Dreams and Dream Contents of Patients with Different Anxiety Disorders

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I declare under oath that I have produced my thesis independently and without any undue assistance by third parties under consideration of the 'Principles for the Safeguarding of Good Scientific Practice at Heinrich Heine University Düsseldorf'.

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Abstract

While anxiety disorders are one of the most prevalent and frequent mental disorders in the modern western world, study of dreams, dream contents and dream characteristics of clinical outpatients suffering from anxiety disorders still remains relatively scarce and weakly investigated field of psychology. The present dissertation thus serves the purpose to investigate dream life and specific dream contents and characteristics in such clinical patients, as well as to compare them with dreams and dream contents and dream characteristics of healthy people. The dissertation consists out of a literature review on dreams and anxiety and an empirical study, in which dream contents and dream characteristics were compared between a research sample of 38 adult clinical patients diagnosed with anxiety disorders and a matched control group of 38 healthy individuals. Methods of this study included written dream diaries, as well as two dream questionnaires (The Multidimensional Düsseldorf Dream Inventory (MDTI) and the Mannheim Dream Questionnaire (MADRE)), and two nightmare questionnaires (the Nightmare Behavior Questionnaire (NBQ) and the Nightmare Distress Questionnaire (NDQ)). General study period was 21 days, and the study also involved two meetings (each about 40 minutes) with each of the participants, before and after the 21-day study period. Thus, this dissertation encompasses and involves three articles, all of which are united and interconnected with a single and uniform research problem and topic – investigation and exploration of dreams and dream contents and characteristics in anxiety disorders. Results of the present dissertation indicate substantial differences in dreams of patients with anxiety disorders compared to dreams of healthy subjects and show specific and anxiety-characteristic dream contents in their dreams. Similarly, significant and clear differences in dream characteristics of anxiety outpatients compared to healthy persons were found. This dissertation thus makes important and significant contributions to the knowledge of dreams, dream contents and characteristics in anxiety disorders, which may be beneficial for the understanding of these type of mental disorders, as well as their treatments and therapy in future.

1. Introduction and Motivation

It is generally acknowledged and recognized that dreams, dream experiences and dream contents are tightly connected with psychopathology and are affected by mental health of an individual and its characteristics (Cartwright, Agargun, Kirkby, & Friedman, 2006; Desroches & Kaiman, 1964; Free, Winget, & Whitman, 1993; Gentil & Lader, 1978; Hartmann, 1996; Kirschner, 1999; Miller, DeCicco, Dale, & Murkar, 2015; Nadorff, Porter, Rhoades, Greisinger, Kunik, & Stanley, 2014; Simon, Berki, Gettys, & Vedak, 2016; Swart, Van Schagen, Lancee, & Van Den Bout, 2013). And, vice versa, there are also several indications that dreams and dream contents affect and influence waking-day emotionality, mood, affective experiences and well-being (Cartwright, 2010; Hartmann, 1996; Kramer, 1991; Malinowski & Horton, 2015; Perogamvros & Schwartz, 2012). With respect to anxiety and anxiety disorders, derived from the assumed continuity between waking-life experiences and dreams, as well as from clinical observations, it can be assumed that anxiety and anxiety disorders may be directly reflected in the dreams of the respective persons. However, there is relatively little research on this topic and the results are contradictory. For example, studies on relationships between dreams or dream contents and state and trait anxiety in non-clinical populations have to be regarded separately from studies on relationships between dreams or dream contents and clinical manifestations of anxiety disorders and anxiety disorders in clinical outpatients. A large number of studies and research address and investigate relationships between anxiety disorders and nightmares or bad dreams (Kellner, Singh, & Irigoyen-Rascon, 1991; Levin & Hurvich, 1995; Nadorff et al., 2014; Nielsen, Laberge, Paquet, Tremblay, Vitaro, & Montplaisir, 2000; Ohayon, Morselli, & Guilleminault, 1997; Picard-Deland, Carr, Paquette, Saint-Onge, & Nielsen, 2018; Schredl, Kronenberg, Nonnell, & Heuser, 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013), but there is still a relative lack of clinical psychological research concerning the subject of associations between clinical anxiety disorders and dream contents and dreams in general (Skancke, Holsen, & Schredl, 2014), while already existing studies on this topic are distinguished by an unsystematic, separated and segregated character (DeCicco, Zanasi, Dale, Murkar, Longo, & Testoni, 2013; Foss, 1994; Free et al., 1993; Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999; Miller et al., 2015; Sikka, Pesonen, & Revonsuo, 2018).

Anxiety disorders are a group of several various mental disorders which are characterized by feelings of anxiety, excessive worry, increased preoccupation and fear or phobia. According to the DSM-5 (American Psychiatric Association, 2013) anxiety disorders include disorders that share

features of excessive fear and anxiety and related behavioural disturbances, where *fear* is defined as the emotional response to real or perceived imminent threat and *anxiety* as anticipation of future threat (American Psychiatric Association, 2013). According to the DSM-5, anxiety disorders include several types of disorders which are divided into anxiety disorders, phobias and selective mutism. Anxiety disorders include generalized anxiety disorder, panic disorder, separation anxiety disorder, substance or medication-induced anxiety disorders and anxiety disorders due to another medical condition and other specified or unspecified anxiety disorders, while phobias include social phobia (social anxiety disorder), specific phobias and agoraphobia (DSM-5, American Psychiatric Association, 2013; Kupfer, 2015). Also, anxiety as a general personality factor (trait anxiety) or as a normal response to harmful situations or expectations (state anxiety) can be distinguished (Spielberger, 1983; 1985). Trait anxiety is an individual's predisposition or tendency to response to some stimulus, stressor or irritant with anxiety and is expressed in feelings of stress, anxiety, worry, or discomfort which are experienced by an individual on a regular basis every day. State anxiety is a temporal emotion or affect distinguished by psychological and physiological arousal and feelings of fear, dread, tension and apprehension and it represents fear, nervousness or discomfort and the arousal of the autonomic nervous system provoked by a situation, which is perceived as dangerous. Trait anxiety is related to permanent factors of personality and typical reactions to similar situations, while state anxiety is related to temporary conditions, consequences and feelings (Spielberger & Sydeman, 1994).

Anxiety disorders still remain one of the most prevalent mental disorders in the general adult population in the modern western countries - in the U.S. their prevalence is about 18 %, while in the European Union over 60 million citizens suffer from various anxiety disorders every year (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005; Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007; Remes, Brayne, Van der Linde, & Lafortune, 2016; Simpson, Neria, Lewis-Fernandez, & Schneier, 2010; Wittchen, Jacobi, Rehm, Gustavsson, Svensson, Jönsson, & Fratiglioni, 2011), and they still are becoming more and more wide-spread and common nowadays among European and U.S. populations. Anxiety disorders generally affect twice as many women as men, and people younger than 35 years old tend to suffer from anxieties more often than individuals older than 55 years, while a younger person has a 20 % higher risk to suffer from an anxiety disorder (Baxter, Scott, Vos, & Whiteford, 2013; Baxter, Scott, Ferrari, Norman, Vos, & Whiteford, 2014; Craske & Stein, 2016). Thus, due to this particular situation, evident prevalence of anxiety disorders in the modern western population and significant deficit of specific research on the topic of particular qualities of dreams of clinical patients with anxiety disorders it seems necessary and essential to explore and analyse dreams and dream contents of clinically ill anxiety

outpatients and to compare their dream contents and characteristics with the contents and characteristics of dreams of healthy people. Understanding dreams and specific dream contents, qualities, characteristics and features of patients with anxiety disorders may further contribute to understanding these disorders and may be beneficial for the psychological treatment of anxiety disorders.

2. Objectives and Concept

The aim of the present work is to investigate and explore dreams, dream contents and dream characteristics of individuals suffering from anxiety disorders. Therefore, the first aim of the present work was to get an overview on the existing literature about dreams in anxiety patients and to derive main research lines. The main objective of the present work is to identify the contents of dreams of patients with anxiety disorders and to conduct a comparison of contents and characteristics of dreams of such patients with the dreams of matched healthy people. To our knowledge, such a comparison in a sample of outpatients suffering from different clinical anxiety disorders has never been done before. Similarly, we aim to explore dreams characteristics and nightmare characteristics of anxiety patients and compare them with the dream characteristics of matched healthy persons. At present, it is unknown, if patients suffering from anxiety disorders also experience more anxiety related topics in their dreams, as suggested from different theories of dreaming (e. g., the continuation hypothesis) which was however not tested empirically so far. Several groups of patients with several types of anxiety disorders are investigated in the present study: generalized anxiety disorder; specific phobias, panic disorder, social phobia, agoraphobia, and separation anxiety disorder. Though it is known that the nightmare frequency in patients with anxiety disorder is relatively low compared to patients with Posttraumatic Stress Disorder (PTSD), specific contents and characteristics of dreams in anxious patients remain scarcely investigated.

Several hypotheses are examined in the present work. With regard to dream contents of anxiety outpatients the primary hypothesis is that dream contents of anxiety patients are significantly different from the dream contents of healthy people, and contain more anxiety related topics and more negative and unpleasant contents and imagery like aggressive interactions, misfortunes, failures, negative emotions and negative evaluations, an increased number of dangerous, unfriendly, threatening, fearful and frightening situations and activities, as well as a lower frequency of friendly interactions, good fortune, successes, positive emotions and positive evaluations, and a lower number of positive emotions, such as happiness, joy or, confidence. With regard to dream characteristics the primary hypothesis was that dream characteristics of anxiety patients are significantly different from dream characteristics of healthy people, and their dreams are distinguished by a lower and more negative emotional tone, more intense emotions, higher nightmare frequency, higher distress from nightmares and they suffer more from nightmare behavioral consequences. The secondary hypothesis with regard to distress from nightmares and behavioral consequences after nightmares was that male and female patients with anxiety disorders differ in terms of their nightmare distress and their behavioral consequences after

nightmares, with women reporting more nightmare distress than men and displaying more intense behavioral consequences of nightmares, which is based on the observation that females generally report higher frequency of nightmares than males in the general adult population (Nielsen, Stenstrom, & Levin, 2006; Ohayon et al., 1997; Schredl, 2014; Schredl & Reinhard, 2011) and more nightmare distress (Schredl & Reinhard, 2011).

3. Methods of the Empirical Studies

Sample and Participants

The sample for the empirical study consists of two groups – 38 clinical patients with different anxiety disorders and 38 age- and gender- matched healthy individuals without any prior or current mental disorder. Patients were recruited from the outpatient psychotherapy centre of our Department, who had been referred for the treatment of their anxiety disorders. The patients were diagnosed with different types of anxiety disorders and were undergoing a cognitive-behavioral psychotherapeutic treatment. Anxiety outpatients were sampled for the study during the course of their treatment and were investigated during the first third of the therapy. The number of their psychotherapy sessions prior to the investigation ranged from 8-10 sessions. Specifically, the diagnoses of the anxiety patients included the following kinds of anxiety disorders: generalized anxiety disorder (n = 11), social anxiety disorder (social phobia; n = 6), panic disorder (n = 5), agoraphobia (n = 1), separation anxiety disorder (n = 2), specific phobia (n = 4). One patient was diagnosed with comorbid generalized anxiety disorder and specific phobia (arachnophobia), three patients were diagnosed with comorbid generalized anxiety disorder and social anxiety disorder, two patients were diagnosed with comorbid generalized anxiety disorder and panic disorder, and three patients were diagnosed with comorbid social anxiety disorder and panic disorder. For the control group with healthy participants, individuals without any mental disorders were recruited with the help of flyers and advertisements, distributed at the university campus as well as through ads and announcements on the internet: in social networks, job and advertisement sites. Matching in pairs was performed on the basis of similar gender (male/female) and approximately similar age of subjects (with the maximal gap of 2 years between two matched subjects). The study involved 54 (71.05%) adult female participants and 22 (28.95%) adult male participants in total, ranging from 18 to 54 years old, with the mean age of 29.20 ± 9.57 years.

Research Instruments

Hall & Van de Castle System of Content Analysis

Content analysis of dreams was performed according to the coding rules of the Hall and Van de Castle system of content analysis of dreams (Domhoff, 1996; 1999; Hall & Van de Castle, 1966). This system of content analysis of dreams is a quantitative and objective content analysis approach and one of the basic and main methods applied in psychological research of dreams, which allows to categorize and codify different aspects and facets of dream content and subsequently statistically analyze and compare these different dream contents. The Hall and Van De Castle system encompasses almost every category that has been presented in other empirical

systems of dream content analysis and has precise coding rules. Therefore, nowadays it is the most widely used method for systematically categorizing, analysing and investigating content of dreams. The wide range of different categories of this system includes such categories as: various characters (animals, men and women, friends, strangers, family members, relatives, prominent persons, professionals, etc.), social interactions (aggressive, friendly, sexual interactions), different kinds of activities (physical, moving, location changes, talking, hearing, expressive communication, seeing, thinking), successes and failures, misfortunes and good fortunes, emotions (anger, apprehension and fear, sadness, confusion, happiness), different locations and settings (indoors and outdoors, familiar and unfamiliar), different types of objects and items, descriptive modifiers (color, size, age, density, temperature, velocity, linearity, intensity, positive and negative evaluations), temporal references, negative particles and words. According to the method, there are almost no elements in a dream report that cannot be classified somewhere in a specific category, while some may also fit into more than one category. Then several categories can be used, or two or more categories can be combined to create new indicators and categories.

Quantitative dream content analysis involves frequency counts of different dream content categories and elements and an objective analysis of these coded frequencies. General procedure of the Hall and Van de Castle dream content analysis consists of several steps, which include: formulating a specific hypothesis, selecting and using existing coding categories and scales from the system with precise boundaries for all the elements appearing frequently in dreams or formulating and developing new coding categories and scales, eliciting dream reports, determining frequencies for those categories in dreams from dream reports of an individual or a group, turning the frequencies into percentages and rates, blind rating by external judges, computing interrater reliability, performing statistical evaluations and analysis, statistically comparing frequencies between experimental and control groups, interpreting the findings and making meaningful and significant interpretations and conclusions according to a study hypothesis in order to determine what is unique about dreams and dream contents of a group or a person being studied. Acquisition of different codified elements and categories of dream contents and dream imagery from dream reports allows to obtain various frequencies and rates of these elements, objects and images in dreams of participants, which are statistically evaluated and analysed subsequently, with the help of methods of statistical analysis and statistical evaluations (for example, *t* tests).

