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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
PSYCHOLOGY

Pandemic Dreaming: An Investigation of Affective Processing through Dream Transcripts and Self-Regulation during the COVID-19 pandemic.

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Research Report

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Research Declaration

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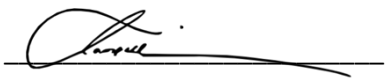
Signed: 

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Abstract

The impact of the COVID-19 pandemic has been associated with a range of social, emotional and behavioural changes, which is arguably observable in dream content. Since dreaming can be understood as a form of affective processing, changes in dream content are not only expected in a time of unprecedented change but allow a unique opportunity to examine how waking affect, self-regulation and unconscious affective processing are associated. Consequently, this research aimed to explore the associations between these variables—through dream transcripts—during the unique conditions of the COVID-19 pandemic, while further examining dream content differences. A quantitative, correlational research design was utilised and secondary data was used from an international survey study. Data analysis involved quantifying dream content through the Hall/Van de Castle method and drew on descriptive and inferential statistics for further analyses. Substantial changes were noted in the dream content, specifically in aggression and social interactions, with females reporting significantly more negative emotional dream content and males significantly more interactions with friends. Significant differences were also observed between the samples' dream content (pandemic dreaming) and normative studies (non-pandemic dreaming), with key differences in dreamed social interactions, characters and emotion. Dream content and SSRQ scores were significantly associated for three content dream variables: imaginary and fictional characters, aggression and aggressive social interactions. Furthermore, anxiety scores were correlated with a range of content indicators including social interactions, dream characters and emotions. These results support the hypothesis that waking experiences reveal themselves within dreams and shows support for the relationship between emotional and self-regulation processes, and sleep experiences.

Keywords: Dreams, Affective Processing, Self-Regulation, Anxiety, Pandemic Dreams.

Dedication

I dedicate this work to the doctors:

Adri Marais, Bridget Campbell, Nadia Sanger, Sahba Besharati, and Samantha Brooks.

For inspiring dreams not found in sleep.

Thank you.

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List of Abbreviations

Abbreviation	Meaning
COVID-19	SARS-Cov-2 virus
WHO	World Health Organisation
REM	Rapid eye movement
HVdC	Hall/Van de Castle method of content analysis
AIM model	Activation-Input Source-Neuromodulation model
ERT	Emotion Regulation Theory
SSRQ	Short Self-Regulation Questionnaire
CWRU	Case Western Reserve University
CL Study	COVID-Lockdown Study
LJMU	Liverpool John Moores University
WEIRD	Western, Educated, Industrialised, Rich and Democratic Countries
DreamSAT	Automated Dream Data Entry System and Statistical Analysis Tool
SPSS	Statistical Package for the Social Sciences
Welch's ANOVA	Welch's One-Way Analysis of Variances
Spearman's *r*	Spearman's Rank Order Correlational Analysis
ε^2	Epsilon-Squared Effect Size
ω^2	Omega-Squared Effect Size
CI	Confidence-Intervals

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I express my most sincere gratitude to my parents for providing continuous support not only through this research process but throughout all the years of my studying; for their singular dedication to me and my dreams. This accomplishment is one I share with you.

Finally, I would like to acknowledge the dreamers without whom this research would not have been possible. Thank you for freely sharing your sleeping lives.

1. Chapter One: Introduction, Rationale and Research Outline

1.1 Introduction

On the 16th of April 2020, Google tweeted that the search term "Vivid dreams during the pandemic" had risen 1300% over a 24 hour period in the United States of America, drawing attention to an increasingly documented occurrence known as "Pandemic Dreaming" (Google, 2020). This term refers to a particular form of oneiric activity—more emotionally intense, anxiety-related, and more negative in tone—which is associated with the outbreak of the SARS-Cov-2 (COVID-19) virus (Barrett, 2021; Gorgoni et al., 2021; MacKay & DeCicco, 2020). This shift in search trends is not entirely surprising: for more than two years, the world has grappled with the enormous impact of the COVID-19 virus. First documented in China in late December 2019, the illness has presented a significant public health crisis due to its exponential transmission capacity and severity (World Health Organization [WHO], 2020). As a result, global lockdown directives were instituted to curb internal and international movement and reduce the risk of contact between individuals. Though the development of effective vaccines has proved vital in the combat against COVID-19, its ongoing mutation have since led governments to revert to some form of these initial lockdowns. Within this context, changes in sleep experiences were first noted, as illustrated by an article published by the New York Times during this period, which posed: "Why am I having weird dreams lately?" (Weaver, 2020).

When considering the social upheaval resultant from the outbreak, historical research suggests that attendant effects should not only be noted within individuals' waking lives but also within their dreams (Hartmann & Brezler, 2008; Lavie, 2001; Wilmer, 1996). Dream studies have found that faced with uncertain or traumatic experiences, individuals routinely experience changes in dream content, which is understood as the imagery and perceptions experienced during sleep and recalled upon waking (Barrett, 2001a; Pagel et al., 2001). Such

evidence indicates that distressing experiences can precipitate a change in dreams which is both notable and measurable in dream narratives. Literature shows that individuals living through crises—such as the 9/11 terror attacks—those who survived traumatic situations, or those who are faced with illnesses experience dreams that are significantly different than individuals not faced with such circumstances (Barrett et al., 2013; Bulkeley & Kahan, 2008; DeCicco et al., 2010; Nielsen et al., 2006; Olley et al., 2005).

However, while researchers have examined the dreams of individuals who undergo collective traumatic experiences—such as those detailed above—a collective experience on the scale of the COVID-19 pandemic is without precedent in recent years. Both the novelty and pervasive consequences of COVID-19 have left virtually no sphere of society untouched: not only has it resulted in the virulent spread of an unfamiliar and potentially lethal disease, but bids to contain and ameliorate the threat has caused a panoply of economic, social, and cultural consequences (Holmes et al., 2020). Consequently, an exploration of individuals' dreams at this juncture could furnish insight into such a unique context whilst further enriching the field of dream research through generating novel understandings of the effect of external crises on dreams on a scale not previously possible. Experts argue that the heightened stress and mental distress experienced throughout the outbreak can be observed in dream content changes due to linkages between waking affective experiences and dream activity (Barrett, 2020; Di Renzo & Tagliocozzi, 2020).

Additionally, such insights may be valuable as it has been shown that effects on dream content are believed to impact women more significantly, whilst additionally being more frequently observed in individuals living with mental health problems (Barrett, 2020; Mota et al., 2020; Pesonen et al., 2020; Schredl & Bulkeley, 2020). As the pandemic has been proven to exert a significant mental health burden on the global population and has added additional distress to individuals with a history of mental illness, examining such individuals'

dream content may be advantageous (Barrett, 2020; Di Renzo & Tagliocozzi, 2020; Marogna et al., 2021; Sommantico et al., 2021).

The idea that mental health and dream content are linked together has been documented throughout the psychological tradition and was first voiced by Sigmund Freud in his seminal work *The Interpretation of Dreams* (1955; also see Solms, 2018). Subsequently, various dream theories have explored the function of oneiric activities, with many conceptualizing dreams as a form of affective processing that occurs whilst we sleep (Cartwright, 2012; Hartmann, 1996; Malinowski et al., 2019). This notion has become increasingly salient as cognitive and affective neuropsychologists find evidence of overlaps between the neural substrates of dreaming and those cognitive processes involved in the experience of waking emotion (Scarpelli et al., 2019).

Consequently, it has been argued that as dreaming is a form of affective processing, dream content may manifest waking moods. To illustrate, individuals who experience mood disturbances such as depression and anxiety have been shown to recount dreams that are notably more negative, include more aggression and are characterized as unpleasant and frightening (Foss, 1994; Khodarahimi, 2009; Kirschner, 1999). Researchers argue that anxiety likely instigates more frightening dreams and depresses dream tones with more aggression, less friendliness, and more frequent failures (Gentil & Lader, 1978; Rimsh & Pietrowsky, 2021; Sikka et al., 2018). Furthermore, the affective quality of anxiety materialises more observably in dreams, as studies show that the dreams' of individuals with anxiety disorders tend to reflect specific themes associated with such disorders (Rimsh & Pietrowsky, 2019). To exemplify, those with social anxiety tend to dream of frightening social situations (Khodarahimi, 2009); those with agoraphobic anxieties often dream of wide, open spaces (Foss, 1994); and those with generalized anxiety disorders exhibit dreams that contain more apprehension and fear (Rimsh & Pietrowsky, 2019). Consequently, as evidence

shows an increase in the prevalence of this mood disorder, feelings of anxiety may be particularly salient to dream experiences in the current context (Pashazadeh Kan et al., 2021; Racine et al., 2021; Varma et al., 2021).

Examining the hypothesized continuity between waking affective experiences—such as anxiety—and dream content may shed new light on long-ranging debates on dream functions, as it indicates that our sleep experiences may be influenced by the emotions we experience during daily life (Schredl, 2018). Furthermore, these continuities render it plausible that dreaming may enable affective processing as waking emotionality is relived and integrated into broader memory systems (Scarpelli et al., 2019). There is neuropsychological support for these hypotheses as research finds that the highly activated brain structures—observed during rapid-eye-movement (REM) sleep—are responsible for the consolidation of emotional experiences and are implicated in waking affect (Malinowski & Horton, 2014; Scarpelli et al., 2019; Solms 2011). Consequently, examining links between anxiety and dream content may offer insight into the affective regulation function of dreaming.

Moreover, if dreaming is understood as a form of affective processing which exhibits continuity with waking affective experiences, linkages between the cognitive processes involved in regulating waking affect and behaviour and sleep mentation may be derived. Research has shown considerable overlap between the neurological bases of affect and those implicated in self-regulation generally (Vandekerckhove & Wang, 2017; Wager & Heathertone, 2016). Particularly, areas of the brain which are believed to be pivotal to self-regulation ability—the ventromedial prefrontal cortex and the anterior cingulate cortex—correlate with both the neural bases of dreaming and are salient to the expression of waking affect such as anxiety (Solms, 2000; 2021; Taylor & Wahlen, 2015; Wager & Heatherton, 2016).These findings suggest that linkages between self-regulation ability—which is

understood as the ability to control and adapt behaviour in response to external events—and the qualitative features of dreams could be derived.

Yet, there is a lack of relevant literature examining this phenomenon. Research has historically considered measurable behavioural outcomes of self-regulatory ability rather than how affective processing and self-regulation may be linked. This considerable shortage can be explained by the fact that measuring affective processing through dreams is notoriously tricky. As dream research is constrained by the reality that dream reports may be inherently biased toward favouring more bizarre and emotionally intense sleep narratives, while simultaneously only presenting a curated, narrative account of dream experiences, researchers have typically avoided examining associations between waking cognitive processes and dreams (Malcom-Smith & Solms, 2004).

Yet, methodologies such as the Hall/Van de Castle (HVdC) content analysis system may be helpful to such research endeavours. Though the method carries significant limitations—which will be explored in further detail in the following chapters—it can quantify the qualitative features of dreams. Thus researchers can gain exploratory insight into the relationships between waking affect, self-regulation, and the dream affect through the methodology. While this in no way diminishes the effect of more subjective and qualitative interpretation of dream content, it allows for an alternative approach in understanding dream content and its relationship to other factors. Consequently, within this context the current study aimed to explore the associations between self-regulation, anxiety, and affective processing through dream transcripts during the unique conditions of the COVID-19 pandemic whilst further examining dream content differences.

1.2 Research Rationale

This study was conceptualized to provide insight into the experiences of international dreamers living through the COVID-19 pandemic and to answer the call for research into the

effects of COVID-19 on emotion-related processes (Brooks et al., 2020). As the literature indicates that external events may have material consequences on dream imagery and manifest waking affect, it was predicted that an analysis of dream content could unearth critical insights into the effects of the outbreak and the social disruptions it has caused. This research further held that examining differences in the dreams of participants living in this context—in comparison to dreams collected during pre-pandemic times—would help understand the mental health burdens of the viral outbreak, as it has been established that dream content can be used as an indicator of mental wellbeing (Gorgoni et al., 2020).

Furthermore, by exploring continuities between waking affective experiences—such as anxiety—and dream content, it was thought that a significant contribution could be made to an emerging literature that explores the novel phenomenon of pandemic dreaming, as well as enriching the broader field. Additionally, as evidence suggests linkages between cognitive processes involved in regulating waking affect, behavior, and sleep mentation, this study was rationalized as providing some understanding of dream functions. Considering that the pandemic has seen increased attention to self-regulation in public health compliance, such knowledge may be advantageous to further research.

Moreover, the distinct context of this study rendered it possible to explore dream functions and impacts of the COVID-19 pandemic on dreaming on a scale not yet possible. Thus, an undertaking of this type was believed to be uniquely poised to broaden the scope of dream literature. Moreover, as the pandemic acts as a proxy for a range of changes in behavioral patterns and social relationships, it was hoped that the study would unearth latent variables which, while not initially conceptualized, could expand academic knowledge of the factors that drive more vivid dreaming. Ultimately, it was believed that this research would be instructive to the study of dreaming through considering linkages between the neurological

and semantic functions of dreaming, by exploring both affect and affective regulation within a broader context of social change.

1.3 Outline of the Research Report

The following research report details the design, methodologies, and statistical analyses undertaken to explore and provide answers to these questions. This research report includes five chapters. The first chapter provides the background, rationale, aims and objectives, and questions which guided this research study. Chapter 2 considers the extensive literature regarding dream content, self-regulation ability and anxiety and aims to situate this work within the tradition of dream research. The third chapter of the research report outlines the methodology utilised in this research. The study's findings are presented in the fourth chapter and subsequently discussed in further detail in Chapter 5, together with the study's limitations and recommendations for future research.

2. Chapter Two: Literature Review and Research Questions

2.1 Introduction

Our preoccupation with sleep experiences has g since antiquity: whether dreams were predictive of the future, indicative of physiological malady or whether considered direct messages from the gods, ancient societies viewed dreams as valid and authentic as everyday waking life (Barbera, 2008). This fascination was not only observed in early European society but throughout the ancient world. While past Chinese dynasties tried to understand messages contained in their sleep narratives, the Mayans considered their dreams a sacred way to connect with their ancestors (Ong, 1981; Tedlock, 1992). This view extends to African societies, where dreams are believed to be connections to the spiritual realm and function to call individuals into healing practice (Nwoye, 2015; Van Der Watt, 2021). This enchantment has spilt into contemporary society: from Samuel Taylor Coleridge's Kubla Khan (1816) to Surrealist works such as Salvador Dali's (1944) "Dream Caused by the Flight of a Bee" (Appendix A), dreams have been a constant source of inspiration for poets, musicians, painters, and sculptors. They have sparked scientific discoveries and may even "give voice to the unspeakable and restore the savaged" (Barrett, 2001, p.6; Barrett, 2001). Our ongoing preoccupation with sleep content can be tied to the inherent ambiguity in this experience. While dreaming is a near-universal occurrence, it is also singularly unique and can only ever be fully appreciated and known by the individual dreamer.

Though an exhaustive account of dream literature is beyond the scope of this paper, the following chapter includes a review of seminal works in the field. This chapter considers the literature on the functions of dreaming while further detailing studies that link dream content, self-regulation, and anxiety. A review of past studies which have considered the impact of external traumatic events on dream content will be provided, leading to a

preliminary overview of pandemic-related dream findings. Neuroscientific advances in dream research will be considered, and the constraints embedded within the field will be discussed.

2.2 From Psychoanalytic Perspectives to Neuroscientific Advances: Historical Insights on the Functions of Dreaming

2.2.1. The Psychoanalytic Tradition

The psychological interest in dreams is tied to Sigmund Freud (1955), who expressed in *The Interpretation of Dreams* that "every dream reveals itself as a psychical structure which has meaning and (…) can be inserted at an assignable point in the mental activities of waking life" (p.35). Freud's psychoanalytic view framed dreams as the fulfilment of wishes derived from appetitive subconscious urges (Freud, 1955; Solms, 2000; Solms, 2015). Through examining both his own and his patients' dreams, Freud's insights converged on the opinion that through dreamwork, underlying unconscious desires were transformed into conscious dreams (Freud, 1955; Solms, 2015).

This premier psychoanalytic perspective construed dreaming as a form of wish fulfilment. Freud argued that as we sleep, day-residues form the raw content of our dreams which activate underlying motivated content which in turn triggers behaviours to satiate such impulses (Boeker, 2018; Freud, 1955). However, as these motivations routinely conflict with the waking ego, dreamwork mechanisms—such as condensation, representation, and displacement—take the primary content of needs and obscure them which enables the fulfilment of these wishes whilst allowing the dreamer to remain asleep (Solms, 2000; Fischmann & Leuzinger-Bohleber, 2018). While Freud's contemporary Jung agreed on the importance of dreams, his opinions diverged from his contemporary. He believed that dreams are simulations that work to compensate for deficiencies in personality or psychic structures (Hull, 2014; Jung, 1948; Zhu, 2013).

2.2.2 REM Sleep and Dreaming: Neuroscientific Advances

However, Aserinsky and Kleitman's 1953 discovery of REM sleep led to a turn away from psychoanalytic perspectives. In line with the increasing behaviourist trajectory of the field, dream research turned away from examining the psychological importance of dreams and worked to understand their neurological underpinnings instead (Haskell, 1986). This epistemological shift from theorising about the psychological processes and manifestations of dreams, toward a more detailed examination of the biological substrates of dreaming led to critical neuroscientific advances in dream research (Haskell, 1986; Fischmann & Leuzinger-Bohleber, 2018). After delineating REM sleep, Aserinsky and Kleitman (1955) hypothesized that dreaming was a psychological state based upon the physiological process of REM sleep (Palagini & Rosenlicht, 2010). Their work progressed with Jouvet's (1965) identification of the pons as the brain region that produced REM sleep as the psychology of dreaming trended toward neuroscientific investigations of brain regions and processes implicated in sleep (Solms, 2015).

Of the prominent theories created during this period was the activation-synthesis theory forwarded by Allan Hobson (Schwartz, 2000). Hobson's theory was founded on an identification of the neural networks implicated in REM sleep, which led him to conclude that REM sleep was the basis of dreaming (Hobson, 1988; Hobson & McCarley, 1997). Hobson et al. (2000) consequently expanded on this theory and formulated the Activation-Input Source-Neuromodulation (AIM) model of dreaming. Based on the activation-synthesis hypothesis, the AIM model positioned that dream experience is a psychological concomitant of REM sleep. In opposition to earlier psychoanalytic perspectives, Hobson argued that primary motivating force of dreams was not psychological but physiological and suggested that dreaming emerged as an epiphenomenon of REM sleep (Hobson & McCarley, 1977; Hobson et al., 1998).

However, scholars like Foulkes critiqued the AIM model on the basis that such a theory was overtly reductionist (1990; Foulkes et al., 1989). Through a series of sleep laboratory studies undertaken with children, Foulkes observed that dreaming not only occurred during REM sleep but could also occur in non-REM phases (Foulkes 1962; Foulkes & Vogel, 1965). Though Foulkes moved away from the argument that sleep and dreaming were equivalent by establishing that REM sleep was not sufficient in neurobiological explanations of dreaming, his work still rejected earlier psychoanalytic understandings as he felt that dreams were not indicative of unconscious wishes but came to understand dreams as a feat of consciousness instead (Solms, 2015).

Pivotally, Foulkes' ground-breaking work in conceptualizing the processes involved in sleep and dreams was enhanced by researchers such as Mark Solms, who provided confirmation that REM sleep is neither necessary nor sufficient for dream generation (1997). Using lesion correlation methods, Solms found that damage to the inferior parietal lobule in the brain cortex led to a complete loss of dreaming while REM sleep remained intact (1997). He further observed the same phenomenon when the white matter of the ventromedial quadrant of the frontal lobes—which connects the frontal cortex to subcortical structures—was damaged (1997). In these premier studies, Solms ascertained that dreaming and sleep had entirely different physiological mechanisms. Thus, it became apparent that equating REM sleep and dreaming was misguided as these phenomena likely served different functional purposes (Solms, 1997, 1999b, 2000, 2021; Solms & Nersessian, 1999).

2.3 Contemporary Considerations

In light of such discoveries, dream research increasingly undertook more robust neurological inquiry into dream functions rather than understanding the biological basis of sleep (Schwartz, 2000; Solms, 2015). However, though advances in the field have expanded understandings of the neurological basis of sleep, there is still wide disagreement about the

functions of dreaming. While some researchers have argued that dreaming serves no adaptive function (Domhoff, 2017; Foulkes et al., 1989) others have offered diverging opinions. These range from understandings that dreams function as virtual reality simulation (Hobson & Friston, 2012), that dreaming may simulate threats and have adaptive evolutionary capacities (Revonsuo, 2000), to the suggestion that dreaming may occur to consolidate memories (Deseilles et al., 2011; Deiselles & Duclos, 2013). While a complete account is beyond the purview of this review, the continuity hypothesis, work of emotional regulation theorists, and insights afforded by cognitive neuroscientists are believed to be key to this research undertaking.

2.3.1 The Continuity Hypothesis

One of the most frequently drawn upon ideas in explanations of the function of dreaming was first articulated by Bell & Hall in 1971, who described what is known as the continuity hypothesis (Domhoff, 2017a). By establishing a method of content analyses—which was tailored to dream research—Hall initially observed that the activities, social interactions, characters, and emotions routinely found in dream reports are often representative of elements of individuals' daily lives (1966). Consequently, Bell & Hall (1971) formalised these observations through the continuity hypothesis, which suggests that there is continuity between everyday life and dream life, and that individuals' dream reports reflect the intensity of concern assigned to such elements (Domhoff, 2017a; Bell & Hall, 1971). Consequently, it may be expected that the frequency of these elements in dreams can be used to gauge their relative importance to the conscious individual (Domhoff, 2017b). As such, the theory allows for the idea that a comparison between dream reports may expose variations in what is considered psychologically important different dreamers (Domhoff, 2017b).

The continuity hypothesis continues to be prominent in contemporary literature and is advanced by researchers such as Schredl and Domhoff, who have routinely found evidence to support the theory. For example, in a study that considered the subject of fever dreams, Schredl & Erlacher (2020) observed that individuals who recalled dreams they experienced while having a fever described health-related topics, as well as a general perception of temperature in their dreams. Additionally, a longitudinal case study which observed the representation of romantic partnerships in dreams found that while romantic partners were often included in dreams, throughout periods in which separation between the dreamer and partner occurred, dreams that included the romantic partner were marked by significantly fewer friendly interactions and more negative emotions than periods during which the partners were together (Schredl & Neuhausler, 2019).

Notably, evidence for the continuity hypothesis has shown that experiences associated with heightened emotional importance are incorporated more commonly into dream reports than those that do not carry the same emotional intensity. To illustrate, Wang et al. (2021) show that events that are more emotional, more meaningful, and have a more substantial impact on the dreamer's life are more likely reflected in participants' dreams than those that are not. Furthermore, investigating media use and dreaming, Moverley et al. (2018) discovered that both the time an individual spends engaging with a particular media type and the emotional concern associated with the media types relate to the frequency of dreams containing references to these media.

2.3.2. The Emotion Regulation Theory of Dreams

As such research demonstrates more frequent incorporations of emotionally meaningful subjects into dreams, Emotion Regulation Theorists' (ERT) use of the hypothesis may be expected. Yet, breaking with the tradition of researchers like Domhoff (2018)—who argue against the idea that dreams serve emotional purposes these theorists have used tenets

of the continuity hypothesis to premise that dream content is closely tied to waking emotional states, as dreaming facilitates emotional processing (Hartmann, 1996, 1998; Ruby, 2011).

Thus, while researchers such as Domhoff recognise that individuals often assign importance to their dreams, it is argued that there is no evolutionary purpose to dreaming which instead emerges as a form of mind-wandering (Domhoff, 2019). Opposingly, scholars who uphold the ERT of dreams strongly feel that dreaming is an affective processing mechanism through which emotional memories are reproduced and integrated into broader memory stores (Cartwright et al., 1998; Nielsen & Lara-Carrasco, 2007; Sandor et al., 2016). These theories explain that as our dream content reflects emotional experiences, it can be believed that dreaming itself enables us to process these feelings (Cartwright, 2012; Deseilles & Duclos, 2013; Malinowski et al., 2019). They posit that while the individual sleeps, their unprocessed emotional thoughts and experiences are represented in their dream content and are subsequently incorporated into wider memory systems which ameliorate the valence of these emotions (Deseilles et al., 2010; Scarpelli et al., 2019).

While investigations into emotion regulating functions of dreams are constrained by difficulties related to the study of dreaming, some scholars have found tentative support for these conclusions. Namely, in a study of 100 Chinese participants, Yu (2013) observed a positive correlation between the intensity of participants' dreams and their pre-sleep and post-sleep emotions. Additionally, Yu found that emotions which preceded dreaming sleep were significantly reduced following dreaming sleep (2013). Similarly, Schredl & Reinhard (2010) found that the emotional intensity of a dream predicted whether that dream effected an individual's waking mood. Likewise, Barnes et al. (2021) evidence that dreams play a pivotal role in how work stressors experienced during work hours are associated with mood the preceding day.

2.3.3 Cognitive and Affective Neuropsychological Contributions

This disjuncture between Domhoff and ERT theorists is illustrative of the ongoing debate concerning the purposes of dreams. Yet neuropsychological evidence has been found to support ERT hypotheses (Vandekerckhove & Wang, 2017). Specifically, Levin & Nielsen (2009) found that cognitive processes which mark dreaming enable the expression of emotions and allow them to be down-regulated (Levin & Nielsen, 2009). Perogramvros et al. (2018) argue that through the activation of emotional and motivational brain circuits, dreaming may allow emotions to be reprocessed, resulting in improved memory organization and emotion regulation. Furthermore, studies have shown that specific structures involved in cognitive and emotional processing during wakefulness are activated during sleep (Nielsen & Levin, 2007). Undertaking a review of the neuroscientific research on dreaming, Scarpelli et al. (2019) suggest that recent dream literature has proven that heightened brain activation may promote cognitive processing.

This is further supported by research that has used anatomical studies to show that during sleep and dreaming, there is an increase in brain activity in the thalamus, the limbic and paralimbic structures, the pontine tegmentum, and the basal forebrain (Deseilles et al., 2011; Solms, 1997). Specifically, research shows that areas of the brain that are implicated in self-regulation—the ventromedial prefrontal cortex and the anterior cingulate cortex—are correlated with the neural bases of dreaming (Solms, 1999; Wager & Heatherton, 2016). These anatomical correlates of dreaming are indicative of memory consolidation processes, which suggests that as we sleep, we may be experiencing emotional memories (Deseilles et al., 2011). In this regard, the considerable overlap in the neural bases of dreaming and affective regulation is particularly relevant for this study (Vandekerckhove & Wang, 2017).

2.4 Waking Affect and Dreaming

Consequently, it may be hypothesized that if dreams allow us to process waking emotions, continuity between our waking emotional states and the content of our dreams can be expected. There is research support for this assertion as in a study that assessed the relationship between dream affect and waking affect it was found that where individuals experienced positive affect during wakefulness the day before dreaming, this mood was significantly reduced in the dream report (Conte et al., 2020). By comparison, the experience of negative affect was amplified in dream reports, as where individuals experienced negative affect during wakefulness, their sleep mentation contained increases in negative affect (Conte et al., 2020).

Similarly, investigations of associations between mental distress and dream content have found strong evidence for continuity between affective states and dream content. To illustrate, researchers have found that anxiety and depression have differential impacts on individuals' dreams, including the length of their dream reports and the vividness of these dreams (Spoormaker et al., 2006). Moreover, a comparison of the dream content of patients with anxiety disorders and healthy patients demonstrated that dreams of individuals with anxiety contained more characters, social and aggressive interactions, negative emotions, and less friendly interactions, success, good fortune, and positive emotions (Rimsh & Pietrowsky, 2021). Studies have also found significant associations between anxiety and disturbing dreams, as those who experience higher levels of anxiety often report dreams that include more fear content (Haynes & Mooney, 1975; Picard-Deland et al., 2018; Skancke et al., 2014). Using the HVdC method, King & DeCicco (2007) illustrate that individuals who experience anxiety detail more negative dreams, which contain more aggression and more violent emotions.

2.5. Literature considering the impact of traumatic events on dreams

This is particularly important when considering that researchers have evidenced links between daily experiences, affect and dream content (Ruby, 2011). Pivotally, studies conducted after the September 11th terrorist attacks proved that the events had a significant effect on dream content (Hartmann & Basile, 2003; Hartmann & Brezler, 2008; Nielsen et al., 2006). In one such study, Bulkeley & Kahan (2008) found that impressions of the tragedy could be observed in dreams as research participants described dream imagery explicitly reminiscent of the attacks and narrated events such as being highjacked, planes crashing into buildings and described images of fire.

Similar research has derived supporting findings, as it has been shown that violent events may impact dreams immediately while also manifesting in sleep long after traumatic exposure (Sandman et al., 2017). To exemplify, Sandman et al. (2017) observed that nightmares may persist in war veterans even decades after the war. Similarly, soldiers who were enlisted in the United States Army during the Vietnam War describe dreaming of traumatic experiences years after these events (Domhoff, 2019). Barrett et al. (2013) derived comparable results when analysing dreams of prisoners of war as research participants narrated dreams that had measurably less friendliness, social interactions, sexuality, and aggression than other men of the same era (Barrett et al., 2013).

These results have been replicated in research that has considered illness's impact on dream imagery. To exemplify, DeCicco et al. (2010) observed the dreams of women diagnosed with breast cancer and found that research participants experienced oneiric activities that were reminiscent of concerns they had during waking life. For example, the participants' dreams included more medical figures, pain, and disease references (DeCicco et al., 2010). These findings have been confirmed by studies on viral diseases such as HIV/Aids,

which have shown that individuals diagnosed with the virus report more distressing dreams and narrate dream content related to infection and disease (Olley et al., 2005).

These historical findings have accorded with research emerging from the COVID-19 outbreak. A growing body of literature demonstrates that the COVID-19 outbreak has affected dream content (see Barrett, 2020; Di Renzo & Tagliacozzi, 2021; Gorgoni et al., 2020; Iorio et al., 2020; MacKay & DeCicco, 2020; Mariani et al., 2021; Marogna et al., 2021; Mota et al., 2020; Pesonen et al., 2020; Scarpelli et al., 2021a; Scarpelli et al., 2021b; Schredl & Bulkeley, 2020). Specifically, MacKay & DeCicco (2020)—using the HVdC method—found that university students enrolled during the pandemic described significantly more virus-related dream content than a matched control group. Pesonen et al. (2020) further discovered that individuals who experienced 'pandemic dreams' detail sleep narratives that reflect pandemic-specific imagery such as personal protective equipment, reference pandemic terms such as social distancing, and present dreams containing fears of contagion.

Such findings have led some to suggested that there is an emerging global phenomenon—pandemic dreaming—as research increasingly demonstrates that the COVID-19 virus is not only exerting an effect on dream content by leading to more negative, threatening, and frightening sleep experiences, but as dreams also come to incorporate pandemic-related images (Barrett, 2020). The literature argues that this specific form of sleep mentation is characterised by fewer positive emotions (Scarpelli et al., 2020); stronger negative emotions (Parrello et al., 2020); include more sensory impressions (Sommantico et al., 2021); and has become more frightening (Pesonen et al., 2020; Mota et al., 2020). Furthermore, this research has also examined changes in dream content during different waves of the outbreak and has shown that while pandemic dreams have become less intense with time, they were more negative in tone during the second wave of the pandemic than during the first wave (Scarpelli et al., 2021b).

