Dissociative scales'* only ČESFA, $D(21) = .169$, $p = .120$, proved to be normally distributed, whilst CDS-2 was not normally distributed, $D(21) = .506$, $p = <.001$. All scales in the *'Sleep scales'* were normally distributed: SCI, $D(21) = .180$, $p = .073$; MUPS, $D(21) = .161$, $p = .162$; and, ESS, $D(21) = .106$, $p = .200$. Finally, the only scale in the *'Memory Scales'* that was not normally distributed was FMT-correct, $D(21) = .214$, $p = .013$; Whilst, SAM-episodic, $D(21) = .155$, $p = .200$; SAM-semantic, $D(21) = .155$, $p = .200$; SAM-spatial,

D (21) = .155, $p$ = .200; SAM-future, D (21) = .155, $p$ = .200; and finally CFQ, D (21) = .155, $p$ = .200, were all normally distributed. Given our results, for all the scales that were normally distributed we will employ a Pearsons parametric correlation, however a *Spearman's* non-parametric test of correlation will also be employed for the two scales that were found to be not normally distributed. To determine an adequate α-level cut off for all of our correlations, we employed a multiple comparison Bonferroni correction:

$$\frac{\alpha_{original}}{n} = \alpha_{new}$$

The Bonferroni correction adjusts the $\alpha$-level by dividing the original alpha (0.05) by the numbers of tests being conducted ($n$). As we conducted 91 correlations between our trait measures, only correlations found at or underneath the threshold of <.001 will be reported as significant (0.05/91= 0.00055).

To determine if the mental health scales in the demographic questionnaire correlated between each other a Pearsons's correlation was conducted. DASS Stress positively correlated with both depression and anxiety.

(Table 36: *Correlation between all mental health scales used in the demographic questionnaire*)

| | | DASS Depression | DASS Anxiety |
|---|---|---|---|
| DASS Stress | Pearsons's correlation | .638* | .615* |
| | Sig. *(1-tailed)* | <.001[§] | .001 |
| DASS Anxiety | Pearsons's correlation | .261 | |
| | Sig. *(1-tailed)* | .126 | |

**Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).

[§]The exact value of $p$ = 0.0009365

Blue = Higher scores indicate worse cognition/mental health/sleep.

To determine if the dissociative scales correlated with each other a Spearman's correlation was conducted, finding no significant correlation (see Table 37).

(Table 37: *Correlation between all dissociative scales used in the demographic questionnaire*)

| | | CDS-2 |
|---|---|---|
| ČESFA | Spearman's Correlation | .092 |
| | Sig. *(1-tailed)* | .346 |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).
Blue = Higher scores indicate worse cognition/mental health/sleep.
Grey = Spearman's Correlations.

To determine if the sleep scales correlated a Pearsons's correlation was conducted, indicating no significant correlations (see Table 38).

(Table 38: *Correlation between all sleep scales used in the demographic questionnaire)*

| | | MUPS | ESS |
|---|---|---|---|
| SCI | Pearsons's correlation | -.338 | .133 |
| | Sig. *(1-tailed)* | .067 | .283 |
| ESS | Pearsons's correlation | .039 | |
| | Sig. *(1-tailed)* | .433 | |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).

Blue = Higher scores indicate worse cognition/mental health/sleep.
Green = Higher scores indicate better cognition/mental health/sleep.

To determine if the different memory scales correlated with each other a Pearsons's and a Spearman's correlation was conducted. Results indicated that SAM subscale episodic memory correlated negatively with CFQ and positively with SAM subscales future, spatial and semantic memory. Lastly, SAM subscale spatial correlated negatively with CFQ and positively with SAM subscale Future. However, none of the correlations passed the requirements for Bonferroni correction (Table 39).

(Table 39: *Correlation between all memory scales used in the demographic questionnaire*)

| | | CFQ | SAM Future | SAM Spatial | SAM Semantic | SAM Episodic |
|---|---|---|---|---|---|---|
| FMT | Spearman's Correlation | -.117 | .088 | -.369 | -.085 | -.085 |
| | Sig. *(1-tailed)* | .307 | .352 | .050 | .357 | .357 |
| SAM Episodic | Pearsons's correlation | -.511* | .427* | .462* | .547* | |
| | Sig. *(1-tailed)* | .009 | .027 | .017 | .005 | |
| SAM Semantic | Pearsons's correlation | -.265 | .292 | .329 | | |
| | Sig. *(1-tailed)* | .123 | .100 | .072 | | |
| SAM Spatial | Pearsons's correlation | -.497* | .448* | | | |
| | Sig. *(1-tailed)* | .011 | .021 | | | |
| SAM Future | Pearsons's correlation | -.269 | | | | |
| | Sig. *(1-tailed)* | .119 | | | | |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).
Blue = Higher scores indicate worse cognition/mental health/sleep.
Green = Higher scores indicate better cognition/mental health/sleep.
Grey = Spearman's Correlations.

To determine if dissociative scales correlated with the mental health scales a Pearsons's and a Spearman's correlation were conducted. ČESFA correlated with DASS Depression however that correlation did not pass Bonferroni correction (Table 40).

(Table 40: C*orrelation between dissociative scales and mental health scales used in the demographic questionnaire*)

| | | DASS Stress | DASS Anxiety | DASS Depression |
|---|---|---|---|---|
| ČESFA | Pearsons's correlation | .315 | .343 | .521* |
| | Sig. *(1-tailed)* | .082 | .064 | .008 |
| CDS-2 | Spearman's Correlation | .135 | .059 | .009 |
| | Sig. *(1-tailed)* | .280 | .400 | .485 |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).
Blue = Higher scores indicate worse cognition/mental health/sleep.
Grey = Spearman's Correlations.

To determine if the dissociative scales correlated with the sleep scales a Pearsons's and a Spearman's correlation were conducted. We were unable to find any correlation that was considered statistically significant under the Bonferroni correction (Table 41).

(Table 41: C*orrelation between dissociative scales and sleep scales used in the demographic questionnaire*)

| | | SCI | MUPS | ESS |
|---|---|---|---|---|
| ČESFA | Pearsons's correlation | -.400* | .290 | -.008 |
| | Sig. *(1-tailed)* | .036 | .101 | .487 |
| CDS-2 | Spearman's correlation | -.269 | .028 | .296 |
| | Sig. *(1-tailed)* | .119 | .452 | .097 |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).

Blue = Higher scores indicate worse cognition/mental health/sleep.
Green = Higher scores indicate better cognition/mental health/sleep.
Grey = Spearman's Correlations.

To determine if the dissociative scales correlated with memory a Pearsons's and a Spearman's correlation were conducted. ČESFA negatively correlated with SAM subscale episodic memory and CFQ. Furthermore, CDS-2 positively correlated with SAM subscale spatial memory. However, none of the correlations passed Bonferroni correction (Table 42).

(Table 42: C*orrelation between dissociative scales and memory scales used in the demographic questionnaire*)

| | | FMT | SAM Episodic | SAM Semantic | SAM Spatial | SAM Future | CFQ |
|---|---|---|---|---|---|---|---|
| ČESFA | Pearsons's correlation | -.129 | -.404* | -.060 | -.257 | -.191 | .384* |
| | Sig. *(1-tailed)* | .289 | .035 | .398 | .130 | .204 | .043 |
| CDS-2 | Spearman's Correlation | -.029 | .172 | .030 | .380* | .209 | -.162 |
| | Sig. *(1-tailed)* | .450 | .228 | .449 | .045 | .181 | .242 |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).
Blue = Higher scores indicate worse cognition/mental health/sleep.
Green = Higher scores indicate better cognition/mental health/sleep.
Grey = Spearman's Correlations.

Then, to determine if mental health scales correlated with sleep scales a Pearsons's correlation was conducted. We were unable to find any correlation between the scales (Table 43).

(Table 43: C*orrelation between mental health scales and sleep used in the demographic questionnaire*)

| | | SCI | MUPS | ESS |
|---|---|---|---|---|
| DASS Stress | Pearsons's correlation | -.261 | -.022 | .191 |
| | Sig. *(1-tailed)* | .126 | .463 | .204 |
| DASS Anxiety | Pearsons's correlation | -.219 | .213 | .271 |
| | Sig. *(1-tailed)* | .170 | .177 | .117 |
| DASS Depression | Pearsons's correlation | -.031 | .065 | .284 |
| | Sig. *(1-tailed)* | .447 | .390 | .106 |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).
Blue = Higher scores indicate that they present to be worse in cognition/mental health/sleep.
Green = Higher scores indicate that they present to be better in cognition/mental health/sleep.

