

## The Basic Emotions in Dreaming

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Above all, I would like to thank God for His unfailing patience, wisdom and mercy. Thank you for Your blessings – *I will give you thanks, for you answered me; you have become my salvation.*  
*Ps 118:2*

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### **Abstract**

Despite the abundance of research investigating emotions in dreaming, there has been a lack of research focusing on the basic emotions in dream content. Each of the seven basic emotions in Panksepp's taxonomy is grounded in an underlying neurochemistry that is common to all mammals. This lack of research is unexpected in light of an overlap in the underlying neurophysiology of dreaming and of the basic emotions. Therefore, a study of the seven basic emotions in dream content, using a dream diary data collection paradigm, was undertaken. Participants consisted of 15 healthy university students who each recorded 10 of their dreams over a period of 4 to 6 weeks. A short self-rated questionnaire was used to record information regarding the dream experience and also to rate the presence and intensity of each of the basic emotions: RAGE, FEAR, GRIEF, SEEKING, CARE, LUST, and PLAY. Overall, 142 dream reports were collected which indicated that FEAR (27%) was the most prevalently rated emotion, followed by a combination of SEEKING and PLAY (18%), a combination of LUST and CARE (18%), and GRIEF (18%); RAGE (12%) and SEEKING [Motivation] (7 %) were the two least prevalent emotions. The significance of the results is further discussed with reference to the basic emotions in general.

*Keywords:* The seven basic emotions; SEEKING system; dream diary; RAGE, FEAR, GRIEF, SEEKING, CARE, LUST, and PLAY; dopaminergic theory of dreaming

## **Introduction**

Dreams are experienced by most people as narratives projected through mental imagery occurring freely during sleep. Although there are many ways of describing dreams, they can be thought of as a “state of consciousness characterized by internally-generated sensory, cognitive and emotional experiences occurring during sleep” (Desseilles, Dang- Vu, Sterpenich & Schwartz, 2011, p. 998). Due to the subjective nature of dreams, investigations into emotions in dreaming have been challenging. However, technological advances have enabled researchers to study dreams in more sophisticated ways. Several techniques are now used to study the neurophysiology of dreams, including brain imaging, lesion studies and analysis of dream content (Schwartz, Dang-Vu, Ponz, Dohoux & Maquet, 2005). This type of dream research has provided insight into the functional states of the brain during sleep, and more importantly, it has provided an avenue for the investigation of emotions in dreaming (Schwartz et al., 2005). Furthermore, it has allowed for the identification of the proposed neural correlates of dreaming.

In the scientific exploration of dreaming, the emotional nature of dreams has established emotions as playing a central role in mental activity during dreaming (Fosse, Stickgold, Hobson, 2001). Moreover, emotional neural systems, such as the amygdala and anterior cingulate, are very active during sleep (Maquet et al., 1996; Braun et al., 1997). This makes emotions not merely subjective phenomena, but creates more concrete basis of tying emotions and dreaming together. The relationship of emotions and dreaming may be mediated by the underlying neurophysiology of emotions and dreaming. Upon examining these neurophysiologies, a clearer picture starts to emerge of how emotions and dreams may be related. First, however, the ways in which emotions in dreams have been studied will be discussed, in order to provide an overview of what emotions are proposed to signify in dreaming.

### **Emotions in Dreams**

Various techniques have been used to investigate dreams, including laboratory awakenings, dream diaries, dream questionnaires, and external dream ratings (Schwartz et al., 2005). Moreover, studies that have utilised these techniques have all reported high instances of emotions in dream recall (Delorme, Lortie-Lussier & De Koninck, 2002; Gilchrist, Davidson & Shakespeare-Finch, 2007; Kahn & Hobson, 2002; Nielsen, Deslauriers & Baylor, 1991;

Rainville & Rush, 2009; Schredl, 2002; Schredl & Doll 1998; St-Onge, Lortie-Lussier, Mercier, Grenier & De Koninck, 2005).

Findings from different studies have reported differences in term of the prevalence of negative and positive emotions in dreams. Hall and Van de Castle (1966) as well as Nielsen et al. (1991) have reported high prevalence of negative emotions in comparison to positive ones. On the other hand, Kahn and Hobson (2002) reported the frequency of positive and negative emotions to be balanced. Additionally, Schredl & Doll (1998) reported that externally rated dreams (i.e., rated by the dreamer) showed more negative emotions, while self-rated dreams (i.e., rated by the dreamer) showed more of a balance of emotions.

Moreover, there are also various theories on the function of emotions. For instance, the Mood Regulatory Function of dreaming suggests that dreams have an emotional regulation function as well as a problem solving function (Kramer, 1991). If problems are successfully solved in a dream, then the emotional surge experienced in dreams, is kept in check and sleep is regulated. However, if problems in dreams are not solved, the emotional surge is not kept in check and sleep is not preserved. Additionally, the Threat Simulation Theory proposes that dreams are virtual environments where threatening situations may be rehearsed (Revonsuo, 2000; Vali & Revonsuo, 2009). Revonsuo (2000) proposes that negative emotions are the most prevalent emotions as the dreamer is often faced with life threatening scenarios in dreams. These findings and theories seem to suggest that emotions play a central role in the dream experience and that certain emotions embody a more central role than others.

### **The Nature of Emotions**

For this investigation of emotions in dreaming it is important to understand what is meant by ‘basic emotions’ and how they differ from other classifications of emotion. In order to do that, it is essential to consider the debate on whether emotions are constructs of the mind or whether they are complex structures generated by various areas in the brain.

**The natural kinds vs. constructionist kinds debate.** In general, emotions are expressed, experienced, and elicited on a daily basis through different stimuli and there seems to be a general consensus on what emotions are (Lindquist, Siegel, Quigley & Barrett, 2013). However, there is a lack of agreement on the etiological nature of emotions.

Essentially, this disagreement centres on the question of whether or not emotions can be considered as universal categories with a specific neural basis, or whether they are

psychologically or socially constructed (Barrett, 2006). The former view on emotions hypothesises that basic emotion categories or ‘natural kinds’ each having biological foundations that arise from specific neurophysiologies (Lindquist et al., 2013). Additionally, there is evidence that proposes that these emotions are basic to all mammalian brain structures and that they are situated in the more primal and instinctual parts of the brain (Ekman, 1999; Panksepp, 1992, 1998). When these areas are stimulated they cause intense stereotyped emotional experiences in all mammals (Panksepp & Biven, 2012). These areas are the foundation for the many ways in which we experience emotions and they mainly provide us with fundamental tools to deal with life tasks (Ekman, 1999).

Alternatively, the latter view proposes that emotions are complex psychological and social constructions (Barrett, 2006). In the psychological and social constructionist views emotions are not specialised neural states, but rather emerge from on-going complex psychological processes and social interactions that shape the way emotions are experienced, expressed, and regulated (Barret, 2006; Boiger & Mesquita, 2012; Fischer & van Kleef, 2010).

However, Panksepp (1998) argues that the constructionist approach not only ignores the plethora of behavioural and physiological evidence for specific emotional responses, but also the abundant neuroscientific evidence that there are genetic foundations for emotions in the brain. Therefore, the view that emotions are discrete categories generated in the brain allows for a better and more comprehensive understanding of how emotions are generated, expressed and experienced. Although there is much evidence for the basic emotions, there is also little consensus about the classification of basic emotions (Panksepp, 1998). However, the basic emotions as taxonomised by Panksepp (1998) are clearer and bolder about the scope of the basic emotional circuits (Charland, 2002).

**Classification and neurophysiology of Panksepp’s basic emotions.** Panksepp’s (1998) comprehensive classification identifies *seven basic emotional or affective systems*: FEAR, RAGE, LUST, CARE, GRIEF, PLAY, and SEEKING (it is important to note that uppercase is used to differentiate the specific neural system of the emotions in the brain from the vernacular use of emotion words). The more primitive and well documented systems, which mature after birth, are the FEAR, RAGE, SEEKING and GRIEF systems. Additionally, the LUST, CARE and PLAY systems mature at different and appropriate times during life and serve special socio-emotional purposes. Importantly, each of these systems has specific neurophysiologies that are

considered as crucial in the neurogenesis of these emotional systems and that function for different purposes of survival.

The FEAR system is believed to be related to experiences of terror, anxiety, and foreboding social separation, leading to distress. The GRIEF system stems from experiences of social separation leading to feelings of loneliness, anguish, and loss. The RAGE system relates to anger and aggression, stemming from the inability to fulfil the bodies need. The PLAY system is associated with opportunities for rough-and-tumble play, the need for social interaction, carefree play, and joy. The LUST system is linked with sexual desire and opportunity to reproduce. The CARE system is associated with nurturance, parental love, personal attachment, and affection that strengthen social bonds. Lastly, the SEEKING system is a neural system that promotes survival abilities and leads animals to actively explore and anticipate things they require for survival. It is important to note that these systems often work in a complementary fashion, in order to achieve the activities of a particular system (Panksepp, 2011), with the SEEKING system predominantly contributing towards the activities of the other six (Panksepp & Biven, 2012). Although the neural areas which generate these emotions systems are very complex, Table 1 briefly summarises the neural areas that are involved in generating each system; it is important to note the overlap in some of the areas.

Table 1

*Summary of the key neuroanatomical areas of the basic emotions.*

Basic Emotional Systems	Key Brain Areas
<b>SEEKING</b>	Nucleus Accumbens - VTA, Mesolimbic and mesocortical outputs & Lateral Hypothalamus - PGA
<b>LUST</b>	Cortico-medial Amygdala, BNST Preoptic Hypothalamus, VMH & PAG
<b>PLAY</b>	Dorso-medial diencaphalon Parafiscula Area &PAG
<b>CARE</b>	Anterior Cingulate, BNST, Preoptic Area, VTA & PGA
<b>FEAR</b>	Central and lateral Amydala to medial Hypothalamus and dorsal PAG
<b>GRIEF</b>	Anterior Cingulate, BNST, Preoptic Area, Dorsomedial Thalamus, PAG
<b>RAGE</b>	Medial Amygdala to BNTS & Medial perifornical hypothalamic to PAG



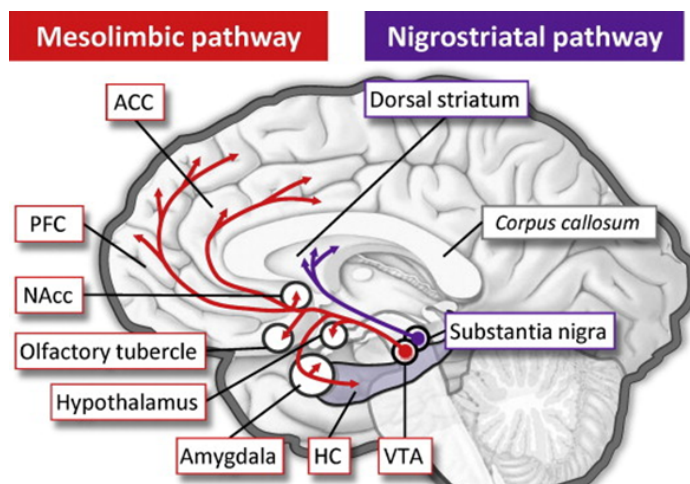
*Note.* Abbreviations: VTA - Ventral Tegmental Area, PAG - Periaqueductal Grey, BNST - Bed Nucleus of Stria Terminalis. Data summarised from Panksepp (1998).

Lastly, this biological view of emotions is of importance as it denotes that emotions, just like dreams, have specific neurophysiological mechanisms that are responsible for generating them. This allows the basic emotions and dreaming to be examined on the same neurological level.

### **Neurophysiology of Dreaming**

Research has begun to establish that dreaming has a specified neurophysiology. This proposes that there are neural areas that instigate the dream process. Predominantly, two neurological regions have been found to be critically involved with generating dreams. First, there is the junction between the occipital, temporal and parietal cortexes, and second is an area in the frontal cortex. Specifically, the pathway that projects to this area uses dopamine and is known as the mesolimbic-mesocortical dopaminergic (ML-DA) system (Solms, 1997; 2000).

Brain lesion studies have revealed that damage to these regions results in complete cessation of dreaming (Solms, 1997), while several neuroimaging studies have established that these regions are highly activated during REM sleep, during which most dream data is collected (Dang-Vu et al., 2005; Dumont, Braun & Guimond 2007; Maquet et al., 1996; Perogamvros & Schwartz, 2012; Solms, 1997; 2000). Moreover, clinico-anatomical lesion studies (the clinico-anatomical method permits brain function to be inferred by matching clinical indicators with lesion location; Solms 1997), the functional imaging studies (Braun et al., 1997; 1998; Franzini 1992; Maquet et al., 1996; Madsen, 1993), as well as studies of dream content (Nielsen et al., 1991; Malcolm-Smith, Koopowitz, Pantelis, & Solms, 2012) all suggest that dreaming involves concentrated activity in the ML-DA pathways, considered as the motivational command centre of the brain (see Figure 1 for a depiction of this system). This is known as the *dopaminergic theory of dreaming*. Damage to this system not only results in the loss of dreams but also of motivated behaviours (Solms, 2000).



*Figure 1.* Main ascending mesolimbic and nigrostriatal dopaminergic pathways. Abbreviations: ACC: anterior cingulate cortex; HC: hippocampal complex; NAcc: nucleus accumbens; PFC: prefrontal cortex; VTA: ventral tegmental area (From Perogamvros & Schwartz, 2012).