While the impact of the COVID-19 crisis may be observed in dreams due to the proven emotional toll of the outbreak, the pandemic has further resulted in an array of behavioural and social disruptions that could further impact dream content. Particularly, experiences of social isolation of the kind engendered by the pandemic have historically contributed to more vivid dreams (Barrett, 2001a). Changes in sleep patterns have also been observed throughout the outbreak and scholars such as Bottary et al. (2020) argue that these changes may influence the recollection of memorable dreams. Moreover, increased prevalence of anxiety and depression have emerged from the pandemic, and it is consequently likely that such factors will be implicated in dream characterisations (Brooks et al., 2020; Choi et al., 2020; Feter et al., 2020; Fiorillo & Gorwood, 2020; Holmes et al., 2021; Lebel et al., 2020; Özdin & Bayrak Özdin, 2020; Rudenstine et al., 2020).

2.6. Self-Regulation

These changes in dream content and increases in pandemic dreams offer a valuable opportunity for dream researchers. If dreaming is understood to enable affective processing that allows for affective regulation, there is a possibility that dreams may be linked to self-regulation abilities more broadly which could be more clearly examined within the current context (Wager & Heathertone, 2016). Findings have indicated that successful affective processing is not only central to self-regulation, but that self-regulation failure is triggered by the misregulation of emotions (Wager & Heatherton, 2016). Literature considering self-regulation is broad and ranges from theories and models which assess self-regulatory abilities to theoretical conceptualisations of the processes implicated therein (Brown et al., 1999; Inzlicht et al., 2020; Kanfer, 1970). Others have analysed how self-regulation is related to various goal-directed behaviours (Kelley et al., 2019); and have explored strategies that enhance self-regulation (Berkman, 2016).

Researchers such as Brown et al. (1999)—who conceptualised the Self-Regulation Questionnaire (SRQ)—have been primarily interested in self-regulation functioning from a theoretical perspective and have consequently explored the processes which are implicated in self-regulation ability. Theoretical understandings of self-regulation are as diverse as theories on the functions of dreaming: while some posit that social learning is central to self-regulation (Patock-Peckham et al., 2001), others more specifically examine whether personality traits are predictive of self-regulation ability (Carver & Scheier, 1998). In contemporary literature, there has been an increase in work attempting to understand neural correlates of self-regulation and examining cognitive mechanisms involved in these abilities (Wagner & Heatherton, 2016).

Opposingly, others have been more interested in the behavioural outcomes of self-regulation ability and have considered how self-regulation is implicated in goal-directed behaviours. For example, some of these studies have considered how self-regulation can enable educational achievement (Zimmerman, 2008) and how it may be linked to weight loss and eating disorders (Dohle et al., 2018). Researchers have also examined how self-regulation may be implicated in antisocial tendencies like addiction (Carey et al., 2004; Miller & Brown, 1991; Naqvi et al., 2015; Sayette & Creswell, 2016) and crime (Rocque et al., 2016).

However, since the COVID-19 outbreak, researchers have begun to explore how self-regulation may aid the struggle against the virus. Specifically, studies have looked at how self-regulation may promote resilience and enhance individuals' health behaviours (Apgar & Cadmus, 2020; Hofmeyr et al., 2020; Matias et al., 2020; Panayiotou et al., 2020). Emerging findings indicate that when individuals regulate their behaviours effectively, they may also be better prepared to mediate challenges posed by the pandemic. To illustrate, Apgar & Cadmus (2020) undertook a mixed-methods study which found that students who engage in self-

regulation, develop coping mechanisms which ensure that they can meet the challenges posed by the pandemic more successfully (Apgar & Cadmus, 2020). Comparable results have been found in research that has considered how self-regulation is implicated in the adaptive behaviours of healthcare workers (Hofmeyer et al., 2020). Hofmeyer et al. (2020) found evidence that healthcare workers engaged in frontline efforts start to experience feelings of compassion fatigue that subsequently undermines their wellbeing. They argue that this fatigue and other mental health effects may be ameliorated through self-regulation strategies such as emotion regulation and self-compassion (Hofmeyer et al., 2020).

Significantly, while some have considered how sleep impacts self-regulation capacity, literature that has explored the role of dreaming in self-regulation is lacking. Throughout the literature, the evidence conclusively suggests that sleep deficiencies impair cognitive functioning and curtail self-regulation ability (Hilser et al., 2018). Yet, research that considers how dreaming and dream content may be associated with conscious cognitive processing—as measured by self-regulation ability—is exceedingly limited. This limitation is a considerable opportunity for researchers interested in exploring the topic.

2.7 Calvin Hall and Robert Van de Castle: The Study of Dreams

However, researchers wanting to utilise such opportunities have often encountered constraints in examining dream content through sound analytic methodologies. In particular, Calvin Hall faced such a predicament when wanting to study Freud and Jung's theories reliably. As a result, Hall (1966) began to develop what would become the golden standard of content analysis in dream research. After collecting thousands of dream reports and categorizing the content of these narratives, in 1959 Hall published *The Meaning of Dreams* (Schwartz, 2000). In this work, Hall supported Freud's findings and suggested that dreams serve to encode and symbolize the psychic conflict that is generated by unfulfilled wishes (Schwartz, 2000).

In collaboration with Robert Van de Castle, the HVdC system of content analysis was subsequently created—illustrated in Table 1—marking a seminal contribution to scientific inquiries into dreams (Hall & Van de Castle, 1966). The method is a coding system that uses rules to classify dream content into quantifiable elements. The system consists of ten broad categories and various subcategories that conceptualise dream content. Included in these ten categories is what is known as the "Big Five" of the system, which is routinely studied as they are commonly observed in dream reports. These are (1) characters, (2) social interactions, (3) good and misfortunes, (4) success and failure, (5) and emotions.

Table 1
Hall and Van de Castle Content Categories

Main Categories	Description
Settings and Objects	Indoor, outdoor, uncertain, distorted settings
	Objects such as architecture, body parts, household clothing, food
Characters	Persons (number, sex, identity, age)
	Animal, creature, mythic or fictional creatures
Social interactions	Aggressive (eight subclasses ranging from verbal threats to causing death)
	Friendly (ranging from verbal expressions of friendliness to long-term close relationships)
	Sexual (ranging from sexual fantasies to sexual intercourse)
Activities	Communication, thinking and physical activities
Achievement outcomes	Success and Failure
Fortune	Misfortune and good fortune
Emotion	Anger, apprehension, happiness, sadness, confusion
Descriptive elements	Modifiers such as size, velocity, age, colour
	Temporal scale referencing time
	Negative scale (e.g., no, never, not)
Theoretical scale	Castration anxiety

Main Categories	Description
	Castration wishes
	Penis envy
	Oral incorporation
	Regression
	Food and eating
	Elements from the past

Note. The table details the main content categories established by Hall and Van de Castle and is adapted from their work (1966).

While numerous studies have used the HVdC system, the methodology has faced extensive critique. Though the HVdC system offers a range of content categories, it has been critiqued as researchers argue that the system does not adequately capture nuances and the subjective nature of dreaming (Schredl, 2010). Moreover, the utility of the HVdC has been questioned as many argue that through quantifying dream reports a loss of information occurs: to illustrate, though the system is wide-ranging the methodology has been particularly critiqued for a lack of adequacy in capturing emotions narrated in dream reports (Schredl, 2010). Since the HVdC methodology requires dream emotions to be clearly identified in dream narratives, implicit emotions, positive emotions, and differences in the intensity of dream emotions are not sufficiently captured. More significantly, statistical comparisons in dream content indicators and those established during normative studies undertaken from 1947 to 1952, with American research respondents is subject to significant limitations. Though the HVdC norms have been replicated in several studies, the cross-cultural validity of such comparisons is questioned.

However, the HVdC system is useful as it converts dream narratives into a series of content indicators which are readily apprehended and communicable. Owing to such benefits, the methodology has become instrumental to researchers as it allows for the quantification of dream content according to rationally derived scales (Domhoff, 2017). In the pandemic setting, the utility of this method has been underscored as it not only conceptualises a wide

range of qualitative dream content and renders them appropriate for statistical analyses, but the established normative scales renders it possible to compare the dreams of individuals living within this unique context, to the dream content of individuals who lived during pre-pandemic times, thus allowing researchers to measure critical differences between such samples. Furthermore, the widespread use of the scale in assorted studies and populations facilitates cross-comparisons, as the HVdC method results in a range of content indicators that are easily apprehended and communicated and can be compared. While the HVdC method is subject to important methodological limitations which carry consequences for the generalisability of research, in the absence of more robust and current dream content methodologies it remains useful in dream research.

2.8 Rationale

As outlined in Chapter 1, the evidence indicates a substantial rise in vivid, negative, emotionally intense dreams, which demonstrates that unprecedented changes created by the COVID-19 pandemic are impacting individuals' affective processing (see Barrett, 2020; Di Renzo & Tagliacozzi, 2021; Gorgoni et al., Iorio et al., 2020; MacKay & DeCicco, 2020; Marriani et al., 2021; Marogna et al., 2021; Mota et al., 2020; Pesonen et al., 2020; Scarpelli et al., 2021a; Schredl & Bulkeley, 2020). This accords with historical literature and evidence that waking affect routinely manifests within dream contents and can be assessed by dream tone. Studies of associations between anxiety and dream content have shown that individuals who experience disturbed waking affect concomitantly demonstrate dream disturbances that correlate with their waking emotions (Haynes & Mooney, 1975; Rimsh & Pietrowsky, 2021; Skancke et al., 2014). Consequently, insight into the dream contents of individuals living during the COVID-19 pandemic can be instructive as it offers a unique avenue to explore the effects of the pandemic on the population's conscious and unconscious processing mechanisms.

Furthermore, neuropsychological evidence indicates that these affective processes and cognitive processes, such as self-regulation, may be associated (Wagner & Heathertone, 2016). Thus, it is plausible that knowledge of associations amongst affective processing—as assessed by the quantification of qualitative dream features—and self-regulation may be valuable as it could heighten understanding of this ability at a time where such an ability has been argued to significantly predict individuals' coping with the COVID-19 pandemic (Panayiotou et al., 2020). Moreover, such insight may be crucial as self-regulation has been implicated not only in health-risk behaviours (Artuch-Garde, 2017) but has also been shown to be a resilience factor that can help individuals cope (Panayiotou et al., 2020).

Methodologies such as the HVdC system offer researchers who want to explore these factors a comprehensive tool through which to do so. As the system renders raw dream content into quantifiable percentages and frequencies, it opens possibilities to explore associations between waking affect, self-regulatory functioning, and dream content in a scientifically sound manner. Furthermore, the use of this methodology has also proven vital in understanding the novel phenomenon of pandemic dreaming, as it not only allows researchers to make comparisons between other pandemic-related findings but enables those working within the field of dream research to explore how dreaming and dream content has changed since the outbreak.

2.9 Research Questions and Hypotheses

Thus, to explore the phenomenon of pandemic dreaming and to examine hypothesized and evidenced associations between dream content, waking anxiety, and self-regulation, the primary research question investigated in this study was:

> Is there a relationship between affective processing as identified through affective content quantified in self-reported dream transcripts and (1) self-regulation as measured by the Short Self-Regulation Questionnaire (SSRQ), and (2) anxiety as

measured by scores on the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS), in individuals living during the COVID-19 pandemic?

In light of research evidence, the following primary research hypothesis was identified:

A statistically significant relationship between affective processing as identified through affective content in self-reported dream transcripts and (1) self-regulation as measured by the Short Self-Regulation Questionnaire (SSRQ), and (2) anxiety as measured by scores on the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS) exists in individuals living during the COVID-19 pandemic.

To explore the primary research question, the following secondary questions were proposed:

Is there a significant association between dream content as identified by the HVdC, specifically: (1) the social interactions; (2) emotion; (3) characters; (4) good and misfortune; and (5) success and failure, and participants (1) SSRQ scores and (2) anxiety scores as measured by the anxiety subscale of the HADS?

The following hypotheses were identified as salient to the secondary research questions:

A statistically significant association between (1) the social interactions; (2) emotions; (3) characters (4) good and misfortune; and (5) success and failure, and participants (1) SSRQ scores and (2) anxiety scores as measured by the anxiety subscale of the HADS exists.

Another key aim of this research was to explore whether there were significant differences in the dream content quantified in self-reported dream transcripts of the current sample and dream content of normative samples established by Hall & Van de Castle.

3. Chapter Three: Research Methodology

3.1 Introduction

This chapter provides an overview of the research methodology employed throughout this study to answer the primary and secondary research questions. It details how the research sample was established by detailing the sampling strategy, inclusion and exclusion criteria, and describing the research participants by considering their demographic characteristics. Moreover, the research design is defined, as well as a rationale. The chapter describes research instruments employed and procedures followed in data collection. Finally, the data analysis methods are overviewed, and ethical issues are discussed.

3.2 Research Design

This study was undertaken through a cross-sectional analysis of secondary data harvested from a more extensive international survey, herein referred to as the COVID Lockdown (CL) study. The CL study was undertaken by Professor Samantha Brooks at Liverpool John Moores University (LMJU) to explore behavioural responses to the COVID-19 outbreak. The extraordinary nature of the COVID-19 setting, as well as the relative novelty of the research topic is well-suited to such research designs (Panke, 2018). Additionally, a correlational research design was used in the investigation of the association between affective processing, self-regulation, and anxiety. This is understood as a research approach wherein two or more variables are observed to investigate the extent to which they are related (Schober et al., 2018; Wang & Chen, 2020). While such a design limits the ability to generalize the findings and constrains broader interpretations, it is valuable in facilitating an understanding of the relationships between variables (Curtis et al., 2012).

To answer the primary research questions two dependent variables were identified: (1) scores on the SSRQ and (2) scores on the anxiety subscale of the HADS. The main independent variable was dream transcripts coded and quantified using the HVdC method:

five of these categories were identified as independent variables: (1) Dream Characters, (2) Social Interactions, (3) Good Fortune and Misfortune, (4) Success and Failure, (5) Emotions. Consequently, as each of these categories contains various subcategories specific analyses were undertaken to assess the relationships between SSRQ and anxiety scores, and the subcategorised independent variables. To assess differences in the dream content of participants living during the COVID-19 pandemic, quantified content indicators were compared to a normative sample of students' dreams between 1947 and 1950 at the Case Western Reserve University ([CWRU] Domhoff, 2003). In this normative sample, five dream reports were collected from 100 females (n = 500) and 100 males (n = 500).

3.3 Research Sample

3.3.1 Research Sampling Procedure

Research participants were drawn from a larger pool of 2518 respondents who partook in the CL study. These individuals were recruited into the CL study through convenience sampling—which while potentially limiting the representativeness of the sample—was required given lockdown constraints; this strategy further yielded an international sample. Participants were informed about the study through advertisements placed on social media (Facebook and Twitter) and the Prolific website. Prolific is a self-service platform that connects researchers to study participants (Prolific, 2022). This allowed individuals between the ages of 18 and 75 to self-select their participation in the research, which was hosted and disseminated through the Qualtrics site which includes online survey software (Qualtrics, 2022). Research participation was incentivised with a £1 per hour minimum wage, regulated by Prolific. Furthermore, participants were offered the chance to win a £100 Amazon gift card after completing the study.

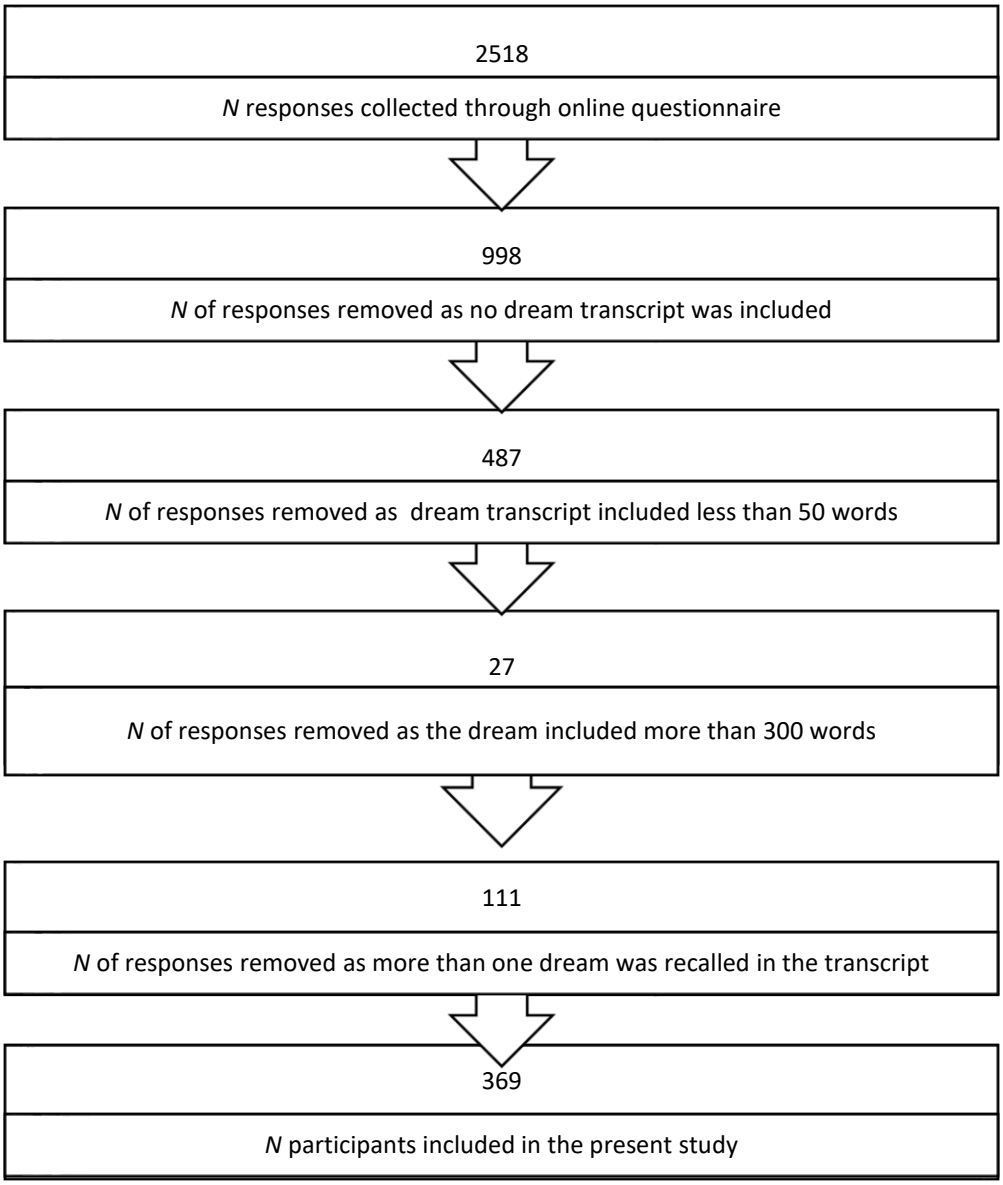
From the larger sample, a total of 369 participants were included in the present research by the inclusion and exclusion criteria:

1. Participants had to complete the entire survey.
2. They must have experienced some form of COVID-19 lockdown in their residential country.
3. Participants had to have given responses to the question “please describe (…) [a] dream that you recently had”.
4. The length of responses to this question had to be between 50-300 words long according to the requirements of the HVdC method, and only one discernible dream had to be included as part of the response.

This final criterion was derived from the HVdC method: While limiting the research findings—as longer and shorter transcripts were not considered—the method requires that the data contain only one dream between 50 to 300 words to allow statistically sound normative comparisons, and to account for variability in dream lengths which may impact statistical analyses (Domhoff, 1999). As depicted in Figure 1, 369 international research respondents were included having met the inclusion and exclusion criteria. This was considered an adequate sample size, as a minimum sample of 100-125 dream reports has been deemed sufficient for studies which used comparisons with the HVdC norms (Domhoff, 1999). Furthermore, a sufficient number of both male (n = 168) and female responses (n = 195) were collected to enable normative comparisons.

Figure 1

Flowchart Presenting Participants' Inclusion in the Study



Note. The flowchart depicts the method by which participants were included in the final study.

3.3.2 Participant Demographics

Participants' age, gender, nationality, and educational attainment were considered to characterise the research respondents. The demographic table (Table 2) shows that the research sample included more female participants (52.8%, *n* = 195) than male participants (42.4%, *n* = 168), and only 2 of the participants stated that they preferred not to be identified by their gender, while 4 identified their gender as "Other". These individuals were grouped

into a gender-nonconforming category for ease of statistical analyses and constituted only a small minority of the set as they made up just 1.6% of the sample (*n* = 6). While participants ranged in age from 18 to 74, the average age was 28.69 years old (*SD* = 10.23), and respondents were most commonly 20 years old.

Table 2

Participant Demographic Characteristics by Education Level

Education	Male		Female		Gender Nonbinary	
	n	*%*	*N*	*%*	*n*	%
High School Completed	36.00	21.43	29.00	14.87	01.00	16.67
College/ A-Levels/ Diploma	30.00	17.86	30.00	15.38	00.00	00.00
Undergraduate Degree Incomplete	07.00	04.17	08.00	04.10	00.00	00.00
Undergraduate Degree	63.00	37.50	76.00	38.97	01.00	16.67
Masters/ Postgraduate Degree Incomplete	00.00	00.00	02.00	01.03	00.00	00.00
Masters/ Postgraduate Degree	28.00	16.67	43.00	22.05	02.00	33.33
PhD Degree	04.00	02.38	06.00	03.08	01.00	16.67

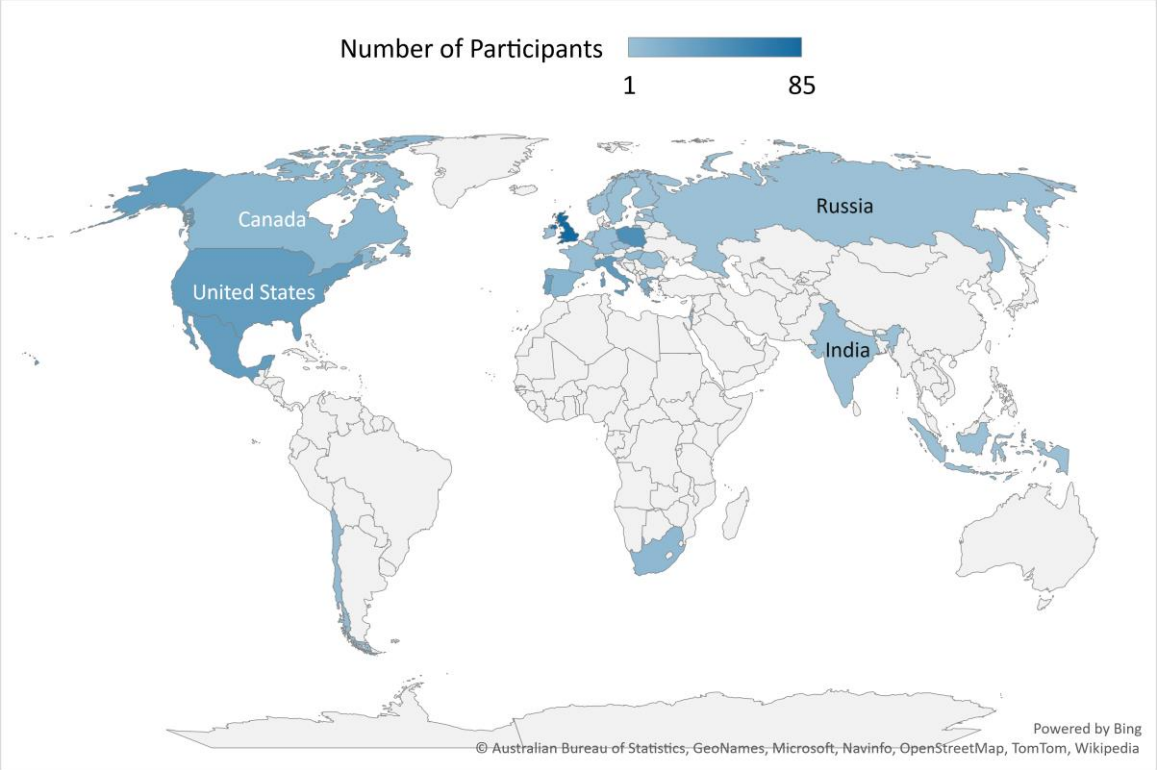
Note. The table presents the demographic information of the sample. The sample's age characteristics, as well as their level of education, are depicted. The total *N* of research participants was 369. One participant did not furnish educational information.

Analyses of the sample educational information showed that respondents were highly educated, with the majority having at least completed high school (*n* = 66, 17.89%). Many of the participants noted having completed or being enrolled in various diplomas (*n* = 60, 16.26%), being enrolled in- (*n* = 15, 4.07%) or having completed undergraduate degrees (*n* = 140, 37.94%), and postgraduate degrees (*n* = 75, 20.33%). Furthermore, 2.98% of the sample (*n* = 11) described that they had PhD degrees, while only 0.27% of the sample (*n* = 1) stated that they had not completed any secondary education. One research participant negated to declare educational information.

As evidenced in the demographic map included in Figure 2, research participation was international as individuals from twenty-eight different countries were included in the final sample. Most respondents were from the United Kingdom (23%, *n* = 85), followed by Poland (13%, *n* = 48) and Italy (10.3%, *n* = 38) respectively. Only a handful of participants came from what has been labelled non-Western, Educated, Industrialised, Rich, and Democratic (WEIRD) countries (Henrich et al., 2010). Specifically, only nine South African participants, one participant from India, one participant from Indonesia and ten Sri-Lankan respondents participated in the study.

Figure 2

Demographic Map of Participants' Nationality



Note. The total *N* of participants was 369. Participants came from Estonia (1), Finland (1), India (1), Indonesia (1), Ireland (1), Latvia (1), Netherlands (1), Norway (1), Romania (1), Russian Federation (1), Israel (2), Sweden (2), Germany (3), Slovakia (3), Czech Republic (4), Chile (7), Hungary (7), South Africa (9), Canada (10), Spain (13), Greece (20), Portugal (32), Mexico (36), United States of America (36), Italy (38), Poland (48), United Kingdom (85).

3.4 Data Collection and Analysis

3.4.1 Data Collection Instrument

Research data was collected using four sections of the broader CL study questionnaire conceptualised by Professor Brooks at LJMU. These sections were: (1) the socio-demographic questionnaire; (2) scores on the SSRQ; (3) scores on the anxiety subscale of the HADS; and (4) participants' dream narratives. The following discussion details the psychometric properties of these instruments.

3.4.1.1 Demographic Questionnaire. Participants' demographic information was collected through the demographic questionnaire. This survey requested that participants provide their age, gender, nationality, political affiliation, and level of educational attainment (see Appendix B). However, only participants' responses to four demographic questions were considered: Their responses to open-ended questions regarding their age, nationality and highest level of education were used, and participants' answers to a multiple-choice question which asked, "What gender do you identify with?" was included in the present study.

3.4.1.2 The Self-Regulation Questionnaire. The SRQ developed by Brown et al. (1999) was further included in the research survey (Appendix C). Data collected from this instrument allowed for an assessment of participants' self-regulatory ability using self-report items. Sixty-three questions are included in the questionnaire, which is answered on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree; Brown et al., 1999). Items include questions such as "I have so many plans that it's hard for me to focus on any one of them" and "I think a lot about what other people think of me" (Carey et al., 2004, p. 256-257). These items are scored and a total score out of 315 is believed to reflect the self-regulatory functioning of an individual (Brown et al., 1999).

Miller & Brown (1991) argue that self-regulation is composed of seven dimensions and building on the work of Kanfer (1970) suggest that seven steps are involved in the

regulation of the self, namely: individuals firstly receive information, thereafter they must evaluate the information and compare it to social norms, at the third step change is triggered whereafter the individual searches for options. In stages 5 and 6 a plan is formulated and implemented, and finally, the effectiveness of the plan is assessed. However, the empirical basis of these seven dimensions has been questioned (Carey et al., 2004). In a psychometric analysis of the questionnaire, Carey et al. (2004) found a single-factor structure of the self-regulation questionnaire and subsequently created a short version of the SRQ known as the Short Self-Regulation Questionnaire (SSRQ).

Carey et al. (2004) found that the SSRQ had good reliability and validity ($\alpha = 0.92$). It was also highly correlated with the original SRQ (Pearson's $r = .96$). In subsequent research, the validity of the scale was established, with multiple countries including South Africa, validating its use (Potgieter & Botha, 2009; Vosloo et al., 2013). Consequently, participants' scores on the SSRQ (which can be observed in Appendix D) were totalled to measure participants' self-regulation ability as its proven use in various cultures was deemed suitable for this international sample. The scale was found to have good reliability ($\alpha = 0.93$) and was highly correlated with scores on the SRQ (Pearson's $r = .97$, $p < .01$). As such, the SSRQ was judged an adequate measure of self-regulation ability.

3.4.1.3 The Anxiety Subscale of the Hospital and Anxiety Scale. To gain insight into participants' waking emotional states, dreamers' scores on the anxiety subscale of the HADS were analysed (Zigmond & Snaith, 1983; Appendix E). Participants' scores on the scale were used to quantify the anxiety that they experienced during waking life. The HADS has been validated as a reliable instrument to assess clinically significant anxiety in individuals (Zigmond & Snaith, 1983). The subscale includes seven self-report items such as "I feel tense or 'wound up'" and "I get sudden feelings of panic" which use Likert scales to assess individuals' anxiety (Zigmond & Snaith, 1983, p. 368-370). A score out of 21 is

calculated with scores less than 7 indicating an absence of noteworthy anxiety, 8-10 indicating moderate anxiety, and scores of above 11 believed to indicate significant anxiety. The anxiety subscale has not only demonstrated reliability and validity in a variety of countries (Cassiani-Miranda et al., 2021; Wouters et al., 2012; Yang et al., 2014) but has also been used in dream studies (Yuan et al., 2020; Zhou et al., 2020).

3.4.1.4 Dream Question. Participants' dream narratives were collected through an open-ended question that allowed for the detailing of dream experiences (see Appendix F). Participants were prompted by the instruction to "please take a moment to think about one or two dreams that [they could] remember from recent months" and to specifically recall those that "were most vivid" and which they "[could] still remember". After this prompting—and a warning against the inclusion of false information or identifying information—participants were asked to "describe (…) with as much detail as you can, the dream(s) that you recently had" and were instructed that they could respond "I have decided not to share my dream" if they did not want to complete the question. Importantly, the use of dream narratives is limited by the fact that the narratives provided by the respondents are largely subjective and curated. Thus, while participants are believed to have accurately recounted their dream experiences it is possible that various biases and selectivity were incurred through soliciting and analysing subjective dream reports.

3.4.2 Data Collection Procedure

At the time of data collection, the first round of COVID-19 infections was being experienced, and thus public health imperatives and directives required that data collection be undertaken through online methodologies. Resultantly, from July until September 2020 an online questionnaire was administered through Qualtrics. Before the survey commenced, a participant information notice was presented to research participants that included all pertinent information about the study. Respondents were notified of the advantages and risks

of partaking in the questionnaire (Appendix G) and were informed of the measures instituted to ensure that information was confidential, as well as limits to confidentiality. Upon providing informed consent, participants could proceed with completing the questionnaire which included: a demographic questionnaire, a COVID-19 lockdown survey, the HADS, the SRQ, the Obsessive-Compulsive Inventory-revised, two memory tests and the dream recall question.