We conducted a Pearsons's and a Spearman's correlation to determine if mental health scales correlated with the memory scales. SAM subscale episodic memory correlated negatively with DASS subscale stress and DASS anxiety, whilst SAM subscale semantic memory correlated negatively with DASS depression. However, none of the correlations passed Bonferroni correction (Table 44).

(Table 44: C*orrelation between memory scales and mental health scales used in the demographic questionnaire*)

| | | DASS Stress | DASS Anxiety | DASS Depression |
|---|---|---|---|---|
| FMT | Spearman's Correlation | .085 | -.086 | .086 |
| | Sig. *(1-tailed)* | .356 | .355 | .355 |
| SAM Episodic | Pearsons's correlation | -.510* | -.382* | -.326 |
| | Sig. *(1-tailed)* | .009 | .044 | .074 |
| SAM Semantic | Pearsons's correlation | -.253 | -.064 | -.508* |
| | Sig. *(1-tailed)* | .135 | .391 | .009 |
| SAM Spatial | Pearsons's correlation | -.090 | -.097 | -.248 |
| | Sig. *(1-tailed)* | .349 | .338 | .139 |
| SAM | Pearsons's correlation | -.069 | -.140 | -.135 |

| | | | | |
|---|---|---|---|---|
| Future | Sig. *(1-tailed)* | .383 | .273 | .279 |
| CFQ | Pearsons's correlation | .345 | .230 | .265 |
| | Sig. *(1-tailed)* | .063 | .158 | .122 |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).
Blue = Higher scores indicate that they present to be worse in cognition/mental health/sleep.
Green = Higher scores indicate that they present to be better in cognition/mental health/sleep.
Grey = Spearman's Correlations.

Finally, a Pearsons's and a Spearman's correlation were conducted to determine if memory measures correlated with sleep scales. SCI positively correlated with FMT, as well as negatively with SAM subscale future memory and CFQ. ESS also correlated negatively with SAM subscale semantic memory and positively with CFQ. However, none of these passed the Bonferroni correction (Table 45).

(Table 45: C*orrelation between memory scales and sleep scales used in the demographic questionnaire*)

| | | SCI | MUPS | ESS |
|---|---|---|---|---|
| FMT | Spearman's Correlation | .454* | -.275 | .099 |
| | Sig. *(1-tailed)* | .019 | .114 | .357 |
| SAM Episodic | Pearsons's correlation | .035 | -.263 | -.354 |
| | Sig. *(1-tailed)* | .439 | .124 | .058 |
| SAM Semantic | Pearsons's correlation | -.208 | -.367 | -.478* |
| | Sig. *(1-tailed)* | .183 | .051 | .014 |
| SAM Spatial | Pearsons's correlation | -.263 | .018 | -.315 |
| | Sig. *(1-tailed)* | .125 | .470 | .082 |
| SAM Future | Pearsons's correlation | -.454 | .060 | -.254 |
| | Sig. *(1-tailed)* | .019 | .398 | .134 |
| CFQ | Pearsons's correlation | -.385* | .017 | .421* |
| | Sig. *(1-tailed)* | .043 | .472 | .029 |

** Correlation is significant at the <.001 level (*1-tailed*).
* Correlation is significant at the 0.05 level (*1-tailed*).
Blue = Higher scores indicate worse cognition/mental health/sleep.

Green = Higher scores indicate better cognition/mental health/sleep.
Grey = Spearman's Correlations.

In conclusion, we found some trait-specific scales that correlated with each other; however most likely due to an inadequate sample size, none was able to pass the Bonferroni correction. We are positive that given a higher sample size more scales would pass the Bonferroni correlation, as some of the few significant correlation where in the expected directions. For example, the negative correlation between a worse mental health and more dissociative symptoms (e.g. the correlation between ČESFA and DASS depression scale, $r$ (51) = .521, $p$ = .008), or worse sleep indicating worse memory (e.g. the correlation between SAM semantic scale and ESS scale, $r$ (51) = -.478, $p$ = .014). Finally, we were expecting to find a bigger relationship between the two dissociative scales, however potential lack of correlation could be due to CDS-s being very specific to DPDR symptoms, whilst ČESFA covers a broader range of dissociative symptoms.

3.4.3 Dissociative states before, immediately after, and the morning after Gazing Tasks.

We conducted series of independent *t*-test to compare the difference in CDS-S (Cambridge Deperzonalisation Scale – State version) score during the three separate times participants filled in the scale. The results of the first independent *t*-test indicated that there was no statistically significant difference in CDS-S mean scores before the gazing task (GT) when comparing the control group ($M$ = 105.60, $SD$ = 179.46) with the MG group ($M$ = 165.09, $SD$ = 172.36), $t$ (19) = -.773, $p$ = .225, $d$ = -.338.

An independent *t*-test was a conducted to compare the difference between groups for the CDS-S mean scores immediately after completing the GT. There was a significant difference between the control group (M = 181.80; SD = 210.75) and the MG group (M =

512.01; SD = 511.01), $t$ (19) = -1.904, $p$ = .036, $d$ = -.832, because more dissociative states were reported by the MG group.

A third independent $t$-test indicated that there was a significant difference in CDS-S scores the morning after the GT when comparing between the control group (M = 83.90; SD = 127.52) and the MG group (M = 298; SD = 361.45), $t$ (19) = -214.10, $p$ = .046, $d$ = -.774, as dissociative states were still more present in the MG group in the morning.

A paired-samples t-test was conducted to demonstrate the difference between in CDS-S mean scores before vs. immediately after they had completed the GT. The results indicated that there was a significant increase in CDS-S scores in both the control group ($M$ = 76.20, $SD$ = 115.74), $t$ (9) = -2.082, $p$ = .034, $d$ = .658, and the MG group ($M$ = 347.81, $SD$ = 426.46), $t$ (10) = -2.705, $p$ = .011, $d$ = .816.

Another paired-samples t-test was conducted to demonstrate the difference in CDS-S mean scores, immediately after vs. the morning after they had completed the GT. The results indicated a significant overnight reduction in CDS-S scores in the control group ($M$ = 97.90, $SD$ = 103.94), $t$ (9) = 2.979, $p$ = .008, $d$ = .942, and in the MG group ($M$ = 214.91, $SD$ = 246.71), $t$ (10) = 2.889, $p$ = .008, $d$ = .871.

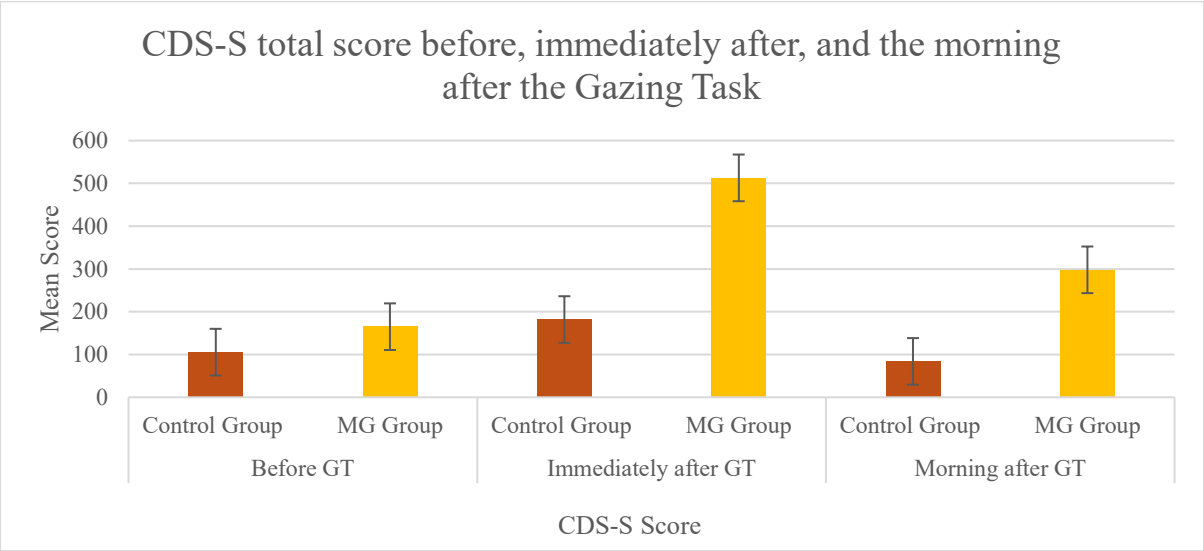
Applying a Bonferroni correction for these five t-tests, however, means that only the overnight reduction in CDS-S scores passes the new α level of 0.01.