Moreover, this ML-DA system also makes up the core of the SEEKING system, one of Panksepp's basic emotion systems. As such, there is an emphasis on the SEEKING system in the dopaminergic theory of dreaming (i.e., the SEEKING system is proposed to be a vital instigator of the dreaming process; Solms, 2000). Therefore, not only is there a neurophysiological reason to study emotions in dreams, but there is evidence that the neurocircuitry for certain of the basic emotions and the areas proposed to generate dreaming overlap, and that the basic emotions, including SEEKING, are highly active during dreaming (Desseilles et al., 2011; Perogamvros & Schwartz, 2012). Based on the literature, then, it could be reasonably argued that certain of the basic emotions, as proposed by Panksepp (1998), and the neurophysiology of dreaming are related and they overlap.

### **Conclusion and Rationale for Study**

Even though there is an abundance of research examining emotions in dreaming, the basic emotions have never been studied in the dream content before. In light of the overlap in the underlying neurophysiologies of the basic emotions and dreaming, such an investigation would be valuable. Furthermore, the dopaminergic dream theory draws on Panksepp's basic emotion systems, providing a further rationale to study the seven basic emotions in dream content. Consequently, an exploration of the basic emotions in dream content could potentially give rise to a better understanding of the dream process. Therefore, the goal of the study was to aid in

integrating the overlap in the neurophysiology of dreaming with that of the basic emotions in dream content.

### **Aims and Hypothesis**

Considering the evidence that the neural pathways proposed to be responsible for dreaming and the neural circuitry of the basic emotions as proposed by Panksepp (1998) overlap, this study will endeavour to explore these basic emotions in the dream content. The proposed study is exploratory because the basic emotions have never been studied in dream content before, and therefore there are no specific hypotheses. However, based on the literature the proposed study anticipated results that indicate a higher propensity for SEEKING emotions. Nevertheless, the primary objective of the proposed study was to investigate the presence and prevalence of the seven basic emotions in dreaming. This will be done using the self-rated reports of participants utilising a dream diary data collection paradigm.

## **Methods**

### **Design**

The study was a quantitative correlational research design and compared the prevalence of the seven basic emotions in self-rated dream reports. Participants were asked to each record 10 dreams over a period of four to six weeks, to achieve a significantly large sample size (Domhoff & Schneider, 2008). The dream collection took place in the participants' homes and not in laboratory setting. Stickgold, Pace-Schott and Hobson (1994) suggest some benefits of home dream collections over laboratory awakenings. Namely, (1) participants are in a more familiar and comfortable environment, and there is no adaptation period as with laboratory awakenings; (2) studies that collect dreams in home settings do not need to be concerned with the difficulty of finding a space, equipment and competent staff; and (3) laboratory dreams can cause confusion when the participant is spontaneously woken up during sleep, potentially causing issues with dream recall, which is not an issue with home dreams as participants record dreams when they wake up.

The most important variables of the study were the basic emotions as described by Panksepp (1998): FEAR, RAGE, LUST, CARE, GRIEF, PLAY and SEEKING. These emotions were collected via a questionnaire, where participants rated these emotions if they felt they were present in their dreams.

## Participants

Initially, 37 participants met the criteria for the study. However, the sample consisted of 15 healthy Undergraduate students from the University of Cape Town, of which thirteen were female and two were male. Equal sex sampling was not achieved due to the Humanities Faculty, and in particular the Psychology department, having substantially more female than male students. The participants were recruited for the study based on several exclusion criteria to evaluate their suitability for the study.

**Exclusion criteria.** The following exclusion criteria were considered to try and ensure that participants were healthy, frequent dreamers, with good subjective sleep quality.

**Sleep Quality.** This criterion was an important factor because poor sleep quality can be an indication of sleep and medical disorders (Buysse, Reynolds, Monk, Berman & Kupfer, 1989). The study wanted to distinguish those participants who are “good” sleepers from the ones who are “bad” sleepers. An overall score of  $> 5$  on the Pittsburgh Sleep Quality Index (PSQI) indicated that the participant was a poor sleeper (Buysse et al., 1989), and consequently, only participants with a score  $< 5$  were considered eligible for the study.

**Psychiatric and sleep disorders.** Findings suggest that psychiatric and sleep disorders may effect sleep architecture and dream recall (Benca, Obermeyer, Thisted, & Gillin, 1992; Nofzinger, 2005). A number of psychiatric disorders are associated with sleep disruptions at both a subjective and polysomnographic level (Nofzinger, 2005). Participants previously diagnosed with any chronic psychiatric disorders or any sleep disorders, also assessed by the PSQI and a general medical history questionnaire were excluded from the study.

**Chronic medical conditions.** Chronic medical conditions are often linked to sleep abnormalities (Parish, 2009). Some conditions affect sleep due to the physiological nature of the condition or due to the medicines that are used to treat them. Parish (2009) reports that patients with chronic medical conditions often report having fewer hours of sleep, and less recuperative sleep when compared to healthy individuals. Some of these chronic disorders include asthma, lung problems, diabetes and epilepsy (Bazil & Malow, 2005; Janson et al., 1996; Resnick et al., 2003). Participants diagnosed with any chronic medical condition, as assessed by the general medical history questionnaire, were not eligible for participation.

**Medication.** Another factor that can have an effect on sleep is the use of medications. Brooks (2005) has identified medications as altering natural sleep patterns. Also, most

psychiatric drugs disrupt sleep quality and sleep architecture (Goldsmith & Casola, 2006; Teplin, Raz, Daiter, Varenbut & Tyrell, 2006). Therefore, it was vital to know which medications participants were ingesting, as assessed by the general medical history questionnaire. Participants using any narcotics or chronic medications at the time of the study, except birth control, were excluded from the study.

***Dream recall frequency.*** Individuals vary in the frequency with which they can recall their dreams in the morning (Schredl, 2004). Although the study did not use dream recall frequency as one of its variables, dream recall was used as an exclusion criterion to distinguish frequent dreamers from infrequent dreamers in order to ensure high dream recall. A Dream recall frequency scale was used to establish this criterion and participants with low dream recall were excluded.

## **Measures**

**Phase 1.** The measures used during Phase 1 were for the purposes of identifying suitable participants for participation in Phase 2. The measures were administered via an online questionnaire.

***Beck Depression Inventory II (BDI-II).*** According to Beck, Steer, & Garbin (1988) the BDI (Appendix A) demonstrates strong psychometric properties, yielding an average coefficient alpha of .86 for psychiatric patients and .81 for non-psychiatric subjects. Also, the overall internal consistency for the BDI is reported to range from .73 to .92, with an average of .86 (Beck et al., 1988). The BDI-II is the revised version of the BDI and a study by Osman, Barrios, Gutierrez, Williams & Bailey (2008) reported high estimates of internal consistency for this instrument, coefficient  $\alpha = .92$ , average inter-item correlation  $r = .35$ . Segal, Coolidge, Cahill & O' Riley (2008) in their study reported internal reliability to be  $\alpha = .92$ , for young adults, and  $\alpha = .86$  for older adults. Furthermore, various studies using the BDI-II in different settings report good reliability and validity for this measure (cf. Golden, Conroy & O'Dwyer, 2007; Storch, Roberti & Roth, 2004; VanVoorhis & Blumentritt, 2007).

***Dream recall frequency scale.*** Dream recall frequency scale (Appendix B) is a suitable measure for determining differences in the frequency with which individuals are able to recall their dreams (Schredl, 2004). Pearson correlation scores for test-retest reliability on this scale have been found to be high ( $r = .85, p < .0001$ ; Schredl, 2004). Moreover, the interval between

the first and second test did not impact the correlation scores significantly, indicating that dream recall is a fairly stable trait. This would further add to the criterion validity of the measure.

***The Pittsburgh Sleep Quality Index (PSQI).*** The PSQI (Appendix C) is a questionnaire designed to assess sleep quality and sleep disturbances over an interval of one month (Buysse et al., 1989). In validating the measure, an overall PSQI score  $> 5$  was found to yield a diagnostic sensitivity of 89.6% in distinguishing good and poor sleepers (Buysse et al., 1989). The PSQI also showed a good overall reliability coefficient (Cronbach's  $\alpha = 0.84$ ), indicating a high internal consistency (Curcio et al., 2012). In primary insomnia patients, the general PSQI score correlation for test–retest reliability was .87 (Backhaus, Junghanns, Broocks, Riemann & Hohagen, 2002).

**Phase 2.** The measures used during Phase 2 were for the purpose of dream data collection. These measures were administered via self-rated dream reports and questionnaires.

***Dream diary.*** The dream diary method has been shown to provide considerable consistency in what people dream about (Domhoff, 2000). According to Schredl, Wittmann, Ciric, & Götz (2003) in a dream diary the internal consistency indicates the reliability coefficient, with a dream diary kept for 14 days showing an  $r = .74$ . Prolonging the collection period to four weeks improved the internal consistency to  $r = .90$  (Schredl & Fulda, 2005). This indicates that a data collection period of between two and four weeks is adequate to balance daily variations in dream recall (Schredl, 2004; Appendix D).

***Basic emotions index.*** Due to the absence of a measure to help participants identify the basic emotions, an index was created to help participants rate these emotions. Nielsen et al. (1991) suggest that when subjects are provided with an aid to report emotions the identification of emotions becomes more significant. Therefore, to try and control for better identification, the basic emotions were represented by three descriptive key words each, as indicated by Panksepp and Biven (2012; Appendix D Item Q3). Participants had to rate the basic emotions for intensity (on a scale from 1 to 3). Additionally, dictionary definitions of all the words in the basic emotions index were provided for participants to try and ensure a standardised understanding of each emotion (Appendix D).

## **Procedure**

The study consisted of two phases with all data collected in the participants' homes. Phase 1 included participation in an online survey, intended to determine the eligibility of the

participants. Subsequently, during Phase 2 eligible participants were contacted and invited to take part in the second part of the study. Participants were offered course credits for their participation.

**Phase 1.** During Phase 1, an advertisement (Appendix E) was put up, on the student portal to announce the research study. However, the importance of dreaming was not emphasised as research has shown that this often produces a bias in the post-hoc reporting of dream frequency (Schredl, Ciric, Götz & Wittmann, 2003). The advertisement explained the general aims and procedure of the study and all the consent information was provided to interested individuals. Individuals could not proceed unless they had given their consent, indicating that they had read and understood all the procedures, risks, benefits and the purpose of the study. Participants were also informed that participation in Phase 1 did not oblige their participation in Phase 2. After consenting to the study, participants had to fill out a general health questionnaire (Appendix F), the BDI-II (Appendix A), a Dream recall frequency scale (Appendix B), and the PSQI (Appendix C). Upon completing the questionnaire in Phase 1 of the study, participants were thanked for their participation and were awarded their course credit. Phase 1 lasted for one month. Subsequently, data from the questionnaires were analysed in order to assess those participants who would be eligible for Phase 2.

**Phase 2.** Eligible participants were contacted via e-mail and informed about the 2<sup>nd</sup> phase of the study. Those who were interested could then e-mail the researcher and ask for more details about the study. Seventeen participants indicated their interest in the study. Phase 2 consisted of two parts: the pilot and the data collection part. During both parts of Phase 2 participants had to record their dreams in a dream diary, and had to answer a short questionnaire comprised of eight questions about each dream. Participants were instructed to record all dreams, when present, immediately after waking up; this was to ensure that the dream was still as fresh in their minds as possible. Participants could also report dreams separately if they had multiple dreams at the same time (for detailed instruction see Appendix D).

**Pilot.** The pilot study was done in order to test whether participants had any problem using the dream diaries and the basic emotions index. The first five participants who expressed their interest in the study were chosen for the pilot. These participants were invited for an information session, which lasted approximately 45 minutes. During this session participants were informed about the purpose of Phase 2 and the pilot of the study, the procedures, risks,

benefits, and they also had to sign the consent form (Appendix G) before continuing. Subsequently, participants were given the dream diaries and the researcher explained the instructions; participants then had to record one dream at home. After completing this, participants were given a feedback sheet (Appendix H) to assess any issues they might have had while using the dream diary. No significant problems were reported with using the dream diary or the basic emotions index.

**Data collection.** After the pilot study, all interested participants, including the participants from the pilot study, were invited for another information session where the participants were informed about the purpose of the study, procedures, risks, benefits, and they also had to sign the consent form (Appendix I) before continuing; any questions participants had were answered. Subsequently, participants were given a dream diary and were informed that they had to record 10 dreams. Once participants had completed recording dreams, they had to return the dream diary to the researcher and they were thanked for their participation and awarded their course credits.

### **Ethical Considerations**

The Human Research Ethics Committee of the University of Cape Town's Faculty of Humanities approved the ethics for the study (reference number PSY 2013-018). The ethical guidelines for research with human subjects were strictly adhered to.

**Consent, voluntary participation, and confidentiality.** During both phases, participants read and signed the consent form (Appendices E, G & I) which confirmed (a) that participation was voluntary, (b) participants were allowed to withdraw from the study, (c) the data provided would remain confidential and anonymous; and (d) data would be safely stored. In the interest of confidentiality, each dream diary was assigned a number to ensure that no identifying information appeared on the dream diary itself. Only the researcher in the project was privy to information linking participant names with dream diary numbers.