The survey format ensured that participants could not move forward until all questions were answered, and they were unable to amend answers to previous questions. Respondents were given one week to complete the entire questionnaire and upon completion, were thanked for their participation and directed to a debriefing page (Appendix H). Consequently, participants were identified for inclusion in the present study using the inclusion and exclusion criteria. These participants compromised the total *N* of this study. Sociodemographic data, SSRQ scores, anxiety scores using the HADS, and their dream transcripts were analysed as described subsequently.

3.4.3 Data Preparation and Analyses

The following discussion considers the five steps of data cleaning and analysis methods used to answer the research questions. These data analytic methodologies are discussed.

3.4.3.1 Hall/Van De Castle Content Analyses. The first step of data analysis involved quantifying dream data using the HVdC method which can be observed in more detail in Appendix I. The method is underpinned by the idea that the frequency with which a dream element appears within a dream is indicative of the intensity of the concern, interest, or emotional preoccupation an individual assigns to that element (Domhoff, 1999). Thus, an examination of the statistically significant differences between groups and individuals can be used to gauge psychologically salient dream content (Domhoff, 1999).

The HVdC method uses an objective method of content analysis which render dream data quantifiable and thus suitable for statistical analysis (Maggiolini et al., 2010). The system rests on a nominal level of measures and—as elsewhere discussed—contains broad categories according to which dream data are coded: (1) Characters, (2) Social Interactions, (3) Activities, (4) Striving, (5) Misfortunes and Good Fortunes, (6) Emotions, (7) Physical Surroundings, and (8) Descriptive Elements. Two additional scales—namely (1) Elements of the Past and (2) Food and Eating—are further conceptualised but not typically assessed in dream studies.

Data analysis involves coding dream transcripts according to these categories, which compose of various sub-categories that are classified through specific rules (Domhoff, 1996; Domhoff, 2017; Maggiolini et al., 2010). While each category generates insight into dreams, historically the so-called "Big Five" of the HVdC method have proven valuable and are routinely used (Domhoff, 2017). Thus, the dream analysis of the present research was limited to these categories, namely: (1) Characters, (2) Social Interactions, (3) Emotions, (4) Misfortunes and Good Fortunes, and (5) Success and Failure as identified in Table 3.

Table 3

Hall/van de Castle Category and Subcategory Descriptions

Category	Subcategory	Subcategory Descriptions
Characters		
	Number of Characters	Single Individual
		Two Individuals
		Group of Individuals
	Gender of Characters	Male Character
		Female Character
		Joint Characters
		Indefinite Gender
	Identity of Characters	Family Members
		Relatives
		Known Individuals
		Occupational Individuals
		Prominent Individuals

Category	Subcategory	Subcategory Descriptions
		Unknown Individuals
		Imaginary or Fictional Characters
		Animals
		Deceased Characters
		Uncertain Individuals
	Age of Characters	Adult
		Teenager
		Child
		Infant
Social Interactions		
	Aggressive Interactions	Covert feelings of hostility or anger without any overt expression of aggression
		Aggression displayed through verbal or expressive activity
		Attempts by one character to reject, exploit, control, or verbally coerce another character
		A serious accusation or verbal threat of harm
		An act that involves the theft or destruction of possessions
		An aggressive act that involves a character being chased, captured, confined, or physically coerced into performing some act
		Aggression that involves an attempt to harm a character physically
		Aggression that results in death
	Friendly Interactions	Friendliness is felt but not overtly expressed
		Expressions of friendliness conveyed through verbal or gestural means
		Friendliness expressed through offering gifts or loaning possessions
		Friendliness expressed through extending assistance or offering to do so
		Expressions of friendliness that involve taking initiative in requesting a character to share in a pleasant social activity.
		Friendliness expressed through socially acceptable forms of physical contact
		Friendliness expressed through a desire for a long-term close relationship with a character
	Sexual Interactions	Sexual thoughts or fantasies
		Sexual overtures or propositions
		Necking and nonplatonic kissing

Category	Subcategory	Subcategory Descriptions
		Nonintercourse activities often preceding intercourse
		Sexual intercourse.
Striving		
	Success	A character is described as expending energy and perseverance in pursuit of a goal, which is successfully attained.
	Failure	A character is described as expending energy and perseverance in pursuit of a goal which is not realised.
Fortunes		
	Good Fortune	An acquisition of goods or something beneficial happens that is adventitious or the result of circumstance beyond the characters control; good fortune is also coded when the dreamer is in a bountiful environment or becomes lucky.
	Misfortune	A character encounters an environmental obstacle or barrier; is unable to move; is lost; is late or is in danger of being late; or is in a situation where they are frustrated by external obstacles not consciously or intentionally produced
		A character is falling or in danger of falling
		A character is threatened by something in the environment
		A character is involved in an accident without suffering physical or mental injury; their possessions are lost, destroyed, damaged or defective.
		A character is injured or ill.
		A character is dead or dies as a result of an accident or illness, or unknown cause.
Emotions		
	Negative Emotions	Anger
		Apprehension
		Confusion
		Sadness
	Positive Emotions	Happiness

Note. The table presents a brief overview of the Big Five of the Hall/Van de Castle system, as well as the subcategories contained therein.

After coding dream descriptions in this manner and undertaking statistical analyses, a range of percentages and ratios are generated, which are readily understood in dream research

as content indicators. The content indicators not only facilitate ease of communication but also lend themselves to forms of statistical analyses that are most appropriate for data from nominal categories (Domhoff, 1999). To ensure that content indicators are reliably ascertained, dream reports are limited to between 50 and 300 words, and at least 125 dream reports should be collected (Domhoff, 2003).

3.4.3.2 Hall/Van De Castle Statistical Analyses. After the dream data were prepared through manual scoring according to the content categories, the coded dreams were inserted into the HVdC recommended Automated Dream Data Entry System and Statistical Analysis Tool (DreamSAT). As illustrated in Appendix J, The DreamSAT is a Microsoft Excel spreadsheet designed to ease the statistical analysis of dreams that have been coded using the HVdC system (Schneider, 1995). It automatically generates several different reports based on the entered data, such as raw frequencies of coded dream categories and various indices which are included for consideration (Table 4).

Table 4

Hall/Van de Castle Content Indicator Formulae

Content Indicator	**Formulae**
Characters	
Male/Female Percent	Males ÷ (Males + Females)
Familiarity Percent	Familiar characters ÷ (Familiar + Unfamiliar Characters)
Friends Percent	Friends ÷ All Human Characters
Family Percent	(Family + Relatives) ÷ All Human Characters
Animal Percent	Animals ÷ All Characters
Social Interaction Percentages	
Aggression/Friendliness Percent	Dreamer involved Aggression ÷ (Dreamer Involved Aggression + Dreamer Involved Friendliness)
Befriender Percent	Dreamer as Befriender ÷ (Dreamer as Befriender + Dreamer as Befriended)
Aggressor Percent	Dreamer as Aggressor ÷ (Dreamer as Aggressor + Dreamer as Victim)

Content Indicator	**Formulae**
Victimization Percent	Dreamer as Victim ÷ (Dreamer as Victim + Dreamer as Aggressor)
Physical Aggression Percent	Physical Aggressions ÷ All Aggressions
Social Interaction Ratios	
Aggression/Character Index	All Aggression ÷ All Characters
Friendliness/ Character Index	All Friendliness ÷ All Characters
Sexuality/Characters Index	All Sexuality ÷ All Characters
Self-Concept Percentages	
Self-Negativity Percentages	(Dreamer as Victim + Dreamer involved Misfortune + Dreamer involved Failure) ÷ (Dreamer as Victim + Dreamer involved Misfortune + Dreamer involved Failure + Dreamer as Befriender + Dreamer involved Good Fortune + Dreamer Involved Success)
Bodily Misfortunes Percentages	Bodily Misfortune ÷ All Misfortunes
Negative Emotions Percent	Negative Emotions ÷ All Emotions
Dreamer-Involved Success Percent	Dreamer-Involved Success ÷ (Dreamer Involved Success + Dreamer Involved Failure)
Percentage of Dreams with at Least One	
Aggression	Dreams with Aggression ÷ Number of Dreams
Friendliness	Dreams with Friendliness ÷ Number of Dreams
Sexuality	Dreams with Sexuality ÷ Number of Dreams
Misfortune	Dreams with Misfortune ÷ Number of Dreams
Good Fortune	Dreams with Good Fortune ÷ Number of Dreams
Success	Dreams with Success ÷ Number of Dreams
Failure	Dreams with Failure ÷ Number of Dreams
Striving	Dreams with Success or Failure ÷ Number of Dreams

Note. The table presents formulas used in the calculation of Hall/Van de Castle indices. It has been adapted from Domhoff (2003).

The use of the DreamSAT facilitates statistical comparisons to normative dream data collected at CWRU. However, though these norms have been replicated when considering the extensive cultural and demographic differences between the samples, and discrepancies in

collecting the dream reports such comparisons are subject to significant threats to validity and thus present a significant limitation to this study (Domhoff, 1999). Importantly, as data derived from nominal scales violate parametric statistical assumptions, non-parametric statistical analyses were utilized to explore the research questions (Domhoff & Schneider, 2015). To assess whether statically significant differences between the present sample and normative studies occurred the DreamSAT was used to evaluate the significance of the difference between two independent proportions (*z*-test). Effect sizes were calculated through the DreamSAT to ascertain the magnitude of any reliable differences that were found, using Cohen's *h*-statistic.

Cohen's *h*-statistic was used as it makes a correction using an arcsine transformation of the percentage difference between any two comparison groups to deal with problems related to determining effect sizes with data expressed in percentages (see Domhoff & Schneider, 2015). Namely, because the standard deviation of a sampling distribution cannot be determined as the distances between the *z*-scores are unknown when working with percentile ranks, a mathematical correction must be made, which is done using Cohen's *h*-statistic. Finally, it must be understood that when making comparisons between normative studies and subsections of the dream sample—save for content indicators included under the category of "Percentages of Dreams with at Least One"—the *n* used in statistical analysis is not the total number of dreams and therefore research participants used in the sample, but the total number of elements coded within the dream research. This allows variations between dream lengths to be accounted for (Domhoff, 2017)

Following the coding of participants' dream responses, only 364 dreams were inputted into the DreamSAT. Five participants' dreams were removed from the automatic analysis because they did not include content which was quantified through the categories selected for consideration in this study. While the Settings or Objects categories may have

captured participants' descriptions these categories fell beyond the scope of this research and thus participants who dreamed of being stuck in a "Windows landscape" or someone who dreamed of just experiencing a "last-minute change of plans" without referencing emotions, characters, misfortunes, or success/failure were not captured by the DreamSAT. However, these participants were retained in the overall sample and were considered in other statistical analyses but excluded from normative comparisons.

During manual coding of the dream data, specific qualitative statements were extracted to explore trends in the dream transcripts that were not sufficiently accounted for through the HVdC method or which were obscured by the numeric findings of the HVdC method. As manual coding was done, such trends were analysed and extracted to support the quantitative results of the analyses, and to capture unique, qualitative features of the dream content. Thus, the quantitative findings are discussed with reference to supporting qualitative dream features. However, it is important to note that no formal qualitative methods were used in this respect; only qualitative extracts were used on occasion to add a degree of depth to the quantitative findings.

3.4.3.3 Descriptive and Inferential Statistical Analyses. To explore the association between dream content and anxiety and self-regulation ability, the Statistical Package for the Social Sciences (SPSS) version 27 was used (IBM corp., 2022). Descriptive statistical analyses were undertaken through SPSS to ascertain the primary characteristics of the data. The SPSS program moreover enabled in-group comparisons using Welch's One-Way Analysis of Variances (Welch's ANOVA) which overcame violations of normality and homogeneity within the data (Celik, 2020). Thereafter, inferential data analyses were undertaken using non-parametric statistics as the data rested on the nominal level of measure and frequently violated the strictures of parametric statistical analyses.

A Spearman's Rank Order Correlational Analysis (Spearman's *r*) was conducted to measure the strength of the linear association between dream content variables and both anxiety and self-regulation scores, with the level of significance set at .05 (Sedgwick, 2012, p.1). Participants' anxiety scores and SSRQ scores were ranked to assess whether distinct levels of anxiety and self-regulation ability were associated with statistically significant differences in dream content categories. This was analysed by way of Kruskal Wallis H tests which is a rank-based nonparametric test that can be used when assumptions of normality and outliers are violated, as in the case of the present sample (Ostertagová et al., 2014). Posthoc tests were conducted using Dunn's (1966) procedure, with Bonferroni corrections for multiple comparisons made. As the distribution of participants' scores was not sufficiently similar, mean rank statistics were examined and reported (Ostertagová et al., 2014). This same statistical analysis was used to investigate gender differences in dream content.

3.5 Ethical Considerations

To uphold ethical practice, a discussion of relevant ethical considerations and steps taken to ensure adherence to ethical standards is presented. Ethical principles were maintained throughout the data collection procedure employed in the CL study, which received ethical clearance from the LJMU United Kingdom Research Ethics Committee (approval code 20/NSP/035, Appendix K). As the study was supervised by the principal investigator of the CL study, no amendments were necessary to the LMJU ethics application. However, additional ethical clearance was supplied by the Human Research Ethics Committee (non-medical) of the University of the Witwatersrand, which deemed the study to be of minimal risk (MASPR/21/010, Appendix L).

This research was guided by the following ethical considerations: Participants' right to autonomy was respected in data collection as participation was self-selected, and participants had to express informed consent and could withdraw from the survey at any point

(Horn, 2017). Participants could additionally request the destruction or removal of their responses from the response set (Anabo et al., 2018). Additionally, requiring expressed informed consent further assured the ethical principles of fidelity and veracity. As depicted in the information sheet evidenced in Appendix G, all aspects of the research study were clearly communicated to the research participants.

Pivotally, participants' confidentiality was stringently protected: Respondents were informed of the measures taken to ensure confidentiality, limits to confidentiality, and any exceptional circumstances under which confidentiality would be voided. No identifiable information was collected from the participants except for their email addresses. However, this information was not shared amongst researchers utilizing the data. To ensure that the research abided by the principles of beneficence and non-maleficence preventative measures were implemented (Peter & Friedland, 2017). No overtly traumatizing or triggering questions were asked in the research survey. Furthermore, upon completing the research questionnaire, participants were directed to resources which could be utilized if needed. Lastly, to abide by the principles of equality and justice, all participants were selected for the study through self-selection, and research findings will be freely accessible.

4. Chapter Four: Results

4.1 Introduction

Dream transcripts were coded using the HVdC method, which quantified the affective content of participants' dreams to answer the research questions. No formal qualitative analysis was conducted, but in addition to the coding protocol, qualitative extracts were pulled out from dream transcripts to support quantitative results with qualitative dream features. The DreamSAT was used to examine differences between the sample's dreams and pre-pandemic norms, thus exploring the nature of pandemic dreaming. Thereafter, descriptive and inferential statistical analyses were undertaken to consider associations between affective processing, self-regulation and anxiety. Consequently, anxiety and SSRQ scores were ranked to explore variations in dream content when accounting for differential SSRQ and anxiety scores, while gendered differences were examined. This chapter discusses the results of these analyses.

4.2 Dream Content Findings.

An examination of the dream responses elicited through the questionnaire suggested that participants' dream transcripts ranged in length; while the average length of the transcripts was 106.46 words (*SD* = 54.64), the transcripts were predominantly shorter, and responses commonly contained only 52 words. Though female participants (*M* = 111.79, *SD* = 59.6) averaged longer dreams than male participants (*M* = 99.99, *SD* = 47.42), and shorter dream transcripts than gender nonconforming participants (*M* = 114, *SD* = 64.90), a Welch's ANOVA established that these differences were not statistically significant (Welch's $F_{(13.43)}$ = 2.16, *p* = .15)

4.2.1 HVdC Content Analysis Results

The HVdC method was undertaken by using the DreamSAT to explore the primary research questions. The results of the content analyses, in-group differences, and comparisons to normative samples are consequently detailed.

4.2.1.1 Affective Content of Participants' Dreams. As suggested in Table 5, the most coded dream content category was dream characters, who were found in 90.79% (*n* = 335) of all the transcripts. Thereafter, social interactions were more frequently observed (68.76%, *n* = 252), with success and failure (33.52%, *n* = 122) being coded least commonly in the transcripts.

Table 5

Table Representing the Frequency of Content Categories Coded in Dream Reports

HVdC Category[a]	Frequency of Element Coded	*N* Dreams	% Dreams
Characters	737.00	335.00	90.79%
Aggression	198.00	128.00	34.69%
Friendliness	147.00	110.00	30.22%
Sex	17.00	14.00	03.85%
Success	79.00	72.00	19.78%
Failure	52.00	50.00	13.74%
Misfortune	106.00	98.00	26.92%
Good Fortune	26.00	27.00	07.32%
Emotions	243.00	170.00	46.70%

Note. A total of 369 dreams were included in the analysis. Items represent the frequency of each category and the number of dreams in which they were identified.
[a]HvDC category refers to Hall/Van de Castle System Content Categories.

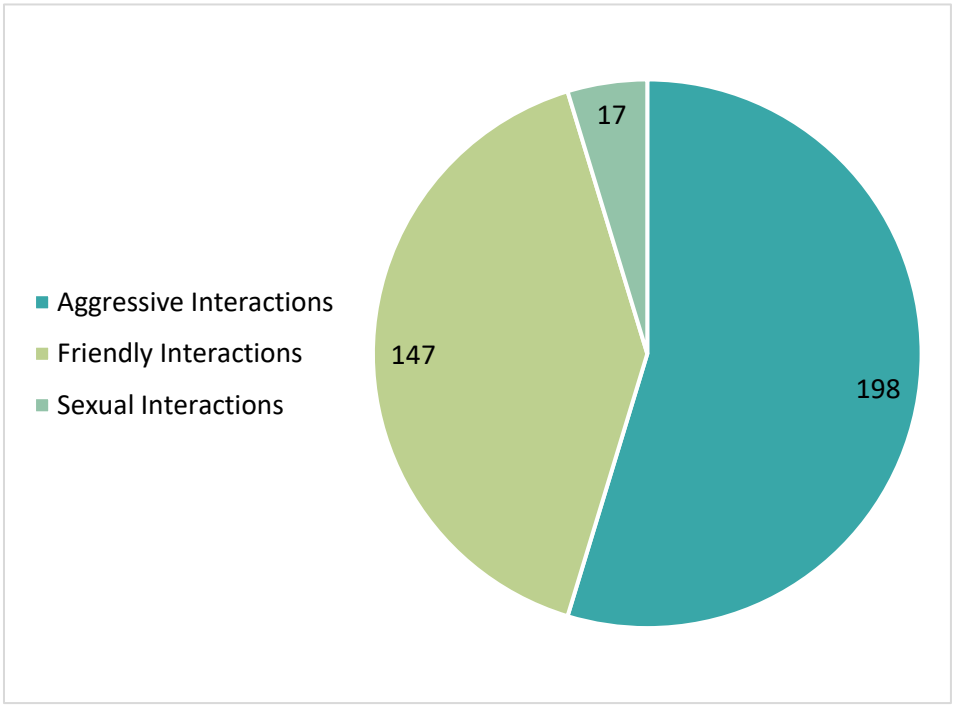
4.2.1.1.1 Characters. Most participants' dreams (92.03%, *n* = 335) contained references to characters, which are defined as the people, animals and mythical figures that are contained in dream reports (Domhoff, 2003). Over a third of the dream reports (32.1%, *n*

= 117) contained at least one character, while slightly less (31.9%, *n* = 116) contained two or more characters (28%, *n* = 102). These characters were likelier to be familiar to the dreamer (63.73%, *n* = 427) than unfamiliar (36.27%, *n* = 243), as participants often described engaging in various activities with known individuals such as travelling with their partners, escaping dangerous situations with their families, or "hanging out" with their "friends from school". Dreams tended to include male characters (54.31%, *n* = 170) rather than female characters (45.69%, *n* = 143), with a small minority of the characters being animals (6%, *n* = 47) or dead and imaginary figures (6%, *n* = 7.

4.2.1.1.2 Social Interactions. The HVdC method subsequently quantified the social interactions contained in dreams. These interactions were classified into three subcategories, namely: aggressive interactions, friendly interactions, and sexual interactions. The bulk of dreams shared by respondents (68.76%, *n* = 252) contained at least one form of social interaction, while a total of 362 social interactions were included in the data. As illustrated in Figure 3, the nature of these exchanges was primarily aggressive or friendly, as only a small minority of the interactions were sexual.

Figure 3

Pie-chart Depicting Forms of Social Interactions



Note. The pie chart illustrates the frequency of types of social interactions coded in the dreams. The total *n* of social interactions was 362.

The aggressive interactions were predominantly physical (63.96%, *n* = 126) and involved the dreamer (80.71%, *n* = 159) who was more often the victim of the aggression (55.84%, *n* = 110) than the aggressor (14.72%, *n* = 29). This was observed in participants' responses which contained references to several physical aggressions that ranged from instances of physical detainment—such as "I got taken by the police"—to more severe violence like family members "getting shot", a partner trying to "gouge [the dreamer's] eyes out" and even a person "dressed in [a pink rabbit suit] hitting [the dreamer] with a hammer". As conceptualised in Table , the most common form of aggression was an attempt by one character to physically harm another character (33,33%, *n* = 66), while the least frequently observed were instances where a serious accusation or verbal threat of harm was made (*n* = 3, 1.52%).

Table 6

Aggression Subclasses: Frequency of Coded Aggressive Interactions

Aggression Subclass	*N*	% of Total Aggression
Covert feelings of hostility or anger without any overt expression of aggression	13.00	06.55%
Aggression displayed through verbal or expressive activity	31.00	15.66%
Attempts to reject, exploit, control, or verbally coerce another character	25.00	12.63%
A serious accusation or verbal threat of harm	03.00	01.52%
Theft or destruction of possession belonging to a character	14.00	07.07%
Being chased, captured, confined, or physically coerced.	31.00	15.66%
An attempt to harm a character physically	66.00	33.33%
Aggression that results in the death of a character	15.00	07.58%

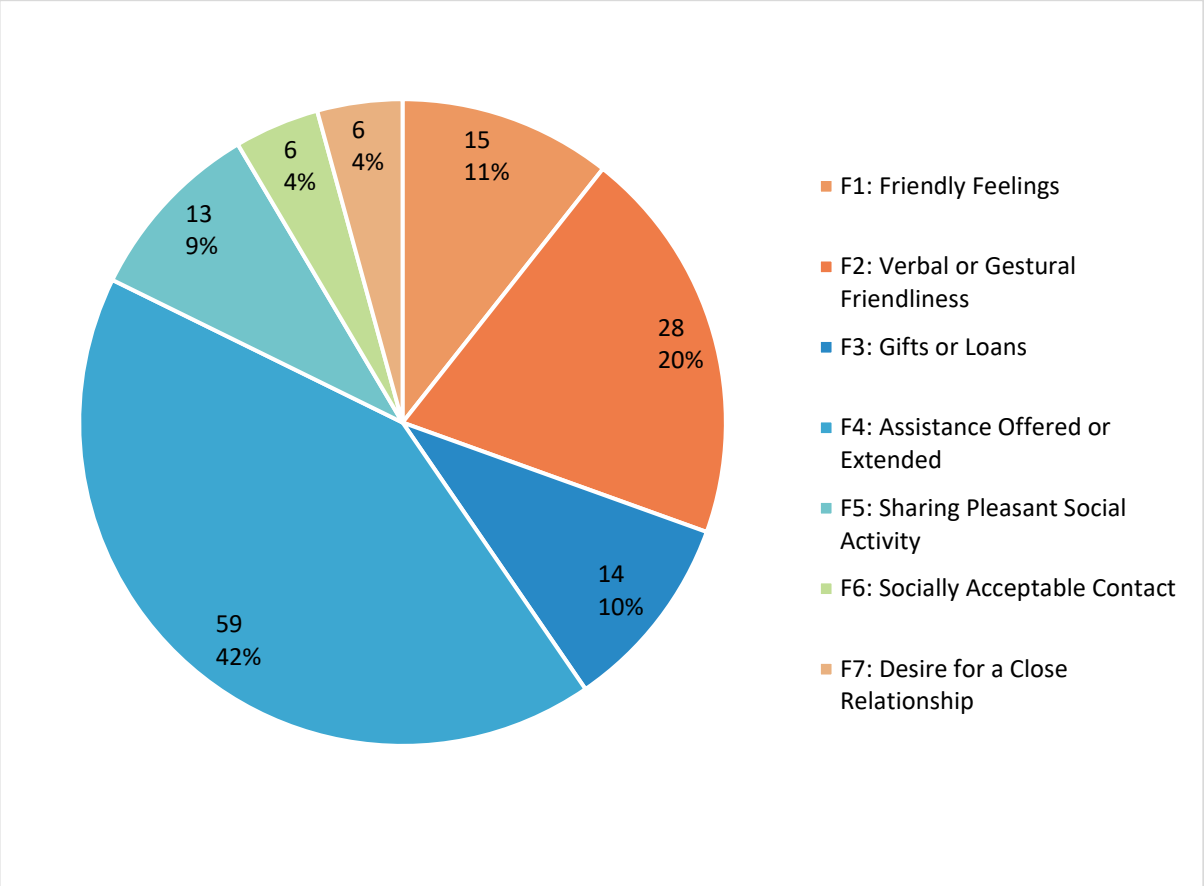
Note. The table details the subclasses of aggressions found in the data, as well as the frequency of each subcategory, and the portion of each subcategory relative to the total *N* = 198 of aggressions.

Seven forms of friendly interactions were observed in dreams (Figure 4). Of the 147 friendly interactions identified in the reports, 91.84% (n = 135) involved the dreamer, while only 12 of these interactions were classified as witnessed interactions (8.16%). Dreamers served as befrienders in 41.49% of the cases (n = 61), and the befriended slightly more commonly (42.86%, n = 63). There were 5 (3.40%) instances where the respondents engaged

in reciprocal friendliness with other characters and six interactions (4.08%) where mutual friendliness was coded.

Figure 4

Pie-chart Illustrating Subclasses of Friendly Interactions Coded in Dream Reports



Note. The figure depicts the types of friendly interactions contained in participants' dream transcripts. The total *n* of friendly interactions coded was 147.

While a large number of the transcripts contained instances of friendly and aggressive interactions, only 17 sexual interactions were coded in a minority of the dream reports (n = 14, 3.85%). Of these limited interactions, the dreamer was likelier the recipient of the sexual interaction (61.54%, n = 8) than the initiator (15.38%, n = 2), with only 23% of the interactions being mutual (n = 3). Analyses suggested that a few of the sexual interactions were witnessed (27.78%, n = 5), which frequently involved the dreamer observing their partners engaging in sexual activities with secondary parties.

4.2.1.1.3 HVdC Striving and Fortunes Category Findings. After concluding analyses of social interactions, the successes and failures contained were analysed, and analyses of good- and misfortunes were undertaken. Results suggest that more misfortunes were coded in the dream transcripts (*n* = 98), than success (*n* = 72), failure (*n* = 50) and good-fortune (*n* = 27). Thus, as participants engaged in more goal-directed activity such as "proposing" to romantic partners, undertaking "driving test[s]", going to "job interviews", and even running away from danger, findings indicate that such pursuits were commonly more successful (59.02%, *n* = 72) than unsuccessful (40.98%, *n* = 50). Yet, participants were likelier to be faced with misfortune in their dreams (80.30%, *n* = 106) than with good fortune (19.69%, *n* = 26).

4.2.1.1.4 HVdC Emotions Findings. The final HVdC category to be analysed was the emotions described in participants' dreams. Resultant of a lack of inter-rater agreement on the nature of emotions found in dream reports, the HVdC system quantifies only five forms of emotions, namely: (1) anger, (2) apprehension, (3) confusion, (4) sadness, and (5) happiness (Domhoff, 2003). However, during data analyses, it was noted that some of the participants' dreams included affective content not adequately conceptualised by these categories as participants narrated being "terrified" and "scared". As such, a separate coding category was additionally established to quantify such descriptions which were considered indicative of fear.

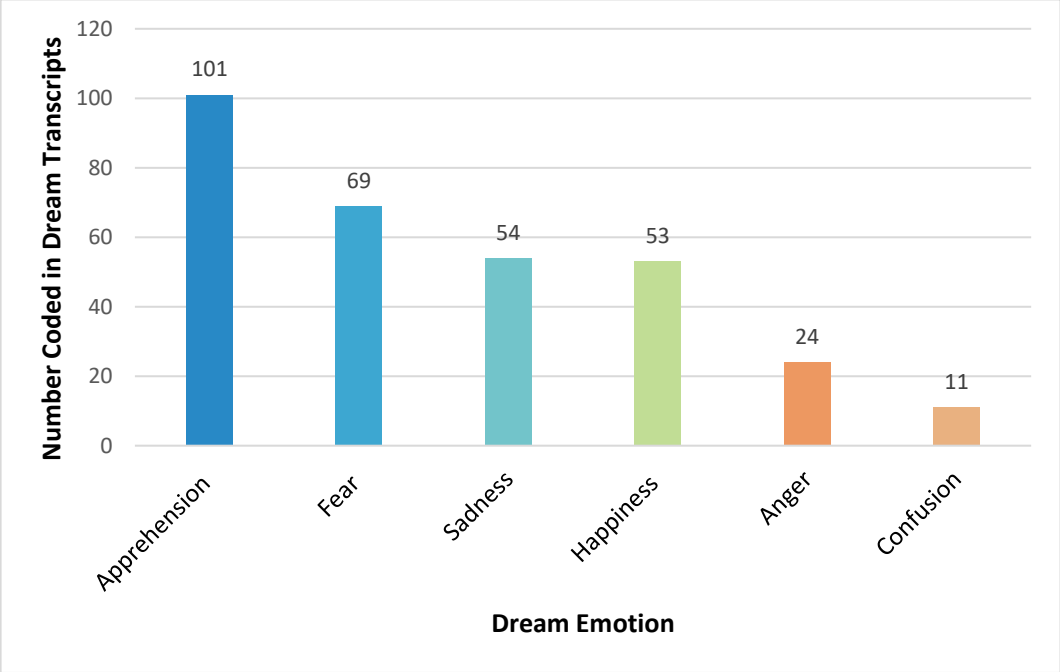
Analyses of the HVdC-delineated subcategories ascertained that 243 emotive descriptors were coded in less than half of the dreams (*n* = 170, 46.07%). Overwhelmingly, emotions tended to be negative (*n* = 190, 78.19%) rather than positive (21.81%, *n* = 53), and most often included feelings of apprehension (*n* = 101, 41.56%). Pivotally, dreamers were slightly likelier to detail dreams that could be classified as having sad (*n* = 54, 22.22%) rather than happy (*n* = 53, 21.81%) affective content, but less likely to include anger (*n* = 24, 9.88%

and confusion (*n* = 11, 4.53%). When considering the additional category of fear, the analysis demonstrated that 69 instances of fear were coded, increasing the total number of emotions (*n* = 312). As illustrated in Figure 5, fear was the second most prominent emotion found in the dream transcripts accounting for 22.16% of the total emotions.

Note. The total number of emotions coded in dream transcripts was *N* = 312.

Figure 5

Bar-chart Representing the Frequency of Different Emotions Coded in Dreams



4.2.2 Normative Comparisons

To examine differences between the samples' dream reports and those collected in pre-pandemic times, the DreamSAT was utilised to test for the significance of differences between two independent proportions (*z*-test) and content indicators were compared, with the magnitude of statistically significant differences calculated through the Cohen's *h* statistic. As evidenced in Table 7, male participants evidenced significant departures regarding some of the dream content categories, while other categories remained the same.

Table 7

Profile of Male Participants' Dream Content Categories Compared to Male Norms.