To estimate inter-rater reliability between two independent judges for the content analysis of dreams, in the present study a certain proportion of all dream reports from the two groups (10% of all dream reports from both groups) was coded by a second independent rater, in addition to the main rater, who coded all dream reports from the two groups of the study. The second judge was

„blind", and thus had no access to other data or information about the participants while performing the codification of dream reports. Inter-rater reliability between the two independent raters was at acceptable levels with respect to all ratings (moderate correspondence, at the level of 75%) (Koo & Li, 2016; McHugh, 2012).

Dream Diary

Dream diaries were used to gather dream reports from the participants. Dream diaries were filled in every day during a 21-day study period. They contained one checklist for all of the 21 days, where participants noted whether they had had any dreams or not during the previous night, and a 21-page journal to write down their dream reports as they remembered their dreams as soon as they woke up every morning, in a free form, directly after sleep, in case they had had any dreams that night. Dream diaries also contained two 4-unit scales for positive and negative emotions, respectively (from 0 – "no emotions" to 3 – "strong emotions") and one 10-unit scale for general intensity of emotions in each dream (from 0 – "not intensive", "insignificant", to 10 – "highly intensive"), which were filled in for each dream separately, even if the participants had two or more dreams per night.

Questionnaires

Sociodemographic Questionnaire. A short standardized questionnaire was used to gather personal sociodemographic data. The questionnaire contained questions regarding name, age, gender, education, occupation, current or lifetime presence and kind of any mental disorder and intake of psychoactive drugs.

The Multidimensional Düsseldorf Dream Inventory (MDTI; Pietrowsky, Schmitz, Zink, & Gieselmann, unpublished). A multidimensional questionnaire to assess dream characteristics. The MDTI allows to assess dream characteristics independently from dream contents and to compare dream experience intra- and inter-individually. The questionnaire consists of six scales (factors): aversive dreams, dream recall, personal significance of dreams, incorporation of waking life into dreams, wishes fulfilment in dreams and dream vividness. The questionnaire involves 38 items which were derived from a pool of attitudes and descriptions of dreams and had to be rated by the degree of agreement with four answer options – "I fully disagree", "I rather disagree", "I partly agree", "I fully agree". The questionnaire represents an instrument which allows to study features and characteristics of dreams of a person in a quantitative manner irrespective of specific dream contents.

The Mannheim Dream Questionnaire (MADRE; Schredl, Berres, Klingauf, Schellhaas, & Göritz, 2014). A questionnaire to assess dream characteristics and subjective dream experiences. The questionnaire allows to obtain dream features, which include dream recall, emotional intensity of dreams, nightmare frequency, lucid dreaming, attitudes towards dreams and effects of dreams on waking life mainly in a quantitative manner. Answers for the item "dream recall frequency" contained seven options from 1 – "almost every morning" to 7 – "never", answers for the items "nightmares frequency and prevalence" and "frequency of influence of dreams on mood" contained eight options from 1 – "several times a week" to 8 – "never", answers for the items "emotional intensity of dreams" and "nightmare distress level" contained five options from 1 – "not at all intense"/ "not at all distressing" to 5 – "very intense"/ "very distressing", answers for the item "average emotional tone of dreams" contained 5 options from 1 – "very negative" to 5 – "very positive", answers for the eight items on "attitudes toward dreams" contained five options from 1 – "not at all" to 5 – "totally". The questionnaire contained an open question which allows the participant to describe and characterize most common and prevalent topics and themes of nightmare dreams, if there were any present during the study period.

The Nightmare Behavioral Consequences Questionnaire (NBQ; Pietrowsky & Köthe, 2003) is a questionnaire to assess behavioral consequences after a nightmare. It allows to explore behavioral effects and influences caused by a nightmare. The questionnaire consists of 43 items which belong to six scales: physiological effects (4 items), emotional effects (9 items), cognitive effects (worries and concerns after a nightmare; 10 items), behavioral coping attempts and strategies (9 items), attempts to find an explanation for the nightmare (5 items), trivializing the nightmare (3 items). The four answer options for each item included - "I fully disagree", "I rather disagree", "I partly agree", "I fully agree".

The Nightmare Distress Questionnaire (NDQ; Belicki, 1992; German version: Böckermann, Gieselmann, & Pietrowsky, 2014) is a questionnaire to assess subjective nightmare distress. The questionnaire consists of 13 items which belong to three factors in the German version (Böckermann et al., 2014): general nightmare distress, impact on sleep, impact on daytime reality perception. The five answer options for the items, except items № 5, № 8, and № 13, include - "Never", "Rarely", "Sometimes", "Often", "Always". The five answer options in the items № 5 and № 8 include - "Not at all", "A little", "Somewhat", "Distinctly", "Substantially". The five answer options in the item № 13, include - "Not interested at all", "A little interested", "Somewhat

interested", "Very interested", "Extremely interested". The reliability (internal consistency) of the questionnaire is good (Cronbach's $\alpha = .80$; Böckermann et al., 2014).

4. Summary of the Studies

The dissertation is comprised of three study manuscripts, which are listed below for an overview.

	Study Name	Publication Status
Study 1	Dreams in Anxiety Disorders and Anxiety – Review	Rimsh, A. & Pietrowsky (2020). *International Journal of Dream Research, 13(1),* 1-16.
Study 2	Analysis of Dream Contents of Patients with Anxiety Disorders and their Comparison with Dreams of Healthy Participants	Rimsh, A. & Pietrowsky, R. (submitted to *Dreaming*)
Study 3	Characteristics of Dreams and Nightmares in Patients with Anxiety Disorders	Rimsh, A. & Pietrowsky, R. (submitted to *The Journal of Nervous and Mental Disease*)

4.1. Study 1: Dreams in Anxiety Disorders and Anxiety – Review

The first study represents a comprehensive and up-to-date review of already existing published psychological literature and studies on the topic of dreams, dream contents and characteristics of individuals suffering from anxiety disorders and anxiety. Thus, the review serves to summarize and give a complete and contemporary overview of the existing studies and research on the topic of relationships between dreams and dream contents and anxiety and anxiety disorders. It involves a full survey of relationships between dreams, dream content and dream disturbances and trait and state anxiety in non-clinical and clinical populations, between dream content and dream disturbances and anxiety disorders in clinical populations and between nightmare distress and anxiety, as well as of interrelationships between dreams and comorbid anxiety and depression and the influence of anxiety on dream recall frequency.

The review contains three chapters – the first chapter contains overview on anxiety disorders, according to the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013), the second chapter contains overview on the latest theories on the possible aetiology and function of dreams and nightmares, which may provide different models for the understanding of the interrelationships between dreams and dream

contents and anxiety and anxiety disorders, and the third and the main chapter contains a systematic review on the relationship and influence of anxiety and different types of anxiety disorders on dreams, including nightmares.

The third and the main chapter of the review focuses on a systematic overview of interrelationships between anxiety and anxiety disorders and dreams, dream contents and dream disturbances and contains several subsections. The review generally allows to conclude that the relationships between dreams and anxiety in clinical patients with different anxiety disorders remain not widely and comprehensively investigated, specific studies regarding this particular topic are scarce and it is not clear yet how and in which way some specific anxiety disorders, for example, specific phobias or social phobia affect dreams or dream content. There is still strong evidence that excessive anxiety or anxiety disorders instigate relevant feelings, emotions and content in dreams. It was shown clearly that higher trait and state anxiety directly influence and affect dream content or specific characteristics of dreams, and such relationships between anxiety and dream contents and characteristics exist. Strong and obvious associations between heightened levels of trait and state anxiety and changes in dreams, dream content and dream disturbances were observed. Heightened waking day anxiety, whether it is trait or state anxiety, might instigate strong negative emotions, which may find their reflection in dreams in the form of negative emotions or emotions of anxiety and fear in dream content. With regard to trait anxiety it is obvious that heightened levels of trait anxiety in non-clinical individuals instigate more negative emotions and emotional tone in dreams, generally more negative, sad and despondent dream contents, higher general negativity in dreams, higher dreamed fear and apprehension in dreams, higher frequencies of different threats and dangers, aggressive unfriendly interactions and aggression, failures and misfortunes, negative emotions and negative affect in dreams. Also heightened levels of trait anxiety lead to a more realistic dream content and the presence of higher numbers of realistic threats and dangers in dreams. Higher levels of specific anxiety about certain specific topics in combination with heightened general trait anxiety leads to the presence of related topics in dreams. With regard to state anxiety, it is evident that heightened state anxiety leads to more negative and "harmful" emotional tone and affect in dreams, higher frequencies of aggressive interactions, aggression, aggressive acts directed toward a dreamer and negativity in dreams, higher presence and occurrence in dreams of different violent emotions (such as sadness, anger or fear). Thus, both heighted trait and state anxiety levels instigate higher nightmare and bad dream frequency, while state anxiety may also serve as a "mediator" variable between trait anxiety and nightmare frequency, as heightened trait anxiety instigates and provokes higher frequency of nightmares and bad dreams as a response and reaction to the presence of heightened waking-day

state anxiety.

With regard to the relationships between specific anxiety disorders in clinical patients and dream contents it was indicated, that the presence of a clinical anxiety disorder directly influences and affects dream contents or characteristics of dreams. The data about dream contents and characteristics of dreams of clinical patients suffering from different anxiety disorders indicate that their dreams are distinguished by a generally lower emotional tone, a more negative, sad and despondent mood and affect, higher numbers of aggressive interactions and higher level of general aggression, lower frequencies of friendly interactions and actions, fewer successful and fortunate events or situations, higher frequencies of failures and unsuccessful events and situations, highly unpleasant, traumatic, frightening and fearful experiences, lower numbers of known characters and acquaintances, higher frequencies of change of locations and scenes. In addition, dreams of anxiety patients suffering from different anxiety disorders exhibit particular contents, specific only for this certain type of anxiety disorders - dreams of clinical patients with panic disorder contain higher rates and frequencies of separation anxiety , dreams of an agoraphobic sufferer involve higher numbers of wide, big open spaces, areas and places which are in fact highly frightening, traumatic and unpleasant for a dreamer with this mental disorder and dreams of a social anxiety sufferer contain higher numbers of highly frightening and threatening individuals of the opposite gender and frightening social situations and events, such as public speeches and examinations. Also, presence of different anxiety disorders on a clinical level, including generalized anxiety disorder, panic disorder, social anxiety disorder and separation anxiety disorder, is directly related to higher frequency of repeated nightmares and bad dreams. Though there were rare separate studies which did not confirm that higher trait or state anxiety or presence of a clinical anxiety disorder influences, affects and alters dream contents or specific characteristics of dreams, the review shows that the vast majority of studies and research on this particular topic indicated that such influence, associations and interrelationships exist and dreams, dream contents, characteristics and disturbances are directly affected, influenced and altered by anxiety and anxiety disorders. The results of the review showed that due to the relatively low number of studies which deal with the topic of influence and relationships between anxiety disorders and dreams, as well as their and their relative inconsistency, dream contents and characteristics, the problem of these interrelations and connections is not extensively or comprehensively investigated and developed up to this day. Taking into account and considering this relative deficit and scarcity of empirical evidence and studies on this particular topic, as well as certain heterogeneity and inconsistency in the results of existing studies, we deemed it necessary to conduct further research on the topic of dream contents and characteristics of patients suffering from anxiety disorders in order to obtain

more conclusive, comprehensive and definitive results and data about specific and particular influence, relationships and associations between anxiety disorders and dream contents and characteristics. The review allows to conclude also that further deeper and more comprehensive study and research of this particular topic seems necessary and needed.

4.2. Study 2: Analysis of Dream Contents of Patients with Anxiety Disorders and their Comparison with Dreams of Healthy Participants

In this study we aimed to investigate specific characteristics and contents manifested in dreams of patients with clinical anxiety disorders, as well as to compare their dreams and dream contents and characteristics with dreams of age- and gender-matched healthy persons. Such a comprehensive comparison in a sample of patients suffering from different clinical anxiety disorders has never been done before. The central hypothesis of this study was that dream contents of anxiety patients are significantly different from the dream contents of healthy people, and contain more anxiety related topics and more negative and unpleasant contents and imagery like aggressive interactions, misfortunes, failures, negative emotions and negative evaluations, as well as a lower frequency of friendly interactions, good fortune, successes, positive emotions and positive evaluations, and a lower number of positive emotions, such as happiness or joy.

Dream content analysis was performed according to the Hall and Van de Castle coding system of dream content analysis and the coding rules, norms and units presented in this system (Hall & Van de Castle, 1966). Dreams were coded on the basis of the list of specific dream categories from this system, which included, specifically: characters (presence of different characters in dreams, with two subcategories of gender and identity), social interactions (presence of different social interactions in dreams, with three subcategories of aggressive, friendly and sexual interactions), activities and actions (presence of different types of activities in dreams, with eight subcategories of various types of activities), successes and failures (presence of successful or unsuccessful outcomes), good fortune and misfortune (presence of lucky, fortunate, or unlucky, unfortunate outcomes, events, or episodes in dreams), emotions (presence of different types or classes of emotions in dreams, with five subcategories of emotions of anger, fear and apprehension, confusion, sadness and joy and happiness), settings and locations (locations, environments, settings and surroundings in which dreams manifest themselves, surrounding scenery of a dream with three subcategories of different types and kinds of locations), objects (different types or classes of objects, items and things in dreams with 13 subcategories of various types of objects and items), descriptive elements and modifiers (different types and classes of adjectives, adverbs or phrases, which are used for descriptions and descriptive elaborations, assessments, evaluations or judgments and assertions, with nine subcategories of various types of descriptions and descriptive evaluations and assessments), temporal references and modifiers (any types or forms of mentions or references to certain time or periods of time, various time intervals, particular points of time or different time indications and notions), negative descriptive elements and modifiers (any types of negative particles, negative linguistic forms or formulations in explicit

and manifested descriptions and definitions in dream reports). The coded dreams and dream contents were statistically analysed and compared between two groups (group of anxiety patients and healthy individuals control group), by using *t* tests to compare differences for each coding category and subcategory. The most frequent anxiety-related dream topics and themes in dreams of anxiety outpatients were obtained with the help of chi-square test statistics which allowed to compare the frequencies of different dream themes and topics in the two groups.