*(Table 46: Descriptive statistics for CDS scores before, immediately after, and the morning after the Gazing Task.)*

| | | *M* | *SD* |
|---|---|---|---|
| Before the GT. | Control group | 105.60 | 172.36 |
| | MG group | 165.09 | 179.46 |
| Immediately after the GT. | Control group | 181.80 | 210.75 |

| | | | |
|---|---|---|---|
| | MG group | 512.91 | 511.01 |
| The morning after GT. | Control group | 83.90 | 127.52 |
| | MG group | 298 | 361.45 |

(Figure 23: *CDS total mean scores before, immediately after, and the morning after GT for each group.)*



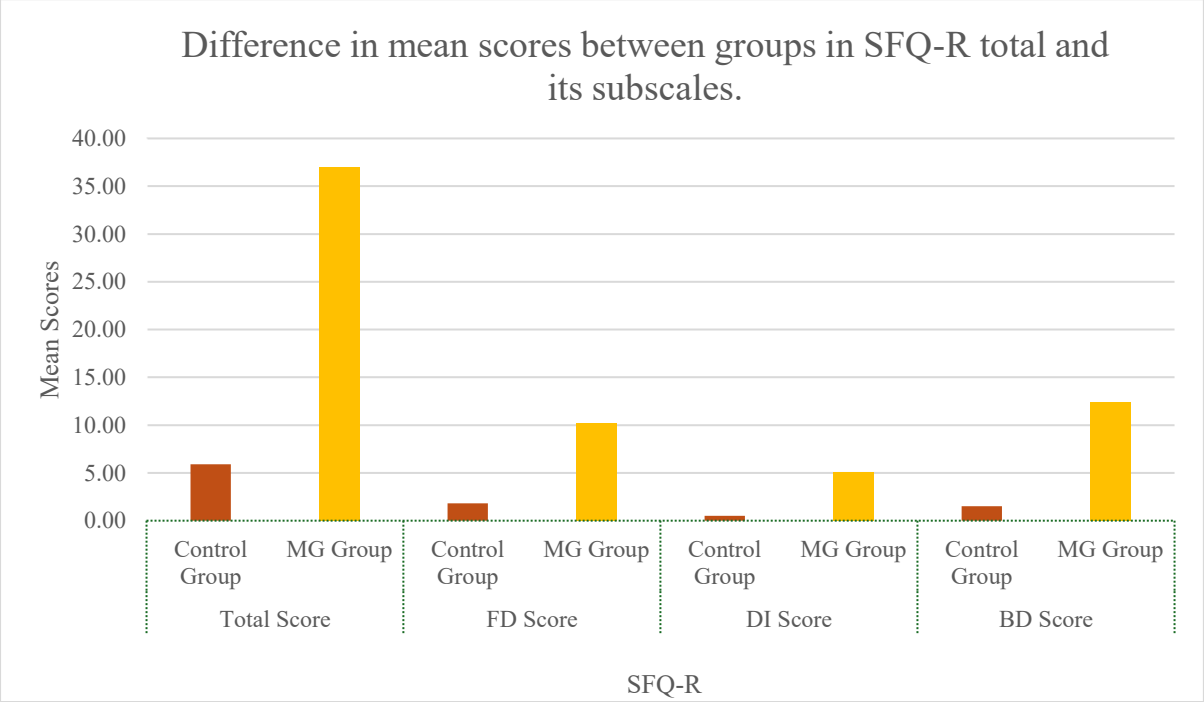

We conducted a series of independent *t*-test to compare the difference in SFQ-R (Strange Face Questionnaire - Revised) total score, and its sub-scales, between the two groups (see Table 47 and Figure 24). The results indicated that there was a statistically significant difference in SFQ-R total score, when comparing the control group ($M$ = 5.90; $SD$ = 8.07) to the MG group ($M$ = 37; $SD$ = 27.63), $t$ (19) = -3.422, $p$ = .001, $d$ = -1.495, as the MG group reported more anomalous experiences during mirror gazing than the control group during control gazing. The same was true for SFQ-R subscale 'FD' (Face Deformation), when comparing the control group ($M$ = 1.80; $SD$ = 2.44) to the MG group ($M$ = 10.18; $SD$ = 7.90), $t$ (19) = -3.213, $p$ = .002, $d$ = -1.404. The independent *t*-test for SFQ-R 'DI' (Dissociative Identity) scores also indicated a statistically significant difference between the control group ($M$ = .50; $SD$ = 1.27) and the MG group ($M$ = 5.09; $SD$ = 5.13), $t$ (19) = -2.750, $p$ = .006, $d$ = -

1.201. The final independent *t*-test also found a statistically significant difference in SFQ-R 'BD' (Body Dysphoria) scores between the control group ($M$ = 1.50; $SD$ = 2.51) and the MG group ($M$ = 12.36; $SD$ = 8.54), $t$ (19) = -3.868, $p$ = <.001, $d$ = -1.690. All four tests passed the Bonferroni-corrected α threshold of .0125.

(Table 47: *Descriptive statistics for SFQ-R total score and subscales: FD, DI and BD.)*

| | | *M* | *SD* |
|---|---|---|---|
| SFQ-R total score | Control group | 5.90 | 8.08 |
| | MGT group | 37.00 | 27.63 |
| SFQ-R 'FD' | Control group | 1.80 | 2.44 |
| | MGT group | 10.18 | 7.90 |
| SFQ-R 'DI' | Control group | .50 | 1.27 |
| | MGT group | 5.09 | 5.13 |
| SFQ-R 'BD' | Control group | 1.50 | 2.51 |
| | MGT group | 12.36 | 8.54 |

(Figure 24: *SFQ-R total score and subscales: FD, DI and BD.)*



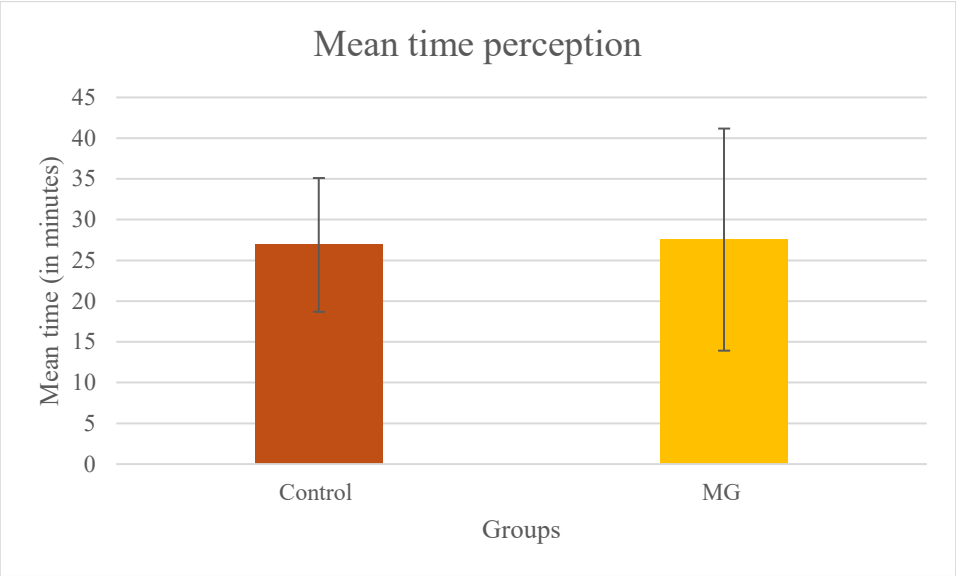
3.4.4 Perceptual Time Contraction

We were also interested in determining if the previous hypothesis linking time contraction to depersonalization could be found during this experiment. Following the procedure of the last experiment, participants were kept blind on the time spent during the GT (30 minutes). After completing the GT participants were asked to write in minutes how long they perceived to have been in the mirror gazing booth. Table 48 and Figure 25 show the descriptive statistics of how each group perceived time during gazing task. An independent samples *t*-test was performed to evaluate the difference in the perceived time (in minutes) after the GT between the control group and the MG group. The results indicated that there was no statistically significant difference between time perception in control group and MG group, $t(19) = -.130$, $p = .449$, $d = -.57$.

(Table 48: *Descriptive of mean time perception during GT in minutes*)

| | *N* | Mean | Std. Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| Control group | 10 | 26.90 | 8.21 | 15.00 | 45.00 |
| MG group | 11 | 27.55 | 13.63 | 15.00 | 60.00 |

(Figure 25: *Time perception during GT in minutes*)




Following the same analysis as in the last chapter, we conducted a spearman's non-parametric correlation (*Table 49*) between time contraction and the mean scores of the SFQ-R subscales and CDS-S. First, we converted all time estimation into a percentage by dividing the total sum of times by the minutes spend during MGT. We then employed a multiple comparison Bonferroni correction (0.05/2= 0.025), determining an α-level of 0.025. As seen in Table 49, there was no correlation that passed the threshold. Therefore, none of the data may indicate a possible trend justifying Caputo's' (2019) hypothesis regarding time contraction.