Dream Content Categories		Male Participants	Male Norms	*h* scores	*Sig.*
Increased Dream Content Categories					
	Familiarity Percent	65%	45%	.41	** $p < 0.001$
	Family Percent	28%	12%	.42	** $p < 0.001$
	Dead & Imaginary Percent	06%	00%	.36	** $p < 0.001$
Decreased Dream Content Categories					
	Male/Female Percent	43%	67%	-.28	** $p < 0.001$
	Befriender Percent	37%	50%	-.28	* .05
	Aggressor Percent	18%	40%	-.49	** $p < 0.001$
	Aggression	36%	47%	-.23	** .01
	Sexuality	06%	12%	-.21	* .01
Stable Dream Content Categories					
	Friends Percent	35%	31%	.08	.16
	Animal Percent	08%	06%	.07	.23
	Aggression/Friendliness Percent	54%	59%	-.10	.26
	Physical Aggression Percent	56%	50%	.12	.27
	Self-Negativity Percent	60%	65%	-.10	.19
	Bodily Misfortunes Percent	31%	29%	.03	.84
	Negative Emotions Percent	77%	80%	-.08	.45
	Dreamer-Involved Success Percent	57%	51%	.12	.45
	Friendliness	32%	38%	-.14	.10
	Misfortune	29%	36%	-.15	.07
	Good Fortune	06%	06%	.01	.92
	Success	18%	15%	.08	.32
	Failure	15%	15%	-.01	.90
	Striving	32%	27%	.10	.23

Note. The table illustrates male participants' coded dream content categories in comparison to male norms. Content categories are categorized into three sections: (1) Male content indicators that were significantly increased compared to the norm (2) male content indicators that were significantly decreased compared to the norm (3) content indicators that did not significantly change.
*Significant at 0.05 level
** Significant at 0.01 level

Similar changes were observed with regarding to the dream reports detailed by female research participants as illustrated in Table 8. In the ensuing discussion the results of these

normative comparisons—which demonstrated how dreams have changed in the current pandemic context—are discussed in further detail.

Table 8

Profile of Female Participants' Dream Content Categories Compared to Female Norms.

Dream Content Categories	Female Participants	Female Norms	*h vs. scores*	*Sig.*
Increased Dream Content Categories				
Familiarity Percent	65%	58%	.15	* .01
Family Percent	28%	19%	.21	** $p < 0.001$
Dead & Imaginary Percent	06%	01%	.29	** $p < 0.001$
Animal Percent	08%	04%	.15	** .01
Physical Aggression Percent	56%	34%	.45	** $p < 0.001$
Success	18%	08%	.32	** $p < 0.001$
Striving	32%	15%	.41	** $p < 0.001$
Decreased Dream Content Categories				
Aggressor Percent	18%	33%	-.35	** .01
Aggression	36%	44%	-.18	* .04
Friendliness	32%	42%	-.22	** .01
Stable Dream Content Categories				
Male/Female Percent	53%	48%	.11	.18
Friends Percent	35%	37%	-.03	.59
Aggression/Friendliness Percent	54%	51%	.05	.57
Befriender Percent	37%	47%	-.21	.12
Self-Negativity Percent	60%	66%	-.12	.09
Bodily Misfortunes Percent	31%	35%	-.09	.53
Negative Emotions Percent	77%	80%	-.08	.43
Dreamer-Involved Success Percent	57%	42%	.29	.09
Sexuality	06%	04%	.10	.24
Misfortune	29%	33%	-.09	.26
Good Fortune	06%	06%	.03	.76
Failure	15%	10%	.16	.06

Note. The table illustrates female participants' coded dream content categories in comparison to female norms. Content categories are categorized into three sections: (1) Female content indicators that were significantly increased compared to the norm (2) female content indicators that were significantly decreased compared to the norm (3) content indicators that did not significantly change.

*Significant at 0.05 level

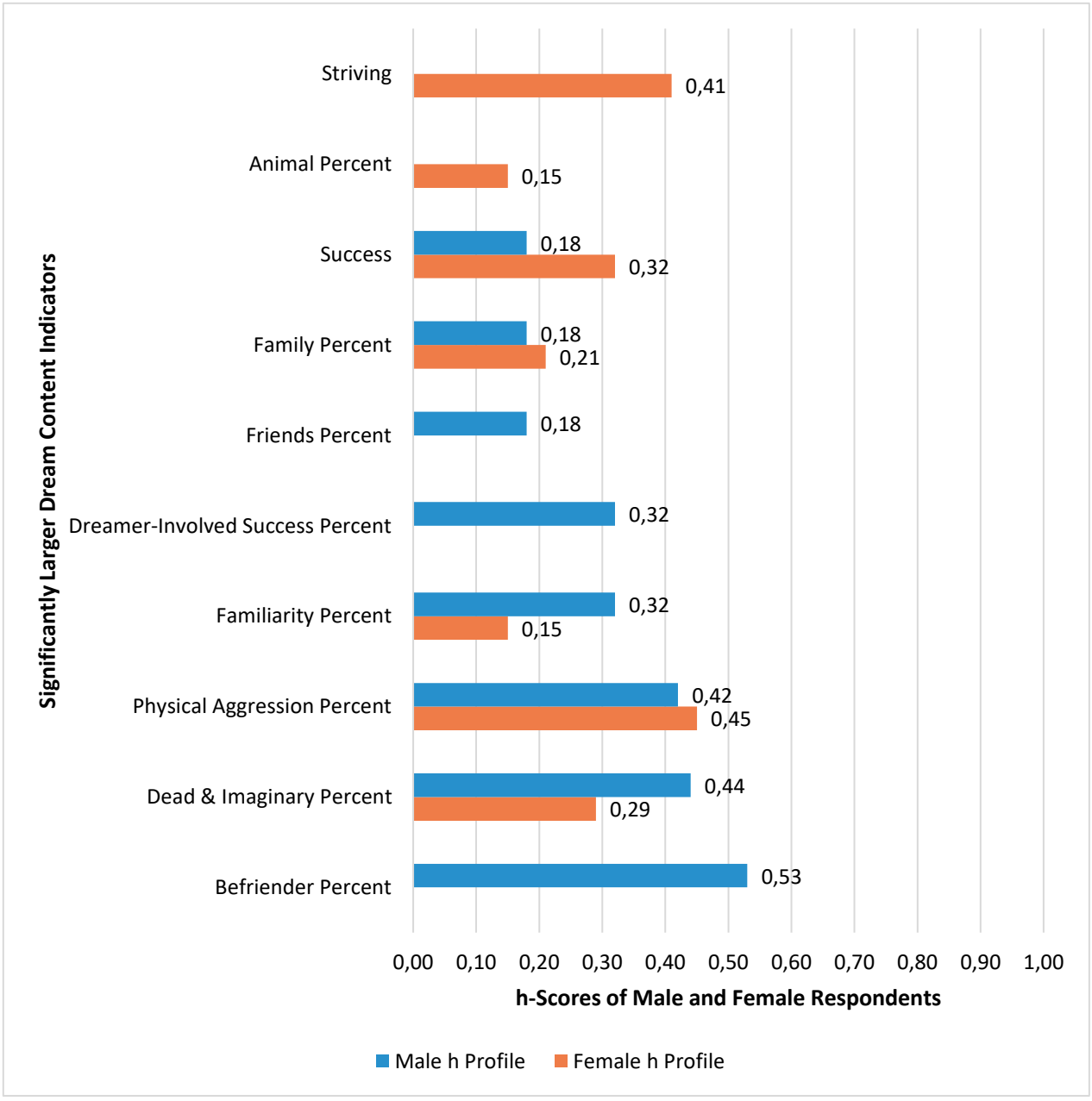
** Significant at 0.01 level

4.2.2.1. Normative Comparisons: Increases in Dream Content.

As evidenced in Figure 6—which presents the magnitude of differences in HVdC content indicators between these participants and the CWRU norms (*h*-profile)—this sample evidenced substantial increases in certain dream content categories. Primarily, the dream characters were found to be demonstrably different from pre-pandemic samples: both men ($p < .001$, Cohen's $h = .32$, 61%, $n = 294$) and women ($p < 0.01$, Cohen's $h = .15$, 28%, $n = 371$) included significantly more familiar characters than male (45%, $n = 1108$) and female CWRU participants (58%, $n = 1363$). This was observed in responses as participants referenced characters such as boyfriends and other known individuals and reported engaging in activities with them ranging from "going on holiday", to "dinner" and finally being able to "see them" after long periods of separation.

Figure 6

Positive H-Scores of Content Indicators found to be Statistically Different than Pre-Pandemic Norms



Note. This figure illustrates the positive *h*-scores of content indicators found to be statistically significantly different in comparison to CWRU norms. Male and female scores are represented, but where no significant differences were observed for participants of either gender, *h*-scores are absent.

Relatedly, increases in familial characters were observed as participants described family members such as parents and siblings, and one participant even dreamed of her deceased brother whom she hoped would "reappear in her dreams again". For female

participants, the results suggested a medium effect size in comparison to the CWRU sample (Cohen's h = .21) indicating that women included moderately more (28%, n = 371) family characters than the norms (19%, n = 1376), and though the effect size for male participants was slightly smaller (Cohen's h = .18) participants nonetheless incorporated more family (18%, n = 294) in their dreams than men in the CWRU study (12%, n = 1108).

Interestingly, both male and female respondents included significantly more ($p < 0.001$) dead and imaginary characters in their dreams. For female dreamers, a modest effect size was noted (Cohen's h = .29) suggesting that their dreams included moderately more (6%, n = 412) dead and imaginary characters than women in the pre-pandemic sample (1%, n = 1423). However, male participants demonstrated a pronounced increase in this category (Cohen's h = .44) including much more dead and imaginary characters (8%, n = 320) than male norms (0%, n = 1180). This was observable in responses as male dreamers often recalled meeting deceased relatives through sleep experiences: one participant noted that his dead "grandad" appeared in his dream along with his deceased "cat". Another participant narrated a recurring dream of his father who had recently passed away and explained that he could see his dad but could not communicate with him which left him feeling "despair".

Concerning other character content indicators, men and women diverged slightly as though female participants more often dreamed of animals like pets who had "[gone to] the vet" more (p = .007, Cohen's h = .15) than women in the normative study—with animals making up 8% (n = 412) of all characters compared to the baseline sample (4%, n = 1432) - this difference was not observed for male participants. Yet, male participants included significantly more friends (p = .007, 40%, n = 294) in their dream responses than the normative sample (31%, n = 1108) while female participants did not (p = .15). The analyses indicated that men evidenced increases (Cohen's h = .18) in friends with dreams detailing engaging in activities with friends that were prohibited by public-health requirements such as

"going to the movies", "play[ing video] games", "attending parties" or even just "hanging out".

Rises in content indicators were further observed across the social interactions in dream transcripts, with the sample showing substantially more physical aggression in their dreams. Both men (54%, n = 109, p = .001, Cohen's h = .42). and women's dreams (54%, n = 109, p = .00, Cohen's h = .45) included much more physical aggression than male norms (34%, n = 337) and female norms (34%, n = 337). While some of these aggressions were familiar such as occurrences wherein a participant was "shot in [the] stomach" or engaged in "fights" with strangers, others contained references to novel physically threatening events such as being on a bus when "5 people (…) who weren't wearing masks [got on]" and started "cough[ing] on everyone". Additionally, men demonstrated an increase in the befriender percentage (p = .001, Cohen's h = .53) which indicates that they acted as the initiator of friendly interactions far more frequently (75.56%, n = 45) than men in normative samples (50.25%, n = 203).

Additionally, male respondents were further found to have increased dreamer-involved success (p = .05, Cohen's h = .32) suggesting that their dreams more frequently involved successful endeavours (66.67%, n = 54) than the norm (47%, n = 141). This finding was extended as results showed that male participants (p = .05, Cohen's h = .18, 21.82%, n = 165) and female participants (p < 0.001, Cohen's h = .32, 18%, n = 193) instanced a concomitant increase in dreams containing at least one element of success in comparison to male (15%, n = 500) and female norms (8%, n = 500). This increase was manifest in the narrations as respondents included references to goal-directed behaviour which were successfully resolved. Such actions were wide-ranging as individuals detailed events in which they successfully aided others such as helping a man who was lost in the ocean, or assisting individuals to escape from a highjacked plane, pursuing romantic relationships, and even

spurring their favourite football team into victory with an inspirational speech. Furthermore, for female participants, an additional increase was observed in “Dreams with at Least one” instance of striving ($p < 0.001$, Cohen’s $h = 41$). As the striving indicator conceptualises what portion of dreams involve success and failure, this result suggests that dreams wherein female dreamers undertook more purposive and goal-oriented behaviours were more frequent in this study (31.61%, $n = 193$) than in the female CWRU sample (14.66%, $n = 500$).

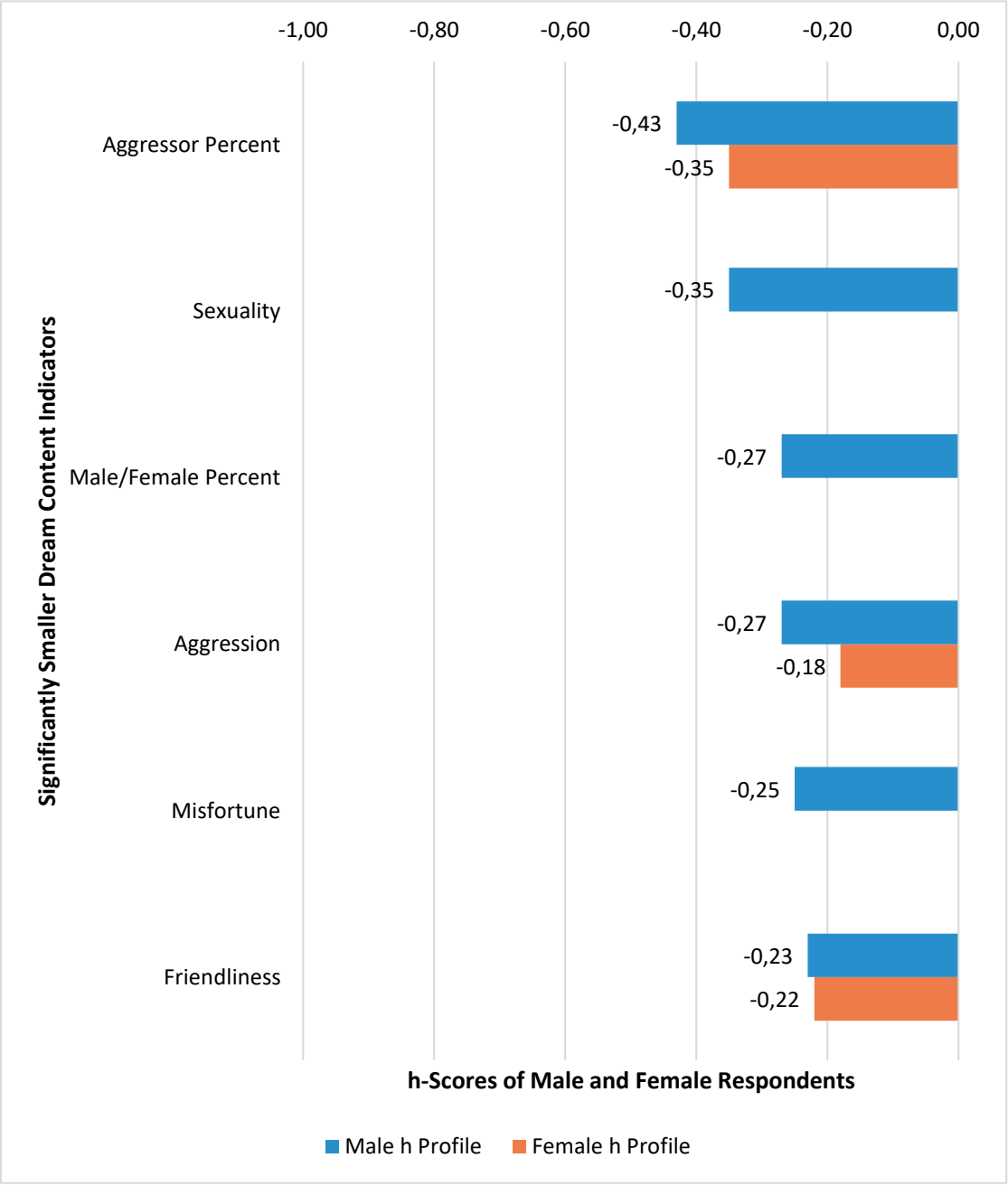
4.2.2.2 Normative Comparisons: Decreases in Dream Content

Yet, substantial declines in other content categories were observed. In terms of dream characters, male participants were found to have significantly fewer characters included in their dreams who were identified as male as indicated by a reduction in the male/female percent ($p = .005$, Cohen’s $h = -0.32$). This suggests that male respondents' dreams typically included fewer male characters (54.03%, $n = 124$) than the norm (67.24%, $n = 873$). Though no additional declines in content indicators related to dream characters were noted, analyses suggested that dreamed social interactions changed as both men ($p = .004$, Cohen’s $h = -0.43$) and women ($p = .00$, Cohen’s $h = -0.35$) evidenced large declines in the aggressor percentages.

As shown in Figure 7, this indicates that though the amount of physical aggression increased in the responses, men (20%, $n = 55$) and women (17.72, $n = 79$) were significantly likelier to be the victim of such exchanges than the initiator, in comparison to male (39.53%, $n = 253$) and female CWRU participants (32.90%, $n = 231$). This was mirrored in the category of content indicators entitled “Dreams with at Least One” as male ($p = .003$, Cohen’s $h = -0.27$) and female participants ($p = .037$, Cohen’s $h = -0.18$) showed declines in dreams including aggression. Thus, the data indicates that women (35.75%, $n = 193$) and men’s dreams (33.94%, $n = 165$) contained less overall aggression than men (47%, $n = 500$) and women (44.40%, $n = 500$) in normative studies.

Figure 7

Negative H-Scores of Content Indicators Found to be Statistically Different than Pre-Pandemic Norms



Note. This figure illustrates the negative *h*-scores of content indicators found to be statistically significantly different in comparison to Case Western Reserve University norms. Male and female scores are represented, but where no significant differences were observed for participants of either gender, *h*-scores are absent.

Moreover, declines were observed in dreams containing at least one instance of friendliness (*p*'s < 0.009) which demonstrated that female (Cohen's *h* = -0.22, 31.61%, *n* =

193) and male respondents (Cohen's *h* = -0.23, 27.27%, *n* = 165) narrated less friendly interactions than CWRU women (42.20%, *n* = 500) and men (38.20%, *n* = 500). Additionally, male participants included dreams that contained significantly less sexuality (Cohen's *h* = -0.35, *p* = .00) and misfortune (Cohen's *h* = -0.25, *p* = .006). Thus, sexual interactions were significantly reduced in the current sample (03.03%, *n* = 165) in comparison to male norms (11.60%, *n* = 500), as well as the amount of misfortunes contained in the dream reports (24.85%, *n* = 165) when compared to norms (36.20%, *n* = 500).

4.2.2.2.3 Normative Comparisons: Stable Content Indicators

Yet, the normative comparisons suggest that other dream content indicators remained relatively stable in the dream content category. For male participants the (1) animal percent, (2) aggression/friendliness percent, (3) self-negativity percent, (4) bodily misfortunes percent, (5) negative emotions percent, (6) good fortune (7) failure and (8) striving remained the same, indicating consistency across some dream content indicators (all *p* 's > .09). Similarly, female participants content indicators remained stable across the (1) Male/Female percent, (2) Friends percent, (3) Aggression/Friendliness percent, (4) Befriender percent, (5) Self-Negativity percent, (6) Bodily Misfortunes percent, (7) Negative Emotions percent, (8) Dreamer-Involved success percent, (9) Sexuality, (10) Misfortune, (11) Good-fortune and (12) Failure (all *p* 's > .06).

4.3 Self-Regulation Findings

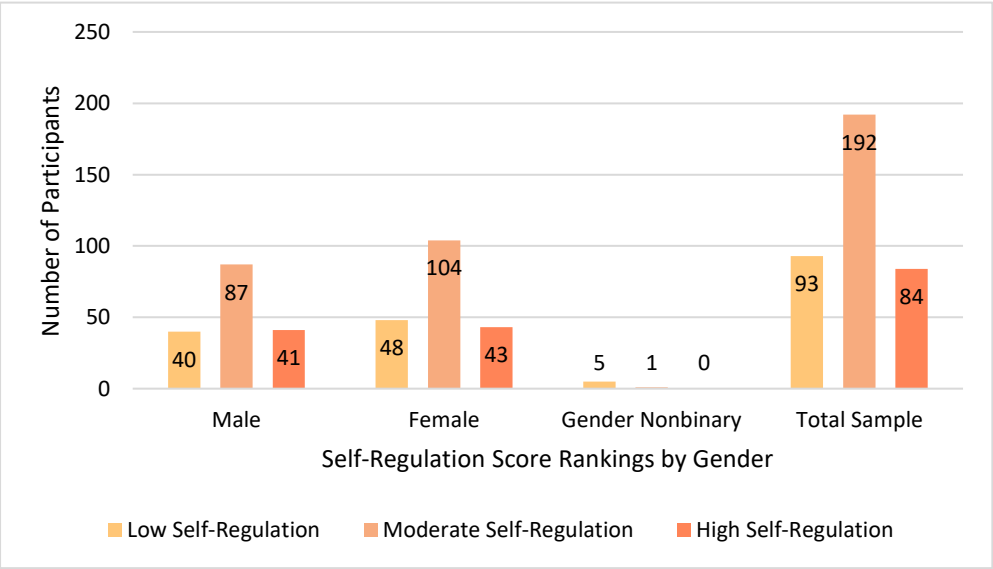
To investigate whether an association between affective processing and self-regulation ability existed, participants' scores on the SSRQ were considered and correlational analyses were undertaken. The results of these analyses are presented in the ensuing discussion.

4.3.1 SSRQ Descriptive Statistical Findings

Participants SSRQ scores ranged from 58 to 155 (max score = 155) with an average score of 108.44 (*SD* = 17.89) found in the sample. A Welch's ANOVA indicated a gendered difference in SSRQ scores (Welch's $F_{(213.58)} = 7.25$, $p = .007$) however a small effect size was derived ($\omega^2 = .017$, 95% CI [0.001, 0.04]). Bonferroni posthoc tests showed the while male participants averaged similar SSRQ scores (Mean = 109.42, *SD* = 18.02) than female participants (Mean = 108.44, *SD* = 17.20), the scores of gender nonbinary participants were significantly lower (Mean = 81.33, *SD* = 17.31) than both female participants ($p \leq .001$) and male participants ($p \leq .001$). As shown in Figure 8, these scores were ranked into low, moderate, and high self-regulation ability: The lower quartile of participants who totalled scores on the SSRQ falling between 0 and 96 were grouped and defined as having low self-regulation ability. The upper quartile of the participants—those with scores above 123 on the SSRQ—were defined as those with high self-regulation ability, while the rest of the participants—whose scores ranged from 97 to 122—were classified as having moderate self-regulation ability.

Figure 8

Bar-chart Representing Participants' Short Self-Regulation Score Rankings



Note. This bar chart illustrates the frequency of men, women and gender non-binary individuals ranked SSRQ scores, as well as the total sample. Scores between 0-96 indicate low self-regulation, between 97-122 indicate moderate self-regulation, and scores higher than 123 indicate high self-regulation.

The majority of the respondents had SSRQ scores which indicated moderate self-regulation ability (52.03%, *n* = 192). A slight minority (22.76%, *n* = 84) reflected high self-regulation abilities, and more participants (25.20%, *n* = 93) attained SSRQ scores indicative of low self-regulation ability. When considering the SSRQ scores in terms of gender, it was noted that women were likelier to have scores representative of moderate self-regulation ability (53.33%, *n* = 104) than low- (*n* = 48, 24.61%) or high SSRQ scores (22.05%, *n* = 43). Contrastingly, men were likelier to have scores indicating moderate- (51.79%, *n* = 87) and high- (24.40.5%, *n* = 41) than low self-regulation ability (*n* = 40, 23.81%). Gender nonbinary individuals were overwhelmingly classified as having low-self regulation ability (83.33%, *n* = 5).

4.3.2 SSRQ Scores and Dream Content.

The correlational analyses found that participants' dream content and their total SSRQ scores were significantly associated in a few ways. Table 9 depicts that though the majority of the subcategories related to dream characters were not significantly associated with the SSRQ scores (*p*'s > .06), a significant association was found between SSRQ scores and characters included in the dreams who were identified as family members of the dreamer. Here, a weak positive association was observed between these two variables ($r_s(367) = 0.11$, $p < .03$) which indicates that higher SSRQ scores were observed in conjunction with more family characters in dream reports.

Table 9

Spearman Rank Order Correlational Analysis of Associations Between Dream Content Variables and SSRQ Scores.

Dream Content Variable		Spearman's Correlation Coefficient	Sig.
Dream Characters			
	Male Characters	0.05	0.36
	Female Characters	-0.05	0.39
	Familiar Characters	0.00	0.94
	Unfamiliar Characters	-0.09	0.09
	Family Characters	.11*	0.03*
	Friend Characters	-0.09	0.06
	Deceased Characters	-0.07	0.17
	Creature Characters	0.04	0.47
	Number of Animal	-0.03	0.62
	Number of Animals	-0.00	0.95
	Number of Imaginary or Fictional Characters	0.09	0.08
Dream Social Interactions			
	Aggression Class 1	-0.05	0.33
	Aggression Class 2	-0.09	0.09
	Aggression Class 3	-0.08	0.14
	Aggression Class 4	-0.04	0.41
	Aggression Class 5	0.03	0.64
	Aggression Class 6	-0.07	0.18
	Aggression Class 7	-0.07	0.17
	Aggression Class 8	-0.00	0.99
	Number of Aggressions	-.11*	0.04*
	Non-Physical Aggression	-0.07	0.16
	Physical Aggression	-0.06	0.22
	Dreamer Involved Aggression	-.12*	0.02*
	Dreamer As Aggressor	-0.06	0.26

Dream Content Variable		Spearman's Correlation Coefficient	Sig.
	Dreamer As Victim	-0.10	0.05
	Friendly Class 1	-0.02	0.76
	Friendly Class 2	0.04	0.48
	Friendly Class 3	-0.07	0.15
	Friendly Class 4	0.01	0.87
	Friendly Class 5	-0.07	0.16
	Friendly Class 6	-0.03	0.59
	Friendly Class 7	0.04	0.46
	Dreamer as Befriender	0.03	0.52
	Dreamer as Befriended	-0.06	0.22
	Dreamer Involved Friendliness	-0.02	0.66
	Sexual Class 1	-0.01	0.92
	Sexual Class 2	0.02	0.73
	Sexual Class 3	0.04	0.42
	Sexual Class 4		
	Sexual Class 5	-0.04	0.47
	Total Social Interactions	-0.08	0.12
Dream Success and Failure			
	Number of Success	-0.03	0.53
	Number of Failures	0.04	0.39
Dream Misfortunes and Good-Fortunes			
	Misfortune Class 1	0.10	0.06
	Misfortune Class 2	0.04	0.40
	Misfortune Class 3	-0.00	0.95
	Misfortune Class 4	0.01	0.83
	Misfortune Class 5	0.02	0.69
	Misfortune Class 6	-0.00	0.97
	Number of Misfortunes	0.08	0.11
	Bodily Misfortunes	0.01	0.86

Dream Content Variable		Spearman's Correlation Coefficient	Sig.
	Number of Good Fortunes	-0.03	0.56
Dream Emotions			
	Anger	-0.05	0.34
	Apprehension	-0.07	0.17
	Happiness	0.02	0.72
	Sadness	0.04	0.49
	Confusion	-0.05	0.31
	Fear	-0.04	0.42
	Total Negative Emotions	-0.08	0.14
	Total Positive Emotions	0.02	0.72
	Number of Emotions in Report	-0.05	0.32
	Number of Emotions Including Fear	-0.07	0.34

Note. The table presents the results of a Spearman Rank Order Correlational analysis evaluating the association between dream content variables identified in participants' dream responses, and participants scores on the SSRQ.
*Significant at the 0.05 level
**Significant at the 0.01 level.

Moreover, a significant weak negative correlation was found between SSRQ scores and the number of aggressions contained in the dream report ($r_s(367) = -0.11$, $p < .04$), thus indicating that increases in aggression in dreams were associated with decreases in SSRQ scores. However, this finding did not extend to any of the other social interaction classes where no significant association was observed between SSRQ scores and friendly or sexual interactions (p's > .16). More notably, no significant association was found between participants' self-regulation ability and any of the emotion categories (p's > .15) or striving and fortune categories (p's > .56).

A Kruskal Wallis test was used to assess whether there were significant differences in the distribution of dream content when participants' self-regulation abilities were ranked.

Only one significant difference was ascertained. In the character category one observable difference was noted in the distribution of imaginary or fictional characters contained in the dream transcripts: This difference was noted between participants with moderate and high self-regulation abilities ($\chi^2(2) = -14.37$, $p \leq .04$) as those with high self-regulation ability were likelier to have dreams including at least one imaginary or fictional character (11.9%, $n = 10$) compared to those with moderate self-regulation abilities (4.39%, $n = 8$). However, a small effect size was noted ($\varepsilon^2 = -0.05$).

While a significant correlation was observed between SSRQ scores and aggressive interactions, no significant difference in the distribution of aggressive interactions was found between the groupings of self-regulation ability (*p'*s > .08). This finding was replicated across the social interaction categories as no significant difference in distribution was found in either friendly interactions (*p'*s > .14) or sexual interactions in the dream content (*p'*s > .15). No observable departures were attained in the striving contained in participants' dream content when considering their SSRQ abilities (*p'*s > .59), or the fortunes (*p* > .13). Finally, the distributions of emotion were not substantially variant by gender (*p'*s > .10).