The materials for the study included a short sociodemographic standardized questionnaire which was used to gather personal sociodemographic data and a dream diary, which was used to gather dream reports from participants. Dream diaries were filled in every day during a 21-day study period. In total, the dream sample assessed by the diaries consisted of 941 dream reports in total: 472 (50.2%) dream reports from the anxiety patients and 469 (49.8%) dream reports from the control group of mentally healthy individuals. 723 (76.84%) dream reports were from female participants and 218 (23.16%) dream reports from male participants. The average number of dream reports per group during 21 days did not show any significant difference between the two groups (t (939) = 0.20, p = .84).

The results of the study revealed that in line with our hypothesis, presence of an anxiety disorder resulted in such a way that the dream contents of anxiety patients differed significantly from the dream contents of healthy persons and contained more negative and unpleasant elements. Dreams of anxiety outpatients contained more characters (t (939) = 4.65, p < .001), higher numbers of different activities (t (939) = 4.12, p < .001), social interactions (t (939) = 4.67, p < .001), aggressive (t (939) = 12.47, p < .001) and sexual interactions (t (939) = 2.07, p < .05), lower numbers of friendly interactions (t (939) = 7.47, p < .001), higher frequencies of failures (t (939) = 9.141, p < .001) and misfortunes, unlucky, dangerous and threatening situations and events (t (939) = 13.53, p < .001), and a lower prevalence of successes (t (939) = 3.52, p < .001) and fortune and fortunate situations (t (939) = 11.62, p < .001), as well as more negative (t (939) = 6.35, p < .001; t (939) = 9.87, p < .001; t (939) = 8.21, p < .001) and less positive emotions (t (939) = 13.79, p < .001). They also had higher numbers of locations and settings (t (939) = 7.37, p < .001), different body parts (t (939) = 3.49, p < .001), more negative evaluations and assessments (t (939) = 13.86, p < .001), and were characterized by less bright and less chromatic colors (t (939) = 2.78, p < .05), objects of different sizes (t (939) = 7.73, p < .001; t (939) = 2.95, p < .01), and differences in other modifiers.

In addition, a number of specific anxiety-associated or anxiety-related dream topics and themes were found to be more prevalent in anxiety outpatients compared to healthy individuals. These themes included, among others, being chased and pursued, being physically attacked and

facing aggressive actions, being frozen with fright, quarrels and verbal aggressive interactions, anxiety and fear about aggressive actions from others, fear of falling and being in danger of falling, being excluded and being rejected in social situations, death of parents and family members, accidents and car or plane crashes, facing failures and being unsuccessful. The list of typical dream topics and themes was taken from the Typical Dream Questionnaire (TDQ), which contains 56 typical dream themes in total (Nielsen, Zadra, Simard, Saucier, Stenstrom, Smith, & Kuiken, 2003). These results indicate an obvious and significant difference in dreams, dream contents and structure in anxiety disordered patients compared to healthy individuals, although anxiety themes are not always and solely prevalent and dominant in their dreams.

4.3. Study 3: Characteristics of Dreams and Nightmares in Patients with Anxiety Disorders

This study is devoted to and focused on the investigations of dream characteristics, i.e., dream emotionality, nightmare frequency, nightmare distress, and behavioral consequences after nightmares of anxiety patients and their comparison with these dream characteristics in healthy individuals. The primary hypothesis of this study was that dream characteristics of anxiety patients are significantly different from dream characteristics of healthy people, and their dreams are distinguished by a lower and more negative emotional tone, more intense emotions, higher nightmare frequency, higher distress from nightmares and they suffer more from nightmare behavioral consequences. The secondary hypothesis with regard to distress from nightmares and behavioral consequences after nightmares was that male and female patients with anxiety disorders differ in terms of their nightmare distress and their behavioral consequences after nightmares, with women reporting more nightmare distress than men and displaying more intense behavioral consequences of nightmares.

With regard to the methods of the study, dream characteristics were assessed with the Multidimensional Düsseldorf Dream Inventory (MDTI; Pietrowsky et al., unpublished) and the Mannheim Dream Questionnaire (MADRE; Schredl et al., 2014), nightmare distress was assessed with the Nightmare Distress Questionnaire (NDQ; Belicki, 1992; German version: Böckermann et al., 2014), nightmare consequences were assessed with the Nightmare Behavioral Consequences Questionnaire (NBQ; Pietrowsky & Köthe, 2003), while dream emotionality and intensity of emotions in dreams were assessed with the help of dream emotionality scales from dream diaries.

The obtained data from the MDTI, MADRE, and the emotionality scales from dream diaries were compared between the two groups (anxiety patients, healthy control group) by using *t* tests for independent groups. Results concerning nightmares were evaluated only for the group of anxiety patients due to the significant lack of nightmares among the healthy controls and, therefore, lack of the NBQ and NDQ questionaries received from healthy participants. The obtained data from the NBQ and NDQ questionnaires was statistically analysed and compared between males and females within the anxiety group in order to obtain gender differences by using *t* tests for independent groups. Required and optimal sample sizes of the control and experimental groups (38 participants in each) were evaluated with the help of G-Power statistical analysis (Faul, Erdfelder, Buchner, & Lang, 2009) in accordance with the anticipated statistical power of no less than .80.

All participants attended two meetings with the research coordinator: one in the beginning of the 3-week period, when they received study materials (dream diaries with dream emotionality

scales and two questionnaires – NBQ and NDQ – and provided their sociodemographic data. They also gave their written informed consent and were instructed to complete the dream diary during three weeks (21 days), in the morning, directly after sleep, and write down their dreams during this period in a free form. During the study period of 21 days participants also filled in the two questionnaires (NBQ, NDQ), only after nights when they had a nightmare, in the morning directly after sleep. On the second meeting with the research coordinator after three weeks the participants handed in the study materials (dream diaries, NBQ, NDQ) and filled in the two other questionnaires (MDTI, MADRE).

Patients with anxiety disorders were found to provide longer dream reports based on the total word count of dream reports, excluding repeated words and repetitions, fillers, corrections and non-dream related waking commentaries (t (939) = 5.80, $p < .001$). Dreams of anxiety patients were distinguished by a more intense and vivid emotionality (t (939) = 13.05, $p < .001$), higher prevalence of negative emotions (t (939) = 15.07, $p < .001$), and less prevalence of positive emotions (t (939) = 10.27, $p < .001$), as assessed by the three emotionality scales from dream diaries. In addition, the MADRE questionnaire also confirmed and indicated more intense and vivid emotionality of dreams of anxiety disordered outpatients (t (74) = 2.01, $p < .05$). Their dreams also contained more aversive contents (t (74) = 5.33, $p < .001$), they had a higher rate of incorporations from waking life into dreams (t (74) = 2.24, $p < .05$) and possessed higher dream recall level and better dream memory (t (74) = 3.44, $p < .001$), as assessed by the MDTI questionnaire. Also, as assessed by the MADRE questionnaire, anxiety outpatients attributed more meaning and significance to their dreams than healthy participants (t (74) = 2.38, $p < .05$) and were more interested in the interpretation of their dreams (t (74) = 2.70, $p < .05$).

Anxiety patients generally showed a higher frequency of nightmares that the control group (t (74) = 5.33, $p < .001$). Nightmare distress was also significantly higher among the anxiety patients than in healthy participants, as assessed by the MADRE questionnaire (t (74) = 5.90, $p < .001$).

The secondary hypothesis of the study was not confirmed, since men and women of the anxiety patients group differed significantly with respect to nightmare distress and nightmare consequences, but in contrast to our hypotheses nightmare distress and nightmare consequences were more enhanced in men than in women. As assessed by the NDQ, nightmare distress was more intense in male anxiety patients than in female anxiety patients (t (103) = 2.07, $p < .05$). Behavioral consequences and effects of nightmares within the group of anxiety outpatients were significantly more pronounced in men than in women for several of the different kinds of nightmare consequences, as assessed by the NBQ questionnaire. These nightmare behavioral consequences were physiological (t (103) = 4.02, $p < .001$) and emotional reactions (t (103) =

2.18, $p < .05$) and behavioral coping attempts (t (103) = 3.52, $p < .001$) after nightmares.

The study was able to demonstrate dream features and characteristics in a common clinical sample of patients suffering from anxiety disorders with objective measures of dream experience and dream characteristics. These results indicate marked differences in the experience of dreams in anxiety patients, irrespective of their dream contents. Thus, this study adds further knowledge of dreams and dream characteristics in anxiety disorders, which might be helpful for the understanding of these type of mental disorders and their treatment in future.

5. General Discussion

This dissertation was a systematic review and an explorative study with the aim to investigate and explore dreams, dream contents and characteristics of clinical anxiety patients, which tests for differences and makes comparisons between anxiety patients and healthy controls in terms of dream contents and dream characteristics. In addition, it is correlative to investigate relationships between dreams, dream contents, characteristics and disturbances and presence of different clinical anxiety disorders. It is an observational study in a clinical context that does not involve experimental intervention. The present studies provide information on the significance of dreams, their contents and characteristics in patients suffering from anxiety disorders. The empirical study tests the continuation theory of dreaming, if waking experiences are represented in dreams and if this also holds for persons with a mental disorder.

The influence of different anxiety disorders on dreams and dream contents, as well as the topic of dreams, dream contents and dream characteristics of clinical patients suffering from specific anxiety disorders remained a relatively weakly developed and not widely investigated field of research in psychology. In concordance with this purpose and aim, we managed to perform our studies, which comprise this dissertation, and obtain significant and meaningful results and conclusions regarding the influence of different anxiety disorders on dreams.

Results from the review allows us to conclude that generally there are relationships between anxiety and anxiety disorders and dreams. However, though there was a single study, which did not confirm any influence of higher levels of trait anxiety on dream content and did not found any significant relationships between them (Demacheva & Zadra, 2017), the vast majority of the studies on this particular topic confirmed obvious and strong associations and interrelationships between dreams, dream contents and dream characteristics and both, trait and state anxiety and to a lesser degree to several types of anxiety disorders (generalized anxiety disorder, panic disorder, social anxiety disorder and agoraphobic disorder). In addition, clear relationships also exist between heightened levels of trait and state anxiety and presence of different anxiety disorders and higher nightmare frequency and heightened levels of nightmare distress. The data and empirical evidence, summarized in the review, stress and highlight the importance and need to conduct a more comprehensive and definitive further research on the topic of influence of anxiety disorders on dreams, dream contents and characteristics, and two reasons for such need and necessity exist and should be outlined. Firstly, the deficit of data and evidence regarding the relationships between clinical anxiety disorders and dreams and dream content. Secondly, the empirical evidence and data from the existing studies, presented in the

review, were distinguished by a relative heterogeneity and were not fully univocal or unambiguous in terms of specific and certain influence of anxiety disorders or anxiety on dreams. While dream theories, such as the continuity hypothesis of dreaming, allow us to give predictions regarding that anxiety and anxiety disorders would influence and alter dreams and dream content, some of the results and data from the studies presented in the review contradicted this hypothesis and diverged from these expectations suggested by the continuity hypothesis of dreaming. This provides partial support rather to the concepts and constructs presented within the framework of discontinuity hypothesis of dreaming. Therefore, taking into account such heterogeneity of the empirical data and evidence from the studies presented in the review, the review highlights and emphasizes the need and importance of further study and research on dreams, dream contents and characteristics of clinical patients with anxiety disorders.

With regard to dream contents, the hypothesis that dream contents of anxiety patients are significantly different from dream contents of healthy people, was fully confirmed. Generally, these differences in dream content may be caused by the presence of a clinical pathology - a mental disorder, namely, the presence of an anxiety disorder, in our study. Such specific mental conditions and states may affect dream contents fundamentally, which is supported and demonstrated also by the results of several studies and research mentioned earlier, within the framework of the review.

We may presume that higher numbers and presence of different characters in dreams of patients with anxiety disorders is connected with the notion that individuals with anxiety disorders tend to remember and recall their dreams better and in a more detailed way. And, therefore, they tend to give longer and more detailed dream reports with higher numbers of particular details, specific information and precise data, such as frequent mentioning of different characters. These notions are consistent with some of the previous data, which suggests that higher dream recall and memorization levels, as well as longer and more detailed dream reports are connected with the presence of higher rates of trait anxiety (Brown & Donderi, 1986; Demacheva & Zadra, 2017; Gentil & Lader, 1978), state anxiety (Duke & Davidson, 2002; Yu, 2007) and clinical anxiety disorders (Desroches & Kaiman, 1964; Gentil & Lader, 1978). Higher prevalence of different characters of indefinite gender was found in the dreams of anxiety sufferers, which in our study encompasses non-human animals and creatures. These results are concordant with the findings of several previous studies with individuals with higher rates of trait and state anxiety (DeCicco, 2007; Jones & DeCicco, 2009) and clinical anxiety (Khodarahimi, 2009; Miller et al., 2015). Higher prevalence of dreamers' relatives and family members in dream contents of anxiety-disordered individuals may be explained by the

assumption that individuals with anxiety disorders might be more preoccupied with thoughts, reflections and contemplations about their relatives or family members than healthy people, tend to worry or concern about them more often and profoundly, which may find such reflection in their dreams. Likewise, ex-partner characters were also found to be more prevalent in dream contents of anxiety patients and we may assume that this might be connected with higher levels of psychological fear and apprehension of individuals with anxiety disorders, especially, fear of the future, fear of meeting new people or anything new, in general, and their higher concern and preoccupation with thoughts, reflections and contemplations about their past life. Therefore, due to such fears and subjective feelings of uncertainty and lack of confidence in the face of the future, they tend to remain more focused on and concerned with their past life events and doings, including, for example, their previous partners or spouses. Thus, when they continue to be focused in their thoughts and contemplations more on their past life and their past partners rather than on their future life, plans, ideas or thoughts about their future, this might find such reflection in their dreams. Higher prevalence of unknown characters and strangers found in dreams of anxiety outpatients might be explained by their fears, apprehension and anxiety regarding unknown, strange persons and people in the waking life and their preoccupation and focus on such fears about strangers and unknown people. Prominent characters were also found to be more frequent in dreams of anxiety patients, though in this particular case we cannot offer any sufficient and satisfactory rationale for this.