(Table 49: C*orrelation between time perception and depersonalisation)*

| | | Time contraction (%) |
|---|---|---|
| SFQ-R BD | Spearman's Correlation | .211 |
| | Sig. (1-tailed) | .172 |
| | N | 22 |
| CDS-S | Spearman's Correlation | .124 |
| | Sig. (1-tailed) | .291 |
| | N | 22 |

* Correlation is significant at the 0.01 level (*1-tailed*).

### 3.4.5 Memory Tasks

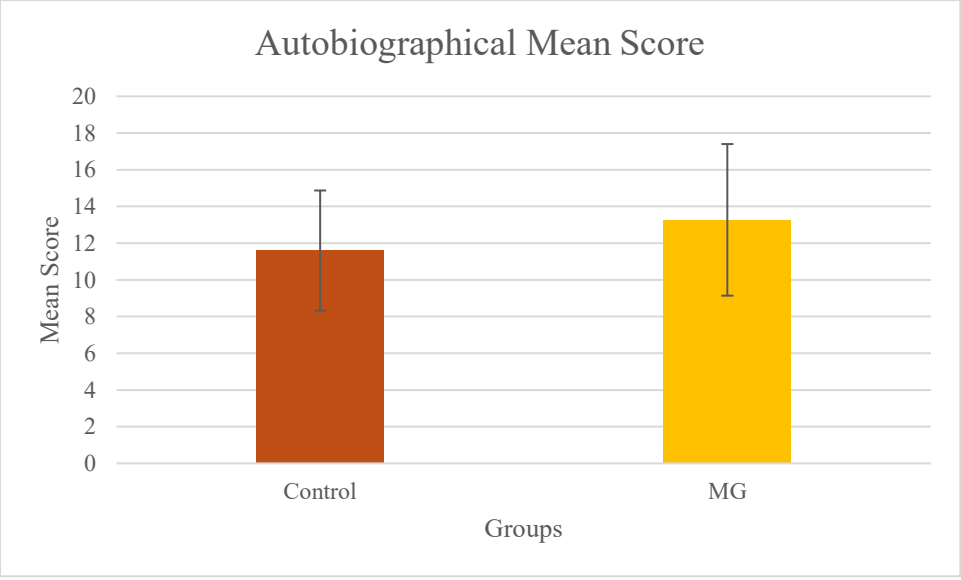
#### *3.4.5.1 Autobiographical Memory Task*

An independent samples *t*-test was performed to evaluate the difference between group for all the correctly recalled answers (free recall) on the autobiographical memory task after sleeping between the control group and the MG group. There was no statistically significant difference between recall in control group ($M$ = 11.60, $SD$ = 3.27) and MG group ($M$ = 13.27, $SD$ = 4.13), $t$ (19) = -1.022, $p$ = .160, $d$ = *-.447*. (see Table 50 and Figure 26).

(Table 50: *Descriptive table of the autobiographical score for each group)*

| | *N* | Mean | Std. Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| Control group | 10 | 11.60 | 3.27 | 6.00 | 18.00 |
| MG group | 11 | 13.27 | 4.13 | 4.00 | 18.00 |

(Figure 26: *Autobiographical score for each group*)



*3.4.5.2 Episodic memory task*

A series of t-test were conducted to analyse the differences between groups for the WMS stories task. There was a total of two stories (*A & B*), each read once at night. Following the reading an immediate retrieval (at night) was conducted, and the final retrieval was conducted the next morning. For each story, and in line with WMS instructions, we scored and summed all units that were remembered correctly, as well as all thematic units. A series of paired-samples *t*-test was conducted to demonstrate the differences in scores between the two retrieval periods, both unit and thematic scores. Afterwards, a series of independent *t*-test were conducted to determine the difference in scores between groups for the night retrieval and for the morning retention. The retention score was obtained by multiplying the scores for the morning recall (*X*) by 100 and then dividing it by the scores for the night recall (*Y*), as indicated by Elwood (1991).

$$\frac{(X * 100)}{Y}$$

The first paired-sample *t*-test was conducted to demonstrate differences in the total unit score (stories A & B summed) before and after sleeping. There was a statistically significant difference in the unit total score for both the control group ($M = 3.70$, $SD = 3.74$), $t\,(9) = 3.126$, $p = .006$, $d = .988$, and the MG group ($M = 6.64$, $SD = 5.05$), $t\,(10) = 4.363$, $p < .001$, $d = 1.315$. This indicated lower memory after sleeping compared to before.

An independent *t*-test was conducted to demonstrate the difference between groups for the total unit score for the night retrieval. The results indicated that there was no statistically significant difference between the control group (M = 28.50; SD = 7.23) and the MG group (M = 26.27; SD = 8.39), $t\,(19) = 6.48$, $p = .262$, $d = .283$. Another independent *t*-test was conducted to demonstrate the difference between groups for the total retention unit score, results indicated

that there was no statistically significant difference between the control group (M = 87.02; SD = 11.56) and the MG group (M = 73.24; SD = 25.50), $t$ (19) = 1.566, $p$ = .067, $d$ = .684.

Then, these tests were repeated for each story separately. A paired-samples $t$-test was conducted to demonstrate the difference in unit scores for story A (emotional story) before vs. after sleep. The results indicated that there was a significant difference in the unit total score for the control group ($M$ = 2.80, $SD$ = 2.94), $t$ (9) = 3.015, $p$ = .007, $d$ = .954, and the MG group ($M$ = 3.64, $SD$ = 2.69), $t$ (10) = 4.478, $p$ <.001, $d$ = 1.350, as memory reduced following sleep

An independent $t$-test was conducted to demonstrate the difference between groups for the unit score of the night retrieval for story A. There was no significant difference between the control group (M = 15.27; SD = 5.02) and the MG group (M = 15.10; SD = 4.61), $t$ (19) = -.082, $p$ = .468, $d$ = -.036. There was also no difference in total unit retention score for story A between the control group (M = 81.27; SD = 16.98) and the MG group (M = 75.62; SD = 20.96), $t$ (19) = .674, $p$ = .254, $d$ = .265.

We then conducted a paired sample $t$-test for the difference in unit scores between groups for story B (neutral story) before vs. after sleep. There was no significant difference in the unit total score for the control group ($M$ = .90, $SD$ = 1.79), $t$ (9) = 1.588, $p$ = .073, $d$ = .502. In contrast, we found a statistically significant difference in the MG group ($M$ = 4.18, $SD$ = 2.79), $t$ (10) = 4.978, $p$ <.001, $d$ = 1.501. This suggests a reduction in memory for story B specific to the MG group. A post-hoc power analysis with G*power (Faul et al., 2007) determined the power of this effect for the MG group to be 0.75 (one-tailed), suggesting a 75% chance that this represents a true effect (25% chance of detecting a type II error).

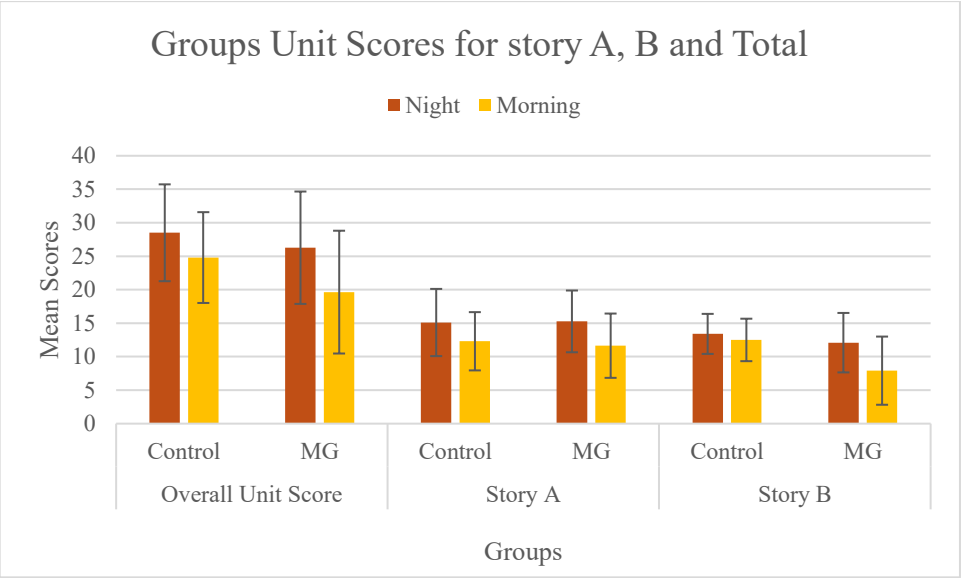
An independent $t$-test showed that there was no statistically significant difference in the unit score of the night retrieval for story B between the control group (M = 13.40; SD = 2.99) and the MG group (M = 15.10; SD = 4.61), $t$ (19) = .784, $p$ = .221, $d$ = *.343*. . However, there

was a significant difference in total unit retention score for story B between the control group (M = 93.18; SD = 12.24) and the MG group (M = 60.38; SD = 31.96), $t$ (19) = 3.043, $p$ = .003, $d$ = 1.329, suggesting that the MG group were worse at retention than the control group. A post-hoc power analysis determined the power of this effect to be 0.50 (one-tailed), suggesting a 50% chance that this represents a true group difference in retention (50% chance of detecting a type II error).There were twelve t-tests conducted, so with a Bonferroni-corrected α threshold of 0.0042, the MG group's reduction in memory score overall, the reduction in memory score for stories A and B, and the difference in retention between MG and control groups remained significant. This provides some indication that the retention of episodic memories may affected by induced dissociative states.