**Risks and benefits.** There were no physical, psychological and social risks associated Phase 1 or Phase 2. Any participants who were identified through the questionnaires in Phase 1 to have potentially undiagnosed depression or a sleep disorder was contacted via email and referred to Student Wellness at the University of Cape Town. The primary benefit to participants was in the allocation of SRPP points. Any discomfort of participating in the study was hoped to be minimised due to the participants being able to do all data collection in their own homes.



## Data Analysis

**Sample size and variables.** The sample size was based on suggestions made by Domhoff and Schneider (2008) that a minimum sample of 100 – 125 dreams are required to detect any significant differences in dreams content. Accordingly, a minimum number of 10 participants each recording 10 dreams was required in order to achieve the minimum sample size.

Additionally, the basic emotions of FEAR, RAGE, LUST, CARE, GRIEF, PLAY and SEEKING were each rated through the three key words used to describe each basic emotion. It is important to note that ratings of the basic emotions and not the dream descriptions were used for data analysis.

**Statistical analysis.** Several statistical analyses were conducted using the SPSS<sup>®</sup> statistical package, version 21.

**Factor analysis.** Since the basic emotions index had never been used before, a factor analysis was conducted to test the reliability of the measure and to establish whether the measure actually yielded seven components, according to the seven basic emotions proposed by Panksepp's taxonomy. In order to deal with the dependency in the data due to each participant having contributed multiple dream reports, the unstandardised residuals instead of raw scores were used (Figueredo, Petrinovich & Ross, 1992).

**Pearson's correlations.** Correlations were used to describe the relationships between each of the basic emotions and overall emotionality, overall dream intensity, and pleasantness of the dream.

**Descriptive statistics.** Frequencies and percentages were used to determine the overall prevalence of each emotion, in the pooled sample.

**Dependent-samples t-tests.** Since the study was interested in the prevalence of the basic emotion categories and each participant contributed to more than one basic emotion category, a dependent-samples *t*-tests were chosen, as they compare the means of related groups to detect whether there are any statistically significant differences between these groups.

As revealed by the correlations of the emotions with the pleasantness of the dream experience, the positive emotions were compared to indicate which positive basic emotion category was the most prevalent. Likewise, the negative basic emotions categories were compared to indicate which negative basic emotion was the most prevalent. Also, the composite of positive and the composite of negative emotions were compared to test whether dreams were

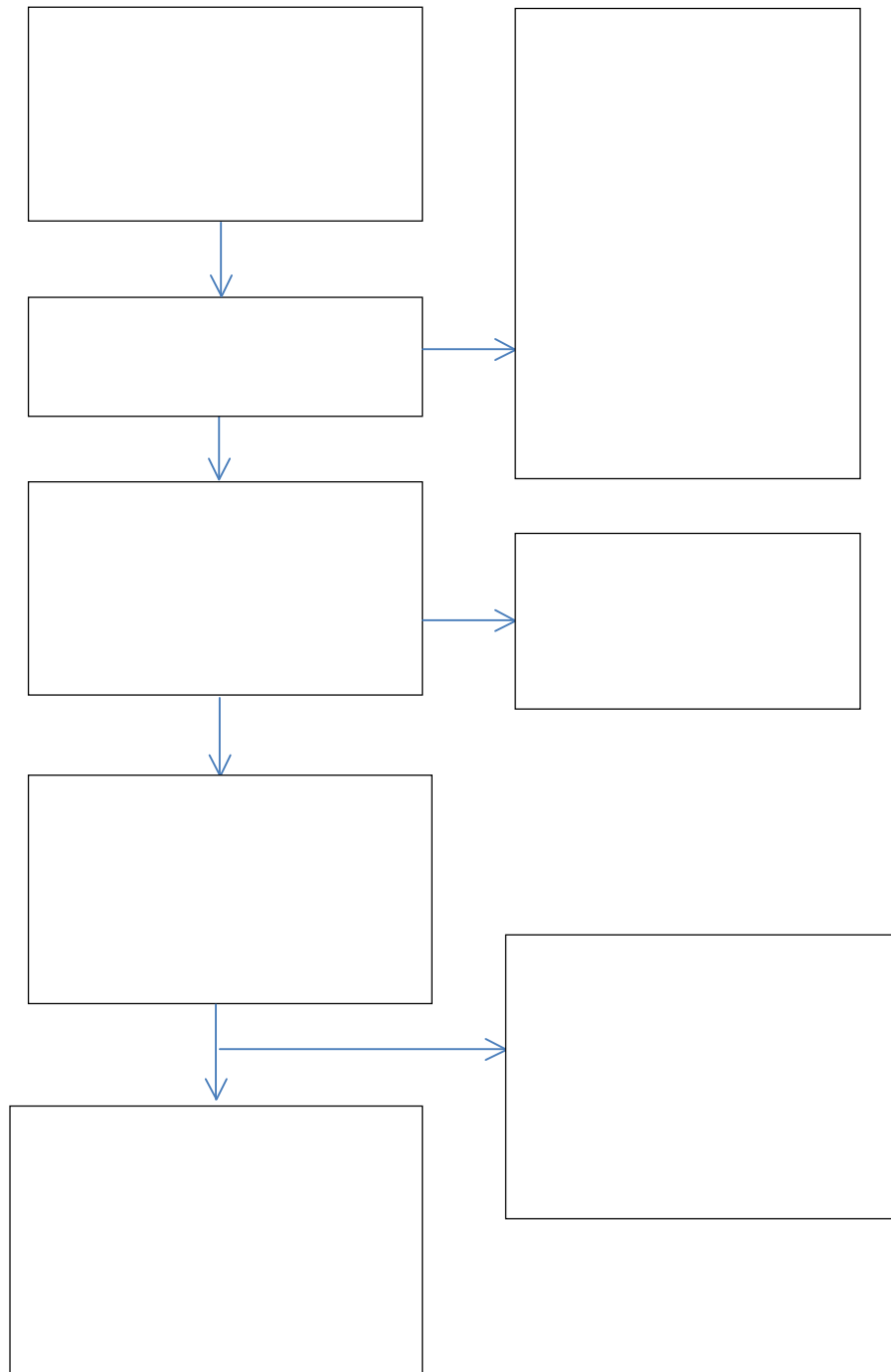
positive or negative, overall. A Bonferroni correction for the  $p$ -value was used, so as to control for familywise error; this value was dependent upon the number of dependent-samples  $t$ -tests that were conducted.

## **Results**

Statistical and descriptive analyses were applied to the sample of 142 self-rated dream reports. Firstly, a Principal Factor Analysis (PCA) was conducted to assess the structure of the basic emotions index. Additionally, Pearson's correlations were used to describe the relationship between the various components (as analysed by the PCA) as well as other questions relating to the dream experience. Subsequently, descriptive statistics and dependent-samples  $t$ -tests were used to explore the prevalence of the basic emotion categories.

### **Participant information**

Participants were recruited according to the exclusion criteria described in the methods section. Although 17 participants started the data collection process only 15 participants successfully completed the study. One participant was excluded for not returning their dream diary (no reason was given by the participant), the second participant was excluded on the grounds that the participant did not follow the instructions of the dream diary (i.e., the participant did not fill in the data as was requested); it was subsequently felt that in order to maintain reliability of the data, this data would be excluded. Figure 2 shows the process of participant selection in more detail.



*Figure 2.* Participant selection process. Flowchart depicting the process for selecting participants and also the number of participants at each stage of selection.

The remaining 15 participants were between 19 and 23 year old ( $M = 19.87$ ,  $SD = 1.41$ ) and contributed 10 dreams each, with the exception of two participants. These two participants did not complete the collection process in the specified time period, one participant contributed six dreams and the other participant contributed five dreams. Also, one participant contributed eleven dreams.

### **Principal Factor Analysis of the Basic Emotions Index**

A basic emotions dream content measure was developed for use in this study. This measure was required to be valid and reliable in order for it to be used for further inferential analyses. However, as the development of this dream measure was not a central aim of the study, only the essential descriptive data and reliability statistics are reported in the main text. Where necessary, the reader is directed to the appropriate appendix for more detailed descriptions of the diagnostic statistics.

The Basic Emotions Index (Appendix D, Item Q3) is a self-report measure based on the seven basic emotions as classified by Panksepp (1998). A principal component analysis (PCA) was conducted on 21 items from the index to identify the simple structure of this measure. Details of the full analysis appear in Appendix J. In summary, the PCA analysis resulted in a six component structure including 17 of the original items, explaining 69.60% of the variance (Table 2). The items that cluster on the same components suggest that component 1 represents a combination of the *CARE* and *LUST* systems (from here on just referred to as CARE/LUST), Component 2 represents the *FEAR* system, Component 3 represents the *RAGE* system, Component 4 represents the GRIEF system, Component 5 represents a combination of the *PLAY* and *SEEKING* systems (from here on just referred to as PLAY/SEEKING), and lastly Component 6 represents the motivational aspect of SEEKING (from here on referred to as *SEEKING* [Motivation] (Table 2). The stability of the simple component structure indicated that this model likely provides the most parsimonious and stable latent structure for the Basic Emotions Index used in this study.

Table 2

*Pattern Matrix<sup>a</sup> for Analysis 3 of the PCA*

	Rotated Components					
	LUST/ CARE	FEAR	RAGE	GRIEF	PLAY/ SEEKING	SEEKING- Motivation
Affection/Love	<b>.843</b>					
Sexual/Desire	<b>.836</b>					
Sexual/Love	<b>.823</b>					
Personal/Attachment	<b>.740</b>					
Feelings of Gratification	<b>.431</b>					
Fear		<b>.823</b>				
Anxiety		<b>.821</b>				
Apprehension		<b>.685</b>				
Rage			<b>.866</b>			
Aggression			<b>.854</b>			
Anger			<b>.794</b>			
Loss				<b>.837</b>		
Grief				<b>.821</b>		
Sorrow/Despair				<b>.710</b>		
Anticipation					<b>.894</b>	
Exuberance/Excitement					<b>.579</b>	
Motivation						<b>.961</b>
Eigenvalues	3.44	2.62	1.85	1.70	1.18	1.04
% of variance	20.20	15.38	10.88	10.03	6.95	6.13
$\alpha$	.78	.75	.75	.77	.62	

*Note.* Factor loadings <.40 were suppressed. Extraction Method: Principal Component Analysis. Normalization.<sup>a</sup> Rotation Method: Oblimin with Kaiser a Rotation converged in 7 iterations.

**Reliability of the basic emotions index subscales.** Reliability analysis of the CARE/LUST, FEAR, GRIEF, and RAGE components showed high internal consistency, with Cronbach's  $\alpha > .75$  (Table 2). The PLAY/SEEKING component showed an overall Cronbach's  $\alpha = .62$ . This is lower than the suggested limit, however, based on theoretical importance of the component, and also to maintain the simple structure, this component was retained. The SEEKING (Motivation) component did not require reliability analysis as it only comprised one item.

The subscales of RAGE, GRIEF, and PLAY/SEEKING showed no problems with *inter-item* and *item-to-total* correlations (used to ascertain the usefulness of an item within a subscale). The FEAR subscale presented problems with only one item, *Apprehension*. Furthermore, the *Cronbach's Alpha if item is Deleted* showed deleting these items would also increase the Cronbach's *Alpha* to .83. However, this item was retained to maintain the simple structure of the overall scale. A full reliability analysis of the subscales is reported in Appendix J. Also, even though the PLAY/SEEKING and SEEKING-Motivation had fewer than three items that significantly loaded into the component, these components were retained for theoretical reasons and also because the component loadings were high. These two components play a central role in the basic emotions (Panksepp, 1998), and the loadings also make theoretical sense.

Finally, once the aforementioned component structure was established, the raw scores of the items that loaded together on each component were used to create a composite score for the basic emotions (e.g. raw scores from Anxiety, Fear and Apprehension were used to create the composite for FEAR). These raw scores were made up of the intensity ratings ranging from 1 to 3 (1 = slightly, 2 = moderate and 3 = intense). The ratings also provided the information for the prevalence (i.e., when an emotion was rated for intensity it also indicated the presence of the emotion and thus the frequency was obtained from that). These composite scores were used for the remaining analyses.

It should be noted that although the components are indicated as PLAY/SEEKING and LUST/CARE, it does not denote that they are the same basic emotions. This is only to indicate that these basic emotions coalesced into the same components, according to the PCA. They will be referred to as PLAY/SEEKING and LUST/CARE for analysis purposes only. Possible reasons for these emotions coalescing into the same categories will be deliberated in the discussion section.

### **Pearson Correlation of the Basic Emotions**

The relationship between the basic emotion composites and the other dream measures were examined using Pearson correlations. These relationships included questions pertaining to the overall dream experience as well as how the emotion components related to each other.