4.4 Anxiety Subscale Results

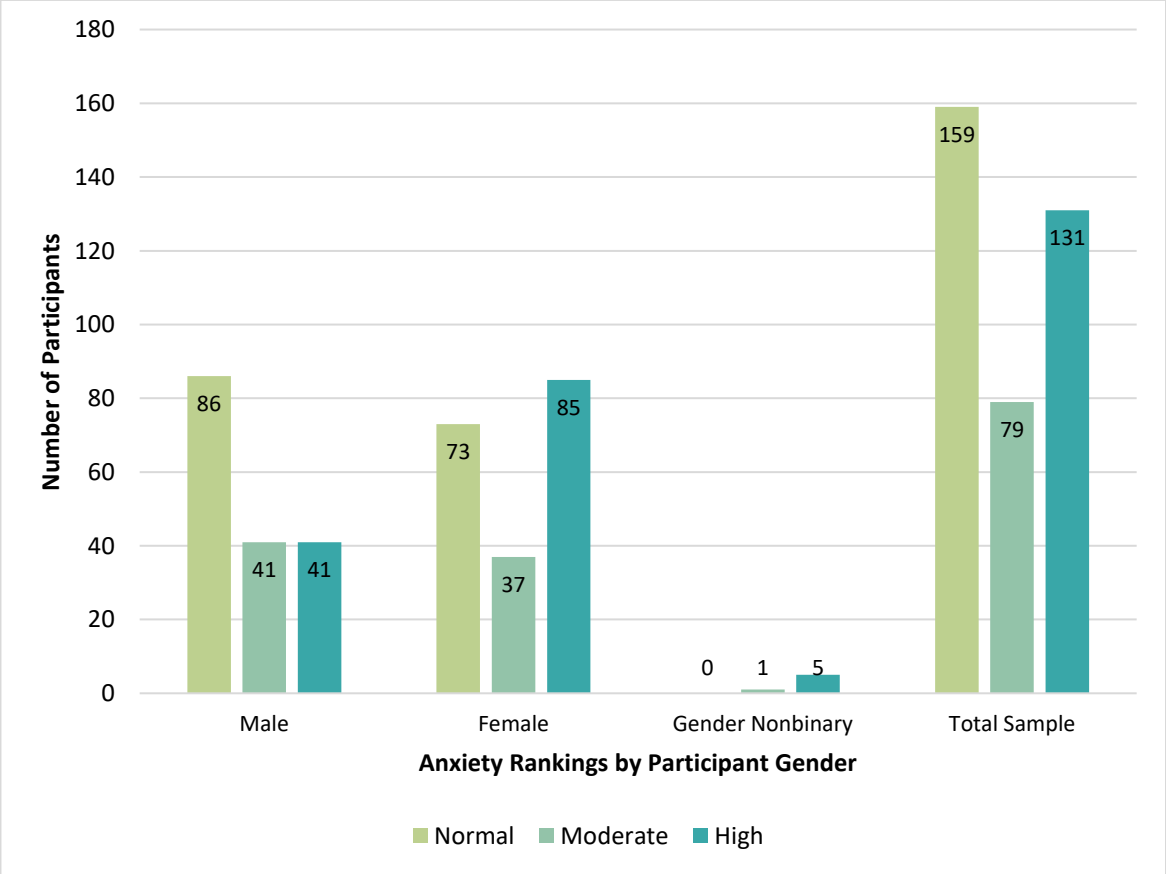
To explore whether affective processing was correlated with waking emotional states, participants' anxiety scores and dream content variables were considered. Spearman's rank-order analyses were undertaken to investigate whether significant associations could be observed amongst the categories, as well as Kruskal Wallis tests to examine whether differential levels of anxiety impacted dream content.

4.4.1 HADS Anxiety Scale: Descriptive Statistical Findings

Descriptive statistical analyses showed that participants' scores on the anxiety subscale ranged from 0 to 20 (max score = 21) and that the average anxiety score was 8.81 (*SD* = 4.46). As depicted in Figure 9, anxiety scores were ranked into normal (scores on the anxiety subscale of less than 7), moderate (scores on the subscale falling between 8 to 10), and high anxiety levels (scores of 11 and higher), based on the scoring procedure used in the HADS (Zigmond & Snaith, 1983). Respondents were likelier to have normal levels of anxiety (43.09%, *n* = 159) than moderate levels of anxiety (21.41%, *n* = 79) but likelier to have high levels of anxiety (35.50%, *n* = 131) than moderate levels of anxiety.

Figure 9

Bar-chart Illustrating Total Participants Ranked Anxiety Scores, and Ranked Anxiety by Gender



Note. The bar chart illustrated ranked anxiety scores that are grouped by gender, as well as depicting the total samples' rankings. Scores of 0-7 were considered to indicate normal levels of anxiety, 8-10 were considered to indicate moderate anxiety levels, and 11 and above indicated high anxiety levels.

Owing to the skewed nature of the data, a Welch's ANOVA which is robust to violations of normality was utilised to analyse whether there were any substantial departures in anxiety scores when accounting for gender which consequently attained a significant result (Welch's $F_{(2, 25.96)} = 23.58$, $p = .00$) and a small effect size was observed ($\omega^2 = .026$, 95% CI [0.006, 0.053]). A Games-Howell post hoc test was conducted which illustrated that men ($M = 7.74$, $SD = 4.09$) had lower anxiety scores than women ($M = 9.62$ $SD = 3.89$, $p \leq .001$) and gender non-binary participants ($M = 12.83$, $SD = 1.72$, $p = .00$), who also had significantly higher anxiety scores than female participants, ($p = .01$).

4.4.2 Associations between Anxiety Scores and Dream Content

As depicted in Table 10, Spearman's correlational analysis found that a statistically significant weak association exists between participants' anxiety scores and the number of creatures in their dream reports ($r_s(367) = -0.11$, $p < .03$). Moreover, it was observed that the number of imaginary and fictional characters and participants' anxiety scores were significantly correlated ($r_s(367) = -0.01$, $p < .05$). Yet, no other significant associations were noted between the character categories and anxiety scores (p's > .06). Thus, the data demonstrate that increased anxiety scores were associated with fewer creatures and imaginary and fictional characters.

Table 10

Spearman Rank Order Correlational Analysis of Associations Between Dream Content Characters and Participants' Scores on the Anxiety Subscale of the HADS.

Dream Character Variables	Spearman's Correlation Coefficient	Sig.
Male Characters	0,03	0.62
Female Characters	0.08	0.14
Familiar Characters	-0.01	0.83
Unfamiliar Characters	0.09	0.06
Family Characters	0.03	0.53

Dream Character Variables	Spearman's Correlation Coefficient	Sig.
Friend Characters	-0.02	0.65
Deceased Characters	0.01	0.79
Creature Characters	-0.11*	0.03*
Number of Animal Characters	-0.09	0.08
Number of Animals Characters	-0.03	0.53
Number of Imaginary or Fictional Characters	-.01*	0.05*

Note. The table presents the results of a Spearman Rank Order Correlational analysis evaluating the association between dream content character variables identified in participants' dream responses, and participants scores on the anxiety subscale of the HADS.
*Significant at the 0.05 level
**Significant at the 0.01 level.

As shown in Table 11, anxiety findings mimicked the SSRQ findings in the social interactions category, as the most commonly associated dream content variables were aggressive interactions. A weak significant association was noted between participants anxiety scores and the total number of aggressions contained in the dream report ($r_s(369) = 0.11$, $p < .03$) indicating that higher anxiety scores were associated with higher numbers of aggressive interactions. Additionally, a similarly weak association was observed between aggressions classified as involving attempts to exploit, reject, control, or verbally coerce characters and anxiety scores ($r_s(369) = 0.14$, $p < .009$) indicating that increases in such interactions were correlated with increases in anxiety levels. The analyses furthermore derived a weak correlation between social interactions that were defined as containing dreamer-involved aggression ($r_s(369) = 0.15$, $p < .004$) and anxiety scores; this finding was extended as interactions in which dreamers were the victims of aggression were further correlated with anxiety scores ($r_s(369) = 0.14$, $p < .008$).

Table 11

Spearman Rank Order Correlational Analysis of Associations Between Dream Content Social Interactions and Participants' Scores on the Anxiety Subscale of the HADS

Dream Content Social Interaction Variables	Spearman's Rank Order Correlation Coefficient	Sig.
Aggression Class 1	0.01	0.76
Aggression Class 2	0.03	0.61
Aggression Class 3	0.14**	0.01**
Aggression Class 4	0.05	0.34
Aggression Class 5	0.01	0.82
Aggression Class 6	0.03	0.57
Aggression Class 7	0.09	0.08
Aggression Class 8	0.01	0.92
Number of Aggressions	0.11*	0.03*
Non-Physical Aggression	0.08	0.11
Physical Aggression	0.04	0.41
Dreamer Involved Aggression	0.15**	$P < 0.001$**
Dreamer As Aggressor	0.07	0.19
Dreamer As Victim	0.14**	0.01**
Friendly Class 1	-0.00	0.95
Friendly Class 2	0.00	0.97
Friendly Class 3	0.09	0.07
Friendly Class 4	0.01	0.89
Friendly Class 5	0.04	0.45
Friendly Class 6	0.01	0.93
Friendly Class 7	-0.03	0.54
Dreamer as Befriender	-0.01	0.83
Dreamer as Befriended	0.13*	0.01*
Dreamer involved Friendliness	0.04	0.49
Sexual Class 1	-0.01	0.91
Sexual Class 2	0.05	0.36
Sexual Class 3	-0.05	0.34
Sexual Class 4		
Sexual Class 5	0.07	0.16

Dream Content Social Interaction Variables	Spearman's Rank Order Correlation Coefficient	Sig.
Total Social Interactions	0.09	0.09

Note. The table presents the results of a Spearman Rank Order Correlational analysis evaluating the association between dream content social interaction variables identified in participants' dream responses, and participants scores on the anxiety subscale of the HADS.
*Significant at the 0.05 level
**Significant at the 0.01 level.

As shown in Table 12, associations between dream content and anxiety scores departed somewhat from the findings concerning self-regulation ability, as a weak significant association was noted amongst participants' scores on the anxiety subscale of the HADS and the number of times that the dreamer was the recipient of a friendly interaction in the dream report ($r_s(367) = 0.13$, $p < .01$). Likewise, the number of failures contained in dreams was shown to be significantly associated with anxiety scores ($r_s(367) = 0.11$, $p < .04$). Thus, the results suggest that higher anxiety scores were correlated with increases in dreams wherein the dreamer was the recipient of a friendly interaction, and in dreams containing failures which suggest an association between waking affect and affective processing.

Table 12

Spearman Rank Order Correlational Analysis of Associations Between Dream Content Variables and Participants' Scores on the Anxiety Subscale of the HADS

Dream Content Variables	Spearman's Correlation Coefficient	Sig.
Number of Failures	0.11*	0.04
Misfortune Class 1	-0.03	0.54
Misfortune Class 2	0.01	0.83
Misfortune Class 3	-0.01	0.88
Misfortune Class 4	0.00	0.98
Misfortune Class 5	-0.00	0.94
Misfortune Class 6	0.03	0.53
Number of Misfortunes	-0.02	0.71
Bodily Misfortunes	0.03	0.58
Number of Good Fortune	0.01	0.82
Anger	0.09	0.06

Dream Content Variables	Spearman's Correlation Coefficient	Sig.
Apprehension	0.10*	0.05*
Happiness	-0.01	0.89
Sadness	0.06	0.24
Confusion	0.01	0.85
Fear	0.10*	0.05*
Total Negative Emotions	0.16**	$p < 0.01$**
Total Positive Emotions	-0.01	0.89
Number of Emotions in Report	0.14**	$p < 0.01$**
Number of Emotions Including Fear	0.08	0.31

Note. The table presents the results of a Spearman Rank Order Correlational analysis evaluating the association between dream content social interaction variables identified in participants' dream responses, and participants scores on the anxiety subscale of the HADS.
*Significant at the 0.05 level
**Significant at the 0.01 level.

The anxiety analyses further departed from SSRQ findings in terms of the emotions contained in the dream transcripts as Spearman's correlational analysis illustrated correlations between dream emotions and waking anxiety. Furthermore, a weak correlation was observed between the total number of negative emotions contained in participants' transcripts and participants' anxiety scores ($r_s(367) = 0.15$, $p < .01$). Similarly, a significant correlation was found between the apprehension and anxiety scores ($r_s(367) = 0.10$, $p < .05$), and fear and anxiety scores ($r_s(367) = 0.10$, $p < .05$). Consequently, the total number of emotions contained in dream reports were shown to be significantly associated with participants' anxiety scores ($r_s(367) = 0.14$, $p < .01$). Read together, the results indicate that increased anxiety scores were associated with increased dreamed apprehension, fear and negative and overall emotion. Thus, conscious affect was statistically significantly correlated with dream emotion illustrating an association between waking affect and unconscious affective processing.

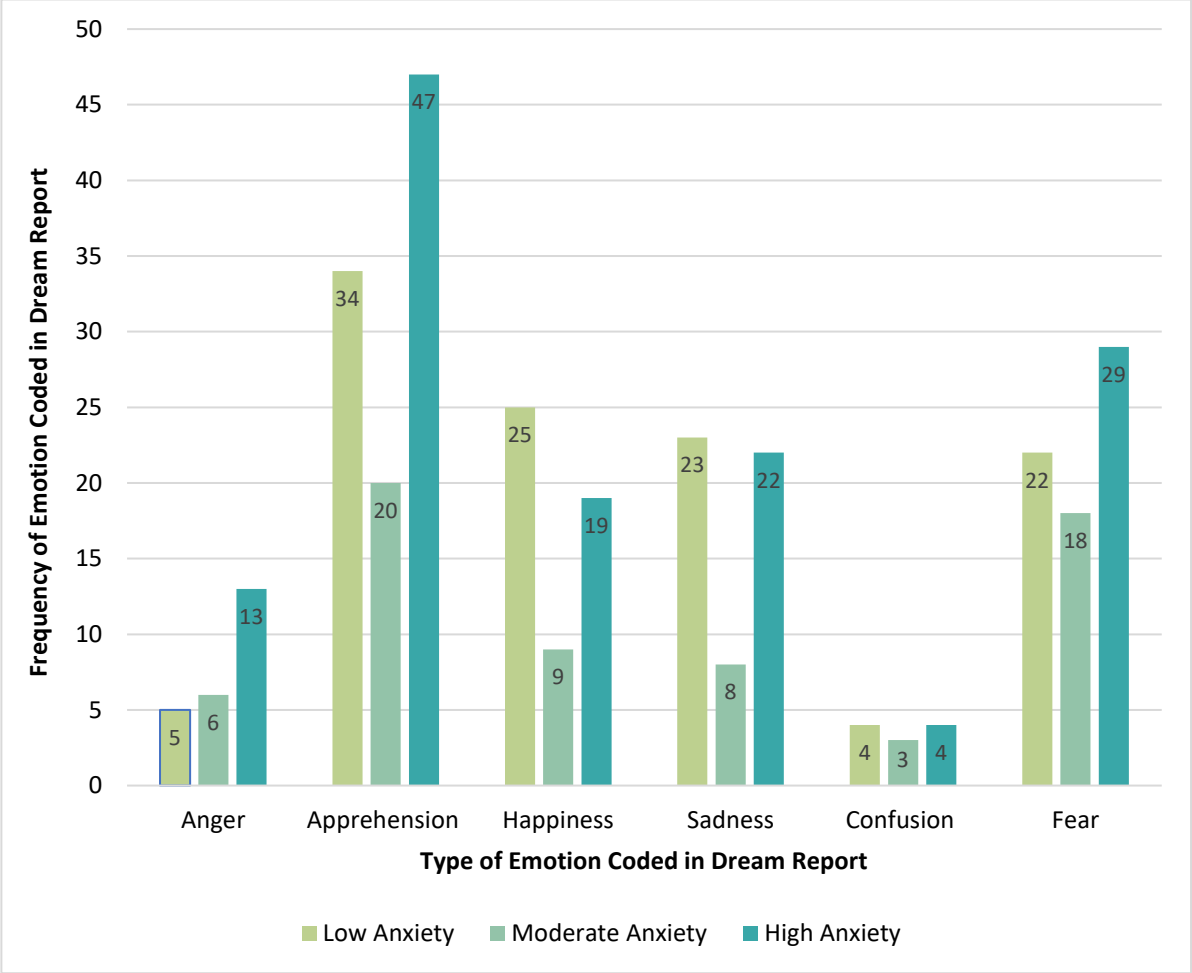
When considering the types of emotions reported in the dream transcripts interesting observations were made. As aforementioned, the most common emotion identified in the

dream reports of participants with low, moderate, and high anxiety was apprehension. However, further analyses revealed that the second most common emotion differed according to anxiety levels as it was ascertained that participants with low anxiety included dreams with happiness second most commonly, in comparison to those with moderate and high anxiety who then had dreams reflecting fear. An examination of emotions categories by way of Kruskal Wallis tests supported this observation as it illustrated that there was a significant difference in the number of emotions contained in the dream reports across different anxiety scores ($\chi^2(2) = 6.37$, $p < .04$, $\varepsilon^2 = 0.01$) with those having high anxiety reporting more emotions in their dreams (Mean Rank = 29.50) compared to those with normal anxiety (Mean Rank = 21.29) and those with moderate anxiety (Mean Rank = 17.50).

The analyses further demonstrated that there was a statistically significant difference in negative emotions (including fear) coded in dream reports across anxiety scores ($\chi^2(2) = 1.72$, $p < .01$) with those with high anxiety having more total negative emotions (Mean Rank = 30.36,) than those with moderate (Mean Rank = 15.50) or normal (Mean Rank = 21.67) anxiety scores. However, only a small effect size was found ($\varepsilon^2 = .01$). The final significant difference observed in emotions pertained to the sadness found in dreams across anxiety scores ($\chi^2(2)= 9.44$, $p < .01$). This significant difference showed that participants who were classified as having high anxiety concomitantly recorded more sadness in their dreams (Mean Rank = 29.91) than those with normal anxiety levels (Mean Rank = 22.57) and those with moderate anxiety (Mean Rank = 18). A weak effect size was observed ($\varepsilon^2 = .02$). These differences are represented visually in the bar chart included in Figure 10.

Figure 10

Bar-chart Depicting the Frequency of Emotions Coded in Dream Transcripts by Differential Anxiety Levels.



Note. The bar chart represents the frequency of coded emotions according to differential levels of anxiety. The total *n* of anger in the transcripts was 24, apprehension was *n* = 101 happiness was *n* = 53 while a total *n* = 54 of sadness, confusion *n* = 11, and fear *n* = 69 was coded in the data.

5. Chapter Five: Discussion and Conclusion

5.1 Introduction

The study of dreaming has established considerable evidence to support the idea that when individuals are faced with unpredictable, stressful events, they may find that these themes manifest in sleep experiences (Barrett, 2001). During such times dreams can become markedly different from those that were encountered previously enabling researchers to gauge the emotional salience of such events, while offering an understanding of their impact (Domhoff, 2017; Hall & Bell, 1971; Schredl & Neuhausler, 2019). This study explored the associations between affective processing, anxiety, self-regulation ability, and associated gendered differences, and aimed to generate insight into the effects of COVID-19 on dream content. The results find support for arguments that waking experiences reveal themselves within dreams and details links between emotional and self-regulation processes, and sleep experiences.

Firstly, the study aimed to offer insight into continuities between waking life and dream content and explore changes in dream content in the COVID-19 context. Thus, the HVdC analyses was undertaken in addition to further statistical measures. While the results must be interpreted in light of significant methodological limitations pertaining to the use of the HVdC system, the research findings suggested that participants' dreams (pandemic dreaming) were different from normative samples (i.e. non-pandemic dreaming) as increases were noted in the following categories: (1) Family Characters, (2) Familiar Characters, (3) Dead and Imaginary Characters, (4) Animals and (5) Friends. Increases were also observed in the social interactions as more (1) Physical Aggression was observed and male participants showed an increase in the (2) Befriender Percentage. Rises were noted in the number of (1) Success and (2) Striving contained in dreams. Yet, declines were observed in: (1) the

Aggressor percentages, (2) the portion of dreams containing at Least one Instance of Aggression, (3) Friendliness, (4) Sexuality, and (5) Misfortune.

Taken together these results indicate that the dreams of individuals included in this study—and by extension living during the COVID-19 outbreak—were significantly different than pre-pandemic normative samples' dreams, in accordance with research undertaken during this time. In answering the research questions, the results further evidenced significant associations between affective processing—as measured through dream content—and self-regulation ability. Spearman Rank-Order Correlational analyses indicate that affective processing is associated with SSRQ scores which were significantly correlated with (1) the number of Dreamer-Involved Aggressive Interactions, (2) the Total Number of Aggressions, and (3) Family Characters contained in dreams. However, these results are offset by the finding that no other significant associations were observed between SSRQ scores.

Additionally, the study demonstrated that affective processing and waking affective are more commonly associated as suggested by the statistical analyses which revealed correlations between dream content variables and participants' anxiety scores. Analyses illustrate that the number of (1) Creatures and (2) Imaginary and Fictional Characters in dreams are associated with participants' anxiety scores. The Social Interactions and Emotions contained in dreams were further demonstrated to be correlated with waking anxiety as dreams involving (1) Threats of Harm, (2) Dreamer-Involved Aggression, and (3) the Number of Aggressions in dreams were associated with anxiety scores. In the Striving category, the (1) Number of Failures were statistically associated, and the total number of (1) Emotions, (2) Negative Emotions, (3) Apprehension, and (4) Fear were correlated with anxiety scores. Thus, the findings indicate that waking affect—as quantified through anxiety scores—and affective processing—measured by dream transcripts—was correlated for individuals living during the COVID-19 pandemic.

This chapter presents a detailed discussion of these research findings and examines insights by situating the results within the context of broader literature and the COVID-19 historical period, as well as examining the results through the lens afforded by the continuity hypothesis and psychoanalytic insights. This discussion makes reference to the Emotion Regulation Theory of Dreams, and seminal insights of cognitive and affective neuropsychologists who have studied dreams to interpret the research findings.

5.2 The Stuff Dreams are Made Of: Interpreting Content Indicator Findings

The HVdC analyses provided some insight into the effects that the pandemic has exerted on dream content while offering some indication regarding the effects of protracted isolation, exacerbated stress and other factors resultant from the pandemic may have on dream content. Here, these findings are discussed.

5.2.1 Waking Lives in Sleeping Worlds: Continuity Hypothesis Insights

Insights derived from the continuity hypothesis of dreaming may suggest that participants recruited into the study often incurred dreams that replicated waking environments and concerns. Based on the work of Hall & Bell (1971) the theory holds that elements within dream narratives correlate with those frequently observed and more emotionally salient in waking life. Thus, content indicators which show increases in familiar characters, physical aggression, negative emotions, and successful attempts to aid other individuals may be indicative of the research respondents' daily life (Dale et al., 2013; Domhoff, 1999; Owczarski, 2021; Schredl, 2018).

To illustrate, this study found that the most frequently coded dream content were dream characters, who were likelier to be familiar to the dreamer than unfamiliar. Increases in the familiarity percentage were further observed in conjunction with increases in family percentages (Hall & Van de Castle, 1966). Though there was some variability in the observed effect sizes, this finding replicates other pandemic findings which have used the HVdC

method to evidence an increased incorporation of family members in dreams, as well as substantial increases in familiar characters (Giovanardi et al., 2021; Guerrero-Gomez et al., 2021; Kilius et al., 2021; Parrello et al., 2021). Thus, it may be speculated that as individuals' contact with unfamiliar people was limited due to pandemic restrictions and social distancing requirements, individuals with whom dreamers are in more frequent contact find their way into dream experiences more commonly (Domhoff, 1999; Domhoff, 2003; Schredl, 2018). Consequently, dreams wherein individuals spent time with their close family members emerged as a response to waking environments that were increasingly marked by such interactions (Domhoff, 2003).

Furthermore, this finding show that as individuals were increasingly separated from family members and friends due to COVID-19 restrictions, such individuals more commonly manifested in the research respondents' dream, as this separation was particularly emotionally important to the research respondents (Hall & Bell, 1971). Dreamers often narrated experiences such as being reunited with their loved ones after long periods of separation and sharing a "hug and (…) a big kiss", while others dreamed of spending holidays with their family "as usual" and being "happy and (…) grateful to (…) be with each other". Thus—as has been suggested by Giovanardi et al. (2021) who similarly found increases in family and friends within dreams experienced throughout the outbreak—sleep narratives could reflect individuals' continued preoccupation with reuniting with their loved ones after substantial periods of separation, engendered by the COVID-19 restrictions.

Moreover—in line with other pandemic findings—this research evidenced that individuals dreamed of dead and imaginary characters with increased frequency when compared to the CWRU participants (Barrett, 2020). Consequently, it could be argued that throughout the initial phases of the outbreak participants were commonly confronted with the tangible threat of illness and death and with morality more generally, which may also have

increased their remembrance of deceased loved ones (Barrett, 2020). Thus, dreams such as one in which a participant specifically expressed that when they are "stressed or unhappy" they feel the need to "talk to [their] father [who] died 12 years ago" who subsequently appeared in their dreams, were commonly observed. The continuity hypothesis could thus be used to argue that such a heightened inclusion of deceased characters may have been observed in the sample's dreams as they were not only more commonly confronted with mortality, but may also have been more prone to remembering loved ones in a context where such remembrance was heightened (Hall & Bell, 1971).

Interestingly, male participants evidenced additional increases in the friends percentage indicator which assesses which portion of all human characters included in the dream content are known characters (Domhoff, 2003). If it is understood that the content of dream narratives correlates with elements that are more salient in waking life, the inclusion of friends in men's dreams may suggest that for male participants separation from friends was experienced more saliently than for female participants (Domhoff, 2017; Schredl & Erlacher, 2020; Schredl & Neuhausler, 2019). This gender disjuncture is supportive of dream research which has found differences in the processing of pandemic stressors and accords with literature that has historically indicated gendered dream content (Barrett, 2020; Domhoff & Schneider, 2008; Hall et al., 1982; Kilius et al., 2021; Kramer et al., 1983; Krippner & Weinhold, 2001; MacKay & DeCicco, 2020).

Consequently, as the data suggests that male participants more frequently and more significantly referenced their friends than female participants did, it could be believed that male participants' experienced separation from friends more saliently than female research respondents (Boeker 2018; Stein & Sandler, 2019). This may account for why male participants referenced their friends in settings prohibited by lockdown regulations as men detailed engaging in various activities such as "playing video games" or just "hanging out".

One male participant alluded that the inclusion of their friend in their dream "[may be] because I have a lot of time without seen them (sic)" which particularly suggests that when confronted with stressful and isolated contexts, male dreamers incorporated social contacts more frequently. This assertion finds support in pandemic research as it has been found that dreams at this juncture are characterised by pleasant events which were prohibited under public health directives (Sommantico et al., 2021).

Similarly, analyses of the social interactions reveal that dreams are reflective of participants' waking concerns as when taken together, the data indicates that where bodily integrity is not only threatened generally but increasingly put at risk through social interactions specifically, the social interactions contained in their dream transcripts may symbolize and incorporate these concerns (Domhoff, 2017; Hall & Bell, 1971; Kilius et al., 2021). Put another way, dream interactions may have been characterized by instances where individuals were victims of bodily harm as they experience feelings of threatened bodily wellbeing within their waking lives as has been demonstrated in additional pandemic literature (Domhoff, 2017; Kilius et al., 2021). This can be observed within the dream data as individuals not only report dreams within which they are routinely the victims of physical threats but often find themselves being "chased" and "running away" from threatening events.

Additionally, these findings correlate with studies that show that when people are confronted with threatening and traumatizing events, higher instances of physical aggression which are directed at the dreamer are observed within dream narratives (Bulkeley & Kahan, 2008; Eposito et al., 2005). As such, if the pandemic is understood as a traumatizing event—as argued by researchers who find an increased prevalence of symptoms of traumatisation globally—an increase in physical aggression is to be expected (Alsheri et al., 2020; Barrett,

2020; Kim et al., 2020; Tang et al., 2020). Moreover, the findings accord with pandemic literature which has observed higher frequencies of threatening dreams (Wang et al., 2021).

Furthermore, some dreamers also recounted experiences wherein pandemic-specific threatening events placed their corporeal wellbeing at risk. For example, one participant recounts being terrified of "get[ing] infected with something", and another participant told of a dream where they were on a bus to go shopping when a group of eyeless, featureless people who are not wearing masks get on the bus and start "cough[ing] on everyone"; for this dreamer, the threat of contagion was not only associated with a lack of compliance to public health measures—as well as oral virus transmission—but what is further notable is the incorporation of featureless individuals who pose harm to the dreamer. This could be interpreted as symbolic of a pandemic context wherein bodily wellbeing is threatened by illness in opaque and uncertain ways due to the novelty of the situation. As researchers such as Šćepanović et al. (2021) have demonstrated that COVID-19 has come to be integrated into dreams in increasingly metaphoric ways, for such dreamers the reality of pandemic social interactions—wherein individuals were discouraged from contact due to the threat of illness—became represented in their sleeping worlds.

The idea that the dreamer's sleeping lives are continuous with daily experiences may be further supported by the observation that there were significant reductions in the number of dreams containing at least one friendly interaction. As waking social interactions were reduced—and perhaps marked by distance and wariness—the number of friendly interactions concomitantly declined. Thus, the broader lack of social interactions within daily life at this time manifested within sleeping worlds. Moreover, male participants recorded a substantial decline in the number of dreams containing at least one instance of sexuality. While the reduction may be indicative of a broader reduction in social interactions in the data, it may be posited that this decrease for male participants is continuous with a reported decline in sex

drive and desires in the population during the pandemic (Bowling et al., 2021; Lehmiller et al., 2021; Li et al., 2021). This accords with evidence that suggests that during times of heightened stress and emotional disruption, notable declines may be found in sexual urges and impulses (Carvalheira et al., 2014). Moreover, a noted decline in sexual interactions in a context marked by a reduction of sexual feelings may support the continuity hypothesis.

Furthermore, the success and striving content findings may support the notion that in a waking context perceived as threatening, dreams not only include threatening events but offered a way for individuals to successfully deal with these events through agentic behaviours that were perhaps unattainable in their waking context (Hall & Bell, 1971; Revonsuo, 2000). To illustrate, participants' dreams indicate continuity between waking and sleeping experiences, and show a heightened awareness of participants' vulnerability—and increased perceptions of social vulnerability and responsibility—as successful endeavours were often observed in contexts where individuals attempted to aid other vulnerable dream characters (Domhoff, 2017; Severo et al., 2021; Wang et al., 2021). Thus, dreams represented a way to act out helping behaviours in a context where such behaviours were encouraged. It is pivotal to remember that during the periods in which research participants were recalling their narratives, there was an increased focus on public accountability as individuals were called to stay at home for their safety, as well as to protect vulnerable individuals and aid public health infrastructures (Yeu & Yang, 2021).

Consequently, dreams which include such helping behaviours replicate themes found within the broader contextual discourse suggesting some continuity between waking life and oneiric activity (Hall & Bell, 2971; Wang et al., 2021; Yeu & Yang, 2017). Not only have such findings have been replicated in past research which has evidenced that individuals confronted with stressful waking experiences engage in agentic sleep events as Dale et al. (2013) show that soldiers who had undertaken military tours routinely reported more success

in their dreams than civilians, but dreams wherein individuals aided and assisted other dream characters can be used as support for such an assertion.

Additional support for the continuity hypothesis was established through analysing the emotions contained in participants' dreams. Overwhelmingly, the emotions that coloured participants' dreams tended to be negative rather than positive as dreamers most often included feelings of apprehension, fear, sadness, anger, and confusion, than happiness. This inclusion of more negative rather than positive content would suggest that within an external environment marked by such emotions, dreams would more prominently incorporate them (Hall & Bell, 1971). It further accords with pandemic research that has shown dreams to be overwhelmingly coloured by negative emotions (Giovanardi et al., 2021).

5.2.2 Neuropsychological Perspectives

Pivotally, though the data suggests that themes experienced during wakefulness may have manifested in negative dreams, dreams that instanced reduced social interactions, and were primarily more aggressive and threatening it is also possible that these dreams have more to do with biological processes than psychological functions. As Malcolm-Smith and Solms (2004) assert waking memory tends to favour emotionally salient events. Consequently, participants may have been prone to recalling threatening and hostile experiences as opposed to more neutral oneiric narratives. Furthermore, as the neural processing of emotional memory consolidation is activated during REM sleep it may be posited that dreams which include intensified emotions are likelier to be recalled (Scarpelli et al., 2019). Similarly, individuals are more probable to report dreams that are emotionally intense than those that are experienced as neutral (Schredl & Doll, 1998).

Additionally, various researchers demonstrated that individuals within the COVID-19 context saw reported substantial changes in their sleeping patterns with many sleeping later during the day and woken naturally rather than by alarm clock. These conditions are

conducive to the late morning effect—increased REM-like dreams during NREM sleep in the late morning—which are also the most memorable sleep experiences (Bottary et al., 2020). It is also possible that as the participants were asked to recall a particularly vivid dream these findings may be biased toward negative dream experiences that were memorable.