(Table 51: *Descriptive table of the group's total unit scores for Story A and B*)

| | | | *M* | *SD* |
|---|---|---|---|---|
| Overall Unit Score | Control group | Night | 28.50 | 7.23 |
| | | Morning | 24.80 | 6.78 |
| | MG group | Night | 26.27 | 8.39 |
| | | Morning | 19.64 | 9.17 |
| Story A Unit Score | Control group | Night | 15.10 | 5.02 |
| | | Morning | 12.30 | 4.35 |
| | MG group | Night | 15.27 | 4.61 |
| | | Morning | 11.64 | 4.80 |
| Story B Unit Score | Control group | Night | 13.40 | 2.99 |
| | | Morning | 12.50 | 3.17 |
| | MG group | Night | 12.09 | 4.44 |
| | | Morning | 7.91 | 5.09 |

(Figure 27: *Unit scores for Story A, B and Total*)




We then repeated these analyses for thematic scores. A paired-samples *t*-test was conducted to demonstrate the difference in the total thematic score (stories A & B summed) before vs. after sleeping. The results indicated that there was a statistically significant difference in the thematic total score for the control group ($M$ = .90, $SD$ = 1.29), $t$ (9) = 2.212, $p$ = .027, $d$ = .699. Similarly, we were able to find a statistically significant difference in the MG group ($M$ = 1.45, $SD$ = 2.25), $t$ (10) = 2.142, $p$ = .029, $d$ = .646.

An independent *t*-test was conducted to demonstrate the difference between groups for the total thematic score for the night retrieval. There was no statistically significant difference between the control group (M = 11.60; SD = 2.63) and the MG group (M = 11.90; SD = 3.015), $t$ (19) = -.249, $p$ = .403, $d$ = -.109. Another independent *t*-test was conducted to demonstrate the difference between groups for the total retention thematic score, results indicated that there was no significant difference between the control group (M = 92.95; SD = 10.89) and the MG group (M = 86.09; SD = 22.21), $t$ (19) = .883, $p$ = .194, $d$ = .386.

Then, another paired-samples *t*-test was conducted to demonstrate the difference in thematic scores between groups for story A before vs after sleep. There was a significant

difference in the thematic score for the control group ($M$ = .80, $SD$ = .79), $t$ (9) = 3.207, $p$ = .005, $d$ = 1.014. We found a similar significant difference in the MG group ($M$ = .73, $SD$ = .79), $t$ (10) = 3.068, $p$ = .006, $d$ = .925.

An independent *t*-test was conducted to demonstrate the difference between groups for the thematic score of the night retrieval for story A. There was no significant difference between the control group (M = 5.70; SD = 1.49) and the MG group (M = 6.27; SD = 1.10), $t$ (19) = -1.006, $p$ = .164, $d$ = -.439. Another independent *t*-test was conducted to demonstrate the difference between groups for the total thematic retention score for story A. There was no significant difference between the control group (M = 87.28; SD = 12.46) and the MG group (M = 86.92; SD = 15.881), $t$ (19) = .057, $p$ = .477, $d$ = *.025*.

We then conducted a paired-samples *t*-test for the difference in thematic scores between groups for story B before vs. after sleep. The results indicated that there was a no significant difference in the thematic score for the control group ($M$ = .10, $SD$ = .99), $t$ (9) = .318, $p$ = .379, $d$ = .101. Similarly, we found no significant difference in the MG group ($M$ = .73, $SD$ = 1.79), $t$ (10) = 1.345, $p$ = .104, $d$ = *.405*.

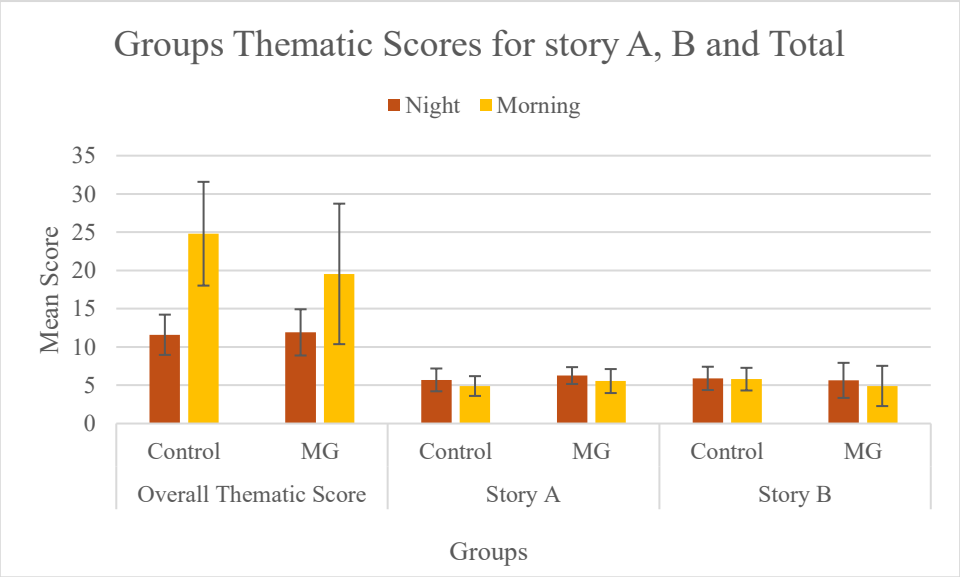
An independent *t*-test was conducted to demonstrate the difference between groups for the thematic score of the night retrieval for story B. There was no significant difference between the control group (M = 5.90; SD = 1.52) and the MG group (M = 5.64; SD = 2.29), $t$ (19) = .307, $p$ = .381, $d$ = .134. Another independent *t*-test was conducted to demonstrate the difference between groups for the total thematic score for story B. There was no significant difference between the control group (M = 99.65; SD = 18.37) and the MG group (M = 89.37; SD = 46.17), $t$ (19) = .657, $p$ = .259, $d$ = .287.

Given the Bonferroni-adjusted α threshold of .0042, none of the significant differences between thematic scores survived correction.

(Table 52: *Descriptive table of the group's total thematic scores for Story A and B*)

| | | | *M* | *SD* |
|---|---|---|---|---|
| Overall Thematic Score | Control group | Night | 11.60 | 2.63 |
| | | Morning | 24.80 | 6.78 |
| | MG group | Night | 11.91 | 3.02 |
| | | Morning | 19.55 | 9.18 |
| Story A Thematic Score | Control group | Night | 5.70 | 1.49 |
| | | Morning | 4.90 | 1.29 |
| | MG group | Night | 6.27 | 1.10 |
| | | Morning | 5.55 | 1.57 |
| Story B Thematic Score | Control group | Night | 5.90 | 1.52 |
| | | Morning | 5.80 | 1.48 |
| | MG group | Night | 5.64 | 2.29 |
| | | Morning | 4.91 | 2.63 |

(Figure 28: *Thematic scores for Story A, B and total*)




*3.4.5.3 Working memory task*

A paired-samples *t*-test was conducted to demonstrate the difference in the scores for the word pair association (WPA) before vs. after sleeping. Participants did the WPA three times in total, twice during the night and once during the morning. We will not be using the first WPA as it is considered a practice round, so comparisons will be between WPA 2 (night) and 3

(morning). The results indicated that there was a statistically significant difference in WPA scores for the control group ($M$ = -3.30, $SD$ = 1.89), $t$ (9) = -5.526, $p$ = <.001, $d$ = -1.747. Similarly, we were able to find a statistically significant difference in the MG group ($M$ = -2.55, $SD$ = 2.42), $t$ (10) = -3.484, $p$ = .003, $d$ = -1.050. Working memory capacity was better in the morning than it was in the previous night in both groups.