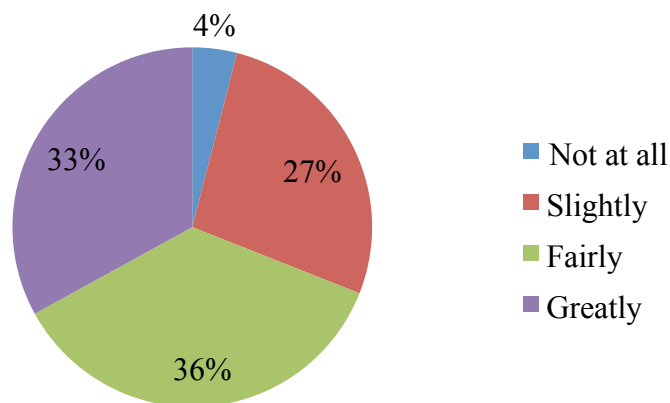
First of all, the subjective ratings of the overall rating of how emotional the dream was (see Appendix D, Item Q2) were positively correlated with FEAR,  $r = .38, p < .001$ ; RAGE,  $r = .24, p < .001$ ; GRIEF,  $r = .38, p < .001$ ; LUST/CARE,  $r = .28, p < .001$ ; and PLAY/SEEKING,  $r$

= .17,  $p = .46$ ; all of the correlations were significant at  $p < .01$  (two-tailed) except for PLAY/SEEKING which was significant at  $p < .05$  (two-tailed). Only SEEKING (Motivation) did not significantly correlate with this question. Also, more emotional dreams were rated as slightly less pleasant, based on the inverse correlation of this question with the dream measure of *How pleasant was your dream*,  $r = -.20$ ,  $p = 0.35$ , significant at  $p < .05$  (two-tailed). Moreover, the rating of the pleasantness of the dream (see Appendix D, Item Q8) relates to whether the dream was experienced as positive (more pleasant) or negative (less pleasant). LUST/CARE,  $r = .32$ ,  $p < .001$  and PLAY/SEEKING,  $r = .28$ ,  $p = .001$  significantly correlated more positively with this measure, indicating that more pleasant dream reports had a higher prevalence of these emotions. Conversely, FEAR,  $r = -.44$ ,  $p < .001$ , RAGE,  $r = -.32$ ,  $p < .001$  and GRIEF,  $r = -.48$ ,  $p < .001$  significantly correlated more negatively with this rating, proposing that more unpleasant dreams had a higher prevalence of these emotions, the correlations were all significant at  $p < .01$  (two-tailed). The SEEKING (Motivation) component did not significantly correlate with this question.

### **Prevalence of the Basic Emotion Categories**

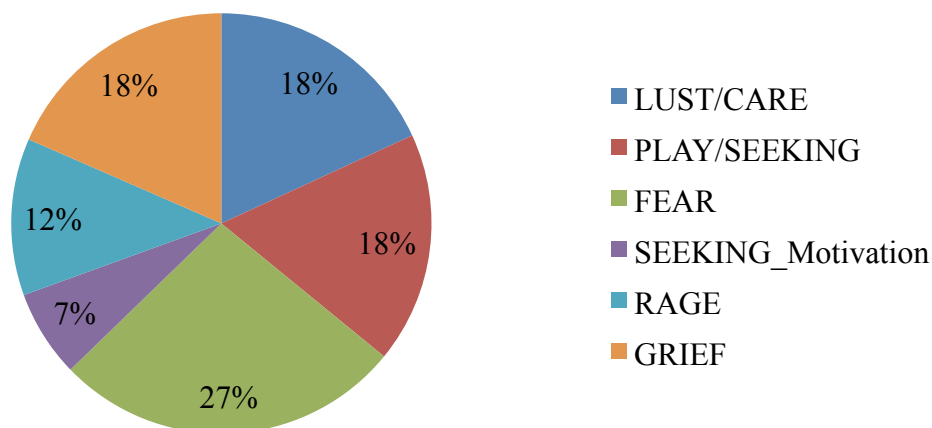
Composite scores for each of the six suggested emotion categories (i.e., the six categories that were revealed by the PCA) were used for further analysis. Whenever participants experienced an emotion, they had to give it a rating between 1 and 3. These ratings were used to indicate the presence and intensity of an emotion in the dream content. This was done by averaging the scores from the items that made up each category and adding together the number of times the composite had a rating.

**Overall dream emotionality.** Figure 3 indicates the ratings of overall emotionality of the dream reports. This shows that only a very small percentage of dreams were rated as not being emotional at all, with the greatest percentage of dreams rated as *Fairly* emotional.



*Figure 3.* Representation of the overall emotionality of the total dream reports. Ratings of this question were as follows: 0 = Not at all, 1 = Slightly, 2= Fairly, 3= Greatly.

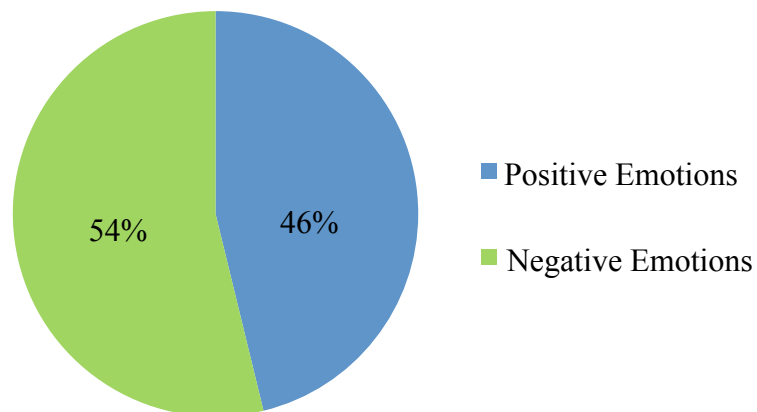
**Percentage of each category.** Figure 4 represents the percentage of dreams containing each basic emotion. Evidently, most dream reports contained FEAR, followed equally by a combination of PLAY/SEEKING, LUST/CARE and GRIEF, with RAGE and SEEKING (Motivation) being the least prevalent.



*Figure 4.* Percentage of the Basic Emotion composites. Percentages are represented as proportions of the total number of dream reports ( $n = 142$ ). The same report was allowed to contain more than one emotion.



**Overall hedonic tone of dreams.** Based on the Pearson correlations, composites of the pleasant emotions and the unpleasant emotions were calculated. LUST/CARE and PLAY/SEEKING were combined into a composite item called Positive emotions and FEAR, RAGE and GRIEF were combined into an item called Negative Emotions. These composites were used to determine whether the overall hedonic tone of the dreams was positive or negative. The composites of positive and negative emotions indicated that the negative emotions (54 %) were more prevalent than positive ones (46%).



*Figure 5.* The overall hedonic tone of the basic emotions. The composites of the positive emotions and negative emotions were used to indicate whether the dreams overall were negative or positive.

**Intensity ratings for each composite emotion.** Each emotion was rated for intensity on a scale from 1 to 3 (Appendix D). Table 3 displays the mean intensity rating per emotion. FEAR and PLAY/SEEKING show the highest intensity ratings, with RAGE having the lowest. Overall, these results indicate that the emotions had low intensity ratings.

Table 3  
*Intensity ratings of the Basic Emotion Categories*

Emotion	<i>M</i>	<i>SD</i>
LUST/CARE	0,36	0,61
PLAY/SEEKING	0,51	0,83
FEAR	0,76	0,90
SEEKING-Motivation	0,26	0,70
RAGE	0,31	0,66
GRIEF	0,48	0,83

*Note.* These ratings are represented in relation to the total number of dream reports ( $n = 142$ ).

### Dependent-Samples *t*-test

Dependent-samples *t*-tests were conducted in order to establish whether the prevalence of the positive compared to the negative emotions was significantly different, and also which of the negative emotions were the most prevalent. Due to the positive emotions having the same prevalence, they were not tested for statistical significance. As multiple paired samples *t*-tests can conflate the probability of a Type I Error, a Bonferroni correction was applied and alpha was adjusted to  $p < .013$ <sup>1</sup>. Directional tests were done, because the descriptive data suggested that some emotion categories were more prevalent than others.

First of all, the descriptive data suggested that FEAR was the most prevalent negative emotion, followed by GRIEF, and RAGE was the least prevalent. The analysis confirms that FEAR ( $M = 0.76$ ,  $SD = 0.90$ ) was statistically more prevalent than GRIEF ( $M = 0.48$ ,  $SD = 0.83$ );  $t(141) = 3.08$ ,  $p < .001$  and FEAR was also statistically more prevalent than RAGE ( $M = 0.31$ ,  $SD = 0.66$ );  $t(141) = 5.36$ ,  $p < .001$ . GRIEF ( $M = 0.48$ ,  $SD = 0.83$ ) was also statistically more prevalent than RAGE ( $M = 0.31$ ,  $SD = 0.66$ );  $t(141) = 2.36$ ,  $p = .01$ . The analysis confirmed that FEAR was the most prevalent negative emotions, followed by GRIEF and then RAGE. Additionally, the overall hedonic tone of the dreams was established by comparing the positive emotion composite (PLAY/SEEKING and LUST/CARE) to the negative emotion composite (FEAR, RAGE and GRIEF), as established by the correlation analysis. The

<sup>1</sup>  $\alpha = .05$ ; Bonferonni correction =  $0.05/4 = .013$ .

descriptive data suggested that the negative emotions were more prevalent than the positive emotions. However, the results from this analysis indicated that the negative emotions ( $M = 0.52$ ,  $SD = .057$ ) were not statistically more prevalent than the positive emotions ( $M = 0.44$ ,  $SD = 0.57$ );  $t(141) = 1.23$ ,  $p = .11$ . This indicates that dreams were more or less balanced when it comes to the overall hedonic tone of dreams.

### **Discussions**

The general purpose of this study was to assess the prevalence of the seven basic emotions, as classified by Panksepp (1998), using self-report dream diaries in a home setting. Since this classification system has never before been studied in dream content, no a priori hypotheses were put forth. However, based on the literature it was expected that SEEKING may be the predominantly rated dream emotion.

In summarising the results, it is important to note that the principle components analysis (PCA) revealed that two elements of SEEKING were being measured. One component indicated that SEEKING predominantly did not occur on its own, but rather that PLAY and SEEKING were conflated into one category. Alternatively, motivation appeared as a separate component of SEEKING, emerging as an independent component to the PLAY/SEEKING composite. Likewise, the emotions of CARE and LUST also did not emerge as two independent categories, and were therefore reported as a composite (LUST/CARE) as well. The rest of the basic emotions, FEAR, RAGE and GRIEF, emerged as independent components. An explanation of why the PLAY/SEEKING and CARE/LUST emotions may have grouped in such a way will be discussed in further detail.

Moreover, the results revealed that FEAR was the most prevalent emotion, followed by PLAY/SEEKING, GRIEF, LUST/CARE, which had the same prevalence, then RAGE and lastly SEEKING – Motivation was the least prevalent category. Furthermore, statistically, FEAR was the most prevalent negative emotion. The positive emotions were not tested for significance as the PLAY/SEEKING and LUST/CARE composites had the same prevalence. Also, the negative emotions were more prominent than the positive emotions. However, the difference was not statistically significant.

Furthermore, although SEEKING was anticipated to be the most prevalent emotion, as would be predicted by the dopaminergic theory of dreaming, there was no direct confirmation of this.

However, the results can be indirectly interpreted for evidence of a central role for activity within the SEEKING system during dreaming. In particular, the results might allude to activity within the SEEKING system, during dreaming, as a result of the inextricable relationships between the neurocircuitries of the SEEKING system and the other basic emotion systems. The ways in which SEEKING activity may be related to the other emotions will be discussed.

### **Overall Emotionality and Hedonic Tone of Dreams**

Generally, the results indicated that dreams were very emotional, with only 4 % of dream reports being rated as not being emotional. This contrasts with findings from other studies which reported higher proportions of dreams with no emotions (Fosse et al., 2001). Furthermore, this seems to be consistent with activity in emotional neurocircuitries reported in the literature (Fosse et al., 2001). That is to say that the highly active nature of neurochemistries of the basic emotions during sleep contribute relatively well to the dream content, which was evident in the sample.

Furthermore, the prevalence of negative and the positive emotions was approximately equal; although the negative emotions were slightly more prevalent than the positive emotions. Fosse et al. (2001) explain that a possible reason for the slightly higher prevalence of negative emotions could be because in this type of unprompted home dream design participants possibly report the most emotionally intense dreams, overlooking or omitting reports of less intense positive emotions (Kahn and Hobson, 2002). In other words, the higher prevalence of negative emotions could also be due to a reporting bias of participants (i.e., because participants were prone to feel negative emotions more intensely, they were more likely to report them; Doll & Schredl, 1998). The results suggest that this might have been the case for this sample as well. In that the subjective ratings of how emotional the dream was had stronger correlations with the negative emotions than the positive ones. Also, the negative emotions tended to be rated more intensely than the positive emotions, although only marginally. Thus, the slightly negative tone of the results could probably be attributed to the method of dream collection (i.e. unprompted home dreams) and also to the slightly higher intensity ratings of the negative emotions. Although, statistically, there was no significant difference in the prevalence of the negative and

positive emotions, which is in line with some of the reported research (Schredl & Doll, 1998; Kahn & Hobson, 2002), this provides information for the dream procedures in home dreams, in order to try and decrease this type of result in future research.

### **The Basic Emotions in Dream Reports**

Not only did the results in this sample indicate that two components of SEEKING were being measured, namely a combination of PLAY and SEEKING and also Motivation, but the results also indicated that neither of these SEEKING components were the most prevalently rated emotion. This might allude to two very important aspects of the SEEKING system: (1) it has a motivational aspect (Alcaro & Panksepp, 2011) and (2) it underlies most of the other six basic emotions (Panksepp, 1998). Also, the coalescing of the emotions of LUST and CARE may also be indicative of the interactions between these systems. Therefore, in order to make sense of the results, it is important to review the interaction of the basic emotions in waking.