This is supported by the emotions category findings which found that the dreams were coloured with more negative, fearful and apprehensive dreams. As such, the prominence of negative emotions may be because such emotions are likelier to impact waking mood and thus are more probable to be explicitly reported and likelier to be remembered by the dreamer as waking memory favours emotionally notable events (Malcom-Smith & Solms, 2004; Schredl & Doll, 1998). One dreamer called attention to this by explaining that their dream of a hostile, fearful interaction "was very different to [their] usual dreams" and even cautioned that "if the study is to learn about how people's personalities or moods affect their dreams" the researchers should "please consider [their] recollection as an extreme minority in [their] case" as their dreams are typically "quite enjoyable".

5.3 Self-Regulation and Dream Content

Having gained insight into the dream content of the research participants, the study examined associations between affective processing and self-regulation using quantified dream data and scores on the SSRQ. These findings are discussed with reference to methodological choices, theories of dreaming and considering neurocognitive insights.

5.3.1 Self-Regulation and Dream Characters

Analyses of associations between SSRQ scores and coded dream content derived a weak, significant association between the number of family characters contained in dream transcripts and SSRQ scores. Thus, increased numbers of family characters were associated with higher scores on the SSRQ. Psychoanalytic insights into dreaming may indicate that the inclusion of family members in dream content may satisfy unconscious desires for contact in

contexts of separation and isolation, and thus the concomitant increase in family characters demonstrates both needs for social connection, and the fulfilment of such needs (Stein & Sandler, 2019; Freud, 1955). Consequently, an association between self-regulation and family characters can imply that individuals who receive such need fulfilment within sleep are better to regulate conscious affect and behaviours (Stein & Sandler, 2019). When considering this finding in light of research which has suggested that individuals with stronger self-regulation proficiencies may mediate external challenges more sufficiently, it may be posited that dreamers with better waking regulation ability report dream experiences which include family characters as unconscious wish fulfilment is being undertaken through sleep (Apgar & Cadmus, 2020; Panayiotou et al., 2020).

Alternatively, as dreams involving family members often included more threatening events, it is arguable that individuals with higher self-regulation show an increase in this area as dreams facilitate a space wherein individuals may simulate threats and thus formulate appraisal strategies to waking events (Revonsou, 2000). This could suggest that dreamers engaging in this type of threat simulation may be better able to regulate waking behaviours, as dream experience may have afforded them a manner in which to engage in problem-solving activities (Revonsou, 2000). As evidence has shown that dream experience is linked to emotional regulation abilities, the inclusion of family members in dreams may indicate that individuals who dream of known, familiar characters may evidence better emotional encoding abilities, and thus have better self-regulation abilities (Cartwright et al., 1998; Hartmann, 1996;).

Yet, these interpretations need to be subjected to further analyses as findings suggest that the affective processing enabled by dream content is not sufficiently transparent, and further research should be undertaken to explore the relationships between these variables. Similarly, due to the wide variety of dreams including family characters, a concrete

interpretation of this association cannot be attained. Dreams including family characters ranged from positive dreams such as individuals being reunited with their family members, to traumatic dreams in which family members died. As such, conclusive interpretations may need to be more adequately supported with reference to participants' waking experiences.

5.3.2 Associations between Self-Regulation and Dream Aggression

Notably, more common associations between dream content and self-regulation were found when examining aggressive interactions as the data suggests that the (1) total number of aggressive interactions and (2) the number of dreamer-involved aggressions is negatively associated with self-regulation. While such findings need to be considered with reference to the significant limitations of this study, the study did derive tentative support that increases in dream experiences in which dreamers are threatened by aggressive social interactions are associated with lower scores on the SSRQ. Though further replicative evidence is required—as well as increasing confidence in the dream content variables through the provision of a second-rater coding participants' dream transcripts—the finding is notable when considering that the measure used to quantify participants' self-regulation ability has not been used in dream research.

Consequently, if aggressive social interactions are indicative of permanence between waking emotion and dream experiences, the results of this study could suggest that individuals with better self-regulation ability demonstrate less hostile social interactions within their dream narratives as they are better able to regulate their waking emotional concerns than individuals with lower self-regulation ability (Hall & Bell, 1971). This may consequently support previous assertions that those with better self-regulation ability tend to show enhanced affective regulation (Hoffman et al., 2012; Matias et al., 2020). Additionally, it could be posited that a decline in aggression which is observed to correlate with a rise in SSRQ scores indicates that individuals with better SSRQ scores can meet the demands of the

external environment more sufficiently, and thus do not dream of events in which they are increasingly threatened.

Yet, if the inclusion of aggressive social interactions is suggestive of continuity between waking life and dream life, this finding additionally suggests that individuals with better self-regulation ability did not experience pandemic stressors in the same way as those with lower self-regulation ability. Not only has past research shown that individuals with enhanced self-regulatory ability show increased resilience to the outbreak, but such an assertion may further be supported by the fact that there was a negative association between dreamer involved aggressive interactions and SSRQ scores (Apgar & Cadmus, 2020; Hofmeyer et al., 2020; Matias et al., 2020; Panayiotou et al., 2020). As dreamers were likelier to be the victim of aggressive exchanges, the association between dreamer involved aggression and SSRQ scores may indicate that individuals with better SSRQ scores perhaps did not experience such a prominent fear of victimisation within waking life, and thus included less such events within their dreamscapes, which is in line with the continuity hypothesis.

However, if social interactions which occurred during dreams illustrate the fulfilment of unconscious wish fulfilment, this finding may accord with psychoanalytic perspectives, as it could be utilised to suggest that individuals with higher SSRQ scores may have been better able to regulate tensions between the waking ego and unconscious urges, and thus did not evidence such wish fulfilment during sleep experiences. As such, while those with lower waking behavioural control may have experienced this tension more poignantly, those with more adaptive behavioural regulation may have mediated these tensions more sufficiently thus incurring less aggressive dream interactions. These findings thus partially support a hypothesis that affective processing as measured by dream content is associated with self-regulation ability which is in line with cognitive neuroscientific understandings of dream

functioning which have shown an overlap in the neural bases of dreaming and self-regulation (Wager & Heathertone, 2016).

Yet, these interpretations should also be read in conjunction with the results that indicate no statistically significant differences in dreaming social interactions across SSRQ rankings. Thus, in the absence of additional statistically significant findings and notably weak observed associations, it cannot be conclusively stated that this study found convincing and conclusive evidence to prove the hypothesis. As reported, the vast majority of the dream categories were not associated with self-regulation scores. While the literature had suggested that associations could be expected between emotions coded in dreams and self-regulation ability, this relationship was not observed. However, it is plausible that the lack of significant association could have resulted from several different causes.

Importantly, Scarpelli et al. (2021) argue that individuals with better self-regulation abilities may reflect more positive affective regulation across different states of consciousness. As most of the sample had scores indicative of lower to moderate self-regulation ability a lack of solid and significant associations may be attributable to the reality that people with higher self-regulation capabilities were underrepresented in the sample. Furthermore, if people with better self-regulation ability reflect more positive affective regulation across conscious states, it is also possible that an association would exist between SSRQ scores and positive dream content. However, as the HVdC system captures negative dream experiences more commonly than positive dream experiences, an association between dream content and SSRQ scores may not have been ascertained as more positive dream content was not fully conceptualized by the coding methodology employed.

Likewise, methodological constraints in examining self-regulation ability may have led to this observation; as the SSRQ has not been used in dream studies other more relevant and proven measures may have unearthed better insights into the relationship between

affective processing and self-regulation ability. As a concept self-regulation is exceedingly broad and covers both affective regulation, as well as more goal-oriented mechanisms. Thus, studies which specifically examine relationships between affective processing and affective regulation may be better apt to explore these associations, as examining self-regulation more generally could perhaps have been too broad. Finally, debates regarding the coding of emotions abound in the dream content and as such, the lack of significant associations between self-regulation and dream emotions may be derived from the fact that this element was not sufficiently quantified in the dream data.

Yet, the results of this study could suggest that some dream elements such as social interactions are more salient to SSRQ ability than others. As self-regulation is understood as the ability of an individual to control their behaviour which in turn allows them to adjust their responses, preserve adaptive behaviour, and regulate actions, it could be argued that effective self-regulation is tasked in social exchanges. Thus, associations between aggressive interactions and self-regulation may demonstrate these variables are associated because if SSRQ scores indicate self-regulation ability, those with higher self-regulation ability may manage social interactions more proficiently than those with lower abilities, as it is within such interactions that behavioural regulation is specifically required.

5.4 Exploring Waking Anxiety and Dream Content

While only a few associations were noted between dream content and self-regulation ability, the analyses of waking affect—as measured by anxiety scores—and dream content more commonly suggested relationships amongst these variables. Consequently, the ensuing discussion details the results and presents a consideration of the evidence of significant associations.

5.4.1. Associations between Anxiety Scores and dream Characters.

Primarily, the data found weak negative correlations between both the number of creatures contained in dream reports and the number of fictional characters contained in dream reports and participants' anxiety scores. As a result, participants with lower anxiety scores more commonly described dreams wherein they confronted characters such as "zombies", or "beasts", as well as more dreams including fictional characters such as "Batman" and "Pennywise" the homicidal clown from the known Steven King novel. This significant association may be resultant from the fact that individuals with high anxiety demonstrate affective dysregulation and thus dreams may become more negative, and threatening and include hostile interactions with threatening dream characters more commonly than dreams including more bizarre elements which may materialise not only in negative dreams but also in positive dream setting (Levin & Nielsen, 2009).

However, as the data further suggests that no association between waking affect and any of the other character categories exists in addition to notably weak effect sizes, any interpretation of these results should be tentative. The predominantly null associations between characters included in dream content and anxiety scores could be resultant of the fact that the characters reported in dreams are not explicitly associated with overall negative or positive dream qualities and instead contextualize the overall narrative of the dream more broadly. Similarly, as the characters are described in a variety of different dream settings, it may be that no significant association is observed because the emotional quality of the dream is not dependent on the dream characters, but is more strongly associated with dream qualities such as the social interactions or emotions coded in the narratives.

5.4.2 Associations between waking anxiety and dreamed social interactions

This observation is supported by this research which shows that waking affect as quantified by anxiety scores shows more significant associations with the social interactions

contained in participants' dreams. To demonstrate, the analysis found that anxiety scores are significantly associated with the (1) total number of aggressions, (2) the total number of dreamer-involved aggressions, and (3) aggressions which were coded as involving an attempt made by one character to control, reject or verbally coerce another character. This suggests that interactions such as dreamers “arguing with [their] family”, hiding from threatening characters and running from individuals with “weapons” were found more commonly in those individuals with higher waking anxiety than individuals with lower anxiety scores.

These results are supportive of research which has shown that individuals who experience both state and trait anxiety evidence more aggressive dreams than healthy participants (King & DeCicco, 2007; Rimsh & Pietrowsky, 2021; Sikka et al., 2018). Furthermore, it accords with findings that have argued that individuals with poorer waking affect may incur dreams that are representative of these waking emotional states as supported by the continuity hypothesis (Kahn et al., 2014; Skancke et al., 2014). As anxiety is characterized by chronic worry and fear of future events, it could be speculated that dreams become spaces in which these feelings are represented resultant of the continuity between waking emotion and dream emotion (Foss 1994; Khodarahimi, 2009; Rimsh & Pietrowsky, 2019).

What was particularly interesting in the findings was the fact that a significant association between aggression and anxiety was not only noted generally, but that dreams in which an aggressive act involved one individual being rejected, exploited, controlled, or verbally coerced by another were specifically associated with anxiety scores. Remarkably, these forms of aggressive interactions were not the most common form coded in the transcript, yet were nonetheless correlated with anxiety scores. Dreams involving such forms of aggression ranged from individuals being rejected such as getting “[broken] up with”, to verbal negativistic and hurtful behaviours such as attending an event with every person they

"ever knew (…) in life" telling the dreamer why it was "easy to forget (…) and never think of" them. Thus, they not only involved physically threatening events but included encounters where individuals were hurt emotionally. It is plausible that feelings of worry and apprehension which manifested in dreams accord with the chronic worry associated with experiences of anxiety in line with the continuity hypothesis and other pandemic related findings (Hall & Bell, 1970; Šćepanović et al., 2022; Sommantico et al., 2021). Furthermore, literature has shown that the dream content of individuals with anxiety is distinguishable as the affective tone of anxiety is mimicked within dreams (Foss, 1994; Khodarahimi, 2009; Rimsh & Pietrowsky, 2019).

While the findings suggest that there is an association between anxiety and social interactions wherein the dreamer is the recipient of a friendly interaction, it is pivotal to note that the most frequent form of social interaction which occurred in the dream data were instances where individuals were aided by other dream characters. Thus, the data frequently described contexts in which the dreamer was under threat from other individuals, or struggling through disasters, and consequently were aided through the intervention of friendly acts. Thus, the finding of this significant association may be explicable by the fact that individuals with higher anxiety scores experience more waking fear and worry, which thus became expressed in their dreams and were ameliorated through friendly interactions.

5.4.3 Associations between waking anxiety and dream emotions

Indications of associations between waking affect and dream experiences are further supported when considering that the results indicate that there is an association between the (1) total number of negative emotions, (2) dreams characterized by fear and apprehension, and (3) the total number of emotions in dream reports, and participants' anxiety scores. These results are more prominent when accounting for the fact that emotions in dream reports are frequently under-rated in dream narratives (Parello et al., 2021). Thus, even where emotions

may not have been adequately accounted for the results nonetheless suggest that emotions were statistically related to waking anxiety.

As the results found a significant association between dreams coded as containing apprehension and participants' anxiety this research largely accords with previous studies and is supportive of the continuity hypothesis as it suggests that the affective tone of anxiety is replicated within dream narratives as individuals who experience anxiety often incur feelings of worry and apprehension for the future (Rimsh, 2020). Thus, the observation that higher anxiety is associated with an increase in dream instances such as an individual feeling "nervous", "very anxious", and "uneasy and stressed" suggests a congruence between these waking and sleeping affective states.

Similarly, as anxiety often manifests in chronic fear and feelings that the worst will happen, findings of a significant association between fear content in dreams and anxiety scores support the continuity hypothesis as it indicates that waking affect is mirrored in dream content (Rimsh & Pietrowksy, 2019). Accordingly, in an external environment marked by feelings of fear not only due to external events but further as a result of the individual's own affective state it may be expected that dreams incorporate these tones more prominently (Giovanardi et al., 2021). As such, evidence of such an association is supportive of literature that suggests that waking affect and sleep affect are largely continuous as fear particularly characterises anxiety experiences (Picard-Deland et al., 2018). Significant correlations between the total number of emotions and the total number of negative emotions with participants' anxiety scores can further be interpreted as support for this hypothesis. These insights may be useful to researchers working within psychology, as it may derive further support for the notion that dreams can be utilised to understanding the mental health needs of individuals.

Pivotally, as most of the emotions coded were negative, the findings of a significant association between total negative emotions, and total emotions will be interpreted concurrently. This significant association between dream tone and anxiety accords with previous research which suggests that when compared to healthy control groups individuals with anxiety recorded more disturbing and negative dreams (Rek et al., 2017). Moreover, the association between dream affect and waking affect is supported by research which shows that brain regions that are implicated in emotional processes during wakefulness are evidenced in the neurophysiological background of sleep that can explain some of the qualitative features of dream experiences (Scarpelli et al., 2019). This accords with emotion regulation theories of dreaming that suggests that the experience of negative emotions during dreams offers a way for individuals to process affect during sleep, that they are unable to process during the day (Cartwright et al., 1996; Cartwright, 2010).

Furthermore, a significant association between dream affect and waking affect could exist as both the emotional intensity of dream experiences and the experience of anxiety are linked to the same neural substrates (Scarpelli et al., 2019; Taylor & Wahlen, 2015). Specifically, research using brain imaging technologies—such as functional Magnetic Resonance Imaging—suggests that higher activation of the amygdaloid complexes, as well as the anterior cingulate cortex and hippocampus, can explain the emotional intensity of dreams (Scarpelli et al., 2019; Deseilles et al., 2011). Higher activation of the amygdaloid complexes has also been found in individuals with anxiety disorders, as evidence shows that greater right amygdala activation is correlated with both anxiety disorders generally, as well as the severity of the disorder (Monk et al., 2008; Taylor & Wahen, 2015). Consequently, it is possible that patients' anxiety scores and dream emotions are correlated due to commonalities in the neural substrates implicated in both sleep and waking affect.

5.4.4 Differential Dream Content by Anxiety Rankings

What was striking in this research was that a significant difference was found in the number of emotions contained in dream reports across different anxiety rankings. While it was expected that individuals with higher levels of anxiety would report more emotions in their dreams compared to individuals with normal anxiety, what was notable was that throughout these comparative analyses the data suggested that individuals with higher anxiety scores and individuals with low levels of anxiety included more emotions, more negative emotions, and more sadness than individuals with moderate anxiety scores. This finding may be resultant of the fact that in a context marked by uncertainty, instability and a general public health calamity, participants who have moderate levels of anxiety can be said to demonstrate adaptive behaviours and thus their dreams reflect less negative affective content than those with high and normal levels of anxiety. While chronic anxiety is indicative of psychopathology, it may be suggested that in a context that demands a threat response, the absence of anxiety can further demonstrate affective dysregulation. This finding is particularly insightful as it suggests that the associations between dream affect and waking affect are not simply correlated, but that nuances in emotional reactions are explicated within dreams.

5.5 Limitations and Recommendations

However, the results of this study need to be considered in light of significant research limitations. As such, limitations and recommendations for future research are consequently discussed below.

5.5.1 Research Design

Primarily, the research design employed may have curtailed the generalisability of the research findings. Though the cross-sectional nature of this research was able to generate novel insights into an unfamiliar research context, when considering the unpredictability of

this context such a design may have concurrently constrained research findings. As the COVID-19 pandemic is ongoing—and as individuals and governments routinely have to adapt responses to the threat—the cross-sectional nature of the study may render these results irrelevant to current COVID-19 experiences. Furthermore, while the use of cross-sectional research designs offers flexibility, such designs are limited as it is not possible to assess the temporal relationships between the variables (Levin, 2006). Thus, though this research offers a snapshot into the experiences of participants, it does not provide insight into whether these associations changed over time. Similarly, the correlational design made it impossible to draw causal inferences about the associations observed which is considered an additional limitation of this research (Thompson et al., 2005).

It is thus recommended that a longitudinal study is carried out to ascertain more insight into dream experiences. Taking into consideration the ongoing impacts of the pandemic, such studies are needed to gain a more adequate understanding of its effects, and the associations between these variables. Furthermore, it is possible that these findings may be pandemic-specific and so future replication studies should be undertaken. Moreover, as past research indicates that a time-effect may be observed within participants' dreams as the profound emotional impact of a catastrophic event may not appear immediately in people's dreams but may emerge over the course of time, follow up studies should be conducted (Nielsen et al., 2004).

5.5.2. Unexplored Variables

The large international cohort of research participants offered a unique opportunity to explore correlations between the research variables. However, the variability of the sample, as well as various sociodemographic characteristics limits the generalizability and results of research findings. To illustrate, while this cross-section of the global population offers a multi-cultural perspective on dream experiences, the current research did not consider

socioeconomic and contextual realities which may have confounded the results. Though the research aimed to increase homogeneity by excluding research participants who had not experienced some form of lockdown constraints, the unique personal and national contexts of research participants may not have been sufficiently similar. Government responses to COVID-19 outbreaks have been differential, and the relative threat posed by the disease as well as consequences of the outbreak is likely to be context-dependent (Gaynor & Wilson, 2020; Kamal et al., 2021). Similarly, individual variability with regard to disease vulnerability, having been infected with COVID-19, or losing a loved one to the virus has been shown to impact dream content, yet resource constraints and limits placed upon the length of this study prevented such factors from being accounted for, thus limiting the findings (Parello et al., 2021; Scarpelli et al., 2022; Schredl & Bulkeley, 2020). Additionally, sociodemographic factors such as age and educational information were not examined.

Consequently, future studies should consider such additional variables. Particularly, studies should investigate pandemic specific factors such as the restriction level experienced by research participants, the intensity of the COVID-19 outbreak in the participants' country of origin, and individual-level factors such as whether the research participant had contracted the virus, was particularly vulnerable if infected by COVID-19, and whether they had experienced a personal loss due to the virus. Additionally, research should examine variables such as education and age to assess whether such sociodemographic characteristics influence dream content. Moreover, it should consider the role of participants' nationality more specifically as while literature suggests that there is continuity amongst dream content regardless of nationality it is possible that differential impacts of culture and context may exert an effect on dream content (Domhoff et al., 2006).

5.5.3 Sample Demographics

Though high variability in terms of nationality may have limited the research, the relative homogeneity of the sample on other dimensions may further be considered a limitation. While the research aimed to be inclusive, the study is constrained as participants were largely heteronormative, young, highly educated, and hailed from WEIRD countries (Henrich et al., 2010). This limitation further extends to the fact the sample was skewed in terms of the SSRQ scores. The data analysis results indicated that a disproportionate number of participants showed moderate self-regulation ability, while the minority of participants had high SSRQ scores. Thus, as the SSRQ scores were skewed, a more representative sample may have enhanced the generalisability of these results. As such, it is recommended that additional research is undertaken which includes a more diverse and representative sample of the global population. Additionally, a broader range of self-regulation abilities should be accounted for in future studies so as the effectively explore associations between affective processing and dream content.

5.5.4 Research Measures

Certain methodological limitations pertaining to the data collection and analyses additionally undermines the generalisability of these results. To exemplify, the language and medium of the measures used to ascertain the research data may have limited these findings as the questionnaire was only presented in English and through online methodologies. Though the use of these measures was necessary at the time of data collection and made it possible to reach a broader variety of participants, it is possible that the measure did not accurately capture the experiences of individuals who may not have been able to participate in the research due to language and technology constraints. Furthermore, language biases may have resulted in some participants from non-English speaking countries being unable to

express their dream experiences in detail sufficiently and thus the responses herein considered may not be sufficiently representative of dream experiences.

Moreover, the research question themselves, and the scales utilised in measuring anxiety and self-regulation ability perhaps did not sufficiently conceptualise these variables in a large international cohort. The use of the SSRQ and anxiety scales were rationalised as evidence has suggested that these measures have been validated in a range of cultural contexts; however, there is limited support for the use of these scales in a cross-cultural setting and thus further work needs to be done to validate these measures. Not only would cross-cultural validity enhance the generalisability of the research findings, but data collection and dissemination in various languages, as well as multilingual data analyses, could unearth research insights that were not uncovered by the present study. Moreover, as the use of Likert scales has been found to increase the likelihood of response biases in research samples alternate measures to conceptualise waking affect and self-regulation may be recommended.

Another methodological related limitation pertained to the use of the SSRQ to measure self-regulation ability. While the SSRQ has been validated in a variety of cultural settings and used in various research contexts, it's applicability to dream studies has not been sufficiently demonstrated. As self-regulation is exceedingly broad it is possible that the inclusion of a more targeted scale that considered one aspect of self-regulation such as affective regulation, rather than self-regulation more broadly would perhaps have rendered more concrete insights into the functions of dreaming. Thus, while some of the dream variables were associated with SSRQ scores—as the measure conceptualises a range of self-regulatory functioning from behavioural control to the ability to adapt to external responses—a concrete answer as to how self-regulation ability and dream content is linked could not be ascertained through this research. Consequently, it is suggested that future research

incorporates a measure of self-regulation that focuses on one aspect of self-regulation rather than on self-regulation functioning more broadly.

Moreover, a further methodological limitation pertains to the collection of dream transcripts which may have primed research participants. To illustrate, participants were asked to reflect on their recent dream experiences and to recall a recent "vivid" dream which could have primed participants' to recalling particularly emotionally intense dreams, rather than more neutral dream experiences, and thus may have biased the results. This bias may be compounded by the fact that studies have not only demonstrated that individuals recall more memorable dreams—and that individuals recall only 5 to 10% of all dream experiences—but also that individuals tend to be biased toward recalling more dramatic dreams (Malcom-Smith & Solms, 2004). Consequently, the research may be limited by such biases as the inclusion of more neutral, unmemorable dream transcripts may not have been sufficiently represented.

Furthermore, while previous research has found that the recollection of a most recent dream is a scientifically valid way of collecting dream transcripts, certain limitations in collecting and analysing such dream transcripts further compromise this research study (Domhoff, 1996). Firstly, dream research is constrained by the fact that it is not possible to objectively verify the dream experiences of individuals. Moreover, research has shown that participants often impose narrative structures on dream experiences that may not be accurately reflective of sleep mentation (Malcom-Smith & Solms, 2004). As such, future research should make use of alternate data collection methodologies such as sleep studies, dream journals or dream surveys.

Finally, while some interpretations of these findings were offered within the discussion of the research results, in the absence of additional insight into participants waking experiences such interpretations were constrained. Research into the functions of dreaming is

diverse, and a range of theories are presented. Yet, to assess the applicability of these theories additional information regarding participants' daily lives, waking concerns, and experiences are often needed. The use of specific dream surveys and follow-up questions would have improved the strength of these findings, and research instruments that incorporate additional questions into participants' waking experiences and concerns should be used in future research.

5.5.5 Content Analysis Limitations

While the HVdC system is able to quantify a wide-range of dream content, it is not without limitations and the use of this method may have significantly constrained the data findings. To exemplify, though the system offers a range of content categories it is possible that more implicit dream content was not sufficiently captured in the data coding. This is particularly relevant to the coding of dream emotions, which were found to be restricted due to the HVdC method. Particularly, the requirement that dream emotions are explicitly identified by the dreamer through words that are synonymous with emotional feelings may lead to an underrepresentation of emotional themes. Furthermore, while the coding methodology attempts to classify positive affect as well as negative emotions, the significant lack of positive emotion categories is a limitation of this study. Only one positive affective state—"happiness"—is supported by the HVdC methodology while more nuanced feelings such as nostalgia are negated. Even feelings such as "confusion" and "surprise" are construed as negative emotions rather than positive emotions, indicative of an inherent bias in the coding methodology. Moreover, it may be argued that even where emotions are adequately coded, the intensity of these emotions is not quantified, and as such the method is limited as it does not differentiate between descriptions such as feeling "scared" or being absolutely "terrified" by dreams (Schredl, 2010). To overcome such limitations, it is recommended that individuals working within this field make use of additional scales to conceptualise more

positive affective content in dream narratives. Relatedly, future research should make use of participants' self-rated dream transcripts to quantify dream emotion that is more implicit in dream reports.

Furthemore, due to resource limitations only the "Big Five" categories were considered while alternate categories such as descriptors, objects, temporal references, settings, and elements of the past were not considered. Consequently, a range of dream elements was left out of the research and not adequately accounted for in this study which constrains the research findings. Subsequent research should be undertaken to explore all the dream content categories of the HVdC system to ensure a more comprehensive and holistic analysis of the dream transcripts described by these research respondents.

Furthermore, the use of methodologies which employ scales—such as the HVdC system—has been argued to be limited as a loss of information takes place (Schredl, 2010). Consequently, elements of participants' dreams may not have been sufficiently captured by the HVdC system. This was noted as a separate category had to be created to examine participants who had pandemic specific dreams which is presented in Appendix O. Relatedly, the use of the system may at times have obscured the uniqueness of a particular person's dreams by analysing the overall group in comparison to normative participants (Schredl, 2010). Similarly, work needs to be done to refine the content analysis, including greater attention to metaphors, individual variations, and cultural dynamics. To illustrate, in their responses, participants may make use of cultural- and individual-specific terminology not quantified through the methodology. Cultural verbiages may at times influence the meaning of dream reports which were subsequently not picked up by the HVdC system.

Furthermore, the heteronormativity upheld by the methodology ensures that it is exceedingly difficult—and not always possible—to account for the experiences of minority individuals. This was observed during data coding as while identifiers of gender included

male, female, joint or indefinite gender categories, specific coding for gender nonbinary participants does not exist. While it could be argued that gender nonbinary identities could be coded as “indefinite”, this category was designed for characters whose gender identities were not described in sufficiently identifying ways. As such, it does not apply to gender nonbinary individuals who explicitly identify their gender in non-heteronormative ways. This presents a significant limitation as the coding methodology is not adequately representative of the social world in which the dreamers live. Thus, it may be argued that the HVdC method does not account for the variability in social, family, and gender identities that increasingly marks society.

Moreover, the HVdC method is primarily underpinned by the continuity hypothesis, as it is believed that emotionally salient concerns are associated with the frequency with which such concerns are represented in dream narratives. As such, the coding of dream content may be implicitly influenced by this hypothesis and the results may be biased toward supporting this notion. The methodology is further limited as in order to control for variability in dream transcript length, it requires that dreams range from 50 words to 300 words. While this has the benefit of ensuring that normative comparisons are enabled, and that variability is reduced, the disadvantage of this approach is that individuals who fall beyond these limitations were not included in the current study.

Most significantly, the use of the HVdC system must be evaluated with reference to the substantially outdated norms which were further derived from a United States research sample. When considering the vast differences in this research sample and the normative research sample, any generalisability of these research findings is considerably limited as there are various socio-demographic and cultural differences between the two groups. This posed a substantial threat to the validity of these research findings. Though normative findings have been replicated in subsequent research, it is recommended the norms are

updated to be more representative of the current global population and that the HVdC system itself is expanded to be more inclusive of non-heteronormative identities.

Additionally, follow up studies should consider the dream transcripts of individuals who included less than 50 words in their responses, and who included more than 300 words in their responses so that the findings are more representative of the larger sample recruited in this study. Future research may also wish to consider the research data through alternative data analysis methodologies. It is suggested that more comprehensive qualitative methodologies are employed which are culturally relevant and allow for the coding of minority identities. Furthermore, qualitative methods such as thematic analysis may also enable the analysis of implicit dream content, in addition to explaining more metaphorical dreams and symbolism.

5.5.6 Coder Subjectivity

Finally, while the HVdC system is beneficial as it provides a concrete and comprehensive set of rules through which to analyse the dream transcripts, it is nonetheless possible that errors and biases may have been included in the data analysis due to resource constraints which prevented more than one data-coder. While every effort was made to code the dream transcripts reliably and accurately—following the detailed rules established by the method—it is possible that human error may have influenced the findings, and may limit the conclusions herein derived. Due to these resource constraints, inter-rater reliability could not be ascertained, and further study validation is needed.

5.6 Conclusion

While these findings need to be interpreted in light of these significant limitations, this study is believed to offer some understanding of the dream experiences of individuals living during a time of rapid, unprecedented change. Though the study does not establish concrete support for different dream function theories, the results and discussion of this

research demonstrates the applicability of different dream function theories, which may indicate that the putative roles of dreaming are dependent on both the context and on the individual dreamer.

One of the key aims of this research was to explore assertions made by dream researchers who have argued that dreams incurred during the COVID-19 outbreak have been materially different from dreams that have been observed during pre-pandemic times. This study found evidence for such assertions as it not only demonstrated that both male and female participants' evidenced substantial changes in dream content indicators, but showed that some dreams elicited in this undertaking were reminiscent of the pandemic itself. While these findings are limited due to the outdated normative samples' content indicators, it is held that the study was able to generate insights which showed that dreamed social interactions, characters, and emotions both explicitly and symbolically incorporate the COVID-19 outbreak. Furthermore, it was argued that these changes are not only indicative of how the external environment has changed, but further reflect attempts by individuals to process feelings and concerns that they associate with this period of unparalleled disruption.

While correlations were observed between self-regulation and dream content that was marked as aggressive, further research needs to be understanding to explore the associations between self-regulation ability and affective processing. Yet, findings that waking emotions (as analysed by anxiety scores) were more commonly related to unconscious affective processing, suggest that individuals' waking experiences and emotions are sufficiently related to dream content which comes to incorporate such experiences. As such, this study has not only supported previous research but has shown that external contexts and waking affective experiences are routinely mirrored within sleep mentation in ways that link both conscious and unconscious processing that should be conclusively examined in additional research.