Considerably higher general numbers of social interactions in dreams of anxiety outpatients might also be explained by the notion that such patients are able to remember and recall their dreams better and in a more precise way. Considerably higher prevalence of aggressive interactions in their dreams indicates that general aggression, hostility and aggressiveness, directed towards a dreamer and involving a dreamer, are prevalent in dreams of such patients. Such results completely correspond with the previous research with individuals with higher rates of trait anxiety (Brown & Donderi, 1986; Gentil & Lader, 1978; Pesant & Zadra, 2006), state anxiety (King & DeCicco, 2007) and clinical anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999), and may reflect in dreams inner fears, frights, worries, apprehensions and concerns about aggression and aggressive interactions during their waking life. Lower presence of different friendly interactions in the dreams of anxious patients also are confirmed by prior data (Kirschner, 1999; Gentil & Lader, 1978) and may be explained with their fears and apprehensions during their everyday life which often concern social interaction. Also, results showed that the presence of anxiety disorders increases frequency of sexual interactions and sexual activities in dreams significantly.

Higher presence of different activities in dreams of anxiety patients (physical activities, physical movements, location changes and travelling, talking and verbal communications, non-verbal and expressive communications, visual activities, listening and auditory activities) may also be explained by the mentioned above tendency and ability of such patients to provide longer and more detailed dream reports. These results are partly consonant with the data from previous research that dreams of patients with clinical anxiety (DeCicco et al., 2013; Miller et al., 2015), as well as of non-clinical individuals with higher levels of trait and state anxiety (Jones & DeCicco, 2009) are featured by higher scene and location change rate. This is confirmed in our study which found that dreams of patients with anxiety disorders are distinguished by higher numbers of changes of locations, transportations and traveling, which necessarily implies and involves more frequent changes of scenery, settings and locations as a result of these journeys and travels.

The results regarding lower prevalence and frequency of successes and good fortune in dreams of anxiety disordered patients, as well as higher prevalence of misfortune and failures in their dreams may indicate that dreams of individuals suffering from anxiety disorders contain higher numbers of various threats and dangers and frightening, scaring and dangerous situations, unpleasant, traumatic and harmful events, experiences and occurrences. This supports similar findings obtained in previous studies with patients with clinical anxiety disorders (Gentil & Lader, 1978; Khodarahimi, 2009: Kirschner, 1999). This may reflect the predominant negative, sad and depressed mood, tune and fearful attitude during the everyday life of anxiety patients. Moreover, it may reflect their inherent general lack of confidence in their own capabilities and capacity, self-doubt, uncertainty and lack of confidence about the possibility to achieve success, and their tendency to expect and apprehend rather some misfortunate, negative, unhappy and unlucky incidents or situations than expect any fortunate, positive, happy and joyful events or outcomes.

Obvious higher prevalence of different negative emotions (anger, fear, sadness) and a significantly lower frequency of positive emotions (happiness and joy) in dreams of anxiety sufferers allow us to make several conclusions. Firstly, it serves as an evidence of higher levels of general aggression and hostility in their dreams. Secondly, such significantly higher general negativity and despondency, considerably more negative emotionality and lower emotional tone and pronouncedly more negative, sad and unhappy affect and mood of dreams of anxiety disordered patients indicate that their dreams represent a frightening, fearful, aggressive, hostile, dangerous and threatening environment for the dreamer with the corresponding negative and more despondent emotions, such as fear, anxiety, apprehension, anger and

sadness. We can hypothesize that such specific emotionality in dreams of anxiety patients is induced by their peculiar psychological states and experiences during waking life, characterized by inner fears, apprehensions and anxieties, negative and despondent thoughts, ideas and emotions.

Higher presence of different locations and settings in dreams of anxiety patients might is reminiscent to the previously mentioned notion that dreams of both individuals with clinical anxiety disorders (DeCicco et al., 2013; Miller et al., 2015) and people with higher levels of non-clinical trait and state anxiety (Jones & DeCicco, 2009) are characterized by a higher rate of locations and settings change. Among others, especially interesting seems the finding that dreams with no specific settings or locations, which occur "in a vacuum", nowhere, in terms of a certain place or site, were also much more common among the group of anxiety patients.

Higher presence and frequency of different human body parts, internal body organs, bodily fluids and, particularly, blood or blood stains may be connected with and explained by fearful concerns and preoccupation of a dreamer about the dreamer's own body and health, which is a common symptom of panic disorder and generalized anxiety disorder. This is also parallel and reminiscent with the results of an earlier study with individuals with higher levels of state anxiety which found that their dreams contained higher numbers of limbs of a human body (King & DeCicco, 2007).

Dreams of anxiety patients were generally less colorful and contained fewer numbers of different colors, colorful and bright tones than dreams of healthy participants, which may also indicate higher levels of general negativity, lower emotional tone and a more negative affect of their dreams. The results also indicate that the presence of an anxiety disorder instigates a higher overall subjective intensity of different experiences, activities, situations, phenomena, actions and emotions in dreams and leads to a significantly higher subjective general intensity of dream imagery, concepts and contents. This allows us to conclude that all of the discussed negative, aggressive and unfriendly manifestations and emotions in dreams of anxiety patients not only merely exist in large numbers in their dream content, but also are characterized by a particularly high subjective intensity, expression and emphasis.

Generally, we may assert that the continuity hypothesis of dream formation was partly confirmed by the present results, though not entirely. Although dreams of anxiety outpatients generally contained significantly higher prevalence of negativity and more negative emotionality and affect, as well as a higher prevalence of unfriendly interactions, failures and misfortune, however, in terms of dream themes and topics their dreams were not solely distinguished by anxiety-related or anxiety-focused themes. According to the results of our

study with regard to the specific dream topics and themes, which were found more prevalent in anxiety outpatients, these themes and topics were not always dealing with anxiety or fear and related topics. Dream themes of anxiety patients were relatively wide, diverse and heterogenous.

The hypothesis that dream characteristics of anxiety patients are significantly different from dream characteristics of healthy people was also confirmed. Results from the MDTI questionnaire, which indicated that anxiety disorder patients had higher dream recall level, may confirm the longer dream reports of these patients and imply that clinical patients suffering from anxiety disorders are able to remember and recall their dreams better and more precisely Similarly, some of the earlier research showed that clinical outpatients with anxiety disorders (Desroches & Kaiman, 1964; Gentil & Lader, 1978) as well as non-clinical individuals with higher levels of trait and state anxiety (Brown & Donderi, 1986; Duke & Davidson, 2002; Gentil & Lader, 1978; Yu, 2007; Zadra, O'Brien, & Donderi, 1998) are able to recall their dreams better, more precisely and provide longer and more detailed dream reports with a higher number of specific details. There was, however, a couple of studies which contradicted our results and indicated that anxiety instigates significant decrease in dream recall rate and level (DeCicco et al., 2013; Miller et al., 2015). This difference, however, might be explained by the notion that in both of these studies the sample was comprised of non-patients and adults from general population with higher levels of anxiety rather than clinical patients diagnosed with specific anxiety disorders. Higher level of aversive dream contents in dreams of anxious outpatients also indicates and confirms negative and unpleasant dream contents, which is consistent with the results of the earlier studies obtained in the samples of clinical patients with anxiety disorders (Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999). Significantly higher rates of incorporations from waking life into dreams of anxiety patients indicates that their dreams were more related to their real waking life and their dreams are more affected by their real-life experiences. On the other side, their waking life everyday mood was also found to be more often affected by and related to their dreams. Taken together, these results imply that here we might observe more intense mutual reciprocal two-way interrelations and interconnections between waking life and dream life in anxiety disorder patients.

Taking into account the earlier mentioned general negative emotions in dreams of anxiety patients, we may also speculate that their dreams influence their waking life mood in a specific manner - probably predominantly worsening and lowering it, making it also more negative and depressive, worsening and intensifying their anxiety manifestations during waking life. Additionally, anxiety patients paid more significance to their dreams in general and felt their

life was enriched by their dreams, which also might be the indication that their dreams may worsen and lower their mood in waking life and intensify their anxiety symptoms and manifestations. However, the increased significance of dreams is not transferred to an increased personal significance of their dreams or that participants can seek help from their dreams for waking life, which may seem somehow contradictory.

Results regarding a significantly higher number of nightmares in anxiety outpatients fully correspond with the results of previous studies involving patients with different anxiety disorders (namely, generalized anxiety disorder, panic disorder, social anxiety disorder and separation anxiety disorder; (Kellner et al., 1991; Nadorff et al., 2014; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013). Thus, we may conclude that higher nightmare frequency is a typical and characteristic feature of individuals suffering from different types of anxiety disorders. Higher levels of nightmare distress were observed in the present study in clinical anxiety patients with anxiety disorders. Similar results with regard to nightmare distress, however, were found earlier only in samples of non-clinical anxious individuals with higher rates of trait and state anxiety, though not in samples of clinical patients with different anxiety disorders (Belicki, 1992; Berquier & Ashton, 1992; Blagrove, Farmer, & Williams, 2004; Levin & Fireman, 2002; Mindell & Barrett, 2002; Nielsen et al., 2000; Ohayon et al., 1997; Picard-Deland et al., 2018; Zadra, Germain, Fleury, Raymond, Nielsen, 2000). Our results may indicate thus that – besides a higher nightmare frequency – a higher nightmare distress and disturbance from nightmares may also be a common and characteristic feature of clinical patients suffering from different anxiety disorders.

The hypothesis that males and females within anxiety disordered patients differ in terms of their nightmare distress and their behavioral consequences after nightmares with women reporting more nightmare distress than men and displaying more intense behavioral consequences of nightmares, however, was only partially confirmed. Nightmare distress was higher and more intense in male patients than in female patients, as well as several specific behavioral consequences and effects of nightmares were more intense and pronounced in men than in women (physiological and emotional reactions and behavioral coping attempts after nightmares). From the three factors of the NDQ, the factor „Impact on Sleep" had the highest scoring while the factor "Daytime Reality Perception" had the lowest scoring. In contrast to factor "Nightmare distress", the other factors of the NDQ were not significantly different between the genders. This is somehow contradictory and inconsistent with the previous data, which indicates that women generally report more nightmare distress (Schredl & Reinhard, 2011). However, these data are related to the general population of common healthy men and

women, while our study sample was comprised of individuals with specific types of mental disorders. That is why we may conclude that our studies provide evidence that male patients suffering from anxiety disorder experience higher levels of nightmare distress and are prone to higher levels of emotional disturbance from nightmares than female anxiety patients.

With regard to behavioral consequences after nightmares, physiological reactions after nightmares, emotional reactions after nightmares, as well as behavioral coping strategies were significantly more prevalent, intense and pronounced in male anxiety patients than in female patients. This indicates that male anxiety patients generally suffer considerably more from different kinds of emotional and physiological consequences of nightmares and are more affected by them than female anxiety patients, and thus, probably, they make more attempts to cope with their nightmares with the help of different behavioral coping strategies in order to minimize their distress. All of the behavioral consequences of nightmares, as assessed by the NBQ, were rated in a comparable degree, except the attempts to explain a nightmare, which was scored relatively high by the anxiety patients.

Limitations and methodological shortcomings of the empirical study should be reported. First, the sample of participants was not large – 38 participants in each of the two groups. Further, due to a substantially larger presence of females in the study sample and its relative gender homogeneity, there was a slight underrepresentation of males in the sample, which, however, reflects the general prevalence of anxiety disorders with respect to gender distribution of different types of anxiety disorders. Third, the sample was characterized by a relatively lower heterogeneity and narrow variability in terms of representativity of various types of anxiety disorders in participants – the majority of the participants of the study were diagnosed with generalized anxiety disorder, social anxiety disorder, and panic disorder, while only four outpatients were diagnosed with specific phobias, two with separation anxiety disorder, one with agoraphobia and several participants were diagnosed with comorbid mental disorders. These three types of anxiety disorders thus were relatively underrepresented in the study. However, since the focus was not primarily on the influence of specific anxiety disorders on dreaming, but rather on a typical sample of outpatients and external validity, such a heterogeneity of anxiety diagnoses can be accepted. Further, the sample could be biased by an intrinsic interest to dream research, which could influence the study results and with regard to the dream diaries filled in direct after sleep, there could be a subjective recall bias present in the participants' dream reports. Likewise, with regard to the dream diaries there could be false or incomplete dream reports when the participants had forgotten to fill in the diary in the morning and completed this later during the day. In addition, based upon the research in this

dissertation, the following research and investigation modifications and improvements for future studies can be suggested: conducting similar research and study on the influence of different anxiety disorders on dreams, dream contents and characteristics with larger samples of participants, with an equal gender distribution, and covering all types of anxiety disorders in an adequate manner or focusing only on one specific anxiety disorder for a greater homogeneity of the sample.