**The SEEKING system and motivation.** The SEEKING system is the motivational mechanism that drives most animals and humans to mobility, it facilitates the elements of interest, foraging, anticipation, expectancy, and curiosity that are required for various activities of daily living (Alcaro, Huber & Panksepp, 2007). This is because the circuitry responsible for the genesis of the SEEKING system is proposed to mediate neural areas which are related to goal-directed behaviours (Panksepp, 1998). At the core of this, is the mesolimbic dopaminergic (ML-DA) system which has been acknowledged for its significant role in motivated behaviours and which stimulates the emergence of the SEEKING system, giving rise to its motivational aspect (Alcaro et al., 2007; Berridge & Robinson, 1998). Furthermore, this system is associated with many other neural regions and neurochemicals (Ikemoto & Panksepp, 1999; Panksepp, 1998), which allow the SEEKING system to contribute, to a varying degree, to the tasks and activities of every other basic emotion (Panksepp, 2011). That is to say that the SEEKING system has a relationship with the other basic emotions, each of which is mediated to varying extents by the neurophysiology of the SEEKING system.

**The PLAY system.** The neural mechanisms for PLAY are critical for developing social skills, but also for joy and laughter. Importantly, the SEEKING system is highly active during PLAY activity, as the energised SEEKING behaviours promote the PLAY activities. Panksepp & Biven (2012) mention that PLAY is often confused, by many, with curiosity (and other activities promoted by SEEKING); however, they caution that although these two categories are

highly interactive, they are distinct. This confusion, and the complementary neurochemistries of these two systems, are in keeping with the overlap between the emotions of SEEKING and PLAY in the present study.

**The FEAR system.** The FEAR circuit is intended to help animals escape and avoid numerous dangers (Panksepp, 2011). Specifically, reaching safety is often a primary goal of an animals or humans, when faced with a dangerous situation. Importantly, Ikemoto & Panksepp (1999) assert that both avoidance behaviours (associated with FEAR) and appetitive behaviours (associated with SEEKING) utilise the SEEKING system in order to promote life-saving actions. In other words, the SEEKING system allows the FEAR system to stimulate the necessary action to avoid dangerous situations and promote survival, which indicates the recruitment of dopamine energised SEEKING impulses (Panksepp, 2005).

**The LUST and CARE systems.** The LUST system mediates sexual urges and the primal need to reproduce. The CARE system is a way to ensure that parents take care of and nurture their offspring and also to maintain social bonds (Panksepp, 2011). Panksepp and Biven (2012) hypothesise that the evolution of the CARE and LUST circuits were intimately intertwined. In other words, the neurochemical regulator of sexuality (LUST) also lies at the core of nurturing (CARE) behaviours (Panksepp, 2011). Therefore, the overlap between these two emotional systems in the present study is also in keeping with the overlap in their activities during waking. Furthermore, the SEEKING system is once again recruited in carrying out behaviours involved in fulfilling the tasks of the CARE and LUST systems (Panksepp & Biven, 2012). More specifically, urges to provide CARE arise from SEEKING arousal, and similarly, behaviours related to finding companionship and sexual desire are promoted by or through the SEEKING system.

**The GRIEF system.** The GRIEF system speaks of the emotional pain that ensues from loss or social separation. Panksepp, Solms, Schläpfer & Coenen (2012) emphasise that this system encourages social connection. Furthermore, the authors state that individuals, who have been socially separated, suffer emotionally in a distinct and powerfully unpleasant manner. The SEEKING urges sustain social comfort to help avoid separation distress (Panksepp, 1998). In other words, the GRIEF system interacts not only with the SEEKING system, but this interaction also seems to be grounded in CARE and LUST activities.

**The RAGE system.** Lastly, the RAGE system frequently works in resistance to the SEEKING system. Specifically, when SEEKING urges are not fulfilled RAGE can set in (Panksepp, 1998; 2010; 2011; Panksepp & Biven, 2012). RAGE is normally stimulated by frustrations and efforts to limit animals' unobstructed movement. In other words, when the SEEKING activities are restricted, RAGE is aroused (Panksepp, 2011). Then perhaps the less prevalent ratings of this emotion are due to RAGE working in contrast to the SEEKING system which is highly active during dreaming and thus not restricted.

***Interactions of the basic emotions in dreaming.*** The interactions of the basic emotions with each other as laid out above can be used to cautiously interpret the results of this investigation. First of all, the literature argues that the SEEKING system enables an individual to be energised or motivated for the quest to sustain an appealing and meaningful life (Kashdan, 2012). Then, two questions becomes of central importance to interpreting the present results in relation to dreaming. One, do the emotion systems in dreaming utilise the SEEKING system as they do in waking? If it is the case, that the functionality of the neurophysiology of the basic emotions is similar during sleep compared with waking, it may be that the SEEKING system is highly active when participants are experiencing certain emotions in dreams, such as GRIEF, PLAY, CARE, LUST and FEAR.

Assuming that this is so, the prevalence of SEEKING within dreams may be a problematic way of drawing conclusions about the presence of activity within the ML-DA system during dreaming. Rather, it may be more valid to draw conclusions on the role that the SEEKING system may play in generating dreams (the dopaminergic theory), based on the ways in which the SEEKING system has been described to relate to the other basic emotion systems. Two, to what extent would any of the emotions, so reliant on the SEEKING system during waking, be active during dreaming if the SEEKING system were not functioning properly? The exploration of this question would be a possible future research endeavour.

Moreover, the interactions of the basic emotions seem to suggest that the way emotion activities occur in waking, may also be the same in dreaming. In that case, dreaming activity should be investigated to see whether the activities of the basic emotions in dreaming are the same as in waking. This will allow for better inferences to be made as to how the basic emotions may be represented in dream content.

Additionally, the adequacy of the basic emotions index to differentiate the basic emotions in dreaming requires further discussion. The problems with the basic emotions measure seem to indicate the terminological problems in emotion research (Panksepp, 2010). That is to say, that perhaps participants did not adequately recognise some of the terminology used in the measure, despite the groupings of the description words being carefully considered. Also, the coalescing of some of the basic emotions might also suggest that participants were unable to distinguish some of the emotions, especially closely related emotions such as LUST and CARE and PLAY and SEEKING, which is perhaps due to the complementary and complex nature of the relationship between these emotions a system. This overlap creates complexities that cannot be avoided (Panksepp & Biven, 2012) and make the interpretation of the results more challenging and circumspect.

**Threat-Simulation Theory.** Moreover, the high preponderance of the FEAR emotion may also allude to the Threat-simulation theory (TST) as an interpretation for the FEAR emotions. This view holds that negative emotions, such as fear, are present in dreams to facilitate threat avoidance skills. The incidence of fear and threatening emotions in dreams serve the purpose of aiding the dreamer in safely finding a solution to a possible threat and being able to re-enact that during the dreaming process (Revonsuo, 2000; Valli et al., 2005). This would certainly provide another tentative explanation of why the negative emotions, particularly the FEAR emotion, were so prevalent. It is worthwhile to note, however, that Malcolm-Smith et al. (2012) state that TST and the SEEKING theory are not necessarily incompatible. They elaborate that TST is not proposed to be the only function of dreaming and that many of the FEAR behaviours require activation of the SEEKING behaviour. Once more, future research could investigate the preponderance of FEAR with the activities that occur in dreams, in order to ascertain whether these activities subserve behaviours that would be consistent with a highly active SEEKING system during waking.

**Evidence of the SEEKING system and neural areas of emotions in dreaming.**

Although not directly confirmed during this study, there is abundant research that suggests that the SEEKING system is highly active during sleep and dreaming. Also, recent studies in dream and sleep research have reported activation of emotional systems, especially amplified activity in the amygdala all through the mesolimbic dopaminergic regions during REM sleep (Peregamvros, Dan-Vu, Desseilles & Schwartz, 2013). Moreover, neuroimaging, neurophysiological and brain



lesion studies have revealed; (1) that during sleep there are areas which are specified by activation and deactivation patterns related to emotion and reward areas (which is related to the SEEKING system see Panksepp, 1998; Braun et al., 1997; Dahan et al., 2007; Lansink et al., 2008; Léna et al., 2005; Maquet et al., 1996); (2) that some key structures of the SEEKING system are also activated during sleep – the ML-DA pathway to be precise (Léna et al., 2005; Maquet et al., 1996; Perogamvros & Schwartz, 2012; Solms, 2000); and (3) an elevated dopamine level in the ML-DA system during sleep is theorised to be important in the genesis of dreams (Solms, 2000).

Many of these regions which are found to be highly active during dreaming are the same areas that also generate the basic emotions. This provides neurological evidence that the basic emotions should be active during the dreaming process, which is visible in the ratings of the basic emotions in the dream content. Moreover, if the SEEKING system, which is described above as complementing the other basic emotions, is found to be so active during sleep and dreaming, then studying the basic emotions in dreaming offers a distinct advantage over studying other taxonomies of emotion.

With regard to the dopaminergic theory, the SEEKING system was not most prevalently rated emotion. However when considering the description of the relationship between the SEEKING system and the other emotions, it is plausible to say that although the SEEKING system was not the most prevalent emotion, it was still active via these underlying relationships with the other basic emotions. However, this is only a tentative interpretation, based upon the literature on the underlying neurophysiology of the SEEKING system. Although, these results do not directly confirm the dopaminergic hypothesis, they also do not contradict it, it is important to consider the caution that needs to be heeded considering the assumptions and unanswered questions raised during this investigation. Further research would be required to be able to make more substantial conclusions with this regard.

### **Limitations and Recommendations**

First of all, the psychometric properties of the basic emotions index have not been confirmed, as the index was used for the first time during this study. Although the index was generally used as an aid to help participants identify their emotions, careful consideration must be taken when interpreting the results derived from this instrument. Notwithstanding, the factor analysis revealed that overall the index was consistent with theory on the basic emotions, and the

reliability analysis also suggested that most of the items in the components were measuring the same underlying concept. However, other items on the index were problematic and had to be removed from the analysis. The problematic items should be revised and the scale should be tested with suitable items. Additionally, some items showed low reliability within their components, but they were retained for this analysis to maintain the simple structure of the index and also because the reliability was not severely low. Although in future research these items should be revised. While the results indicate that the emotions overlapped in ways that are consistent with the neurophysiology of certain basic emotions, it is recommended that for future research, the basic emotions instrument should be revised to ensure the reliability of the measure. An extensive pilot study could be undertaken with this regard.

Furthermore, although careful consideration was made to instruct and train participants in the use of the dream diary, there were a few participants who did not follow the exact instructions. Urbina (1981) suggests that adequate training should be provided to ensure that participants follow the instructions as provided. For future research, more extensive training needs to be provided, to ensure that participants definitively understand and follow the instructions and procedures of the study.

Lastly, a theoretical limitation of the study is that, as there was no direct observations of the neurophysiological activity of the basic emotions whilst participants were sleeping, many of the questions that were brought up by the study create much room for interpretation and thus any interpretation could mostly only be made in hypothetical and indirect ways, until such time that those questions are answered. Due to the study only asking about the feeling state of the dreamer, behaviours related to the basic emotions in waking should be looked for in dreams to see if there is a link in the feeling state and the activity in the dreams.

### **Summary and Conclusion**

This was the first time that the prevalence of the basic emotions have been characterised within dream content, and as such this offers an opportunity to try and draw from the knowledge on the basic emotions to dreaming. In general, the prevalence of the basic emotions in dream content was well represented and indicates the relative contribution of each of the basic emotion systems in dream content. The results also indicate that activity within the SEEKING system may underlie, to some degree, the presence of GRIEF, PLAY, LUST, CARE and FEAR in dream content as well (Panksepp & Biven, 2012). This study has proposed that while participants

do not report the core SEEKING emotions, they are reporting emotions that are critically reliant on activity within the SEEKING system. This may also be said for the interaction between the other complementary emotions, such as PLAY and CARE. However, this is only the case if the emotions interact with each other in dreaming as they do in waking. Therefore, an investigation into the activities of the basic emotions in dreaming and in waking may consolidate findings from this study. Additionally, the TST was explored as a possible avenue for the preponderance of the FEAR emotion, as this emotion is central to the purpose of TST.

In conclusion, studying emotions in dreams on the basis of their neurophysiology provides a better way of understanding emotions in dreaming. Thus the findings provide an avenue for understanding the ways in which the neurophysiology of the basic emotions relate to the highly emotional nature of dream content. Such findings potentially provide better insight into understanding the role and function that emotions play in dreaming and potentially also provide insight on the dreaming process itself in relation to theories such as the dopaminergic hypothesis of dreaming. However, the pertinent questions which have been raised need to be answered in order to improve and consolidate the interpretations of this study.

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**Appendix A**  
**Beck Depression Inventory - II**



# Beck Depression Inventory

## Baseline

V 0477

CRTN: \_\_\_\_\_ CRF number: \_\_\_\_\_

Page 14 patient initials: \_\_\_\_\_

# BDI-II

Date: \_\_\_\_\_

Name: \_\_\_\_\_ Marital Status: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

Occupation: \_\_\_\_\_ Education: \_\_\_\_\_

**Instructions:** This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

### 1. Sadness

- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it.