To conclude, this report has made repeated references to the fact that dream research offers a singular gateway into the exploration of unconscious processing and emotion, and may shine a light on the human inner world. While analyses of waking concerns and experiences may present more objective and measurable insights, this research has shown that dreams at times may truly represent "a royal road to the unconscious" (Freud, 1955, p.42). This study has explored a variety of dreamscapes that depict the internal struggles of individuals in the unimaginable reality of the COVID-19 pandemic: dreams of death and illness, despair and fear, uncertainty and apprehension. Yet, at the same time, these respondents have detailed dreams of immense happiness and joy as they fulfil their most hopeful goals, visit their loved ones, adventure with friends, marry partners, and become reunited with the deceased. At a time of rapid social upheaval, this research has shown that this "royal road" may lead to novel and insightful understandings as it guides us into a world largely unexamined in psychological research, a world that we spend nearly half our lives occupying, a world that starts with dreams.

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Appendices

Appendix A

Dream Caused by the Flight of a Bee (Around a Pomegranate one Second from Waking up) by Salvador Dali.



2009 Salvador Dalí, Gala-Salvador Dalí Foundation / Artists Rights Society (ARS), New York, Courtesy of Art Resource, NY/Photo by Erich Lessing

Appendix B

Sociodemographic Questionnaire

1. What is your age (please write a number in the box below)?

2. What gender do you currently identify with?
    a. Male
    b. Female
    c. Prefer not to be identified by gender
    d. Other
3. Please write which country (including the region) you are from in the box below:

4. On which side of the political divide do you tend to identify?
    a. Far left
    b. Left
    c. Central Right
    d. Far right
    e. No political interest
5. In terms of British Politics - in the recent Brexit referendum and voting how might you have voted?
    a. For Brexit (to leave the European Union)
    b. For Remain (to stay in the European Union)
    c. Undecided
    d. Not interested
    e. Other

6. What is your highest level of education? Please write in the box below (e.g. School-level exams, Undergraduate degree, Masters degree, PhD):

Appendix C:

Self-Regulation Questionnaire as Presented in CL Study

1. I usually keep track of my progress toward my goals.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

2. My behavior is not that different from other people's.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

3. Others tell me that I keep on with things too long.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

4. I doubt I could change even if I wanted to.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

5. I have trouble making up my mind about things.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

6. I get easily distracted from my plans.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

7. I reward myself for progress toward my goals.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

8. I don't notice the effects of my actions until it's too late.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

9. My behavior is similar to that of my friends.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

10. It's hard for me to see anything helpful about changing my ways.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

11. I am able to accomplish goals I set for myself.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

12. I put off making decisions.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

13. I have so many plans that it's hard for me to focus on any one of them.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

14. I change the way I do things when I see a problem with how things are going.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

15. It's hard for me to notice when I've had enough (alcohol, food, sweets).

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

16. I think a lot about what other people think of me.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

17. I am willing to consider other ways of doing things.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

18. If I wanted to change, I am confident that I could do it.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

19. When it comes to deciding about a change, I feel overwhelmed by the choices.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

20. I have trouble following through with things once I've made up my mind to do something.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

21. I don't seem to learn from my mistakes.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

22. I'm usually careful not to overdo it when working, eating, drinking.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

23. I tend to compare myself with other people.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

24. I enjoy a routine, and like things to stay the same.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

25. I have sought out advice or information about changing.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

26. I can come up with lots of ways to change, but it's hard for me to decide which one to use.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

27. I can stick to a plan that's working well.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

28. I usually only have to make a mistake one time in order to learn from it.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

29. I don't learn well from punishment.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

30. I have personal standards, and try to live up to them.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

31. I am set in my ways.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

32. As soon as I see a problem or challenge, I start looking for possible solutions.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

33. I have a hard time setting goals for myself.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

34. I have a lot of willpower.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

35. When I'm trying to change something, I pay a lot of attention to how I'm doing.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

36. I usually judge what I'm doing by the consequences of my actions.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

37. I don't care if I'm different from most people.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

38. As soon as I see things aren't going right I want to do something about it.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

39. There is usually more than one way to accomplish something.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

40. I have trouble making plans to help me reach my goals.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

41. I am able to resist temptation.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

42. I set goals for myself and keep track of my progress.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

43. Most of the time I don't pay attention to what I'm doing.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

44. I try to be like people around me.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

45. I tend to keep doing the same thing, even when it doesn't work.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

46. I can usually find several different possibilities when I want to change something.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

47. Once I have a goal, I can usually plan how to reach it.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

47. I have rules that I stick by no matter what.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

48. If I make a resolution to change something, I pay a lot of attention to how I'm doing.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

49. Often I don't notice what I'm doing until someone calls it to my attention.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

50. I think a lot about how I'm doing.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

51. Usually I see the need to change before others do.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

52. I'm good at finding different ways to get what I want.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

53. I usually think before I act.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

54. Little problems or distractions throw me off course.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

55. I feel bad when I don't meet my goals.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

56. I learn from my mistakes.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

57. I know how I want to be.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

58. It bothers me when things aren't the way I want them.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

59. I call in others for help when I need it.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

60. Before making a decision, I consider what is likely to happen if I do one thing or another.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

61. I give up quickly.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

62. I usually decide to change and hope for the best.

Strongly disagree	Disagree	Uncertain or unsure	Agree	Strongly agree

Appendix D

Short Self-Regulation Questionnaire

Item	Subscale
1. I usually keep track of my progress toward my goals	Receiving
2. I have trouble making up my mind about things	Planning
3. I get easily distracted from my plans	Implementing
4. I do not notice the effects of my actions until it's too late	Receiving
5. I am able to accomplish goals I set for myself	Searching
6. I put off making decisions	Planning
7. It's hard for me to notice when I've "had enough" (alcohol, food, sweets).	Receiving
8. If I wanted to change I am confident that I could do it	Searching
9. When it comes to deciding about a change, I feel overwhelmed by the choices	Planning
10. I have trouble following through with things once I've made up my mind to do something	Implementing
11. I don't seem to learn from my mistakes	Assessing
12. I can stick to a plan that's working well	Implementing
13. I usually only have to make a mistake one time in order to learn from it	Assessing
14. I have personal standards, and try to live up to them	Evaluating
15. As soon as I see a problem or challenge, I start looking for possible solutions	Searching
16. I have a hard time setting goals for myself	Planning

17. I have a lot of willpower	Implementing
18. When I'm trying to change something, I pay a lot of attention to how I am doing	Assessing
19. I have trouble making plans to help me reach my goals	Planning
20. I am able to resist temptation	Implementing
21. I set goals for myself and keep track of my progress	Assessing
22. Most of the time I do not pay attention to what I'm doing	Receiving
23. I tend to keep doing the same thing even when it doesn't work	Triggering
24. I can usually find several different possibilities when I want to change something	Searching
25. Once I have a goal I can usually plan how to reach it	Planning
26. If I make a resolution to change something, I pay a lot of attention to how I'm doing it	Assessing
27. Often I don't notice what I am doing until someone calls it to my attention	Receiving
28. I usually think before I act	Planning
29. I learn from my mistakes	Receiving
30. I know how I want to be	Evaluating
31. I give up quickly	Implementing

Appendix E

Hospital Anxiety and Depression Scale

1. I feel tense or wound up:

Most of the time	A lot of the time	Time to time, occasionally	Not at all

2. I still enjoy the things I used to enjoy:

Definitely as much	Not quite so much	Only a little	Not at all

3. I get a sort of frightened feeling like something awful is about to happen:

Very definitely and quite badly	Yes, but not too badly	A little, but it doesn't worry me	Not at all

4. I can laugh and see the funny side of things:

As much as I always could	Not quite so much now	Definitely not so much now	Not at all

5. Worrying thoughts go through my mind:

A great deal of the time	A lot of the time	From time to time but not too often	Only occasionally

6. I feel cheerful:

Not at all	Not often	Sometimes	Most of the time

7. I can sit at ease and feel relaxed:

Definitely	Usually	Not often	Not at all

8. I feel as if I am slowed down:

Nearly all of the time	Very often	Sometimes	Not at all

9. I get a sort of frightened feeling like ‘butterflies in the stomach’:

Not at all	Occasionally	Quite often	Very often

10. I have lost interest in my appearance:

Definitely	I don’t take as much care as I should	I may not take quite as much care	I take just as much care as every

11. I feel restless as if I have to be on the move:

Very much indeed	Quite a lot	Not very much	Not at all

12. I look forward with enjoyment to things:

As much as I ever did	Rather less than I used to	Definitely less than I used to	Hardly at all

13. I get sudden feelings of panic:

Very often indeed	Quite often	Not very often	Not at all

14. I can often enjoy a good book or radio or TV programme:

Often	Sometimes	Not often	Very seldom

Appendix F

Dream Question

Questions about your dreams

In this final section (total anonymity guaranteed)please take a moment to think about one or two dreams that you can remember from recent months - the dreams that were most vivid for you and that you can still remember. We are very interested to hear about your dreams! Remember do not write your own or others' names and try not to write about specific places or events that may identify anybody - be general but clearly describe your dream. Our expert researchers will be looking at your dream transcripts carefully and if they appear to have been falsified or include personal identifying information your data will be deleted and you will be disqualified from the prize draw.

Disclaimer:

If you cannot remember your dreams or change your mind about sharing them please simply write "I have decided not to share my dream" and we will continue to use the rest of the data you have already provided.

Without writing personal information (e.g., of people's names, actual places) please describe, with as much detail as you can the dream(s) that you recently had using the space below to type out your answer.

Appendix G

Participant Information Sheet and Consent Form

Title of Study:

COVID Lockdown: thoughts, feelings, and dreams.

You are being asked to participate in a research study conducted by:

Dr. Samantha Brooks, a cognitive neuroscientist researcher and lecturer at the School of Psychology, Liverpool John Moores University, Liverpool, UK.

You can contact Dr. Samantha Brooks about this study at:

s.j.brooks@ljmu.ac.uk or drsamanthabrooks@gmail.com

What is the purpose of the study?

Research shows that the dream images we produce when we dream tell us something about how we wish things to be in our everyday lives. Currently our everyday lives have seen unprecedented changes due to the coronavirus outbreak in early 2020 and the subsequent lockdowns across the world to try to prevent the spread of the virus. Some of us are accepting the lockdown while others are struggling to accept it or are resisting it. The amount of resistance our minds experience in response to external events has an impact on how we think and feel. And this resistance can have an impact on the dream images we produce which can tell us something about our 'true' feelings and cognitive coping mechanisms. Often psychologists ask participants to 'self-report' how they think and feel for example by using questionnaires. This approach tells us something but not all about cognitive and emotional processes in the brain. Instead, psychologists can use other methods that tap into unconscious processes such as with subliminal stimulation or by interpreting a person's dreams which avoid deliberate responses that are often shaped by our need to be perceived favorably.

This online study aims to understand the cognitive coping processes that are associated with COVID lockdown and how these cognitive processes are linked to emotions (in the form of questionnaires and dream-image themes).

Why have I been invited to participate?

This study is an online ‘self-selection' study – which means that anyone is eligible to take part if interested. We have tried to ensure that the study aims are explicit so that each potential participant fully understands what is being measured. We would like to ask as many people as possible from around the world – but only those who are currently in – or have previously experienced – lockdown in their country in an attempt by their government to control the coronavirus outbreak.

Do I have to take part?

You do not have to take part in this study. Your participation in this online study is entirely voluntary and you can choose to withdraw at any time without any adverse consequences. Participants completing the whole survey and who provide their email address at the end (which will be listed in a separate database to the survey details to maintain anonymity) will be entered into a random prize draw for the chance to win a £l00 Amazon voucher advertised during October 2020.

What will happen to me if I take part?

You will first need to consent to taking part by checking the consent statement after reading this information.

After that you will be asked a series of questions including:

1. Demographics:
    a. Age
    b. Gender
    c. Highest level of educational attainment

d. General political views (if any)

2. Validated questionnaire/self−report and cognitive measures:
    a. Questions about feelings: (HADS, Zigmond & Snaith, l983)
    b. Questions about self-regulation thoughts (SRQ, Brown et al. 1999)
    c. Questions about obsessive-compulsive thoughts (Foa et al. 2002
    d. Digit-span working memory task (forward) (Cambridge Brain Sciences)
    e. Free Recall test (written by author)
3. Other questions:
    a. Coping with COVID lockdown (Based on a MORI survey conducted by Duffy & Allington 2020).
    b. An open question about a dream or dreams that were most recently remembered (max l000 words)

How long will all this take?

In the first section the demographics questions should take no more than 5 minutes to complete. The second section questionnaires and digit span test will take a bit longer (and can be completed over a number of days, up to one week). The questions about feelings should take approximately 10 minutes; the questions about self-regulation should take approximately 15 minutes; the questions about obsessive-compulsive thoughts should take approximately 10 minutes. All questionnaires require you to tick one box out of maximum 5 alternative answers – you will not be able to move forward until all questions are answered. Finally, the 'game-like' digit- span task should take approximately 20 minutes to complete and requires you to remember a series of digits. The other questions about coping with the COVID lockdown and describing dreams should take about 30 minutes to complete. Again, these can be completed on different days. The COVID lockdown questions again require you to choose one answer from a short list of possible answers (max 5 items). The dream question asks you

think carefully about the last vivid dream or dreams you had and write as much detail about them as possible (while avoiding the inclusion of personal information about other people or places). The total survey should take a maximum of h hours to complete with the dream diary – but could take less time – and completion can be spread over a week - you can save it and return to it later (but the survey will close one week after first opening it).

What are the possible disadvantages and risks of taking part?

There are no dangers in taking part. However, it might be tiring to answer so many questions. It might also feel uncomfortable to write about a private dream – but you must remember that these details will always remain totally confidential and will not be traceable to you. You can provide your email address to be entered into the prize draw, but you are not obliged to do so. If you do your email address will immediately be removed from the survey database and placed into a separate database for the prize draw and for sharing of the final group data. If it gets tiring answering all the questions you can take a break at any time and you can stop completing the survey if you want to.

What are the possible benefits of taking part?

Despite the possible disadvantages it may also be interesting to reflect on your thoughts and feelings relating to the COVID lockdown and it might be fun to think about a previous dream you have had. And you will be helping cognitive neuroscientists and psychologists to understand how people react (cognitively and emotionally) to a pandemic lockdown. Findings from this study may help to advise future government policy and reactions to potential future pandemics – so that future lockdown experiences might be more pleasant.

What will happen to the data provided and how will my taking part in this project be kept confidential?

The information you provide as part of the study is the research study data. Any research study data from which you can be identified (e.g., from identifiers such as your name date of

birth audio recording etc.) is known as personal data. Personal data does not include data that cannot be identified to an individual (e.g., data collected anonymously or where identifiers have been removed). We will use a unique ID code (e.g., 0l0203etc.) for the data we collect about you and will only use your age gender and highest education level (e.g., we will not record your date of birth or any other identifying information). We ask you to provide your email address for entry into the prize draw and to send you a summary of the group findings when the study is completed. Your email address however will be removed from the survey data output and stored in a separate data base soon after completion. Anonymous data might be used for additional or subsequent research studies and we might share anonymous data with other UK investigators (e.g., in online databases). There will be no personal information that could identify you when shared with other researchers or when results are made public.

Limits to confidentiality

The investigator will work with the participant in an attempt to minimize and manage the potential for indirect identification of participants.

The Investigator will keep confidential anything they learn or observe related to illegal activity unless related to the abuse of children or vulnerable adult's money laundering or acts of terrorism.

The investigator has a professional obligation to inform relevant agencies if they learn about…

In certain exceptional circumstances where you or others may be at significant risk of harm the investigator may need to report this to an appropriate authority. This would usually be discussed with you first.

Examples of those exceptional circumstances when confidential information may have to be disclosed are:

1. The investigator believes you are at serious risk of harm either from yourself or others

2. The investigator suspects a child may be at risk of harm
3. You pose a serious risk of harm to or threaten or abuse others
4. As a statutory requirement e.g., reporting certain infectious diseases
5. Under a court order requiring the University to divulge information
6. We are passed information relating to an act of terrorism

What will happen to the results of the research project?

The investigator intends to enable students complete a dissertation to satisfy their degree programme (additional ethical approval for a named student to work on this study will be acquired) and to publish the results in a journal article.

Who is organising and funding/commissioning the study?

This study is organised by Liverpool John Moores University, but external funding is currently not necessary for this project.

Who has reviewed this study?

This study has been reviewed by and received ethics clearance through the Liverpool John Moores University Research Ethics Committee.

What if something goes wrong?

If you have a concern about any aspect of this study, please contact the relevant investigator who will do their best to answer your query. The researcher should acknowledge your concern within l0 working days and give you an indication of how they intend to deal with it. If you wish to make a complaint, please contact the chair of the Liverpool John Moores University Research Ethics Committee (researchethics@ljmu.ac.uk) and your communication will be re-directed to an independent person as appropriate.

If you are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for legal action.

Data Protection Notice

The data controller for this study will be Liverpool John Moores University (LJMU). The LJMU Data Protection Office provides oversight of LJMU activities involving the processing of personal data and can be contacted at secretariat@ljmu.ac.uk. This means that we are responsible for looking after your information and using it properly. LJMU's Data Protection Officer can also be contacted at secretariat@ljmu.ac.uk. The University will process your personal data for the purpose of research. Research is a task that we perform in the public interest.

Your rights to access change or move your information are limited as we need to manage your information in specific ways in order for the research to be reliable accurate and anonymous. If you withdraw from the study, we will keep the information about you that we have already obtained.

You can find out more about how we use your information by contacting secretariat@ljmu.ac.uk.

If you are concerned about how your personal data is being processed please contact LJMU in the first instance at secretariat@ljmu.ac.uk. If you remain unsatisfied you may wish to contact the Information Commissioner's Office (ICO). Contact details and details of data subject rights are available on the ICO website at: https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/

Contact for further information:

If you have any questions or queries, please do not hesitate to contact:

Dr Samantha Brooks: drsamanthabrooks@gmail.com / s.j.brooks@ljmu.ac.uk

Liverpool John Moores University Ethics Chair: researchethics@ljmu.ac.uk

Thank you for reading this information sheet and for considering taking part in this study.

Please now read and check the box below to continue:

I confirm that I have read and understand the information provided for the above study. I have had the opportunity to consider the information ask questions and have had these answered satisfactorily ☐

Appendix H

Debriefing Page

End of Survey and debrief

Thank you for taking part in this survey, we very much appreciate your contribution. If you would like to be entered into the prize draw for the chance to win a £l00 Amazon voucher please write your email address in the box below.

Please be assured that this information will not be saved with all your other answers, we will save all email addresses in a separate database for the purposes of the prize draw and to disseminate group findings and summary data.

If you have experienced any discomfort during the completion of this survey (e.g. if it has raised some uncomfortable thoughts and feelings) please consider either contacting Dr Samantha Brooks for further guidance on support networks to contact or consider contacting online organisations such as those listed on the UK's NHS website:

https://www.nhs.uk/conditions/stress-anxiety- depression/mental-health-helplines/

You can also gain further information about the UK government's response to the COVID pandemic here:

https://www.gov.uk/coronavirus

Remember also if after completing the survey you change your mind and do not want your answers to be included in the study please email Dr Samantha Brooks with the date and time that you completed the survey and your answers will not be included.

Once again thank you for taking part! Stay safe, stay well.

Dr Samantha Brooks and colleagues at Liverpool John Moores University, UK.

drsamanthabrooks@gmail.com

Appendix I

Hall/Van De Castle System

Introduction. The Hall/Van De Castle system is a content analysis method that quantifies data found in dream reports (Domhof, 1996). As illustrated in Table I1, the system is composed of 10 general categories that contain various subcategories (Domhoff, 1996). Items are coded according to various coding rules and procedures, and frequencies can be derived for each sub-category and category (Domhoff, 1996). Furthermore, the system includes formulas for calculating Hall/Van De Castle content indicators which is an array of percentages and ratios through which dream data findings can be conveyed (Domhoff, 2003).

Table I1.

Hall/Van De Castle Main Categories and Subcategories.

Main Categories	Sub-Categories				
Characters	Animals	Humans	Mythical figures		
Social Interactions	Friendly	Aggressive	Sexual		
Activities	Physical	Non-Physical			
Striving	Success	Failure			
Misfortunes and Good Fortunes	N/A.				
Emotions	Anger	Apprehension	Confusion	Sadness	
Physical Surroundings	Settings	Objects			
Descriptive Elements	Modifies	Temporality	Negativity		
Food and Eating	Eating or drinking	Restaurant or bar	Preparing food	Purchasing/ gathering food	Seeing or mentioning food
Elements from the Past	Being younger	Person dead for +1 year	Location, person, object, activity mentioned as not part of dreamer's life +1 year.		

Characters. Utilising the Hall/Van De Castle system, the term character refers to individuals, animals and groups of individuals (Domhoff, 1996). Characters are coded when the following conditions are met (Domhoff, 1996):

1. A character is described as physically present in the dream.
2. They are heard or seen in the dream but are not physically present.
3. They are mentioned in the dream report.
4. They are referred to in order to establish the ownership of an object or the relationship of the character to another character.
5. A part of the character appears in the dream.

Characters—except for animals—are classified according to four headings: Number, gender, identity and age (Domhoff, 1996). The order of the headings is from more general elements to more specific elements, and the coding system always appears in the same sequence (Domhoff, 1996). While a comprehensive consideration of the various headings is beyond the scope of this paper, Table I2 illustrates a brief summary of the scoring symbols for coded characters (Domhoff, 1996).

Table I.2

Summary of Scoring Symbols for Characters.

Number	Gender	Identity	Age
1: Individual	M: Male	F: Father	A: Adult
2: Group	F: Female	M: Mother	T: Teenager
3: Individual dead	J: Joint	X: Parents	C: Child
4: Group dead	I: Indefinite	B: Brother	B: Baby
5: Individual imaginary		T: Sister	
6: Group imagery		H: Husband	
7: Original form		W: Wife	

Number	Gender	Identity	Age
8: Changed form		A: Son D: Daughter C: Child I: Infant, Y: Family member. R: Relative. K: Known. P: Prominent O: Occupational. E: Ethnic S: Stranger. U: Uncertain	

Social Interactions. The system includes three classes of social interactions, namely: aggressive interactions, friendly interactions, and sexual interactions (Domhoff, 1996). Each class of social interaction contains various subclasses which are numbered as illustrated in Table I3 (Domhoff, 1996).

Table I3

Social Interactions and Subclasses.

Friendly	Aggressive	Sexual
F1: Friendliness felt but not expressed.	A1: Hostile thoughts	S1: Sexual thoughts or fantasies
F2: Expressed through verbal or gestural means.	A2: Critical remarks	S2: Sexual overtures or propositions.
F3: Expressed through gifts or loans.	A3: Rejections and refusals	S3: Necking and nonplatonic kissing.

Friendly	Aggressive	Sexual
F4: Expressed through extending or helping.	A4: Dire verbal threats	S4: Nonintercourse activities: handling sex organs, petting, masturbation.
F5: Expressed by requesting characters to share in a pleasant activity.	A5: Stealing or destruction of possessions	S5: Sexual intercourse and attempted sexual intercourse.
F6: Expressed through socially acceptable forms of physical contact.	A6: Being chased	
F7: Expressed through desire for a long-term close relationship.	A7: Being confined or attacked	
	A8: Murder	

Activities. The activities category of the Hall/Van De Castle system is a system of classifying what characters do in dreams and includes those activities that are done by characters individually, those that are done in conjunction with other characters, and those done in interaction (Domhoff, 1996). As illustrated in Table I4, there are eight classes of activities (Domhoff, 1996).

Table I4

Classes of Activities and Coding Symbols.

Class of activities	Coding Symbol
Physical	P
Movement	M
Location Change	L
Verbal	V
Expressive Communication	E
Visual	S
Auditory	A
Thinking	C

Striving: Success and Failure. In order to code the striving category of the Hall/Van De Castle System, the dream report should illustrate that a character has formulated a definite task to accomplish or a goal to achieve and that they deliberately attempt to realise this (Domhoff, 1996). The success and failure of this striving are coded based on the outcome of the attempt to achieve these goals or tasks (Domhoff, 1996).

Good Fortunes and Misfortunes. In the Hall/Van De Castle System, misfortunes are defined as "any mishap, adversity, harm, danger or threat that happens to characters as a result of circumstances over which they have no control; [which] happens to them through no fault of their own" (Domhoff, 1996, p.247). Good fortunes are characterised as "when there is an acquisition of goods or something beneficial happens to a character that is completely adventitious or the result of a circumstance over which no one has control" (Domhoff, 1996, p.249). As illustrated in Table I5, there are six subclasses of misfortune.

Table I5

Subclasses of Misfortune

Subclass	Description of Subclass.
M1	A character encounters an environmental barrier or obstacle, is unable to move, is lost, is late or in danger of being late, or is confronted with a situation that produces frustration for the character who confronts them.
M2	A character is falling or is in danger of falling
M3	A character is threatened by something in the environment.
M4	A character is involved in an accident but does not suffer physical or mental injury.
M5	A character is injured or ill. This includes, pain, operations, bodily and mental defects, insanity, amnesia, blindness and so on.

Subclass	Description of Subclass.
M6	A character is dead or dies as a result of an accident, illness or unknown cause.

Emotions. As illustrated in table I6, there are five classes of emotion: Anger, apprehension, happiness, sadness and confusion.

Table I6

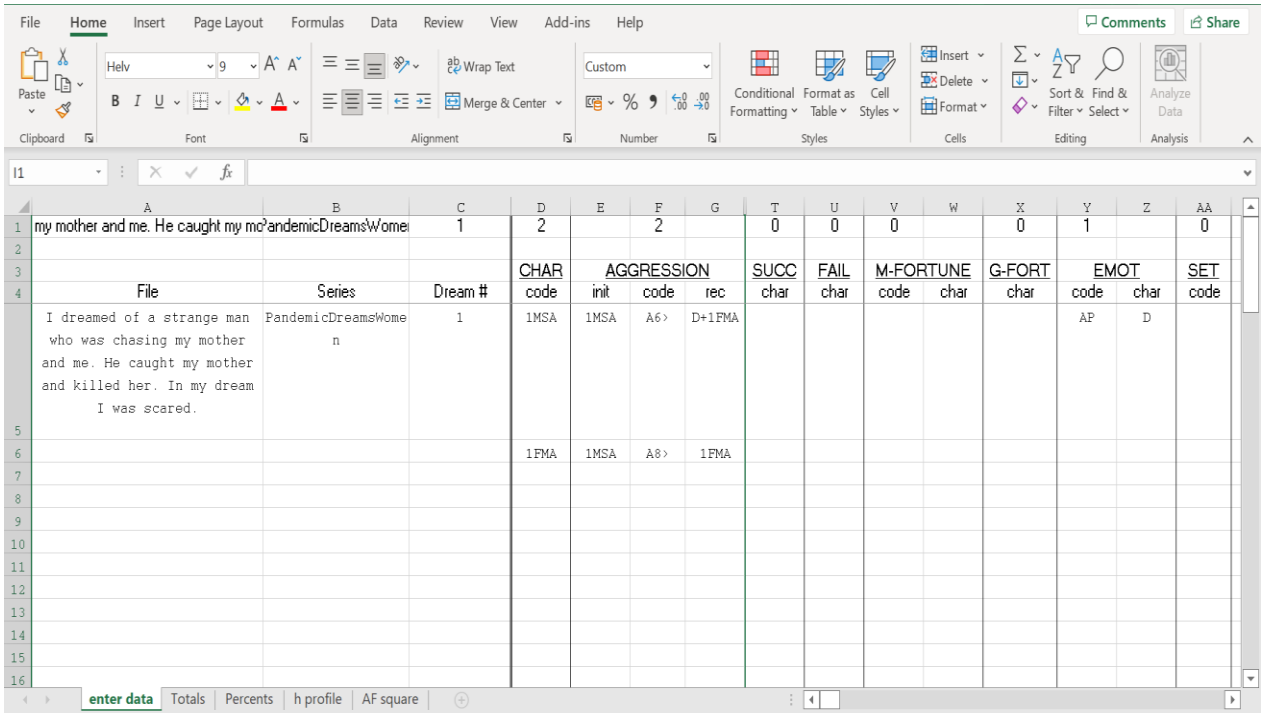
HVdC Emotions Categories

Class of emotion	Description	Coding Symbol
Anger	Anger is reflected by words such as mad, provoked, furious, enraged, and irritated.	AN
Apprehension	Emotions that fall under the class of apprehension are related to feelings of fear, anxiety, guilt and embarrassment. Commonly underlying feelings of apprehension are the idea that the person is uncomfortable because of a threat of some potential danger. Apprehension can be perceived from words such as nervous, worried, scared, and uneasy.	AP
Happiness	All words that describe a state of pleasant feeling tone are coded under happiness. Examples are words such as relaxed, glad, content, elated, joy, and amused.	HA
Sadness	Sadness is used to describe an unhappy emotional state. Some examples include miserable, crushed, depressed, hurt, and heartbroken.	SD

Class of emotion	Description	Coding Symbol
Confusion	Confusion may be indicated by words like surprised, astonished, conflicted, bewildered, and doubtful. Confusion is generally produced through confrontation with unexpected events, or inability to choose. It is a feeling state that may accompany uncertainty and may also shade toward feelings like anxiety, frustration, or depression.	CO

Appendix J

Screenshot of DreamSAT



Note. The Figure includes a screenshot of DreamSAT which facilitates coding dream transcripts according to the HVdC methodology. It is included to provide an overview of how data is coded through the tool.

Appendix K

University Research Ethics Committee Approval Certificate

From: UREC minimal Risk Registration
Sent: 27 July 2020 14:44
To: UREC minimal Risk Registration; Brooks, Samantha
Cc: Ashworth, Emma
Subject: UREC Minimal risk registration number - Brooks - 20/NSP/035

Dear Samantha

Thank you for registering your study as minimal risk.

PI: Samantha Brooks

Title of study: Three types of COVID lockdown response: Links to neural processes of affect regulation

Minimal Risk UREC approval reference number: 20/NSP/035

Approval is given on the understanding that:

· The study is conducted in accordance with the Minimal Ethical Risk Guiding Principles<https://www.ljmu.ac.uk/ris/research-ethics-and-governance/research-ethics/university-research-ethics-committee-urec>

· Any adverse reactions/events which take place during the course of the project are reported to the Committee immediately by emailing researchethics@ljmu.ac.uk<mailto:researchethics@ljmu.ac.uk>;

· Any unforeseen ethical issues arising during the course of the project will be reported to the Committee immediately emailing researchethics@ljmu.ac.uk<mailto:researchethics@ljmu.ac.uk>;

· The LJMU logo is used for all documentation relating to participant recruitment and participation e.g. poster, information sheets, consent forms, questionnaires. The study consent forms, data, information etc. will be accessible on request to a student's supervisory team and/or to responsible members of Liverpool John Moores University for monitoring, auditing and data authenticity purposes.

· Where any substantive amendments<https://www.ljmu.ac.uk/ris/research-ethics-and-governance/research-ethics/university-research-ethics-committee-urec/amendments> are proposed to the protocol or study procedures that change the associated risk from minimal to low risk (use the decision tool to establish the associated risk), the investigators must complete an ethics application form describing all aspects of the study and submit for ethical review and approval as required.