The present studies thus provide a systematic insight on the influence of different types of anxiety disorders on dreams, dream content and characteristics, and outline specific features of dreams of clinical patients with anxiety disorders. These studies thus add further knowledge of dreams and dreaming in anxiety disorders, which may be helpful for the understanding of these mental disorders and the relationships between dreams and waking life may unveil causes of dream disturbances, such as bad dreams or nightmares, in patients with anxiety disorders and may probably unveil causes for the maintenance of anxiety disorders. It can generally be concluded that the results of the present studies have practical relevance and potential for the application of dream material and contents in professional psychological and psychotherapeutic practice when working with people diagnosed with clinical anxiety disorders. By working with dreams from the perspective of understanding how they may reflect a personal clinical pathology and mental disorder, psychologists or psychotherapists may be able to formulate a professional opinion on the capabilities and limitations of a given clinical patient more quickly, precisely and meaningfully, using these client dream characteristics and data, as well as better understand his or her psychological profile. These data might be helpful in dealing with the individual's creative potential for productive psychotherapeutic counselling work and more effective and beneficial psychotherapeutic treatment course. Knowing particular imagery, contents, emotionality and topics and themes of dreams of anxiety outpatients might help in guiding a psychotherapist or psychologist during a treatment course and serve as an orientation in terms of specific fears or apprehensions of a particular patient with anxiety disorder. These data and evidence may also be helpful and serve as an orientation, which specific topics or themes should be discussed and highlighted during a treatment course more thoroughly and in detail.

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7. Papers and Manuscripts

7.1.

Dreams in anxiety disorders and anxiety

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Summary. Anxiety disorders are one of the most common mental disorders nowadays. While anxiety disorders are a rather widely investigated group of mental disorders, study of dreams and dream content of people suffering from anxiety and anxiety disorders is relatively scant. Therefore, the present review serves to summarize and give a comprehensive and contemporary overview of the existing studies and research on the topic of relationship between dreams and anxiety and anxiety disorders. In addition, it might help to emphasize the necessity of broader and deeper research of this problem and further research and studies on the topic. It contains a survey of interrelations between dream content and dream disturbances and trait and state anxiety in non-clinical and clinical populations, between dream content and dream disturbances and anxiety disorders in clinical populations, and the relationships between nightmare distress and anxiety. It also provides a glimpse on the relationships between dreams and comorbid anxiety and depression and the influence of anxiety on dream recall frequency. In sum, the results show that due to the relatively low number of studies which deal with this topic and their relative inconsistency, the problem of these interrelations and connections is not extensively or comprehensively investigated and developed up to this day, while the findings on such relationships and associations still remain heterogeneous and diverse to a certain extent. Therefore, further deeper and more profound research and investigation of this particular topic is required and seems necessary.

Keywords: Anxiety, anxiety disorders, dreams, dream content, dream theories, nightmares, nightmare distress

1. Introduction

It is generally acknowledged and recognized that dreams, dream experiences and dream contents are connected with psychopathology and are affected by one's mental health and his or her affective experiences, emotionality, feelings and mood during waking life (Domhoff, 1996; Nielsen and Levin, 2007; Pesant & Zadra, 2004; Pesant & Zadra, 2006; Revonsuo, 2000; Schredl, 2003b). And, vice versa, there are also several indications that dreams and dream contents affect and influence waking-day emotionality, mood, affective experiences and well-being (Cartwright, 2010; Hartmann, 1996; Kramer, 1991; Malinowski & Horton, 2015; Perogamvros & Schwartz, 2012). With respect to anxiety and anxiety disorders, derived from the assumed continuity between waking-life experiences and dreams, as well as from clinical observations, it can be assumed that anxiety and anxiety disorders may be reflected in the dreams of the respective persons. However, there is little research on this topic and the results are contradictory. For example, studies on state and trait anxiety in non-clinical populations have to be regarded separately from studies on clinical manifestations of anxiety disorders. Thus, the present review served to summarize the studies on the relationship between state and trait anxiety and dreams as well as between dreams and anxiety disorders.

In the first section, a short overview on anxiety disorders, according to the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) is given. This overview is restricted to those anxiety disorders, on which studies with relation to dreams have been made. In the second section, several theories on the possible aetiology and function of dreams and nightmares are outlined, which can serve as models for the understanding of the relationship between anxiety and dreams. In the third – and central – section, a systematic review of the relationship between anxiety, anxiety disorders and dream contents and dream disturbances (including nightmares), is given.

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2. Anxiety Disorders

Anxiety disorders are one of the most prevalent mental disorders in the general population in the western countries (Kroenke, 2007; Remes, Brayne, Van der Linde, & Lafortune, 2016; Simpson, Neria, Lewis-Fernandez, & Schneier, 2010). In the U.S. their prevalence is about 18 % (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005; Remes, Brayne, Van der Linde, & Lafortune, 2016). They also persist to be the most prevalent mental disorders in the European Union and over 60 million European citizens suffer from various anxiety disorders every year (Wittchen, Jacobi, Rehm, Gustavsson, Svensson, Jönsson, & Fratiglioni, 2011). Anxiety disorders are affecting twice as many women as men, and different types of anxiety disorders often co-exist in one person. They typically begin during childhood or adolescence and early adulthood, while younger people have a 20 % higher risk to suffer from anxiety disorders than adults older than 55 years (Craske & Stein, 2016). Generally, individuals younger than 35 years suffer from anxieties more often than older people (Baxter, Scott, Vos, & Whiteford, 2013; Baxter, Scott, Ferrari, Norman, Vos, & Whiteford, 2014).

Anxiety disorders are a group of several various mental disorders which are characterized by feelings of anxiety, excessive worry, increased preoccupation and fear or phobia.

According to the DSM-5 (American Psychiatric Association, 2013) anxiety disorders include disorders that share features of excessive fear and anxiety and related behavioural disturbances, where fear is defined as the emotional response to real or perceived imminent threat and anxiety as anticipation of future threat (American Psychiatric Association, 2013). This means that anxiety is future-oriented and helps to stimulate behaviour of a person in order to avoid anticipated dangers, whereas fear can be regarded as an expression of anxiety.

In accordance with the DSM-5, there exist several forms of anxiety disorders, which can be separated into phobias, anxiety disorders and selective mutism. Phobias include social phobia (social anxiety disorder), specific phobias and agoraphobia, while the anxiety disorders include generalized anxiety disorder, panic disorder, separation anxiety disorder, substance or medication-induced anxiety disorders and anxiety disorders due to another medical condition and other specified or unspecified anxiety disorders. It should be also noted that the classification of anxiety disorders has undergone significant changes since the publication of the DSM-5. Accordingly, stress-related disorders, though characterised by intense fear, such as the acute traumatic stress disorder and the posttraumatic stress disorder, are no longer subsumed under the anxiety disorders in the DSM-5, which have been there until the DSM-IV. Likewise, obsessive-compulsive disorder has been excluded from the list of anxiety disorders (DSM-5, American Psychiatric Association, 2013; Kupfer, 2015). Stress-related disorders and obsessive-compulsive disorders are thus no topic of the review.

It is also necessary to highlight that apart from anxiety disorders, anxiety as a general personality factor (trait anxiety) or as a normal response to harmful situations or expectations (state anxiety) does exist. This distinction was first introduced by Spielberger in 1966 and further developed by him (Spielberger, 1983; Spielberger, 1985). Trait anxiety is defined as individual's predisposition or tendency to response to some stimulus, stressor or irritant, while state anxiety is a temporal emotion or affect distinguished by psychological and physiological arousal and feelings of fear, dread, tension and apprehension. The most convenient and popular worldwide measurement instrument to estimate levels of trait and state anxiety in subjects is the State-Trait Anxiety Inventory (STAI) developed by Spielberger (1983) which is available in 12 languages (Julian, 2011).

2.1. Types of anxiety disorders

2.1.1 Generalized anxiety disorder (GAD)

GAD is defined as an anxiety disorder characterized by an increased level of worry and apprehension, which is often irrational and one can hardly control such thoughts. It can manifest itself in anxious or grim expectations about future life: events, situations, activities, occurrences, circumstances (American Psychiatric Association, 2013). Such anxiety and worry can impair and influence everyday life and functioning as it is typically expressed in disaster or failure anticipation and apprehension. Typical concerns of GAD-sufferers may include: health issues, family problems, friendship problems, interpersonal relationship problems, work difficulties and other everyday matters (Torpy, Burke, & Golub, 2011). GAD is associated with the experience of uncontrollable anxiety and includes at least three of the six symptoms - anxiety, fatigue, impaired concentration, irritability, muscle tension and sleep disorders. The disorder is twice as common in women as in men and has a high tendency of becoming chronic when not treated (Craske & Stein, 2016; Rickels & Schweizer, 1990).

2.1.2 Panic disorder

Panic disorder is an anxiety disorder characterized by emergence of recurrent, unexpected attacks of severe anxiety (panic), which are not restricted to any particular situation or set of circumstances (American Psychiatric Association, 2013). This usually leads to the avoidance of situations perceived by a person as frightening and potentially dangerous, which may provoke the onset of panic attacks. As mentioned above, panic disorder is often accompanied by agoraphobia. Panic attacks may include a wide variety of different psychological and physiological symptoms, such as: anxiety, fear of dying or losing control, persistent concern and worry about having subsequent attacks; palpitations and accelerated heart rate, chills or hot flashes, sweating, trembling and shaking, chest pain and discomfort, nausea and abdominal distress, derealisation and depersonalisation, feeling dizzy, and paraesthesia (American Psychiatric Association, 2013). The intensity of these symptoms usually increases rapidly during several minutes and typically reaches its peak within a 10-minute period of time. Certain causes of panic disorder are still unknown, yet there is some evidence that it may be associated with family background and genetics (National Institute for Health and Clinical Excellence: Guidance, 2013). The onset of panic attacks is normally preceded or triggered by some stressful events, distress, life transitions and transformations, etc., while women are affected more frequently than men.

One characteristic of panic disorder are sleep panic attacks (or nocturnal panic). One study indicated that 18% of all panic attacks of panic disorder sufferers happened during sleep (Taylor, Skeikh, Agras, Roth, Margraf, Ehlers, Maddock, & Gossard, 1986). According to several estimations and surveys, sleep panic attacks occur in 33 % to 71 % of panic disorder sufferers (Mellman & Uhde, 1989; Krystal, Woods, Hill, & Charney, 1991; Craske, Lang, Rowe, DeCola, Simmons, Mann, Yan-Go, & Bystritsky, 2002; Craske, Lang, Mystkowski, Zucker, Bystritsky, & Yan-Go, 2002; Shapiro & Sloan, 1998), and about one third of them experience nocturnal panic attacks as equal or even more often than panic attacks during wakefulness (Mellman & Uhde, 1989; Mellman & Uhde, 1990). Sleep panic attacks usually represent sudden awakening from sleep with an intense jolt or convulsions and include symptoms similar to panic attacks which occur during waking state (Mellman, 2006). Its relationship to nightmares is unclear.

2.1.3 Separation anxiety disorder

Separation anxiety disorder (SAD) is characterized by excessive intense fear or anxiety about separation from home or an attachment figure who might be usually the mother or both parents, siblings, family members, caregivers, significant other, etc., which involves fear or worry of a person that something bad might happen to an attachment figure (Silverman & Dick-Niederhauser, 2004). Symptoms of the disorder may also include distress and worry about leaving an attachment figure, worries about unexpected events that could lead to a separation from such figure, refusal to leave

him or her, fear of being alone, nightmares about separation and complaints in case when a separation is inevitable. In most severe cases it may even include physiological symptoms such as headaches or stomach-aches. Although in previous versions of the Diagnostic and Statistical Manual of Mental Disorders the disorder was attributed only to people under 18 years old, in the DSM-5 it is applicable to adults either. Separation anxiety disorder is regarded as a normal stage of the developmental process of every person, occurring during an infant period of life, from 6 months to 3-4 years, while it is considered a pathology if it manifests itself in older children (over 6 years old), adolescents or adults.

2.2. Types of phobias

A phobia is defined as a type of anxiety disorder characterized by permanent fear of an object or a situation (American Psychiatric Association, 2013). A phobia manifests itself in a persistent reaction of fear in response to specific objects or situations and exists for longer than six months. Phobias often lead to avoidance of specific objects or situations, or, when the avoidance behavior is not possible or available, it causes a significant level of distress to a person. Some types of phobias, particularly, agoraphobia, may lead to the onset of panic attacks (American Psychiatric Association, 2013). It is frequent to have phobias to more than one specific objects or situations of the similar category, class, type, character, etc. Phobias tend to begin in childhood or early adolescence and only agoraphobia usually begins in adulthood (Öst, 1987; Marks & Gelder, 1966; Lijster, Dierckx, Utens, Verhulst, Zieldorff, Dieleman, & Legerstee, 2017). Three types of phobias are differentiated, social phobia, agoraphobia and specific phobia. The last one will not be described here since no studies on specific phobias and dreaming are published at the present.

2.2.1 Social Phobia

Social Phobia (or Social Anxiety Disorder) is a disorder characterised by intense fear in social situations and fear of failure or a negative judgement of other people. This may lead to significant psychological distress and serious impairment of social functioning and communication during everyday life (National Institute for Health and Clinical Excellence: Guidance, 2013). According to DSM-5, social phobia is defined as a "marked and persistent fear of social or performance situations in which a person is exposed to unfamiliar people or to possible scrutiny by others". This condition also includes avoidance of being the focus of attention or such situations when a person faces the risk of feeling fear of acting in embarrassing or humiliating way (American Psychiatric Association, 2013). Typical social situations eliciting social phobia can include: speaking in public, talking to strangers, having conversations with others, attending public events, parties or social meetings, encountering new people, etc.

2.2.2 Agoraphobia

Agoraphobia is a type of phobia characterized by obsessive, persistent and intense fear of open places or situations where the person perceives the environment to be unsafe with no easy way to get away. Typical examples of such circumstances may include: large open spaces (parking lots, fields, etc.), public transport, closed-in accommodations (stores, shopping malls, etc.), crowded places or being outside one's home (American Psychiatric Association, 2013). Fear of such environments causes a person to avoid these situations and places or, when they cannot be avoided, may result in significant distress and panic attacks. In the most severe cases such avoidance even may lead to a person refusing to leave his or her home. Agoraphobia is highly comorbid with panic disorder and often it develops after occurrence of several repeated panic attacks and as the result of the onset of panic disorder (Barlow, 2013), though it should be noted that in some cases agoraphobia can occur without panic attacks.

3. Theories on dreams and nightmares

In order to better understand the relationship between dreams and anxiety, theories on dreaming which seem to be relevant for this relationship will be shortly presented in the following. In addition, we tentatively try to suggest the impact of anxiety on dreams as suggested by each of these theories.