### 2. Pessimism

- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

### 3. Past Failure

- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

### 4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

### 5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

### 6. Punishment Feelings

- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

### 7. Self-Dislike

- 0 I feel the same about myself as ever.
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

### 8. Self-Criticalness

- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all of my faults.
- 3 I blame myself for everything bad that happens.

### 9. Suicidal Thoughts or Wishes

- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

### 10. Crying

- 0 I don't cry anymore than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

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Subtotal Page 1

Continued on Back

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NR15645



V 0477

## Beck Depression Inventory

CRTN: \_\_\_\_\_ CRF number: \_\_\_\_\_

Baseline

Page 15 patient initials: \_\_\_\_\_

### 11. Agitation

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

### 12. Loss of Interest

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

### 13. Indecisiveness

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making any decisions.

### 14. Worthlessness

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile and useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

### 15. Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

### 16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual.
- 3a I sleep most of the day.
- 3b I wake up 1-2 hours early and can't get back to sleep.

### 17. Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time.

### 18. Changes in Appetite

- 0 I have not experienced any change in my appetite.
- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat greater than usual.
- 2a My appetite is much less than before.
- 2b My appetite is much greater than usual.
- 3a I have no appetite at all.
- 3b I crave food all the time.

### 19. Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

### 20. Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

### 21. Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much less interested in sex now.
- 3 I have lost interest in sex completely.

Subtotal Page 2

Subtotal Page 1

Total Score

NR15645

## **Appendix B**

### **Dream Recall Frequency Scale**

How often have you recalled your dreams recently (in the past several months)?

Almost every morning

Several times a week

About once a week

Two or three times a month

About once a month

Less than once a month

Never

## Appendix C

### PITTSBURGH SLEEP QUALITY INDEX

The following questions relate to your usual sleep habits during the past month *only*. Your answers should indicate the most accurate reply for the *majority* of days and nights in the past month.

Please answer all questions

1. During the past month, when have you usually gone to bed at night?

USUAL BED TIME \_\_\_\_\_

2. During the past month, how long (in minutes) has it usually take you to fall asleep each night

NUMBER OF MINUTES \_\_\_\_\_

3. During the past month, when have you usually gotten up in the morning?

USUAL GETTING UP TIME \_\_\_\_\_

4. During the past month, how many hours of actual sleep did you get at night (This may be different than the number of hours you spend in bed.)

HOURS OF SLEEP PER NIGHT \_\_\_\_\_

For each of the remaining questions, check the one best response. Please answer *all* questions.

5. During the past month, how often have you had trouble sleeping because you...

(a) Cannot get to sleep within 30 minutes

Not during the past month ____	Less than once a week ____	Once or twice a week ____	Three or more times a week ____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

(b) Wake up in the middle of the night or early morning

Not during the past month ____	Less than once a week ____	Once or twice a week ____	Three or more times a week ____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

(c) Have to get up to use the bathroom

Not during the past month ____	Less than once a week ____	Once or twice a week ____	Three or more times a week ____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

(d) Cannot breathe comfortably

Not during the past month ____	Less than once a week ____	Once or twice a week ____	Three or more times a week ____
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(e) Cough or snore loudly

Not during the past month ____	Less than once a week ____	Once or twice a week ____	Three or more times a week ____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

(f) Feel too cold

Not during the past month ____	Less than once a week ____	Once or twice a week ____	Three or more times a week ____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

(g) Feel too hot

Not during the past month \_\_\_      Less than once a week \_\_\_      Once or twice a week \_\_\_      Three or more times a week \_\_\_

(h) Had bad dreams

Not during the past month \_\_\_      Less than once a week \_\_\_      Once or twice a week \_\_\_      Three or more times a week \_\_\_

(i) Have pain

Not during the past month \_\_\_      Less than once a week \_\_\_      Once or twice a week \_\_\_      Three or more times a week \_\_\_

(j) Other reason(s), please describe

---



---

Not during the past month \_\_\_      Less than once a week \_\_\_      Once or twice a week \_\_\_      Three or more times a week \_\_\_

6. During the past month, how would you rate your sleep quality overall?

Very good \_\_\_\_\_

Fairly good \_\_\_\_\_

Fairly bad \_\_\_\_\_

Very bad \_\_\_\_\_

7. During the past month, how often have you take medicine (prescribed or "over the counter") to help you sleep?

Not during the past month \_\_\_      Less than once a week \_\_\_      Once or twice a week \_\_\_      Three or more times a week \_\_\_

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity

Not during the past month \_\_\_      Less than once a week \_\_\_      Once or twice a week \_\_\_      Three or more times a week \_\_\_

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all \_\_\_\_\_

Only a slight problem \_\_\_\_\_

Somewhat of a problem \_\_\_\_\_

A very big problem \_\_\_\_\_



10. Do you have a bed partner or roommate

No bed partner or roommate \_\_\_\_\_  
 Partner/roommate in other room \_\_\_\_\_  
 Partner in same room, but not same bed \_\_\_\_\_  
 Partner in same bed \_\_\_\_\_

If you have a roommate or bed partner, ask him/her how often in the past month you have had...

(a) Loud snoring

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_      Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

(b) long pauses between breaths while asleep

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_      Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

(c) Legs twitching or jerking while you sleep

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_      Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

(d) Episodes of disorientation or confusion during sleep

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_      Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

(e) Other restlessness while you sleep; please describe \_\_\_\_\_

---

Not during the past month \_\_\_\_\_      Less than once a week \_\_\_\_\_      Once or twice a week \_\_\_\_\_      Three or more times a week \_\_\_\_\_

## Appendix D

### DREAM DIARY

**Participant number:**

#### Instructions

Dear participant

1. This is a vital part of the reporting procedure, so we want you to be as careful and accurate as possible when you do this part.
2. We would like you to, **after waking up**; record any dream that you had in the space provided. This ensures that the details of your dreams are as fresh in your mind as possible. Please report your dream experience as accurately as possible, both in your free description and using the questionnaire.
3. If you have more than one dream on a particular day, please record them separately.
4. When recording the **Date**, indicate it as it is when you are actually recording the dream.
5. If you have not dreamt, please indicate this on the calendar on the back of this page.
6. After describing your dream, kindly also answer the questions that follow, as these relate to your dream experience.
7. You can simple draw a circle around the answer that applies to your dream.
8. **Regarding Question 3** - Please circle all the emotions that apply to your dream. You are allowed to circle more than one of the emotions.
9. Please **do not** circle emotions that were **not present** in your dream.
10. Also, please rate the intensity of each emotion that you circled (from 1-3), in the space provided

11. Vocabulary definitions of all the emotions are provided. Please use them if you are not certain of the meaning of any of the emotions.

**CALENDAR****Date:****Did you dream?**

---

Yes / No

---

Yes / No

---

Yes / No

---

Yes / No

---

Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

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Yes / No

---

Yes / No

---

Yes / No

---

Yes / No

---

Yes / No

---

Yes / No

---

Yes            /            No

## VOCABULARY DEFINITIONS

**Affection** - a feeling of liking/ nurturing/ love for a person or place

**Aggression** - spoken or physical behaviour that is threatening or involves harm to someone or something

**Amusement** - the feeling of being entertained or made to laugh

**Anger** - a strong feeling that makes you want to hurt someone or be unpleasant because of something unfair or unkind that has happened

**Anticipation** - a feeling of excitement about something that is going to happen in the near future

**Anxiety** - an uncomfortable feeling of nervousness or worry about something that is happening or might happen in the future

**Apprehension** - worry about the future, or a fear that something unpleasant is going to happen

**Curiosity** - an eager wish to know or learn about something

**Delight/Joy** - great pleasure or happiness

**Despair** - the feeling that there is no hope and that you can do nothing to improve a difficult situation

**Excitement** - a feeling of being happy and enthusiastic

**Exuberance** - very energetic (especially of people and their behaviour)

**Fear** - an unpleasant emotion or thought that you have when you are frightened or worried

by something dangerous, painful, or bad that is happening

**Feelings of gratification** - feelings of pleasing someone, or satisfying a wish or need

**Grief** - great sadness

**Loss** - the fact that you no longer have something or have less of something

**Love** - to like another person very much or to have strong feelings of liking a friend or person in your family

**Motivation** - enthusiasm for doing something

**Nurturance** - feelings of taking care of, feeding, and protecting someone or something

**Personal Attachment** - a long-term bond

**Playfulness** - feeling or atmosphere of something or someone being funny, make - believe and not serious

**Rage** - extreme or violent anger

**Sexual Desire** - to sexually want someone

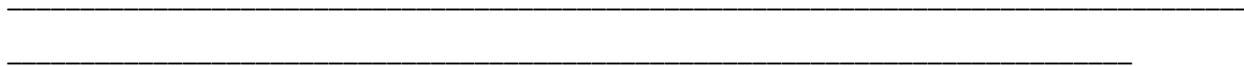
**Sexual Love** - to love someone in a sexual manner

**Sorrow** - a feeling of great sadness

**Trepidation** - fear or worry about what is going to happen

**Urge to Search** - a strong wish, to look for something or someone





**Q1 HOW MUCH** did you dream?

3: greatly                      2: fairly                      1: slightly                      0: not at all

**Q2** How **EMOTIONAL** was your dream overall?

3: greatly                      2: fairly                      1: slightly                      0: not at all

**Q3** What **BASIC EMOTIONS** were present in the dream?  
(Please also rate the emotions in the space provided)

3: intense      2: moderate      1: slightly

Anger		Aggression		Rage	
-------	--	------------	--	------	--

Anxiety		Fear		Apprehension	
---------	--	------	--	--------------	--

Grief		Sorrow/ Despair		Loss	
-------	--	-----------------	--	------	--

Curiosity/ Urge to search		Anticipation		Motivation	
---------------------------	--	--------------	--	------------	--

Nurturance/ Care		Personal Attachment		Affection/Love	
------------------	--	---------------------	--	----------------	--

Sexual Love		Sexual Desire		Feelings of gratification	
-------------	--	---------------	--	---------------------------	--

Joy/ Delight		Exuberance/ Excitement		Playfulness/ Amusement	
--------------	--	------------------------	--	------------------------	--

**Q4** How **VISUAL** was the dream?

4 = very much detail and clarity                      1 = vague or hazy with no detail

3 = moderate detail and clarity                      0 = no visual imagery

2 = dream with only a little detail and clarity

**Q5** What was **YOUR ROLE** in the dream?

1: main character      2: active participant      3: present but inactive      4: passive observer

**Q6** Were you trying **TO DO** anything in your dream?

3: greatly                      2: moderately                      1: slightly                      0: not at all

**Q7** Were you **ACTIVELY MOVING** through the dream environment?

3: greatly                      2: moderately                      1:                      0: not at all

**Q8** How **PLEASANT** was the dream?



7: very pleasant  
6: moderately pleasant  
5: slightly pleasant  
4: Neutral

3: slightly unpleasant  
2: moderately unpleasant  
1: very unpleasant

---

**Appendix E**  
**Student Portal Advertisement & Participant Consent Form**  
**University of Cape Town**  
**Psychology Department**  
**Phase 1**

**Online Survey**

Dear student: You are being invited to participate in a research study being conducted by researchers from the University of Cape Town. The purpose of this study is to investigate the basic emotions in dreaming. There are no predictions for this study, and it is largely exploratory. Questions regarding medical conditions, previous neurological injury and details of substance use are for control purposes only. This study forms part of an Honours degree being undertaken in the Department of Psychology, University of Cape Town, by Daisy (Supervised by Professor. Mark Solms).

**Study Procedures:**

If you decide to participate in this study, you will be asked to fill in some questionnaires. If you would like to see the questionnaires before deciding to take part, please inform the researcher of this.

**Possible Risks:**

It will take about 45-60 minutes of your time to answer the questionnaires. There are some questions of a personal nature that may make you feel uncomfortable, or cause some discomfort. If you feel that you would like to consult with someone about these feelings, or if you feel, after answering the questionnaires, that you are concerned about something, please contact the primary researcher (Daisy Gamxamus) and she will put you into contact with the Student Wellness Centre. It is also required that all questions be answered in this study for you to receive your SRPP points. All information is kept strictly confidential (as will be explained shortly).

**Possible Benefits:**

If you choose to take part in this study, you will be awarded SRPP points, which will help you to fulfil your DP (Duly Performed) requirement for the semester. Although there are no other direct benefits to you, we hope that information gained from this study will help us investigate different aspects relating to sleep and dreaming.

**Alternatives:**

You may choose not to participate in this study, and to participate in another study in order to fulfil your SRPP requirement.

**Voluntary Participation:**

Participation in this study is completely voluntary. If you decide to participate, you are free to change your mind and stop taking part at any time without any effect on your relationship with the Department of Psychology, University of Cape Town, or any staff member in this Department or at the University. If you at first decide to take part, and then later decide you want to stop taking part, please contact the primary researcher (Warren King) on the contact details listed below.