· Where relevant appropriate gatekeeper / management permission must be obtained prior to the study commencing at the study site concerned.

Please note that approval is given for a period of five years from 27/07/2020 and therefore the expiry date for this project will be 5 years from the approval date. An application for extension of approval must be submitted if the project continues after this date.

Best wishes

UREC

Appendix L

University of the Witwatersrand Ethical Approval Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE:	**PROTOCOL NUMBER: MASPR/21/010**
PROJECT TITLE:	Pandemic dreaming: An investigation of affective processing through dream transcripts and self-regulation during the COVID-19 pandemic.
INVESTIGATOR	van den Heever Amonette (2451257)
SCHOOL/DEPARTMENT OF INVESTIGATOR	SHCD/Psychology
DATE CONSIDERED	10 June 2021
DECISION OF THE COMMITTEE	Approved unconditionally
RISK LEVEL	No Risk
EXPIRY DATE	31 December 2023

ISSUE DATE OF CERTIFICATE 28 July 2021 **CHAIRPERSON** ____ (Dr Sahba Besharati)

cc: Dr Sahba Besharati and Prof. Samantha Brooks (Supervisor)

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

Signature **Date** 28 / 07 / 2021

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix M

HVdC Norms

Content Indicator	Female Norm %	Female Norm *N*	Male Norm %	Male Norm *N*
Male/Female Percent	48%	1054	67%	873
Familiarity Percent	58%	1363	45%	1108
Friends Percent	37%	1363	31%	1108
Family Percent	19%	1363	12%	1108
Dead & Imaginary Percent	01%	1423	00%	1180
Animal Percent	04%	1423	06%	1180
Aggression/Friendliness Percent	51%	530	59%	546
Befriender Percent	47%	225	50%	203
Aggressor Percent	33%	231	40%	253
Physical Aggression Percent	34%	337	50%	402
Self-Negativity Percent	66%	865	64%	809
Bodily Misfortunes Percent	35%	206	29%	205
Negative Emotions Percent	80%	420	80%	282
Dreamer-Involved Success Percent	42%	75	51%	141
Dreams containing at least one aggression	44%	500	47%	500
Dreams containing at least one friendliness	42%	500	38%	500
Dreams containing at least one sexuality	04%	500	12%	500
Dreams containing at least one misfortune	33%	500	36%	500

Dreams containing at least one good fortune	06%	500	06%	500
Dreams containing at least one success	08%	500	15%	500
Dreams containing at least one failure	10%	500	15%	500
Dreams containing at least one striving	15%	500	27%	500

Appendix N

Spearman Rank Order Correlational Results: Associations between Dream Content and SSRQ and Anxiety Scores

Dream Content Variable	Self-Regulation Scores		Anxiety Scores	
	Correlation Coefficient	Sig	Correlation Coefficient	Sig.
Male Characters	0,048	0,359	0,026	0,615
Female Characters	-0,045	0,393	0,077	0,141
Familiar Characters	0,004	0,939	-0,012	0,825
Unfamiliar Characters	-0,089	0,088	0,097	0,062
Family Characters	.111*	0,032	0,033	0,526
Friend Characters	-0,098	0,061	-0,024	0,645
Deceased Characters	-0,071	0,173	0,013	0,798
Creature Characters	0,037	0,474	-.114*	0,029
Number of Animal Characters	-0,026	0,615	-0,092	0,077
Number of Animals Characters	-0,003	0,947	-0,033	0,532
Number of Imaginary or Fictional Characters	0,092	0,078	-.102*	0,050
Aggression Class 1	-0,051	0,331	0,016	0,763
Aggression Class 2	-0,087	0,096	0,026	0,614
Aggression Class 3	-0,076	0,144	.143**	0,006
Aggression Class 4	-0,043	0,408	0,050	0,337
Aggression Class 5	0,025	0,636	0,012	0,823
Aggression Class 6	-0,071	0,176	0,029	0,574
Aggression Class 7	-0,072	0,170	0,091	0,082
Aggression Class 8	-0,001	0,991	0,005	0,920
Number of Aggressions	-.108*	0,039	.113*	0,029
Non Physical Aggression	-0,073	0,160	0,083	0,112
Physical Aggression	-0,064	0,217	0,043	0,406
D_Involved_Aggression	-.119*	0,022	.151**	0,004
Dreamer_As_Aggressor	-0,059	0,257	0,067	0,199
Dreamer_As_Victim	-0,101	0,052	.139**	0,008
Friendly Class 1	-0,016	0,755	-0,003	0,947
Friendly Class 2	0,037	0,475	0,002	0,967
Friendly Class 3	-0,074	0,154	0,094	0,072

Friendly Class 4	0,009	0,869	0,007	0,889
Friendly Class 5	-0,074	0,157	0,039	0,451
Friendly Class 6	-0,029	0,585	0,005	0,929
Friendly Class 7	0,039	0,457	-0,032	0,537
Total Friendly Interactions	-0,032	0,540	0,066	0,207
D_as_Befriender	0,034	0,521	-0,011	0,830
D_as_Befriended	-0,064	0,221	.133*	0,010
D_Inv_Friendliness	-0,023	0,663	0,036	0,487
Sexual Class 1	-0,005	0,922	-0,006	0,907
Sexual Class 2	0,018	0,731	0,048	0,360
Sexual Class 3	0,042	0,424	-0,050	0,338
Sexual Class 4				
Sexual Class 5	-0,038	0,469	0,074	0,159
Total Number of Sexual Interactions	0,015	0,775	0,040	0,438
Total Social Interactions	-0,081	0,119	0,089	0,088
Number of Success	-0,033	0,532	0,027	0,611
Number of Failure	0,044	0,399	.108*	0,038
Misfortune Class 1	0,100	0,056	-0,032	0,535
Misfortune Class 2	0,044	0,403	0,012	0,825
Misfortune Class 3	-0,003	0,951	-0,008	0,882
Misfortune Class 4	0,011	0,834	0,001	0,978
Misfortune Class 5	0,021	0,689	-0,004	0,937
Misfortune Class 6	-0,002	0,968	0,033	0,527
Number of Misfortunes	0,083	0,111	-0,020	0,707
Bodily Misfortunes	0,009	0,857	0,029	0,583
Number of Good Fortune	-0,031	0,557	0,012	0,821
Anger	-0,049	0,343	0,097	0,063
Apprehension	-0,071	0,171	.104*	0,045
Happiness	0,019	0,719	-0,007	0,892
Sadness	0,036	0,490	0,061	0,244
Confusion	-0,053	0,310	0,010	0,845
Fear	-0,042	0,416	.104*	0,047
Total Negative Emotions	-0,077	0,138	.158**	0,002
Total Positive Emotions	0,019	0,719	-0,007	0,892
Number of Emotions in Report	-0,052	0,318	.141**	0,007

Number of Emotions Including Fear	-0,070	0,341	0,075	0,309

Appendix O

Pandemic Dream Subsection

Through undertaking the manual coding of dreams, I ascertained that a number of participants could be classified as reporting dreams that evoked pandemic themes. These participants' included reference to pandemic specific imagery in their dream reports that involved both concrete iterations associated with the COVID-19 pandemic such as "COVID", "quarantine", "lockdown", "isolation" and "masks" or participants recalling dreams wherein a family member was infected with the virus or died due to COVID-19 or more abstract references to the pandemic such as apocalyptic scenes or severe natural disasters which were considered to designate latent pandemic themes and thus were classified as such.

In total 12.12% of the sample described dreams containing pandemic related content (*n* = 45). Slightly more female participants (*n* = 27) reported pandemic dreams than male participants (*n* = 18) and participants also tended to be younger with a mean age of 28.13 (*SD* = 7.89) ascertained. As depicted in Table N1, participants' from 14 different countries reported dreams containing pandemic related content with the majority of these participants coming from Mexico (*N* = 6).

Table N1

Demographic Characteristics

Country	*n* Male PD Participants	*n* Female PD Participants	Total *n* of PD Participants	Total *n* of Participants in the Overall Sample	% of PD participants Relative to the Total Country *n*
Chile	01.00	00.00	01.00	07.00	14.29%
Finland	01.00	00.00	01.00	01.00	100%
Greece	03.00	03.00	06.00	20.00	30.00%
Ireland	00.00	01.00	01.00	01.00	100%
Israel	01.00	00.00	01.00	02.00	50.00%

Italy	01.00	01.00	02.00	38.00	05.26%
Mexico	02.00	07.00	09.00	36.00	25.00%
Poland	01.00	04.00	05.00	48.00	10.42%
Portugal	03.00	02.00	05.00	23.00	21.74%
Romania	00.00	01.00	01.00	01.00	100%
South Africa	01.00	00.00	01.00	09.00	11.11%
Spain	00.00	02.00	02.00	13.00	15.38%
United Kingdom	02.00	04.00	06.00	85.00	07.06%
United States	02.00	02.00	04.00	36.00	11.11%

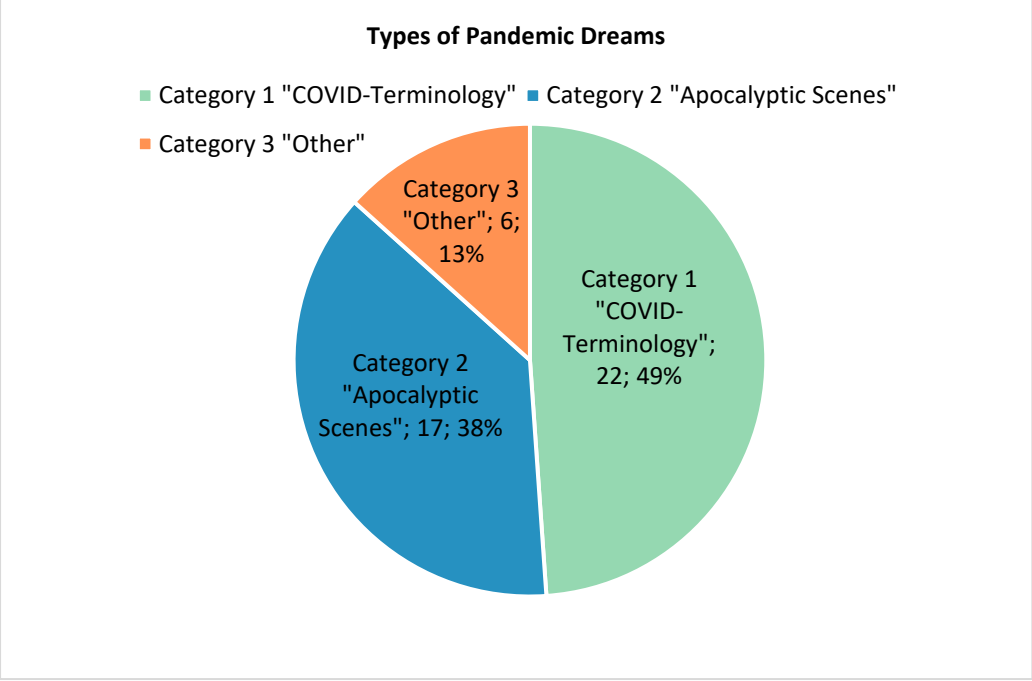
Note. The table presents gender and country demographic information for participants included in the pandemic dreaming subsection. The total n of male participants who reported pandemic dream is 18, the total n of female participants who reported pandemic dreams is 27.

These dreams were subsequently subcategorized according to the themes present in them. The first type of pandemic dream were those dreams that contained explicit references to the COVID-19 pandemic. To exemplify, participants clearly referenced the pandemic by describing dream occurrences such as a "grandmother and (…) [a] uncle [dying] of COVID-19", or a parent being moved to an "isolation center" during the outbreak. Furthermore, some participants referenced personal protective equipment and dreamed of being in public settings and suddenly realizing that they were without masks. One participant dreamed of being at work and "realizing [they] were too close to other people, or [did not] have a mask on, or some other break in the rules" and "becoming[ing] very anxious" as a result. Others dreamed of wanting to engage in some sort of activity but being unable to do so due to a lack of personal protective equipment. For example, one participant dreamed of wanting to find "places to eat" but being unable to do so "because of lockdown restrictions" and because they "needed masks" and none of the characters in the dream had them, while another participant dreamed of trying to meet a man that they were very fond of but not being able to because they "couldn't find a mask in [their] purse". These types of dreams were categories as Type 1.

Another commonly identified type of pandemic dream (Type 2) noted in the data were dreams that included apocalyptic imagery that could be said to symbolize the current crisis. To exemplify, participants dreamed of scenes such as a “zombie apocalypse[s]” or “post-apocalyptic times” that occurred after “Nazi attacks”, “nuclear war” or “chemical weapon [attacks]”. They also dreamed of natural disasters such as “tsunami-like [waves]”, “volcan[ic] eruptions”, “flooding”, complete darkness during the middle of the day, and the sun “getting hotter and hotter (…) as if the end of the world was coming”. As shown in Figure N1, the final type of category was conceptualized to include those dreams that were not classified in the preceding categories but could still be considered to have pandemic related imagery. Two participants noted dreaming of places that were usually busy but that were not desolate and without any people, a further two participants’ dreamed of the sudden death of their grandparents but did not specify COVID-19 as the cause, and one participant dreamed of being afraid of infected with “something” but did not specify that this was COVID-19.

Figure N1

Pie-chart Illustrating Pandemic Dream Categories



Note. The total *n* of pandemic dreams was 45.

4.6.1.3 Differences between the Pandemic Dream Subsection and the Sample

To ascertain whether there were any significant differences between this subsection and the rest of the sample, a Mann-Whitney *U* analysis was undertaken which allowed for a quantified understanding of the differences between the subsection and the total number of dreams included in the study. No significant difference was observed between these participants' anxiety scores and the rest of the samples' anxiety scores ($U = 6891.50$, $z = -0.59$, $p = .55$). However, the test showed that Pandemic Dream Subsection participants' SSRQ scores (Mean Rank = 220.34, $n = 45$) were significantly higher than the rest of the sample (Mean Rank = 180.09, $n = 324$), ($U = 5942$, $z = -2.37$, $p = .02$) with a small effect size observed ($r = 0.12$).

Moreover, to ascertain whether there were any significant differences in dream content between the subsection and the rest of the sample, Mann-Whitney *U* analyses were carried out on the dream content categories. As illustrated in Table N2 the pandemic subsections dream content differed in a few notable areas: Firstly, the subsection's dream reports contained significantly more family characters (Mean Rank = 210.99, $n = 45$) than the rest of the sample (Mean Rank = 181.38, n = 324), ($U = 6120.50$, $z = -2.21$, $p = .03$). A small effect size was noted ($r = 0.12$) However, no significant differences were noted regarding any of the other characters coded in the dream transcripts.

Table N 2

Results from the Mann-Whitney U Analysis comparing the Subsection and Sample's Dream Content

Dream Content Category	Mann-Whitney *U*	*Z* Score	Asymp. Sig. (2-tailed)
Number of Male Characters	7032.50	-0.45	0.66
Number of Female Characters	7026.00	-0.49	0.62

Number of Familiar Characters	6796.50	-0.77	0.44
Number of Unfamiliar Characters	6360.00	-1.56	0.12
Number of Family Characters	6120.50	-2.21	0.03*
Number of Friends	7026.00	-0.43	0.66
Number of Imaginary/Fictional	7139.50	-0.54	0.59

Note. The table presents the results of a statistical comparison between the samples dream content characters, and the subsections dream content characters. Adjusted *p*-values are presented.
*Significant at the .05 level.

As evidenced in Table N3, while no significant differences were observed with regard to the social interactions contained in the dream reports, in analysing the good fortune and misfortunes contained in the dreams the pandemic subsection departed from the rest of the sample as their dream transcripts contained more instances of misfortunes. Significant differences were observed in: misfortune subtype 3 which delineates those events wherein a character is threatened by something in the environment; misfortune subtype 5 which quantifies instances of a charactering being injured or becoming ill; and misfortune subtype 6 which examines instances where a character dies or is dead from an accident or illness.

Table N 3

Results from the Mann-Whitney U Analysis comparing the Pandemic Subsection with the Rest of the Sample.

Dream Content Category	**Mann-Whitney *U***	***Z* Score**	**Asymp. Sig. (2-tailed)**
Aggression Class 1	7213.50	-0.36	0.72
Aggression Class 2	7188.00	-0.33	0.74
Aggression Class 3	7000.50	-1.08	0.28
Aggression Class 4	7222.50	-0.65	0.52
Aggression Class 5	7159.50	-0.59	0.56
Aggression Class 6	7210.50	-0.26	0.80
Aggression Class 7	6745.50	-1.38	0.17
Aggression Class 8	7181.00	-0.51	0.61
Number of Aggression	6796.50	-0.87	0.38

Dream Content Category	Mann-Whitney *U*	*Z* Score	Asymp. Sig. (2-tailed)
Total Friendly Interactions	6867.00	-0.79	0.43
Friendly Class 1	7258.50	-0.14	0.89
Friendly Class 2	7116.00	-0.61	0.54
Friendly Class 3	7252.00	-0.15	0.88
Friendly Class 4	6825.50	-1.14	0.25
Friendly Class 5	7204.00	-0.42	0.68
Friendly Class 6	7218.50	-0.53	0.59
Friendly Class 7	7155.00	-0.92	0.36
Sexual Class 1	7267.50	-0.37	0.71
Sexual Class 2	7177.50	-0.84	0.40
Sexual Class 3	7177.50	-0.84	0.40
Sexual Class 4	7290.00	0.00	1.00
Sexual Class 5	7222.50	-0.65	0.52
Total Social Interactions	6437.50	-1.36	0.17
Number of Failure	6899.00	-0.98	0.33
Misfortune Class 1	7191.00	-0.32	0.75
Misfortune Class 2	7218.00	-0.54	0.59
Misfortune Class 3	5242.00	-7.15	0.00**
Misfortune Class 4	6912.00	-1.60	0.11
Misfortune Class 5	6615.00	-3.42	0.00**
Misfortune Class 6	6633.00	-2.50	0.01**
Number of Misfortune	3884.00	-6.62	0.00**
Bodily Misfortunes	6110.00	-3.72	0.00**
Number of Good Fortune	7050.50	-0.73	0.46
Apprehension	6740.00	-1.13	0.26
Happiness	6864.00	-1.14	0.25
Sadness	6446.00	-2.20	0.03*
Confusion	6963.00	-1.73	0.08*
Fear	6628.50	-1.46	0.14
Number of Emotions in Report	6335.00	-1.58	0.11
Emotions + Fear	2032.00	-0.81	0.42

Note. The table presents the results of a Mann-Whitney *U* Analysis comparing the Pandemic Subsection (n = 45) Dream Content Categories with the rest of the sample (n = 324).
*Significant at the 0.05 level
**Significant at the 0.01 level.

Thus, instances where a character was threatened by something in the external in the environment was found to be significantly higher in the pandemic dream subsection (Mean Rank = 230.51, n = 45) than the rest of the sample (Mean Rank = 178.68, *n* = 324) (*U* = 5242.00, *z* = -7.15, *p* = .00); which was also observed with regard to the observation of characters becoming ill or injured as these instances were significantly more frequent in the subsection (Mean Rank = 200, *n* = 45) than the rest of the sample (Mean Rank = 182.92, *n* = 324) (*U* = 6615.00, *z* = -3.42, *p* = .00). Furthermore, more instances were observed of characters dying or being dead because of accidents or illnesses (Mean Rank = 199.60, *n* = 45; *U* = 6633, *z* = -2.50, *p* = .01) than the rest of the sample (Mean Rank = 182.97, *n* = 324). While only a small effect size was noted in the difference between misfortune subtype 5, (*r* = .18) a moderate effect was noted with regard to misfortune subtype 3 (*r* = .37).

Consequently, there was a statistically significant difference in the number of misfortunes as the subsection instanced higher total number of misfortunes (Mean Rank = 260.69, *n* = 45) than the sample (Mean Rank = 174.49, n = 324) (*U* = 3884.00, *z* = -6.62, *p* = .00). Here a moderate effect size was noted (*r* = .35). The subsection also instanced statistically significantly more bodily misfortunes (Mean Rank = 211.22, *n* = 45) than the rest of the sample (Mean Rank = 181.36, *n* = 324) (*U* = 6110, *z* = -3.72, *p* = .00) with a small effect size was observed (*r* = .19).

There were furthermore significant differences between the subsection and the broader sample when considering the emotions included in dream transcripts. Firstly, a statistically significant difference (*U* = 6162.50, *z* = -1.94, *p* = .05) was observed in the total number of negative emotions coded in the transcripts, with the pandemic subsection's dreams having significantly more negative emotions (Mean Rank = 210.06, *n* = 45) than the rest of

the sample (Mean Rank = 181.52, n = 324). Here a small effect size was observed (r = .10). This difference may be due to the fact that the pandemic sample had statistically significantly more instance of sadness (Mean Rank = 203.76, n = 45) than the rest of the sample (Mean Rank = 182.40, n = 324) as shown by the Mann-Whitney U Analyses (U = 6446, z = -2.20, p = 0.03). A small effect size was observed (r = .12).

Associations Between Anxiety and Dream Content.

Subsequently, inferential statistical analyses were undertaken to ascertain whether there were any significant associations between the anxiety scores of participants who reported pandemic related dreams, and affective processing as measured by the HVdC method of content analysis. Only two significant association between participants anxiety scores and dream content was observed: a statistically significant association between anxiety and the number of female characters contained in the dream transcripts (Spearman's r_s = 0.31, p = .04) and between anxiety scores and friendly interactions wherein the individual was the recipient of a friendly act (r_s = 0.34, p = .02). No other significant associations were observed regarding the characters contained in dream reports (p > .16). Similarly, no significant associations were observed with regards to the correlation between pandemic-participants' anxiety scores and the social interactions contained in the dream reports (p > .07), or the good and misfortunes (p > .10) and success and failures classified in the transcripts (p > .13). Additionally, the emotions were not found to be significantly correlated with participants anxiety scores (p > .07).

Subsequently, Kruskal Wallis tests were undertaken to observe whether there were any differences in dream content when accounting for differential levels of anxiety. Regarding the character categories, the test showed a significant difference was observed in the number of female characters contained in the dream reports across anxiety scores ($\chi^2(2)$ = 9.36, p = .01) as those classified as having high anxiety reported significantly more female

characters in their dream reports (Mean Rank = 29.86, *n* = 14) than those with normal levels of anxiety (Mean Rank = 20.29, *n* = 21) and those with moderate anxiety (Mean Rank = 19.10, *n* = 14). However, a small effect size was observed ($\varepsilon^2 = .02$).

While no significant difference was observed regarding social interactions, good fortunes and misfortunes, and success and failure, an examination of the emotions illustrated that there was a significant difference in the number of emotions contained in the dream reports across different anxiety scores ($\chi^2(2) = 6.37$, $p = .04$) with those having high anxiety reporting more emotions in their dreams (Mean Rank = 29.50, *n* = 14) compared to those with normal anxiety (Mean Rank = 21.29, *n* = 21) and those with moderate anxiety (Mean Rank = 17.50, *n* = 10). Again, a very small effect size ($\varepsilon^2 = .01$) was observed indicating that while a statistically significant difference exists, no substantive difference could be observed.

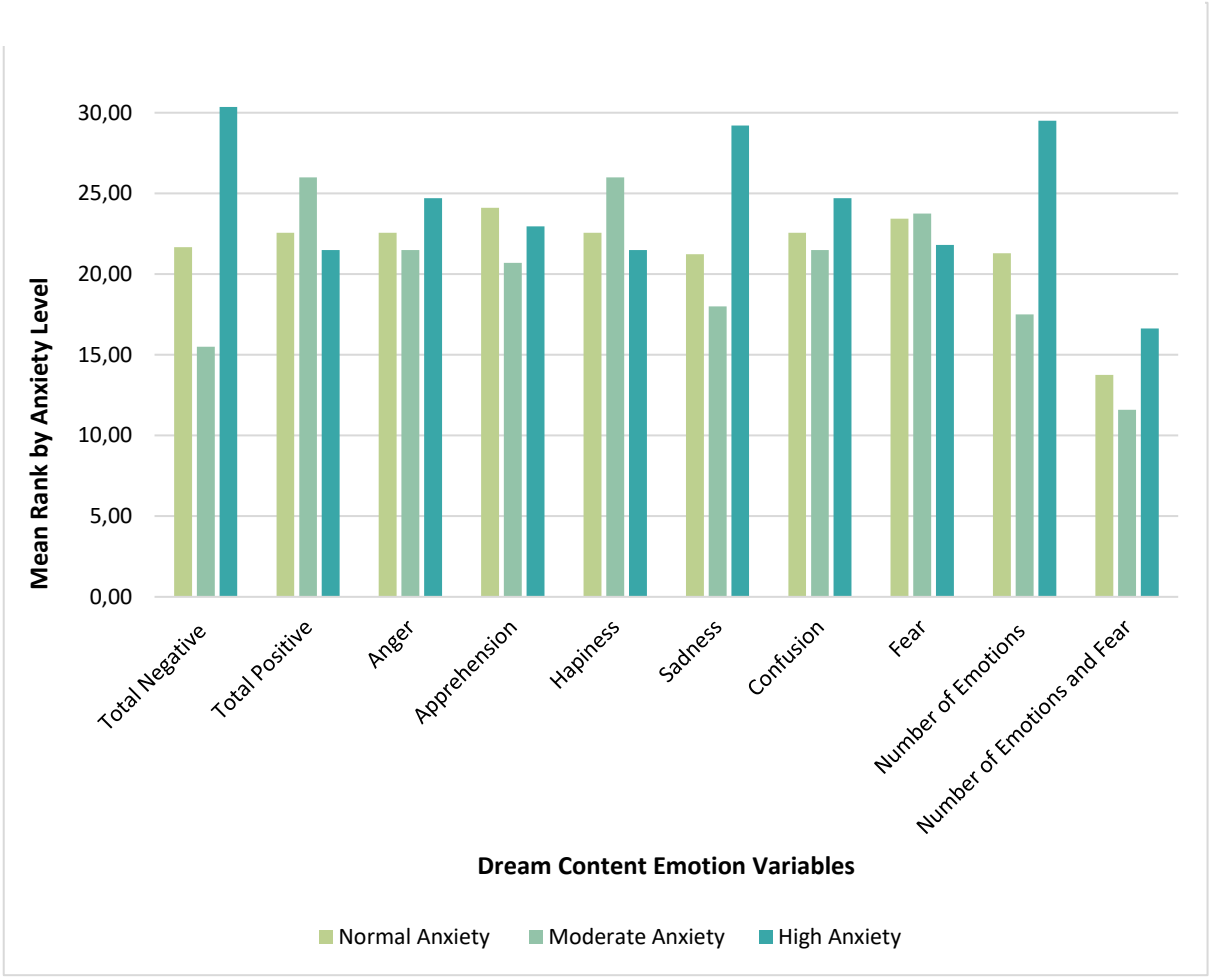
The analyses further demonstrated that there was a statistically significant difference in the total number of negative emotions (including fear) contained in the dream reports across anxiety scores ($\chi^2(2) = 1.72$, $p = .01$) with those with high anxiety having more total negative emotions (Mean Rank = 30.36, *n* = 14) than those with moderate (Mean Rank = 15.50, *n* = 10) or normal (Mean Rank = 21.67, *n* = 21) anxiety scores. However, only a small effect size was found ($\varepsilon^2 = 0.01$). The final statistically significant difference observed in the emotions category pertained to the total number of sadness that was coded in the dream report across anxiety scores ($\chi^2(2)= 9.44$, $p = .01$). This significant difference showed that participants who were classified as having high anxiety concomitantly recorded more sadness in their dreams (Mean Rank = 29.91, *n* = 14) than those with normal anxiety levels (Mean Rank = 22.57, *n* = 21) and those with moderate anxiety (Mean Rank = 18, *n* = 10). A weak effect size was observed ($\varepsilon^2 = 0.02$).

Interestingly, in line with the research findings an observation of Kruskal Wallis test findings' of significant differences in dream content across anxiety levels demonstrates that

while high levels of anxiety are associated with higher mean ranks in sadness, total negative emotions, and total emotions when compared to normal levels of anxiety, the analyses also found that the lowest mean rankings were not observed in participants' with normal levels of anxiety but in those with moderate levels of anxiety as depicted in Figure N2, who more commonly demonstrated the lowest mean rankings in negative emotions categories. Subsequently, pairwise comparison's using a Bonferroni correction for multiple comparisons was undertaken to explore these differences in more detail.

Figure N2

Bar-chart Illustrating the Mean Rankings in Dream Emotion Variables By Anxiety Ranking



The Bonferroni post-hoc test illustrated that the difference observed in the total negative emotions of participants with low, moderate, and high anxiety was due to a significant difference between those with moderate anxiety and those with high anxiety (p =

.009), while the difference between the normal and high anxiety participants was not statistically significant (p = .11), and between those with moderate and normal anxiety was not significant (p = .55). Thus indicating that individuals with moderate anxiety demonstrated significantly lower numbers of negative emotions (Mean Rank = 15.50, n = 10) than those with high anxiety (Mean Rank = 30.36, n = 14). The post-hoc test further illustrated similar results when considering the significant difference in the number of emotions contained in the dream report, as the difference between those with moderate and high anxiety was shown to be statistically significantly different (p = .05), while difference between moderate and normal participants was not significant (p = 1) and the difference between normal and high participants was not significant (p = .16). As such, the statistical finding is attributable to the fact that those with moderate anxiety reported significantly fewer emotions (Mean Rank = 17.50, n = 10) than those with high anxiety (Mean Rank = 29.50, n = 14).

The only statistical difference attributable to a disjuncture between normal and high anxiety was with regard to the sadness variable as the post-hoc test found that those with normal and high anxiety (p = .046) had statistically different amounts of sadness in their dreams. Yet, this difference was also due to a difference between, those with moderate and high anxiety (p = 0.013), with no significant difference observed between those with moderate and normal levels of anxiety (p = 1). Thus, individuals with high anxiety included significantly more sadness (Mean Rank = 29.21, n = 14) than those with both moderate (Mean Rank = 18, n = 10) and normal anxiety levels (Mean Rank 21.24, n = 21).

Associations between SSRQ and Dream Content.

Having considered the associations between dream content and the pandemic dream participants anxiety scores, subsequent analyses were undertaken to assess whether any statistically significant associations existed amongst these participants' self-regulation ability and their dream content. The findings showed that participants' SSRQ scores were associated

with dream content in a few areas. To illustrate, participants SSRQ scores and the number of successes contained in the dream report demonstrated a weak to moderate, negative association (Spearman's r = -0.39, p = .01) indicating that a rise in the number of successes was correlated with a decline in the SSRQ scores. Furthermore, a weak negative association between the number of friends and SSRQ scores was derived (Spearman's r = -0.307, p = .04). Yet, no other statistically significant correlations were observed between participants' dream content and SSRQ scores (p > .09).

Subsequently, a Kruskal Wallis test was undertaken to observe whether there were any significant differences in the participants' dream content when considering their SSRQ rankings. However, the only significant difference in dream content across ranked SSRQ scores was with regard to the amount of confusion contained in participants' dream reports which was found to be statistically significantly different (p = .015). None of the other dream categories were substantially different when considering participants' SSRQ ranks (p > 0.07). A Bonferroni post-hoc test illustrated that the difference in the number of confusions between SSRQ rankings was due to the fact that those with moderate SSRQ scores had significantly less confusion in their dream reports (Mean Rank = 21.50, n = 24) than those with low self-regulation ability (Mean Rank = 29, n = 6). No significant difference was observed between those with moderate and high self-regulation ability (Mean Rank 23, n = 15) (p = 1) and between those with high and low self-regulation ability (p = .08).