Nowadays several theories regarding dream occurrence, dreaming phenomena and dream processes exist. These theories can roughly be divided into two groups: theories explaining origins of dreams, and theories explaining possible functions of dreams, their significance in the adaption process and the human evolution. The first theories may be called structural and biological dreaming theories, while the second theories may be called functional theories.

3.1. Structural and biological dreaming theories

3.1.1 AIM-Model

The three-dimensional cognitive-neurophysiological model of dreaming called AIM-model (Activation level, Input-Output source and Mode of processing) suggested by Hobson and Pace-Shott (2002) reflects different brain states and their variations throughout waking and sleeping phases. It consists of three components: activation of different parts of the brain (A); input-output gating, or inhibition of external sensory input and motor output (I), and modulation (M), or level of activation of aminergic and cholinergic neuromodulators. These three processes are experienced by an individual during all conscious states and not only dreaming (Hobson, Pace-Schott, & Stickgold, 2000). In other words, this model represents how much information is being processed by the brain (A), what kind of information is being processed (I) and how it is processed (M) during sleep and waking states of consciousness. According to this model, higher levels of A, I, M and attention to the information from external environment are associated with the waking state, while lower levels of I and M are observed during sleep (Hobson, 2009). During NREM-sleep A is reduced, while M is in a middle position. On the other hand, REM-sleep, instigating dreaming and dream formation, is characterized by higher levels of A, low levels of M, increased attention to the information obtained from memory and decreased attention to the information from an external environment (I). This model, thus, provides an explanation why we are able to see dreams while sleeping and how these dreams are constructed. According to this theory, dreams during REM-sleep usually have rather small relations or associations with real-life events or experiences, though they are better recalled by a dreamer.

This theory provides a profound psycho-physiological model for dream formation, and it can be presumed that the higher activation of I during REM-sleep is associated with a pronounced processing of internal information, i.e., memories, which may result in the occurrence of high-order memories during REM-sleep related dreams. Thus, in anxiety patient or highly anxious persons, anxiety-related memories should be activated and processed in dreams. According to the AIM-model, it can be expected that people with different anxiety disorders may experience frightening or fearful dreams which contain specific images associated to their frightening situations or objects.

3.1.2 Protoconsciousness theory

This theory was also suggested by Hobson and involves a definition of proto-consciousness which is associated with REM sleep and serves as a basis ground for the formation of primary consciousness. The latter then forms a basis for the formation of second consciousness (Hobson, 2009). Protoconsciousness is understood as a primordial state of mental organization and is a foundation for the formation of true consciousness (primary and secondary). Primary consciousness includes simple awareness that one is conscious and it is typical not only for humans, but for most of the mammals. It is associated with the ability to perceive external environment and experience emotions. Secondary consciousness includes abstract thinking, self-cognition and meta-cognition, which, in other words, reflects awareness of being conscious and of one´s state, knowledge, experience, etc., and not only of an outside world. This type of consciousness is specific only for humans and requires language and verbal thinking. Secondary consciousness is not experienced during sleep and only used in waking life, while primary consciousness is experienced during sleep. According to this theory, waking and dreaming states are seen as interconnected and operate together to provide mutual functioning during whole lifetime. Both states are considered to cooperate and play a crucial role in effective functioning of each other. Brain development is associated with consciousness development from protoconsciousness to the higher levels of consciousness which occurs through individual`s life, especially during REM sleep, in utero and early life (Hobson, 2009). REM sleep is a protoconscious state, which implies that it prepares the brain to operate in the waking state, during the secondary consciousness. Brain activation during REM sleep causes occurrences of visual information and imagery, and this process might be compared to virtual reality. During REM sleep a virtual model of oneself, called „protoself" is created, which acts in this virtual world (Libet, Gleason, Wright, & Pearl, 1993; Wegner, 2004). The main point of such process is to train a brain to function in the real world during this virtual reality, which is de facto a dream. This implies that REM-sleep, and especially dreams, play an integrative role between protoconsciousness and secondary consciousness and thus to have an adaptive function, as to prepare for the waking life (Hobson, 2009).

As for the dreams of anxiety sufferers, we may assume, according to this theory, that dreams of such individuals may contain negative emotions and anxiety, fearful, frightening, and dysphoric images, symbols, objects, states or situations. Thus, through these negative emotions and anxious states during dreaming enables, a rehearsal of them which allows the individual to cope with and adapt to a anxiety or to anxious states during waking life. In other words, it can be assumed that presence of anxiety disorders might provoke occurrence of fearful dreams with corresponding dysphoric and negative emotions, feelings and situations in order to attempt to adapt to anxiety and lower its level.

3.1.3 Continuity and discontinuity hypotheses

The continuity hypothesis of dreaming was first suggested by Domhoff (1996). According to this theory an individual's dream content is highly continuous with waking experiences, thoughts, concepts or emotions and reflects previous waking life experiences during sleep. The continuity hypothesis postulates that one´s thoughts, emotions or mental states experienced during waking life are transferred to dreams and bear resemblance with them. This implies that dream images and content constitute continuity with everyday life constructs and events, and, therefore, the dreaming personality possesses continuity with the waking personality either (Domhoff, 1999).

Although the continuity hypothesis of dreaming is supported by a plethora of observations and studies and gained a significant confirmation, acknowledgement and support within the framework of many other investigations, including even several earlier studies (Domhoff, 1996; Hall & Nordby, 1972; Schredl & Piel, 2005; Schredl, 2003a), there are some aspects that minimize its significance and meaningfulness. First, there is still other significant experimental data that contradicts it: it was clearly shown that children dreamed more about recreational activities than of their usual everyday life events or experiences (Foulkes, 1982). Second, recent studies showed that while some elements of everyday life, such as negative emotions or certain events, are highly represented in dream content, other usual everyday activities, especially cognitive processes, such as reading, writing or mentation, are rarely represented in dreams (Domhoff & Schneider, 2008; Hartmann, 2000; Schredl & Hofmann, 2003; Valli & Revonsuo, 2009). Third, while the dreamer's mood, emotional state, cognitions and personality traits can affect and alter dreams substantially (Erdelyi, 2017) it is not surprising that the dream is a continuation of waking life, since the person of the dreamer is the same person awake with all its memories, emotions needs and wishes. Forth, the theory can hardly be falsificated, since even the occurrence of only one element from waking life in a dream verifies the theory, which is thus of a very poor epistemological quality. That is why we assume that it would be too trivial and an oversimplification to assume that dream content is only a continuation of waking life.

Speculating according to the postulates of this theory, we can expect that dream content of anxiety disordered individuals will likely manifest, represent and reflect similar frightening objects, situations or themes which they experience in their every-day usual life experience. Generally speaking, we can presume, that their anxiety disorders may directly influence their dream contents and such dreams may resemble and reflect their waking life experience of fear and anxiety.

An opposing theory was formulated called discontinuity hypothesis (Stickgold, Hobson, Fosse, & Fosse, 2001). This theory postulates that dreams are based on completely different thoughts or emotions than that experienced during everyday life. It implies that dream content is structurally different from everyday life waking experience and is not correlated with it. In line with this theory we might assume

that dream contents of anxiety sufferers will have little or no resemblance and similarity with their everyday life experience, events, emotions, feelings or states. This implies that their dreams may contain no anxious feelings and emotions, or even positive ones, or completely different situations.

According to the latest data and observations, both theories seem plausible, legit and probable, and dreaming, therefore, involves simultaneous incorporation of both of these phenomena of continuity and discontinuity in terms of dream content and dreams (Blagrove, 2011; Hobson & Schredl, 2011). In line with this notion we must admit that actual dreams and dream contents show signs of the cooperative influence of both of these factors of continuity and discontinuity and contain such elements or experiences which clearly support and confirm the assertion of a combination and joint influence of these two processes during dreaming. Thus, it has been argued that an integration of these two theories is necessary (Voss, Tuin, Schermelleh-Engel, & Hobson, 2010), suggesting that thoughts or emotions during dreams and waking life are related somehow, but structurally independent.

3.2. Functional theories of dreaming

3.2.1 Sentinel Function Theory

Sentinel function theory was proposed by Snyder (1966) and suggests that sleeping and dreaming in REM sleep have an adaptive, preparatory and predictive function for the situations occurring in an environment. He observed animals, especially mammals, and proposed that dreaming during REM sleep prepares them for fight-or-flight reaction if the information from an environment is regarded dangerous, harmful or damaging (Snyder, 1966). If there is no such situation, dreaming with pleasant dreams continues. According to this theory, REM-sleep increases brain activity and performance thus preparing and allowing a human or an animal to awaken immediately and realize fight-or-flight reaction in case of an actual detected danger in an environment upon awakening (Valli & Revonsuo, 2009). Therefore, this theory emphasizes this particular „sentinel" function of dreaming, which implies that it provides an individual´s safety and security from external threats or hazards during sleeping and helps to differentiate various stimuli during sleep as actually hazardous or not and maintain sleep if they are not dangerous enough. Several empirical notions and evidence support this theory. It is yet confirmed that external stimuli, such as sound, words, smells or tactile sensations are registered and detected during sleep and may lead to increased activity in a human brain and to the incorporation of such stimuli into dream content (Schredl, 1999), while sleeping and dreaming is though maintained, when such stimuli are considered not dangerous. Considering the credibleness of the theory, we can propose several assumptions on the subject of dream content of anxious individuals. We suppose that heightened level of anxiety or the presence of an anxiety disorder may be increase the probability that external stimuli during sleep are considered as a signal of danger, indicating the presence of a dangerous situation in the environment. Therefore, it can be assumed that dreams of individuals suffering from anxiety disorders will contain more anxiety related aspects and these persons will have a higher frequency of bad dreams or even nightmares with nocturnal awakenings.

3.2.2 Problem solving and creativity function

An evolutionary function of dreams was proposed by Hartmann (1998), concerning the creative and problem solving function of dreams, which implies that dreams can help people to overcome traumatic experiences and previous harmful situations, whether they are recalled or not, and promote creativity. According to this theory, dreams provide dealing with a trauma in many different mental contexts within the "safe place" of sleep, where psychological "connections" can be made without any danger. These broader connections formed during dreaming provide new associations and linkages of information which can be useful during waking life. This theory implies that dreaming has two major functions: therapeutic function with regard to previous psychological traumas and a problem-solving function which develops and promotes creativity (Hartmann, 1998). It is also implied that one´s creativity and dreaming are connected and dreams are associated with increased creativity and creative capabilities.

In line with this, Barrett (2007) showed that dreams have a problem-solving and adaptive function and help to find solutions for personal problems and concerns of waking life. According to the theory suggested by him such ability to resolve everyday problems during dreaming, in completely different from wakeful state conditions, allowed to improve survival, increase and promote adaptive capabilities and reproductive opportunities (Barrett, 2007). This assumption is supported by the results of a study by Barrett (1993), in which the dreams of college students contained at least partial solutions to their everyday problems.

According to these assumptions we can hypothesise that dreams of individuals suffering from anxiety disorders will involve anxiety-related stimuli which help to find means to overcome distressing anxiety and to and cope with these stimuli in order to reduce anxiety. Such dreams may also contain specific solutions, ways or methods which will help to reduce distress from anxiety or clear off anxiety.

3.2.3 Psychological healing and stress-reduction theories

Several researchers suggested that dreaming helps to maintain and promote psychological well-being and emotional balance and has a psychotherapeutic effect on the dreamer (Breger, 1967; Cartwright, 1991; Garfield, 1991; Hartmann, 1996; Kramer, 2011). All of these theories are based on the idea that dreams possess problem-solving capabilities and thus allow to adjust to and cope with current waking life emotional problems. Breger (1967) claimed that dreams allow to solve emotional problems of a dreamer and, therefore, preserve psychological balance and emotional well-being during waking life. Similarly, Garfield (1991) discovered that dreaming helps to improve psychological health and recover from previous traumatic events, adjust to life stressors and cope with them. Cartwright (1991) proposed that dreams act as a "mood regulator" and highlighted their healing and stress-reduction function. She postulated that dreams can provide reduction of negative emotional charge related to real life experience and events which allows to change the dreamer's attitude toward these events to a more positive one. Kramer (2011) extended her ideas and asserted that dreams ensure "selective mood regulation". He supposed that dreams protect sleep and provide containment of "surge of emotion" which occurs during REM-sleep. If such containment is not successful, this leads to an awakening of

a dreamer. On the other hand, when it is successful a dream attempts to solve a problem associated with existing emotions. Ultimately, this leads to positive changes in dreamer's mood, increases psychological well-being and improves the subjective emotional and affective state of a dreamer. Hartmann (1996) highlighted the idea that the main function of dreams is psychological healing of traumatic experience through emotional problem-solving and stressed the psychotherapeutic effect of dreaming (Hartmann, 1996). He assumed that dreaming helps in healing and reducing stress from previous real life traumatic events or incidents through cross-connections and occurrence of new connections within the neural network of a brain during dreaming. When a traumatic experience is resolved or integrated dreams change and become less intense which provides a relief from a trauma and increases emotional well-being. Nielsen and Levin (2007, 2009) also regarded psychological healing as one of the major functions of dreaming and viewed chronic posttraumatic nightmares as a defect of this function. According to their affective network dysfunction model (AND) persistent occurrence of post-traumatic nightmares indicates a failure in the integration of a traumatic events into neural memory networks. This integration normally occurs during dreaming and allows resolving of a trauma and emotional healing (Nielsen & Levin, 2007; Nielsen & Levin, 2009). However, is has to be noted, that, no psychological "healing" or "recovery" of a trauma due to dreams was actually confirmed (Valli & Revonsuo, 2009). Nevertheless, we might make several predictions in line with these theories: since dreams have a healing function on emotional problems, a higher dream frequency will be associated with a higher well-being, i.e., less anxiety related problems in the waking life. Accordingly, it may be expected that anxiety sufferers will experience "healing dreams" (bad dreams or nightmares) more frequently.