**Confidentiality:**

Information about you obtained for this study will be kept strictly confidential. All the questionnaires and all other written records will be kept in a locked filing cabinet, accessible only to the primary researcher (Daisy Gamxamus). Once collected, the information will be transferred to a Microsoft Excel spread sheet and then onto a program for statistical data analysis. Both spread sheets will be kept in a password-protected folder on the primary researcher's computer, which is also password protected. The information obtained will not become a part of your academic record in any way, nor will it be made available to anyone else. Any reports or publications about the study will not identify you or any other study participant.

**Reporting of the research results and disclosure of information:**

The results of this research will be reported in an Honours dissertation, written by the primary researcher (Daisy Gamxamus). The results may also be published in a journal article in a peer-reviewed academic journal. Every step will be taken to ensure your confidentiality in the reporting of these results. Please also note that researchers have a legal obligation to disclose any information gathered during the research about things such as child physical or sexual abuse, deliberate neglect, family violence, noticeable diseases such as tuberculosis, or any information sought under a warrant or subpoena.

**Questions and information relating to results:**

Any study-related questions, problems or emergencies should be directed to the individuals listed below. If you would like to be informed of the research results, in terms of your individual results or the results as a whole, please contact Ms. Daisy Gamxamus on the contact details

below:

Ms. Daisy Gamxamus 0712239730 (available 24 hours, 7 days a week) e-mail:

[daisygamxamus@gmail.com](mailto:daisygamxamus@gmail.com)

Professor Mark Solms 021-650-3437, email: [Mark.solms@uct.ac.za](mailto:Mark.solms@uct.ac.za)

Ros Adams (Psychology secretary, UCT) 021-650-3417,

email: [Rosalind.adams@uct.ac.za](mailto:Rosalind.adams@uct.ac.za)

Questions about your rights as a study participant, comments or complaints about the study also may be presented to the Research Ethics Committee, Department of Psychology, University of Cape Town, Rondebosch, 7701, or by telephone to 021 650 4608, or by email to [kevin.thomas@uct.ac.za](mailto:kevin.thomas@uct.ac.za)

### **Consent**

I have read the above and am satisfied with my understanding of the study, its possible benefits, risks and alternatives. My questions about the study have been answered. I hereby voluntarily consent to participation in the research study as described.

1. I give my informed consent to participate in this research

(Participant will be required to answer “yes” here before they continue to answer the questions)

**Appendix F**  
**General Medical History Survey Questions**

### 1. Personal Details

#### Personal Details

Name

Surname

Gender

Student Number

Course Code (for SRPP point)

### 2. Date of Birth (YY/MM/DD)

### 3. Age

Age

### 4. Contact Details

Tel. Number (home)

Tel. Number (cell)

Preferred Email Address

### Medical Details

#### 5. Are you right-handed?

Yes

No

Additional Comment

#### 6. Do you take any kind of medication on a regular basis?

Yes

No

If yes, please specify what kind

### 7. Do you smoke cigarettes?

- Yes  
 No

If no, do you ever smoke occasionally?

### 8. Have you ever had a head injury?

- Yes  
 No

If yes, describe the most severe one

### 9. Any surgery/hospitalisation as a result of your head injury?

- Yes  
 No

If yes; please specify

### 10. Have you ever been diagnosed with asthma?

- Yes  
 No

### 11. Have you ever had seizures or an epileptic fit?

- Yes  
 No

### 12. Has anyone in your immediate family (siblings, parents) ever been diagnosed with epilepsy?

- Yes
- No

If yes, please specify who

**13. Have you ever been diagnosed with a psychiatric illness?**

- Yes
- No

If yes, please specify

**14. Have you ever had any neurological condition?**

- Yes
- No

If yes, please specify

**15. Have you ever been diagnosed with a sleep disorder?**

- Yes
- No

**16. If there are any other details about your medical history, that you have not mentioned yet, please add them here:**

If there are any other details about your medical history, that you have not mentioned yet, please add them here:

**17. Do you acknowledge that all of the details (e.g. age & medical details) given to the researcher by you are correct?**

- Yes
- No



**Appendix G**  
**Participant Consent Form**  
**University of Cape Town**  
**Psychology Department**  
**Phase 2: Pilot**

Dear Participant

You are being asked to take part in a research study. This form provides you with information about the study and seeks your consent for the collection, use and disclosure of your dream recall reports, as well as other information necessary for the study. The Principal Investigator (Daisy Gamxamus) or a representative of the Principal Investigator will also describe this study to you and answer all of your questions. Your participation is entirely voluntary. Before you decide whether or not to take part, read the information below and ask questions about anything you do not understand. For your information – this study is covered by UCT’s No Fault Insurance Policy.

**1. Name of Participant**

---

**2. Principal Investigator and Telephone Number(s)**

Daisy Gamxamus

University of Cape Town

0712239730

daisygamxamus@gmail.com

**3. What is the purpose of this research study?**

This research aims to investigate sleep and dreaming in relation to emotions.

This the first stage of phase two of the study, which is called the pilot.

**4. What will be done if you take part in this research study?**

In this experiment you will be required to maintain a dream diary for a specified time, in this case, only for one day.

The dream diary will involve you reporting your dreams, after which your dream diary will be collected.

This stage is done in order to assess the research instrument that will be used.

After completing this study, you will be informed in detail about the design of the study and the research questions we hope to address with this study. You will also have the opportunity to ask questions and thus learn more about psychological research. If you have any questions now or at any time during the study, you may contact the Principal Investigator listed in #3 of this form.

**5. If you choose to participate in this study, how long will you be expected to participate in the research?**

Dream diary reporting will take approximately 1 day (all of this will take place in your home environment).

**6. How many people are expected to participate in the research?**

5

**7. What are the possible discomforts and risks?**

There are no risks to the study. The only possible discomfort will be to record your dreams (or lack of dreaming) on a daily basis for a specified period of time. However, we hope that this discomfort will be minimised by your being able to do this from the comfort of your home environment.

**8. What are the possible benefits to you?**

You will receive SRPP points for participation (2 point for the pilot dream diary).

**10. If you choose to take part in this research study, will it cost you anything?**

No, there will be no costs to you.

**11 a. Can you withdraw from this research study?**

Participation in this study is completely voluntary. If you decide to participate, you are free to change your mind and stop taking part at any time without any effect on your relationship with the Department of Psychology, University of Cape Town, or any staff member in this Department or at the University.

However, you will have to complete the 1 dream and return the feedback sheet study in order to receive your SRPP points.

If you have any questions regarding your rights as a research subject, you may phone the Psychology Department offices at 021-650-3430.

**11 b. If you withdraw, can information about you still be used and/or collected?**

Information already collected may be used.

**12. Once personal and performance information is collected, how will it be kept secret (confidential) in order to protect your privacy?**

Information collected will be stored in locked filing cabinets or in computers with security passwords. Only certain people have the right to review these research records. These people include the researchers for this study and certain University of Cape Town officials. Your research records will not be released without your permission unless required by law or a court order.

**13. What information about you may be collected, used and shared with others?**

The information gathered from you will be: (1) your dream diary reports. If you agree to be in this research study it is possible that some of the information collected might be copied into a “limited data set” to be used for other research purposes. If so, the limited data set may only include information that does not directly identify you. For example, the limited data set **cannot** include your name, address, telephone number, or so forth that link you to the information in the limited data set.

**14. How will the researcher(s) benefit from your being in the study?**

In general, presenting research results helps the career of a scientist. Therefore, the Principal Investigator and others attached to this research project may benefit if the results of this study are presented at scientific meetings or in scientific journals. This study is being undertaken for the Principal Investigator’s Honours degree.

**15. Signatures**

As a representative of this study, I have explained to the participant the purpose, the procedures, the possible benefits, and the risks of this research study; and how the participant’s performance and other data will be collected, used, and shared with others:

Signature of Person Obtaining Consent and Authorization

Date

\_\_\_\_\_

\_\_\_\_\_

You have been informed about this study's purpose, procedures, possible benefits, and risks; and how your performance and other data will be collected, used and shared with others. You have received a copy of this form. You have been given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time.

You voluntarily agree to participate in this study. You hereby authorize the collection, use and sharing of your performance and other data. By signing this form, you are not waiving any of your legal rights.

Signature of Person Consenting and Authorizing

Date

\_\_\_\_\_

\_\_\_\_\_

Please indicate below if you would like to be notified of future research projects conducted by our research group:

\_\_\_\_\_ (initial) Yes, I would like to be added to your research participation pool and be notified of research projects in which I might participate in the future.

Method of contact:

Phone number: \_\_\_\_\_

E-mail address: \_\_\_\_\_

Mailing address: \_\_\_\_\_

\_\_\_\_\_

## Appendix H

### FEEDBACK FORM FOR DREAM DIARIES PILOT

Dear Participant

Thank you for participating in the pilot of the dream diary study. Kindly please take a few minutes to give us some feedback on your experience of using the diary. Please be sure to indicate anything that you thought was problematic, you did not understand or your thought that could be improved, in the comments section.

1. Were the instructions clear?

Yes / No

If No, please

Specify: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Were the vocabulary definitions clear?

Yes / No

If No, please

Specify: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Was it easy to record your dreams in the space provided?

Yes / No

If No, please

Specify: \_\_\_\_\_

- 
- 
4. Was the questionnaire clear?

Yes / No

If No, please

Specify: \_\_\_\_\_

---

---

5. Did you understand the meaning of all the emotions?

Yes / No

If No, please

Specify: \_\_\_\_\_

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6. Overall, was it difficult to use the dream diary?

Yes / No

If Yes, please

Specify: \_\_\_\_\_

---

---

---

7. Do you have any other comments, concerns or suggestions

Yes / No

If Yes, please

Specify: \_\_\_\_\_

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**Appendix I**  
**Participant Consent Form**  
**University of Cape Town**  
**Psychology Department**  
**Phase 2**

Dear Participant

You are being asked to take part in a research study. This form provides you with information about the study and seeks your consent for the collection, use and disclosure of your dream recall reports, as well as other information necessary for the study. The Principal Investigator (Daisy Gamxamus) or a representative of the Principal Investigator will also describe this study to you and answer all of your questions. Your participation is entirely voluntary. Before you decide whether or not to take part, read the information below and ask questions about anything you do not understand. For your information – this study is covered by UCT’s No Fault Insurance Policy.

**8. Name of Participant**

---

**9. Principal Investigator and Telephone Number(s)**

Daisy Gamxamus

University of Cape Town

0712239730

Danyal.Sleepstudy@gmail.com

**10. What is the purpose of this research study?**

This research aims to investigate sleep and dreaming in relation to emotions.

**11. What will be done if you take part in this research study?**

In this experiment you will be required to maintain a dream diary for a specified time, between 3 and four weeks.

The dream diary will involve you reporting your dreams every morning, after which your dream diaries will be collected for analysis.

After completing this study, you will be informed in detail about the design of the study and the research questions we hope to address with this study. You will also have the opportunity to ask questions and thus learn more about psychological research. If you have any questions now or at any time during the study, you may contact the Principal Investigator listed in #3 of this form.

**12. If you choose to participate in this study, how long will you be expected to participate in the research?**

Dream diary reporting will take approximately 3- 4 weeks (all of this will take place in your home environment).

**13. How many people are expected to participate in the research?**

20

**14. What are the possible discomforts and risks?**

There are no risks to the study. The only possible discomfort will have to record your dreams (or lack of dreaming) on a daily basis for a specified period of time. However, we hope that this discomfort will be minimised by you being able to do this from the comfort of your home environment.

**8. What are the possible benefits to you?**

You will receive SRPP points for participation (10 points for the dream diary portion of the study) and 1 more SRPP point for the questionnaire.

**10. If you choose to take part in this research study, will it cost you anything?**

No, there will be no costs to you.

**11 a. Can you withdraw from this research study?**

Participation in this study is completely voluntary. If you decide to participate, you are free to change your mind and stop taking part at any time without any effect on your relationship with the Department of Psychology, University of Cape Town, or any staff member in this Department or at the University.

If you have any questions regarding your rights as a research subject, you may phone the Psychology Department offices at 021-650-3430.

**11 b. If you withdraw, can information about you still be used and/or collected?**



Information already collected may be used.

**16. Once personal and performance information is collected, how will it be kept secret (confidential) in order to protect your privacy?**

Information collected will be stored in locked filing cabinets or in computers with security passwords. Only certain people have the right to review these research records. These people include the researchers for this study and certain University of Cape Town officials. Your research records will not be released without your permission unless required by law or a court order.

**17. What information about you may be collected, used and shared with others?**

The information gathered from you will be: (1) your dream recall reports. If you agree to be in this research study it is possible that some of the information collected might be copied into a “limited data set” to be used for other research purposes. If so, the limited data set may only include information that does not directly identify you. For example, the limited data set **cannot** include your name, address, telephone number, ID number, or any other photographs, numbers, codes, or so forth that link you to the information in the limited data set.

**18. How will the researcher(s) benefit from your being in the study?**

In general, presenting research results helps the career of a scientist. Therefore, the Principal Investigator and others attached to this research project may benefit if the results of this study are presented at scientific meetings or in scientific journals. This study is being undertaken for the Principal Investigator’s Honours degree.

**19. Signatures**

As a representative of this study, I have explained to the participant the purpose, the procedures, the possible benefits, and the risks of this research study; and how the participant’s performance and other data will be collected, used, and shared with others:

Signature of Person Obtaining Consent and Authorization

Date

---



---

You have been informed about this study's purpose, procedures, possible benefits, and risks; and how your performance and other data will be collected, used and shared with others. You have received a copy of this form. You have been given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time.