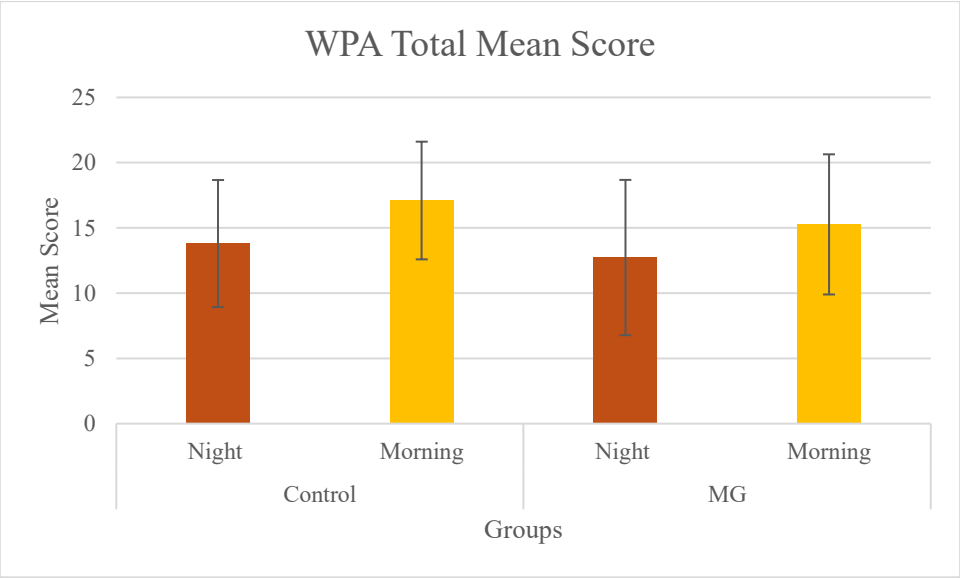
An independent $t$-test was conducted to demonstrate the difference between groups for WPA score during the night, results indicated that there was no statistically significant difference between the control group (M = 13.80; SD = 4.87) and the MG group (M = 12.73; SD = 5.95), $t$ (19) = .449, $p$ = .329, $d$ = .196. An independent $t$-test was conducted to demonstrate the difference between groups for the WPA score in the morning. Results indicated that there was no statistically significant difference between the control group (M = 17.10; SD = 4.51) and the MG group (M = 15.27; SD = 5.37), $t$ (19) = .840, $p$ = .206, $d$ = .367.

The α threshold was adjusted to .0125 given the four t-tests we conducted. Therefore, the increase in working memory capacity that was seen in both groups remained significant.

(Table 53: *Descriptive table of the overall WPA score of each*)

| | | *M* | *SD* |
|---|---|---|---|
| Control group | Night | 13.80 | 4.87 |
| | Morning | 17.10 | 4.51 |
| MG group | Night | 12.73 | 5.95 |
| | Morning | 15.27 | 5.37 |

(Figure 29: *Descriptive table of the overall WPA score of each*)




*3.4.5.4 Procedural memory task*

A paired-samples *t*-test was conducted to demonstrate the difference in the overall number of mistakes that occurred whilst doing the drawing task, comparing the scores before and after sleeping. The results indicated that there was a statistically significant difference in scores for the control group ($M$ = 11.10, $SD$ = 6.81), $t$ (9) = 5.157, $p$ = <.001, $d$ = 1.631. Similarly, we were able to find a statistically significant difference in the MG group ($M$ = 11.81, $SD$ = 9.57), $t$ (10) = 4.096, $p$ = .001, $d$ = 1.235. Fewer mistakes occurred in the morning compared to the previous night, in both groups, demonstrating procedural learning (see Table 54 and Figure 30).

An independent *t*-test was conducted to demonstrate the difference between groups for the overall number of mistakes that occurred during the night. Results indicated that there was no significant difference between the control group (M = 14.80; SD = 9.17) and the MG group (M = 22.09; SD = 12.93), $t$ (19) = -1.476, $p$ = .078, $d$ = -.645. We also obtained a retention (procedural learning) score for the drawing task by using the same formula as indicated by Elwood (1991). An independent *t*-test was conducted to demonstrate the difference between groups for the retention score, indicating that there was a significant difference between the

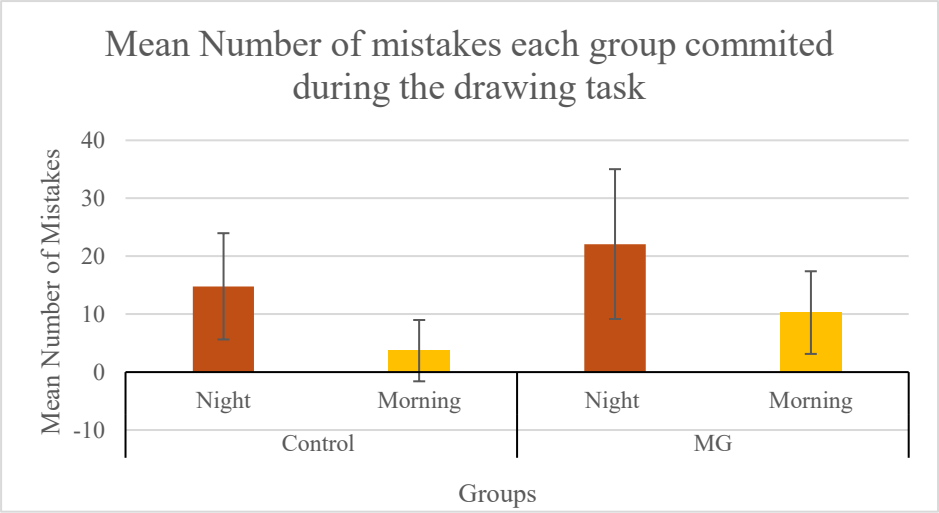
control group (M = 22.83; SD = 20.36) and the MG group (M = 48.02; SD = 31.70), *t* (19) = -2.141, *p* = .023, *d* = -.935. This suggests that procedural accuracy in the morning was more similar to that seen in the evening (showing less procedural learning overnight) in the MG group, compared to the control group.

Given adjustment to the α threshold, however, only the improvement in accuracy in both groups survived the new threshold for significance (.0125).

(Table 54: *Descriptive table of the overall number of mistakes each group committed during the drawing task*)

| | Drawing Error | *M* | *SD* |
|---|---|---|---|
| Control group | Night | 14.80 | 9.17 |
| | Morning | 3.70 | 5.29 |
| MG group | Night | 22.09 | 12.93 |
| | Morning | 10.27 | 7.13 |

(Figure 30: Mean *number of mistakes each group committed during the drawing task*)



A paired samples *t*-test was performed to evaluate the difference in the overall time (in minutes) it took participants to complete the drawing task, by comparing the scores before and after sleeping. The results indicated that there was a statistically significant difference in scores for the control group ($M = 99.22$, $SD = 87.34$), $t(9) = 3.593$, $p = .003$, $d = 1.136$. Similarly, we were able to find a statistically significant difference in the MG group ($M = 64.57$, $SD = 88.48$), $t(10) = 2.420$, $p = .018$, $d = .730$. Both groups improved the speed with which they completed the drawing task overnight, indicating procedural learning (see Table 55 and Figure 31).

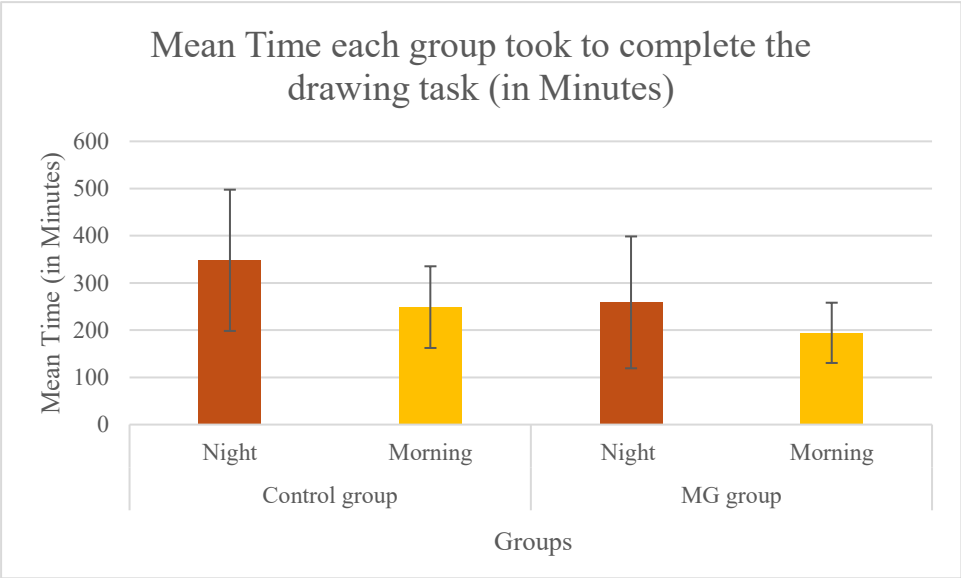
An independent *t*-test was conducted to demonstrate the difference between groups for the overall time the task took during the night. Results indicated that there was no difference between the control group (M = 348.04; SD = 149.61) and the MG group (M = 258.94; SD = 139.62), $t(19) = 1.412$, $p = .087$, $d = .617$. An independent *t*-test was conducted to demonstrate the difference between groups for the retention (procedural learning) score. There was no statistically significant difference between the control group (M = 74.46; SD = 13.90) and the MG group (M = 80.53; SD = 14.37), $t(19) = -.982$, $p = .169$, $d = -.429$.