3.2.4 Theories of simulation functions of dreams

Theories of simulation functions of dreams are based on the idea that the main function of dreams is to simulate everyday life events and threats. These theories assert biological adaptation and evolution as the main function of dreams which promotes and facilitates survival and prosperity in the real world. They emphasize an evolutionary significance of dreaming.

The most prominent of these theories was proposed by Revonsuo (2000) and is called the Threat Simulation Theory. This theory posits that during dreaming an individual is allowed to rehearse avoidance behaviour and appropriate reactions to a threat in a virtual environment. According to this theory dreaming represents an offline model of the real world and dreams simulate dangerous and threatening real life events, such as assaults or open confrontation with other individuals. Thus they have a biological function of adaption and preparation to dangers of the real life (Revonsuo, 2000). Dreaming, therefore, was essential for the human evolution and adaptation to an unsafe environment full of different threats. Dreaming thus leads to an efficient coping behaviour for real life dangerous situations and improves survival capabilities and skills (Revonsuo, 2000). This theory is supported by the observation that dreams often contain aversive or negative themes, such as aggression, negative emotionality or misfortune (Domhoff & Schneider, 2008). In line with the theory it can be assumed that anxiety disorders may increase the occurrence of threatening situations in dreams in order to provide rehearsal of an efficient behaviour in real life dangerous situations. On the other hand, one can expect more dreams of successful coping with fearful or threatening situations according to these theories.

Franklin and Zyphur (2005) extended Revonsuo's (2000) theory and postulated that dreams provide rehearsal of not only dangerous or threatening events, but also of social situations and concomitant communications and interactions. According to their theory dreams simulate social interactions and therefore play a crucial role in the development of higher cognitive functions responsible for social skills and communication in the real world. Having performed content analysis of dreams, they found that dreams often include situations of social interactions and communication. In line with this theory, dreams help to provide successful "social mapping" for the everyday life social situations and also improve our ability to better understand intentions of other people and even anticipate them (Valli & Revonsuo, 2009). Although it is already known that dream contents often include social situations and interactions with familiar characters and known people, which might offer the opportunity to practice and simulate these interactions in dreams, there is still no certain and clear evidence that a useful simulation really occurs during these interactions in a dream, which provides learning and practicing for the real-life social situations. Moreover, it is still somehow unclear, whether there is any practical significance or point in such simulations, as it was not yet determined that such in-dream social simulations are "less costly", easier, more economical or beneficial for a sleeper than real life social simulations (Valli & Revonsuo, 2009). In line with this theory, we can propose that dreams of individuals with social anxiety will contain a higher rate of problematic social interactions and situations of social communication.

Taken together, from most of the theories on dreaming an increased probability of anxiety-related dream contents in the dreams of anxiety patients can be deduced. This holds for the simulation functions dream theories, sentinel function dream theory, problem-solving and adaptation dream theories, protoconsciousness dream theory and the continuity hypotheses of dreaming. Likewise, an increased occurrence of nightmares or bad dreams is suggested by the psychological healing and stress-reduction dream theories in the form of so-called "healing dreams", as well as the sentinel function theory of dreaming. In contrast, the discontinuity hypothesis of dreams formation suggests that the dream content and dreams of anxiety sufferers will involve little or no resemblance with their waking-life anxiety experience, feelings or thoughts, or, in other words, that there is a lesser probability of occurrence of anxiety-related themes, topics or images in dreams of anxiety patients. Although the current theories on origins and functions of dreaming allow a relatively clear prediction on the relationship between anxiety or anxiety disorders and dreams, a surprisingly low number of studies have done with these subjects. And the results of these studies are heterogeneous as will be shown in chapter three.

3.3. Nightmares and bad dreams

According to the DSM-5 and the International Classification of Sleep Disorders (ICSD-3) nightmares are defined as "vivid, highly emotionally dysphoric" dreams that "usually involve efforts to avoid threats to survival, security, or physical integrity". Fear is the dominant emotion which occur

during nightmares, though it is also not uncommon for other emotions, such as rage, anger, sadness or shame to occur during nightmares (Robert & Zadra, 2014; Zadra, Pilon, & Donderi, 2006). Like other dreams, nightmares normally occur during REM-sleep. Several authors suggest a distinction between nightmares and bad dreams: nightmare is a disturbing dream which includes awakening from sleeping, while bad dreams are defined as "negatively toned dreams" or disturbing dreams without awakenings (Levin & Nielsen, 2007; 2009; Robert & Zadra, 2014; Zadra et al., 2006; Zadra & Donderi, 2000). Additionally, nightmares are more emotionally intense, vivid and tense than bad dreams (Zadra et al., 2006). Two types of nightmares are also distinguished: idiopathic nightmares, which are not caused by another disorder or factor and posttraumatic nightmares which occur following a trauma and often are a symptom of the posttraumatic stress disorder (PTSD). There exist several assumptions on the aetiology of nightmares, which highlight that stressful events as well as a deficit in the habituation of cortical arousal to stressful or traumatic events may play a dominant role (Gieselmann, Aoudia, Carr, Germain, Gorzka, Holzinger, Kleim, Krakow, Kunze, Lancee, Nadorff, Nielsen, Riemann, Sandahl, Schlarb, Schmid, Schredl, Spoormaker, Steil, van Schagen, Wittmann, Zschoche, & Pietrowsky, 2019). Likewise, several helpful therapeutic approaches to the treatment of nightmare disorder have been developed in the past few years, which contain a confrontation with the nightmare content and a mastery of the nightmare content and distress as major elements (Gieselmann et al., 2019).

4. Dreams and Anxiety

In terms of relationships between anxiety and dreams it can be assumed that heightened anxiety of an individual may lead to more frequent and more intense fearful or harming dreams and may also induce bad dreams or nightmares. There is certain evidence that excessive anxiety or anxiety disorders instigate relevant feelings, thoughts, emotions and content in dreams. Though it is necessary to point out that, speaking of dream content, there is still relatively little research regarding interrelations of anxiety and dream content (Skancke, Holsen, & Schredl, 2014), though study of such relations is a developing field of investigation. We first want to overview the studies devoted to the relations between anxiety and anxiety disorders and dream content. Furthermore, there are some studies indicating associations between anxiety or anxiety disorders and disturbing dreams and nightmares (Haynes & Mooney, 1975; Hersen, 1971; Levin & Fireman, 2002; Nielsen, Laberge, Paquet, Tremblay, Vitaro, & Montplaisir, 2000; Wood & Bootzin, 1990; Zadra & Donderi, 2000). We would like to overview these studies further. First we will describe the literature on dreams in non-clinical population of persons with high anxiety as a personal disposition (trait or state anxiety) and then turn to dreams in persons with anxiety disorders.

4.1. Dream Content and Trait and State anxiety

According to Hartmann, dreams reflect emotions of waking life (Hartmann, 1996). Strong negative emotions, such as anxiety and fear, during waking day can induce relative negative emotions of anxiety and fear in dreams (Yu, 2007). There is certain evidence that anxiety can affect a person's dreams and different levels of anxiety may influence and alter dream content (Jones & DeCicco, 2009). High waking day anxiety, whether it is trait or state anxiety, can elicit strong emotions, which, in turn, find their reflection in dreams as negative emotions or emotions of anxiety and fear in dream content (Wilkinson, 2006).

Regarding trait anxiety and dreams, it is clearly seen that higher levels of trait anxiety in waking life lead to a more negative emotional tone in dreams and generally to more negative, sad and depressive dream contents and overall higher negativity, higher number of threats and dangers and aggression in dreams. It is now evident that higher trait anxiety in waking life leads to the presence of higher number of aggressive unfriendly interactions, including such interactions directed toward a dreamer, failures and misfortunes in dreams, higher frequency of negative emotions and negative affect in dream content, is related to a more realistic dream content and the presence of higher number of realistic threats in dreams (Gentil & Lader, 1978; Pesant & Zadra, 2006; Schredl, Pallmer, & Montasser, 1996). Latest research also indicates that higher dreamed fear in frequent nightmare sufferers is instigated by the higher levels of trait anxiety of such individuals (Picard-Deland, Carr, Paquette, Saint-Onge, & Nielsen, 2018). Moreover, it was found that higher levels of specific trait anxiety (an anxiety and fear of particular topics, themes, objects or subjects) in combination with higher general trait anxiety can predict occurrence of related specific topics and themes in dreams. It is also obvious that elevated anxiety is related to recurrent, or repetitive, dreams. Higher frequency of recurrent dreams with a more negative emotional tone, affect and experience, dysphoric dream content, higher levels of dream anxiety, hostility, aggression or conflicts occurrence are found to be obviously related to the elevated levels of waking-day trait anxiety (Brown & Donderi, 1986; Zadra, O'Brien, & Donderi, 1998). Higher trait anxiety is also associated with longer dream reports, based on the word count in each dream report (Demacheva & Zadra, 2017).

On the other hand, there were some findings which diverged from the results of the other research and, nevertheless, found several discrepancies in terms of relations and associations between higher levels of trait anxiety and general negativity, higher aggression or overall higher negative emotional tone in dreams. For example, no significant associations were found between higher trait anxiety and occurrence of specific dream content, which included aggressive interactions, failures, misfortunes, significant positive or negative affect and emotions in the study by Demacheva and Zadra (2017) and trait anxiety thus did not influence dream content in healthy females significantly (Demacheva & Zadra, 2017).

With regard to state anxiety, it is almost evident that higher levels of state anxiety lead to a more negative emotional tone and affect in dreams, higher levels of aggression, aggressiveness and negativity, a more negative emotional tone and affect in dreams, presence of more violent emotions in dreams (e.g. sadness or anger) and a higher frequency of aggressive acts directed toward a dreamer (King & DeCicco, 2007). This is supported by some other data which indicates that higher rates of state anxiety increase number of dreams with negative and "harmful" emotional tone (Komasi, Soroush, Khazaie, Zakiei, & Saeidi, 2018). Dreams of anxious individuals also were shown to contain higher frequency of familiar human characters and limbs of a human body (King & DeCicco, 2007). Surprisingly, higher level of state anxiety were found to be associated with higher sexuality and high-

er numbers of sexual objects in dreams. (Robbins, Tanck, & Houshi, 1985).

Some interesting findings regarding both state and trait anxiety can also be mentioned, which implies that the joint and cooperative influence of these both "anxieties" also alters and transforms dreams and dream content in a peculiar and specific way, and, therefore, several distinct features can be outlined. It was clearly shown by Jones and DeCicco (2009) that higher levels of waking day state and trait anxiety are associated with animal imagery in dreams, which is confirmed by the earlier study by DeCicco (2007). They also found that state and trait anxiety increases location change frequency in dreams (Jones & DeCicco, 2009). In addition, it was revealed that both elevated trait and state anxiety during a stressful period increases frequency of recurrent and regular dreams (Duke & Davidson, 2002).

4.2. Dream Content in Anxiety Disorders

Addressing the topic of research of the interrelations between anxiety disorders and dreams and dream content we have to assert that such studies are rather scarce and scant, generally unsystematic and inconsistent and mostly bear individual, singular and non-longitudal, segregate and separate character.

It was shown in general that dreams of anxiety-disordered females were distinguished by a higher frequency of aggressive interactions, especially, directed toward the dreamer, fewer friendly interactions and failures in social interactions, as well as a more negative and lower emotional tone and affect, sadness and gloom (Gentil & Lader, 1978). Anxiety disorders also increased number of failures and decreased number of successes in dreams of such individuals. Dreams of anxious patients are also distinguished by higher scene change frequency (DeCicco, Zanasi, Dale, Murkar, Longo, & Testoni, 2013; Miller, DeCicco, Dale, & Murkar, 2015).

With respect to specific anxiety disorders, we should also assert that there is still not so much empirical evidence regarding the relations between various kinds of anxiety disorders and specific dream content. It is almost obvious that generalized anxiety disorder is related to more negative affect, feelings and mood, lower emotional tone, higher overall aggression and higher frequency of aggressive interactions, lower number of friendly interactions, higher level of misfortune, lower level of success and low number of known characters in dreams (Kirschner, 1999; Sikka, Pesonen, & Revonsuo, 2018). Dreams of panic disorder patients are also distinguished by higher level of aggression, higher number of aggressive interactions and lesser frequency of friendly interactions, more negative emotional tone and affect, frequent misfortunes and lower success, and lesser known characters (Kirschner, 1999). Panic disorder is known to be related to the significantly higher degree of presence of separation anxiety in dreams (Free, Winget, & Whitman, 1993), as well as higher levels of "covert hostility directed outward", which assesses "remarks about others being hostile to others and denial of angry and hostile feelings of the self" (Free, Winget, & Whitman, 1993, p. 598). Generally, dreams of such patients are marked by intense anxiety and fear and higher frequency of more negative emotions (Free, Winget, & Whitman, 1993). Agoraphobia was shown to be related to the presence of wide open landscapes and areas with large spaces to walk or move around in dreams (Foss, 1994). Social anxiety disorder was associated with the occurrence of higher number of frightening and fearful figures of people of an opposite sex (males, in this particular case) in dreams, as well as of common frightening situations or occurrences, such as falling down, encountering frightening animals or creatures, examinations and public speeches (Khodarahimi, 2009). Generally, we can conclude that such dreams include symbolical and associative depictions and reflections of traumatic or unpleasant events and experiences from the past, especially, childhood, which instigate, provoke and cause social anxiety. However, taking into consideration the character of the two studies, one related to the investigation of social anxiety disorder and dreams and the other one dealing with chronic agoraphobia and dreams, their methods, the way of their conducting, and the obtained data, it is necessary to note that their findings are rather limited, due to their case-study status. Therefore, we can hardly extrapolate their results and conclusions on all other patients with such disorders in light of the lack of research on larger samples.