You voluntarily agree to participate in this study. You hereby authorize the collection, use and sharing of your performance and other data. By signing this form, you are not waiving any of your legal rights.

Signature of Person Consenting and Authorizing

Date

\_\_\_\_\_

\_\_\_\_\_

Please indicate below if you would like to be notified of future research projects conducted by our research group:

\_\_\_\_\_ (initial) Yes, I would like to be added to your research participation pool and be notified of research projects in which I might participate in the future.

Method of contact:

Phone number: \_\_\_\_\_

E-mail address: \_\_\_\_\_

Mailing address: \_\_\_\_\_

\_\_\_\_\_

## **Appendix J**

### **Principal Components Analysis of the Basic Emotions Index**

A self-report measure based on Panksepp's (1998) basic emotions was constructed for this study. The Basic Emotions Index included seven basic emotions each defined by three emotions that best describe the component (see Measures and Appendix D). As this is a novel means of assessing the basic emotions, an exploratory principal component analysis was preferred in order to investigate the simple structure of the index (Cudeck, 2000). In order to deal with the dependency in the data due to each participant having contributed multiple dream reports, the unstandardized residuals instead of raw scores were used (Figueredo, Petrinovich & Ross, 1992).

#### **Analysis One**

A principal component analysis (PCA) was conducted on the 21 items of the Basic Emotions Index, using orthogonal rotation via the direct oblimin method, with delta set to 0. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy, to determine a large enough sample size for the analysis,  $KMO = .72$  ('good' according to Field, 2009), and all the individual KMO values for individual items were above the acceptable limit of .50, (individual KMO values reveal whether the individual items are appropriate for the analysis; Field, 2009), except Motivation (.49). Bartlett's test of sphericity  $\chi^2(210) = 1036.14$ ,  $p < .001$ , indicated that the correlations between the items were adequately large for PCA. Communalities after extraction were all above .5, with 15 items (60%) above the recommended .7 (Field, 2009), except for Curiosity/Urge to Search (.31), Feelings of gratification (.45), and Playfulness/Amusement (.47), indicating that these variables could potentially be problematic owing to a lack of shared variance. The determinant for the correlation matrix greater than the suggested limit of .00001 (Fields, 2009), indicating no issues with multicollinearity in the data.

An initial PCA was run on the data (Table 4). Six components were extracted with eigenvalues over Kaiser's criterion of 1, and in combination explained 63.53% of the variance. The scree plot also clearly showed inflexions that justified retaining six components (Figure 6). The pattern matrix (Table 4) showed the six extracted components to be mostly independent;

however, the item Nurturance/Care loaded ambiguously on too many factors and the items Curiosity/Urge to seek and Playfulness/Amusement did not load significantly onto any of the components. Therefore, in an attempt to produce a more meaningful simple structure, these items were removed from the model for further exploration of the component structure.

Table 4

*Pattern Matrix<sup>a</sup> for Analysis 1 of the PCA*

	Rotated Components					
	1	2	3	4	5	6
Affection_Love	.837					
Sexual/Desire	.819					
Sexual/Love	.782					
Personal/Attachment	.749					
Nurturance/Care	.562				-.445	.404
Feelings of Gratification	.433					
Joy/Delight	.429					
Anxiety		.831				
Fear		.811				
Apprehension		.690				
Rage			.863			
Aggression			.855			
Anger			.804			
Loss				-.858		
Grief				-.834		
Despair				-.702		
Anticipation					.762	
Exuberance/Excitement					.559	
Playfulness/Amusement						
Motivation						.844
Curiosity/Urge to search						
Eigenvalues	4,36	2,75	1,95	1,77	1,39	1,12
% of variance	20,77	13,09	9,30	8,41	6,61	5,35

Note. Factor loadings <.40 were suppressed. Extraction Method: Principal Component Analysis. Normalization.a Rotation Method: Oblimin with Kaiser a Rotation converged in 7 iterations.



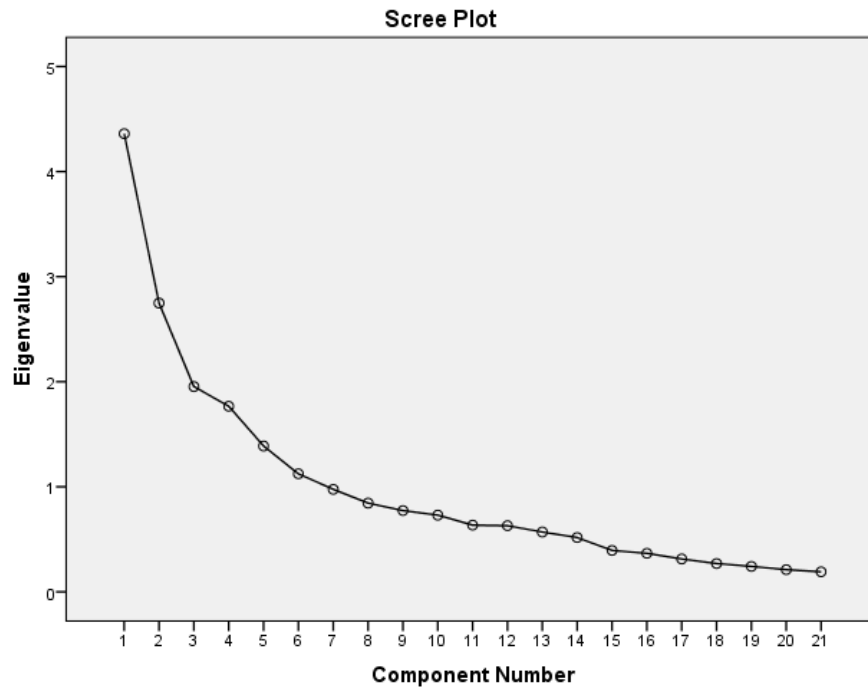


Figure 6. *Scree Plot to show the factor retention.*

### **Analysis Tow**

The KMO measure after the removal of the two variables remained the same as in analysis,  $KMO = .70$ , and Bartlett's test of sphericity  $\chi^2(153) = 883.26, p < .0001$ , still showed that correlations between the items were adequately large for PCA. All the KMO values for individual items were above the acceptable limit of .50 (Field, 2009), except for Motivation (.44). Additionally, all communalities after extraction were above .52, except for Feelings of gratification (.43). The determinant was .001, above the acceptable limit of .0001, indicating no problems with multicollinearity.

The analysis continued to extract six components with eigenvalues over Kaiser's criterion of 1 and in combination explained 68.60% of the variance. The scree plot still clearly showed inflexions that justified retaining six components. Factor loadings indicated (Table 5) that Joy/Delight did not significantly load onto any of the components. Therefore, this variable was removed for further interpretation of the structure.

Table 5  
*Pattern Matrix<sup>a</sup> for Analysis 2 of the PCA*

	Rotated Component					
	1	2	3	4	5	6
Sexual/Desire	.850					
Sexual/Love	.848					
Affection/Love	.830					
Personal/Attachment	.709					
Feelings of Gratification	.420					
Anxiety		.822				
Fear		.814				
Apprehension		.692				
Rage			.864			
Aggression			.857			
Anger			.801			
Loss				.835		
Grief				.824		
Sorrow/Despair				.711		
Anticipation					.875	
Exuberance/Excitement					.603	
Joy/Delight						
Motivation						.923
Eigenvalues	3,87	2,62	1,87	1,72	1,21	1,06
% of variance	21,52	14,54	10,36	9,55	6,74	5,89

Note. Factor loadings <.40 were suppressed. Extraction Method: Principal Component Analysis. Normalization. a Rotation Method: Oblimin with Kaiser a Rotation converged in 7 iterations.

### Analysis Three

The KMO measure indicated slightly reduced sampling adequacy after the removal of the aforementioned three variables, KMO = .68, this is above the acceptable limit of .50 and approaching .70 (Field, 2009); Bartlett's test of sphericity,  $\chi^2(136) = 794.78, p < .001$ , continued to show that correlations between the items were sufficiently large for PCA. All KMO values for individual items remained above the acceptable limit of .50, except for Motivation (.44) and Anticipation (.41). The communalities after extraction were above .50, except for Feelings of gratification (.47). This variable was retained despite its low communality because multicollinearity did not appear to be a problem, Determinant = .003.

The analysis was repeated to obtain eigenvalues for each component in the data. Six components had eigenvalues over Kaiser's criterion of 1 and in combination explained 69.58% of the variance. Also, the scree plot continued to support an inflexion that would justify retaining six components. According to the agreement of the scree plot and Kaiser's

criterion on six components, this is the number of components that were retained in the final analysis.

The pattern matrix of component loadings after rotation showed that all items loaded significantly onto only one component (Table 6), unlike the previous PCAs. Furthermore, the loadings on each component were relatively high, with most exceeding .70, indicating a strong relationship between each of the items and the corresponding component. Finally, only 54 non redundant residuals (39%) with absolute values greater than 0.05 were present; this amount falls below the recommended limit of 50% (Fields, 2009), further indicating that the model was a suitable for the data.

The items that cluster on the same components suggest that component 1 represents a combination of the *CARE* and *LUST* systems (from here on just referred to as *CARE/LUST*), Component 2 represents the *FEAR* system, Component 3 represents the *RAGE* system, Component 4 represents the *GRIEF* system, Component 5 represents a combination of the *PLAY* and *SEEKING* systems (from here on just referred to as *PLAY/SEEKING*), and lastly Component 6 represents the motivational aspect of *SEEKING* (Table 6). While Components 5 and 6 had fewer than three items loadings onto them, these components still accounted for approximately 7% and 6%, respectively, of the variance and had very high loadings, and were therefore retained and also these items are theoretically relevant.

The stability of the component structure indicates that this model likely provides the most parsimonious and stable latent structure for the Basic Emotions Index used in this study.



Table 6  
*Pattern Matrix<sup>a</sup> for Analysis 3 of the PCA*

	Rotated Components					
	LUST/ CARE	FEAR	RAGE	GRIEF	PLAY/ SEEKING	SEEKING- Motivation
Affection/Love	<b>.843</b>					
Sexual/Desire	<b>.836</b>					
Sexual/Love	<b>.823</b>					
Personal/Attachment	<b>.740</b>					
Feelings of Gratification	<b>.431</b>					
Fear		<b>.823</b>				
Anxiety		<b>.821</b>				
Apprehension		<b>.685</b>				
Rage			<b>.866</b>			
Aggression			<b>.854</b>			
Anger			<b>.794</b>			
Loss				<b>.837</b>		
Grief				<b>.821</b>		
Sorrow/Despair				<b>.710</b>		
Anticipation					<b>.894</b>	
Exuberance/Excitement					<b>.579</b>	
Motivation						<b>.961</b>
Eigenvalues	3.44	2.62	1.85	1.70	1.18	1.04
% of variance	20.20	15.38	10.88	10.03	6.95	6.13
A	.78	.75	.75	.77	.62	

Note. Factor loadings <.40 were suppressed. Extraction Method: Principal Component Analysis. Normalization.<sup>a</sup> Rotation Method: Oblimin with Kaiser a Rotation converged in 7 iterations.

### ***Reliability Analysis of the Six Component Model***

Reliability analysis of the CARE/LUST, FEAR, GRIEF and SEEKING (Motivation) components showed high internal consistency, with *Cronbach's alpha* > .75 (Table 6). The PLAY/SEEKING subscale showed an alpha = .62, which is not considered as ideal. The subscales of RAGE, GRIEF showed high internal consistency and the *inter-item* and *item-to-total* correlations (used to ascertain the usefulness of an item within a subscale) were above the acceptable limits of  $r = .30$  (Field, 2009). The LUST/CARE subscale presented no problems with the *inter-item* and *item-to-total* correlations, as all correlations were above the acceptable limits of  $r = .30$ . However, the *Cronbach's Alpha if item is Deleted* showed that Feelings of gratification would increase the *Cronbach's alpha* from .78 to .81 should this

item be deleted. However, this is only a minor increase of .018, and the overall consistency of the subscale suggested that this item should be retained.

Moreover, although the subscale of FEAR displayed high levels of internal consistency, it had an item which showed to be problematic. The FEAR subscale did not exhibit problems with the *inter-item* and *item-to-total* correlations, as these correlations for all items above or at the acceptable limits of  $r = .30$ . Nevertheless, *Cronbach's Alpha if item is Deleted* suggested that the item *Apprehension* would increase the alpha from .75 to .83, should this item be deleted. Raykov (2007) suggests that assessing the gain or loss in reliability from deleting items in components should be approached with care, as this may erroneously suggest removal of an item in order to increase the alpha level. He argues that deleting the item may increase the alpha of the component, but that doing so could decrease the overall reliability of the scale. Therefore, based on the relatively high internal consistency of the component and also that the items show good *inter-item* and *item-to-total* correlation and to maintain the parsimony of the overall scale, this item was retained. Lastly, although the *inter-item* and *item-to-total* correlations of the items in the PLAY/SEEKING subscale were acceptable, according to Field's (2009) limit of  $r = .30$ . The overall *Cronbach's alpha* = .62 for this component and is lower than the suggested limit of .70 (Field, 2009). However, based on theoretical importance of the component and also to maintain parsimony, this component was retained.