Adjustments to the α threshold (.0125) meant that the improvement in speed to complete the task remained significant for the control group, but that for the MG group did not survive correction.

(Table 55: *Descriptive table of the overall time (in minutes) each group took to complete the drawing task*)

| | Drawing Time | *M* | *SD* |
|---|---|---|---|
| Control group | Night | 348.04 | 149.61 |
| | Morning | 248.82 | 86.52 |
| MG group | Night | 258.94 | 139.62 |
| | Morning | 194.37 | 63.82 |

(Figure 31: *Mean time (in minutes) each group took to complete the drawing task*)




3.4.6 Sleep Diary Questions

After waking up, participants filled in a sleep diary that asked participants if they dreamt, how much they are able to remember, the topic/vividness of the dream, and lastly a series of questions surrounding depersonalisation-like symptoms they might have experienced whilst dreaming. A descriptive statistic was conducted to firstly identify the amount of participants that reported having one or more dreams. These results can be seen in table 56. Our results indicated that in the control group six participants out of ten reported having dreamt, of which one reported having one dream, three reported having up to three dreams, and the rest did not specify how many dreams they had. In the MG group, a total of seven participants out of eleven reported having dreamt, of which four reported having a singular dream, one reported having a dream and a half, another reported three dreams, and one did not specify the amount of dreams they experienced.

(Table 55: *Descriptive table of the amount of reported dreams for each group*)

| | Dreams reported | Frequency |
|---|---|---|
| Control group | 1 dream | 1 |
| | 3 dreams | 3 |

| | | |
|---|---|---|
| | Did not report | 2 |
| | Total: | 6 |
| MG group | 1 dream | 4 |
| | 1.5 dreams | 1 |
| | 3 dreams | 1 |
| | Did not report | 1 |
| | Total: | 6 |

A series of independent sample t-test was conducted to investigate the feelings of depersonalisation, derealisation and “fragmentation” within dreams for the participants that had reported dreaming. We found no statistically significant difference for DR (very disconnected from vs. connected to my world) between the control ($M$ = 23.33; $SD$ = 71.24) and the MG ($M$ = -19.29; $SD$ = 60.91) group, $t$ (11) = 1.164, $p$ = .135, $d$ = .648. No significant difference was found for DP (very disconnected from vs. connected to my bodily sensations and emotions) between the control ($M$ = -70.50, $SD$ = 49.85) and the MG ($M$ = -31.86, SD = 40.81) group, $t$ (11) = -1.564, $p$ = .076, $d$ = -.856. Lastly, “fragmentation” (very incoherent / fragmented vs. very coherent) had a statistically significant difference between the control ($M$ = 21.50, $SD$ = 26.85) and the MG group ($M$ = -41.57, $SD$ = 58.68), $t$ (11) = 2.414, $p$ = .017, $d$ = 1.343 (post-hoc power of .52). This suggests that the MG group reported more incoherent and fragmented dreams than the control group. However, this did not survive correction of the α threshold to .0166 and was only associated with a 52% chance of being a true difference.

### 3.5 Conclusions

As expected, we were able to determine that mirror gazing is an effective method to induce dissociative state in ‘healthy’ individuals, as we were able to find a statistically significant dissociative state change, measured with CDS-S, before vs. after the MGT. Furthermore, we were able to determine that CDS-S scores drastically reduce during the night however there is still a difference the between the groups the morning after MGT. This effect

could be due to the hour the MGT was performed, as participants were sent to bed between 30 to 1 hour after MGT; regardless this is an important ethical consideration to have when deciding to test dissociative states on a ‘healthy’ population.

When analysing the perceptual time contraction, we were unable to find the same difference between groups as we did in chapter 2. Although this could be a direct result of our inadequate sample size, our results do not agree with Caputo’s hypothesis on perceived time contractions being more present during dissociative states (2019).

The results for our autobiographical test found no statistically significant difference between groups, this could be due to direct consequence of our sample size. That being said, our results indicate that maybe with more participants a bigger difference might be found.

In our results for episodic memories most finding did not pass the Bonferroni correction except for the unit of story B (Neutral story), we were able to find a difference between the groups suggesting that the individuals in the MG group had less memory consolidation after the MGT. We also found a reduction in score for story B thematic unit when comparing results of after the MGT to the morning after, suggesting that individuals in the MG group also had worse memory retention through the night. Although dissociation is more closely linked to emotional numbing, we would find a bigger discrepancy in the emotional story then in the neutral one.

We were unable to find a statistically significant difference between groups for the WPA memory test or its retention score. For the drawing task we were able to find that participants in both groups had fewer mistakes and improved in speed, demonstrating that MGT does not seem to have an effect on procedural learning.

### 3.5.1 Strengths and Limitations

This is the first study to have investigated the impact of MGT on such a range of different memory tasks, testing them not just immediately and with some delay (Brewin, 2013), but also the morning after sleep and potential memory consolidation. Similar to Brewin we found that participants in the MGT had a harder time remembering the stories told to them after the MGT. Unfortunately, we did not get the necessary sample size for more interpretable results; however, we do believe that the findings nevertheless indicate some insights for induced dissociation, sleep and memory function, as well as helpful directions for future studies. Other improvements on this experiment would be potentially changing the WPA task to measure retention task instead of working memory capacity. Although the instructions provided by the WMS-R was carefully administered and followed by a MSd student, future studies should either have a clinician administer these tests, or use different instruments that do not rely on trained professionals for administering. Lastly, future studies could replicate this experiment with a group of participants who have been diagnosed with dissociative disorders, this would help us understand if the effects on sleep and memory are replicated by MGT group. However, a clinician should be present in case of adverse reactions.

## Chapter 4: General Discussion and Thesis Conclusions

In summary, previous literature and research have demonstrated that dissociation can affect both memory and sleep, and that sleep quality can affect memory and intensity of dissociative states. However, currently there are no studies and whether the effects of inducing dissociation are equivalent to those found in individuals with symptoms of dissociative disorders.

This is one the first study to provide methodological justification toward the temporal dynamics of the task and effect of the MGT to induce dissociative states and anomalous experiences. It is also the first study to investigate effects of induced dissociation on memory

functioning including on effects of overnight consolidation of learnt information and skills. The work presented in this thesis thus contributes novel insights into the mechanisms of induced dissociation, its effects on memory and its potential as a model for studying dissociative disorders. These contributions will be discussed in the following sections.

Both Chapter 2 and 3 show that CDS-S is also a valuable instrument to measure dissociative state changes, and unlike CADSS is specific to the experiences of DP and DR. Researchers wishing to use MGT as a model for studying DP/DR might therefore wish to employ CDS-S rather than CADSS. In chapter 2 we were able to determine that the best procedural method to produce dissociative symptom was by performing the MGT 30 minutes uninterrupted (as shown by our group 2).

Chapter 2 found that dissociative states do not last long dissipated almost completely by after 30 minutes, and when tested again at the 1-hour mark participants had gone back to their original. This is in accordance with Brewin (2013), that reported that dissociative had dissipated after 15 minutes, but here we investigate this directly.

Interestingly, there was some evidence that recovery from dissociative states resulted in an overall reduction of such feelings below baseline levels. Although, more investigation is needed, this could help corroborate the belief that MGT might be used alongside or as a therapeutic tool, as Demartini et al. (2021) believed that inducing dissociation could be used potentially as a therapeutic tool for patients with anorexia nervosa, as mirrors are used to treat individuals with BDD and body dissatisfaction.However, and in contrast with this potential overall reduction of dissociative states in the longer term, in Chapter 3 we found that after sleep, the MGT group retained more of their dissociative states (amount reported was numerically above those measured at baseline). This could be an effect of measurement point (morning vs. evening), or it could mean that sleep soon after MGT-induced dissociation

prolongs the induced state. This second possibility was supported by the reporting of more dream fragmentation in the MGT group.

Chapters 2 and 3 found conflicting evidence with regard to whether MGT contracts perceived time. While Chapter 2 showed that people who underwent 30 minutes of MGT experienced a shrinking of time, this was not replicated in Chapter 3. Our findings therefore suggest that time contraction is not a systematic or reliable outcome of mirror gazing, even though depersonalisation was reliably induced by MGT.

As stated, before Chapter 3 we were able to find a difference between the groups suggesting that the individuals in the MG group had less memory consolidation after the MGT, as well as worse memory consolidation through the night.

In sum, the MGT appears to be a reliable method to induce anomalous experiences relating to depersonalisation, derealisation and dissociative identity, as well as specific states of depersonalisation and derealisation that can be measured with standard instruments capturing such states (CDS-S). The MGT may therefore be used to reliably bring out states that are akin to those seen in clinical populations in healthy participants, for investigational purposes. We have done this in the present thesis and shown effects of dissociation on sleep and memory that are comparable to those found in patients with dissociative disorders.

As previously stated, inducing dissociative states will never be an accurate representation of dissociative states produced by the dissociative disorders; however, given its clinical significance further investigation should be encouraged methods as MG, since they give us a glimpse into this very understudied phenomena Brake et al. (2025). Furthermore, it should help us understand how similar the effects of inducing dissociation, through mirror gazing, are to the symptoms of pathological dissociation on sleep and memory.

In summary, previous literature and research have demonstrated that dissociation can affect both memory and sleep, and that sleep quality can affect memory and intensity of dissociative states. However, currently there are no studies and whether the effects of inducing dissociation are equivalent to those found in individuals with symptoms of dissociative disorders.

## 4.1 Implications and future directions

This thesis suggests that the MGT is a useful tool for studying dissociative states in a controlled manner. Dissociation is induced relatively quickly and reliably, which allows the investigation of, for example, neurophysiological changes in the brain and wider nervous system, which are presently outstanding (Bottger, et al., 2025), or its effects on memory (see Brewin, 2013; Chapter 3 in this thesis) or other cognitive and emotional functions. While this thesis makes some contributions to understanding the MGT and the effects of dissociation on sleep and memory, there are several outstanding questions that directly arise from the work in the thesis, which should be addressed in future studies.

Future research should study more closely the effects of time contraction or dilation as a result of MGT, and their relation to dissociative phenomena, as their results seemed to be inconclusive in this study.

Work should also be conducted to more closely understand how dissociative experiences and anomalous perceptions (SFIs) related to trait measures. It is possible that some people, because of their mental health status or their personality dispositions, are systematically prone to experience specific patterns of SFIs or other dissociative outcomes.

Future research should also compare sleep quality (electrophysiological measures, subjective ratings) and sleep architecture (electrophysiological measures of sleep stages) between groups to test the effects of dissociation on sleep and therefore on the conditions that

allow memory consolidation. Moreover, it would be interesting to see future research focus on the correlation between sleep spindles and dissociative disorders.

Finally, future work should look at populations with higher levels of dissociative symptoms or diagnosed dissociative disorders and how they differ from the populations studies thus far. It is known from other studies of body dysmorphic disorder and schizophrenia that tend to experience great SFQs during MGT (Caputo et al., 2012). It would be of interest to understand whether there might be a benefit for individuals with a dissociative disorder diagnosis to do the MGT, in terms of being able to add something to the diagnosis of such disorders, and maybe even use the task to help with treatment – provided that if you do the task in a controlled setting with clinical personnel. We found some evidence that the MGT results in an eventual reduction of dissociative states below baseline levels, which suggests that the temporary induction of dissociation could relieve state dissociation in the long run. This should be replicated and then investigated for any potential therapeutic implementation.

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Appendix:

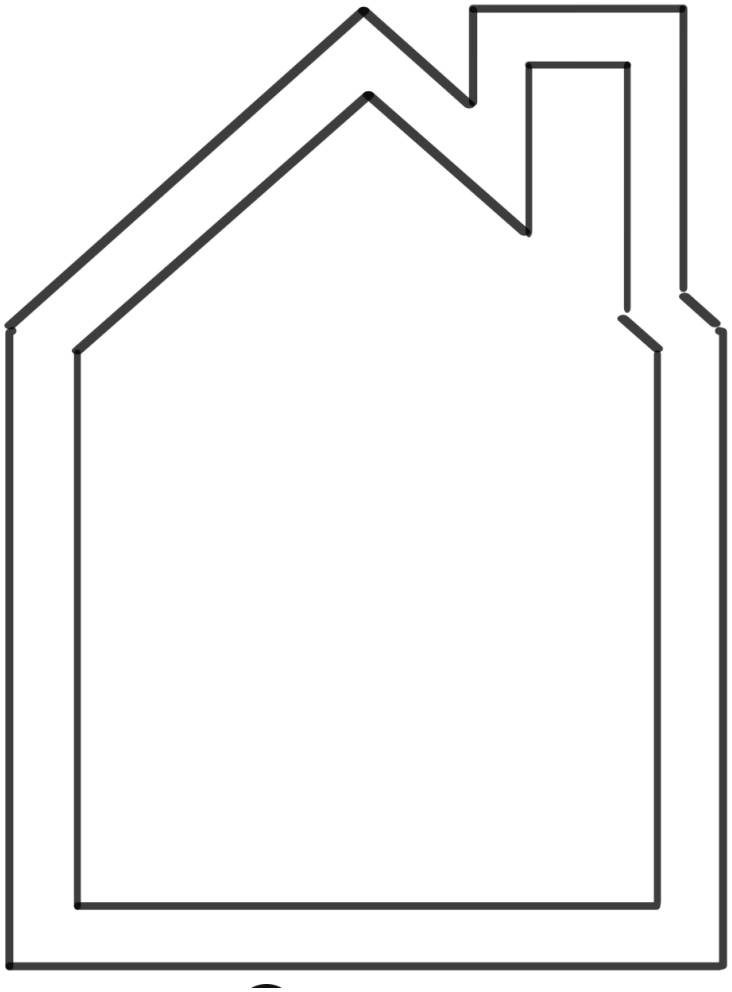
(Table 56: Sleep questions; )

| **Please mark the line to show the present intensity of each of the following experiences.** | |
|---|---|
| 1. | I am feeling strange, as if I were not real or as if I were cut off from the world. |
| 2. | Things around me are now looking ‘flat’ or ‘lifeless’, as if I were looking at a picture. |
| 3. | I am feeling as if parts of my body didn’t belong to me.<br>I’m now having the feeling of being a “detached observer” of myself. |
| 4. | My body is feeling very light now, as if I were floating on air. |
| 5. | I am not feeling any emotions at all. |
| 6. | If I read this sentence aloud, my voice sounds remote and unreal. |

| | |
|---|---|
| 7. | I am having a feeling of complete emptiness in my head so that I do not have any thoughts at all. |
| 8. | I'm having the feeling that my hands or my feet have become larger or smaller. |
| 9. | My surrounds are feeling detached or unreal, as if there was a veil or a fog between me and the outside world. |
| 10. | It seems now as if things that I have recently done had taken place a long time ago. For example, anything which I have done this morning feels as if it were done weeks ago. |
| 11. | If I now try to remember important events in my life (e.g. graduation, wedding etc.), I feel so detached from the memories that it seems as if I have not been involved in them. |
| 12. | I don't seem to be feeling any affection towards my family and close friends. |
| 13. | Objects around me look smaller or further away. |
| 14. | I cannot feel properly the roller or pencil that I have in my hand, as if it were not me who was holding it. |
| 15. | If I now, try to imagine the face of a relative or friend whom I frequently see (but who is not with you at present) I do not seem able to picture it in my mind. |
| 16. | If I pinch myself in my arm now, I feel so detached from the pain that it feels as if it were 'somebody else's pain'. |
| 17. | I am feeling as if I were not in charge of my movements, so that I feel 'automatic' and mechanical as if I were a 'robot'. |
| 18. | I now have the feeling of being outside my body. |
| 19. | I am feeling as if I were not in charge of my movements, so that I feel 'automatic' and mechanical as if I were a 'robot' |

| | |
|---|---|
| 20. | I am feeling so detached from my thoughts that they seem to have a ‘life’ of their own. |
| 21. | I feel like touching myself to make sure that I have a body or a real existence. |
| 22. | I am still having the same strange feeling as when I started to answer this questionnaire. |

(Figure 32: Drawing task practice round)



(Figure 33 to 40: Drawing task)