4.3. Nightmare or Bad Dream Frequency and Trait and State anxiety

A considerably large number of studies found significant and strong relationships between nightmare and bad dream frequency and trait or state anxiety. Higher nightmare frequency was shown to be significantly associated with observed anxiety manifestations and symptomatic in children (Fisher & McGuire, 1990). Such correlation between higher rates of anxiety and a higher frequency of nightmares was also observed and established in healthy adult people (Cook, Caplan, & Wolowitz, 1990), though this particular study does not specify certain type of anxiety (state or trait). Several studies confirm that higher nightmare frequency is significantly related to the higher rates of death anxiety and heightened presence of concerns and worries about death or dying in frequent nightmare sufferers (Dunn & Barrett, 1988; Feldman & Hersen, 1967; Hersen, 1971; Levin, 1989). It was also asserted that such heightened nightmare frequency is associated with lower ego-strength and higher manifest anxiety and anxiety symptomatic (Hersen, 1971; Levin, 1989). Only one small and old study, on the other hand, revealed no significant correlation between fear of dying or death anxiety and concerns about death and nightmare frequency (Collet & Lester, 1969).

Significant associations between heightened levels of trait anxiety and higher nightmare frequency were indicated in a series of studies in children, school adolescents and adult populations which employed retrospective self-reports or prospective daily logs (Haynes & Mooney, 1975; Köthe & Pietrowsky, 2001; Levin, 1998; Mindell & Barrett, 2002; Roberts & Lennings, 2006; Zadra & Donderi, 2000). Several studies also indicate significant relations between heightened trait anxiety and the frequency of disturbing and bad dreams in both adult and children populations (Nielsen et al., 2000; Schredl, Pallmer, & Montasser, 1996; Zadra, Donderi, & Assad, 1991; Zadra & Donderi, 2000). Not only frequent disturbing and bad dreams were found to be related to higher levels of trait anxiety and its psychological symptoms such as heightened fear, dread, inner tension and anxiety, but also their recall rate and degree (Nielsen at al., 2000). In addition, it was shown that elevated levels of trait anxiety in adults led to an increase in number of negative affects in dreams and a decrease in number of positive dream affects (Zadra, Assaad, Nielsen, & Donderi, 1995).

Only one particular study (Wood & Bootzin, 1990) suggests no significant associations between heightened trait anxiety and the higher number of nightmares, and even this study confirms such correlation when the method of retrospective self-reports was used (r=.13). However, this influence was practically absent when daily logs method was used instead of self-reports (r=.04) (Wood & Bootzin, 1990).

A significant number of studies confirm that higher levels of state anxiety significantly correlate with increased nightmare frequency in adults (Cellucci & Lawrence, 1978a; Köthe & Pietrowsky, 2001; Schredl, 2003b; Roberts & Lennings, 2006; Zadra & Donderi, 2000). We can assert, therefore, that the actual experience of anxiety or "anxious states" is significantly related to a higher nightmare frequency in dreams. There is also certain evidence that nightmare occurrence during the night may immediately provoke higher levels of manifested state anxiety the day after this nightmare (Köthe & Pietrowsky, 2001). Likewise, several of the frequent nightmare sufferers exhibited relatively higher state anxiety about their nightmares during the day (Hartmann, Russ, Van der Kolk, Falke, & Oldfield, 1981). None of them, however, was over-anxious and phobic, or possessed heightened neuroticism. Heightened frequency of bad and disturbing dreams was also found to be associated with higher level of state anxiety in adults and adolescents (Blagrove, Farmer, & Williams, 2004; Nielsen at al., 2000; Zadra & Donderi, 2000).

The empirical data suggests that state anxiety may serve as a "mediator" variable between trait anxiety and nightmare frequency, directly influencing and affecting the frequency of nightmares (Köthe & Pietrowsky, 2001; Schredl, 2003b). Thus, we may conclude that state anxiety is related to nightmare frequency level in dreams even more directly and vividly than to trait anxiety. Though, we must admit, however, that nightmare frequency correlates with both trait and state anxiety levels, which is supported by an abundance of experimental evidence. The data from the study by Blagrove and Fisher (2009) especially reveal and highlight such "mediator" relationships between nightmare frequency and state and trait anxiety, as it was shown that heightened trait anxiety instigates and provokes nightmare occurrence as a response and reaction to the presence of heightened everyday state anxiety, which thus leads to a higher nightmare frequency (Blagrove & Fisher, 2009). It is clearly seen then that trait anxiety serves as a personal predisposition or tendency to experience more nightmares, while state anxiety is a direct trigger which initiates and instigates the occurrence of nightmares. Unexpectedly, one study found, nevertheless, no significant correlations between heightened nightmare frequency and higher levels of state and trait anxiety (Dunn & Barrett, 1988).

4.4. Nightmare or Bad Dream Frequency in Anxiety Disorders

Frequent nightmares are found to be associated with anxiety disorders in insomnia sufferers (Ohayon, Morselli, & Guilleminault, 1997). Desroches and Kaiman (1964) clearly indicate that anxiety disorder patients exhibit a higher frequency of frightening dreams than healthy subjects. Higher frequency of nightmares in children and adolescents with anxiety disorders (anxiety-affective disorder) was also confirmed (Simonds & Parraga, 1984). Similarly, significantly higher presence of nightmare disorder in patients with anxiety disorders (15.6%) than in general population (2-5%) was noted (Swart et al., 2013).

A considerable number of studies confirm and indicate inherent and intrinsic relationships and associations between different types of anxiety disorders and nightmare or bad dream frequency. There is certain evidence that the presence of panic disorder correlates with increased nightmare frequency and, accordingly, frequency of related nocturnal panic attacks (Schredl, Kronenberg, Nonnell, & Heuser, 2001). On the other hand, nocturnal panic and nightly panic attacks, which are also often common in patients with obstructive sleep apnea, are found to predict and predispose later occurrence and development of panic disorder (Simon, Berki, Gettys, & Vedak, 2016). A strong evidence also exists that patients with social anxiety disorder are prone to and suffer from more frequent nightmares (Picard-Deland et al., 2018), and, vice versa, individuals suffering from frequent nightmares exhibit higher levels of social fear and social anxiety (Levin, 1998). A typical child anxiety disorder, separation anxiety disorder, is also shown to be related to nightmare disorder and a higher frequency of nightmares, especially, higher frequency of recurrent nightmares with several specific topics and themes, such as losing or destruction of a family, separation and detachment from a family or parents (Simon et al., 2016). Separation anxiety disorder then often manifests itself in children in sleep terrors with frightening and unusual experiences during sleeping and dreaming alone in a dark room. Significantly higher frequency of bad or disturbing dreams is also shown to be associated with the presence of generalized anxiety disorder in adults (Nadorff, Porter, Rhoades, Greisinger, Kunik, & Stanley, 2014). Individuals suffering from this disorder had significantly higher rate of disturbing dreams than healthy subjects (21.6 %), which is consistent with the previous data from the earlier research (Mallon, Broman, & Hetta, 2000; Nadorff et al., 2014).

Empirical evidence from the practical experience of clinical treatment of nightmares, especially from the field of Cognitive Behavioural Therapy, also supports the idea of intrinsic relationships between nightmares and their higher frequency and various kind of anxiety disorders. Several Cognitive-Behavioural studies aimed to reduce nightmare frequency, intensity and distress, all of which utilized and employed systematic desensitization method, not only reached improvement in nightmares, but also reduced daily symptoms of anxiety and anxiety disorders (Burgess, Gill, & Marks, 1998; Cellucci & Lawrence, 1978b; Miller & DiPilato, 1983).This is also confirmed in another study (Kellner, Singh, & Irigoyen-Rascon, 1991), which shows that implementation of imagining and rehearsing cognitive technique aimed to reduce frequent recurrent nightmares also reduces panic disorder intensity and the frequency of related nocturnal panic attacks. Mutually, it was demonstrated that Cognitive Behavioral Therapy for anxiety and generalized anxiety disorder, which contains sleep hygiene, helps to reduce frequency of bad and disturbing dreams in adults (Nadorff et al., 2014).

However, there is few experimental evidence which is discrepant with the data presented above and found no significant relationships between nightmare frequency and anxiety disorders. Two studies revealed no relationship between the frequency of nightmares and any type of psychopathology or mental disorders, including anxiety disorders

(Chivers & Blagrove, 1999; Spoormaker & Van den Bout, 2005). Though, however, such correlation with acute stress was found (Chivers & Blagrove, 1999).

4.5. Nightmare Distress and Anxiety

Nightmare distress is defined as "the waking suffering or distress associated with nightmares" (Belicki, 1992, p. 592) or "trait-like general level of distress in waking-life caused by having nightmares" (Blagrove et al., 2004; p. 129). A clear evidence of the inner relationships between nightmare distress and anxiety and anxiety disorders exists and such associations and influence were confirmed in a significant number of studies and investigations.

There is direct evidence suggesting that elevated levels of trait anxiety both in children and adults are related to the heightened level of nightmare distress in nightmare sufferers (Mindell & Barrett, 2002; Picard-Deland et al., 2018). For children it was found that those children who consider their nightmares more frightening possess higher levels of trait anxiety than those who don't perceive them as frightening (Mindell & Barrett, 2002), while the adults showed direct correlation between the trait anxiety levels and the nightmare distress experienced by the frequent nightmare sufferers (Picard-Deland et al., 2018).

An abundance of empirical data confirms that elevated nightmare distress in nightmare disordered individuals is highly associated and strongly correlated with the heightened levels of state anxiety. Furthermore, some of the studies suggest that state anxiety is related to and correlates with nightmare distress even more significantly and explicitly than with nightmare frequency (Blagrove et al., 2004; Levin & Fireman, 2002; Zadra, Germain, Fleury, Raymond, & Nielsen, 2000). Intensified emotional disturbance related to nightmares and nightmare distress in frequent nightmare sufferers was shown to be associated with an elevated state anxiety (Berquier & Ashton, 2002). Accordingly, it is almost evident that frequent nightmares negatively affect an individual well-being through the distress they provoke and, correspondingly, heighten state anxiety of an individual, as a component of one's well-being, which is implied by the observation that nightmare distress serves as a mediator between nightmare frequency and suicidal ideation and thoughts, and, thus, lower one`s well-being (Lee & Suh, 2016). Likewise, series of other studies also support these ideas and evidently indicate that higher nightmare distress is associated with higher state anxiety and neuroticism due to the elevated levels of negative affect, acute stress or stress-related symptoms and lower well-being in waking life (Blagrove et al., 2004; Levin & Fireman, 2002; Zadra et al., 2000).

Both trait and state anxiety were shown to be related to the elevated levels of nightmare distress (Nielsen at al., 2000), while some of the evidence suggests that both of them are related to nightmare distress even more significantly and directly than to nightmare frequency (Belicki, 1992; Levin & Fireman, 2002). We may conclude, therefore, that higher nightmare distress is strongly and obviously related to elevated levels of trait and state anxiety, heightening their levels and, likewise, is affected and intensified by them.

4.6. Dreams and Comorbid Anxiety and Depression

Certain and significant evidence of the influence of not only anxiety as such, but also comorbid anxiety and depression on dreams and dream content exists. In terms of dream content, dreams of anxious depressive patients are distinguished by a higher aggression and more frequent aggressive interactions in dreams rather than friendly ones, more negative affect and lower negative emotionality, higher number of dead, imaginable or unreal characters and figures (McNamara, Auerbach, Johnson, Harris, & Doros, 2010). They also tend to have a higher overall frequency of dreams with aggressive social interactions and aggressive acts (McNamara et al., 2010). In addition, relationships between anxiety and mood disorders and nightmares were observed. A high comorbidity of nightmares and anxiety and mood disorders, especially among women, is already known and confirmed (Ohayon et al., 1997). Furthermore, individuals suffering from major depression with comorbid frequent nightmares exhibited higher levels of state anxiety, suicidal ideations and tendency and an increased suicidal ideation, which was especially significant in women (Ağargün, Çilli, Kara, Tarhan, Kincir, & Öz, 1998). This is concordant with the fact that frequent nightmares considerably increase the risk of suicide in general population and may even predict such outcome in the most severe cases (Tanskanen, Tuomilehto, Viinamäki, Vartiainen, Lehtonen, & Puska, 2001). Accordingly, it is revealed that frequent nightmare sufferers possess poorer and lower well-being and therefore, are distinguished by significantly heightened level of state anxiety, as well as mood disorders, worse mood and heightened levels of depression and dysthymia (Klůzová Kráčmarová & Plháková, 2015). Additionally, trait factors, especially trait anxiety, can act as a predisposition for the occurrence of nightmares, and for the increase of their severity and nightmare distress intensity as a reaction to state anxiety and depression on a daily basis (Klůzová Kráčmarová & Plháková, 2015), which is consistent and concordant with the results obtained in the study by Blagrove and Fisher (2009).

4.7. Dream Recall and Anxiety

Presence of different anxiety disorders was shown to lead to the higher rate of dream recall in anxiety sufferers, especially, the rate of recall of frightening or disturbing and bad dreams (Desroches & Kaiman, 1964). Similarly, higher levels of anxiety instigate longer dream reports of the highly anxious subjects, based on a mean number of words in a dream report (Gentil & Lader, 1978). This implies that individuals with higher trait anxiety tend to give more detailed answers, and thus, remember dreams better (Gentil & Lader, 1978), exhibit an increase in dream recall rate and, particularly, the recall rate of repetitive dreams (Brown & Donderi, 1986; Zadra et al., 1998). Likewise, heightened state anxiety was found to be related to an increase of total dream recall and recurrent dreams recall rates (Duke & Davidson, 2002). A series of studies demonstrate that dream recall frequency increases when strong pre-sleep negative emotions, such as state anxiety and fear, are present (Yu, 2007). This increase also occurs due to the emotions of fear and anxiety directly during dreaming. Taken together, these studies suggest that various anxiety disorders and heightened levels of anxiety, both trait and state, increase dream recall rate, help to remember dreams better, improve dreams memorization, making it easier to remember different dream content, and instigate longer dream reports of dreamers. There is still some evidence from the more recent studies, however, which indicate that patients suffering from different anxiety disorders, on the contrary, exhibit significant decrease in the

level and rate of dream recall (DeCicco et al., 2013; Miller et al., 2015).

5. Conclusion

According to the existing publications on the problem of relationships between dreams and anxiety we can conclude that the question of associations between dreams, dream content and anxiety disorders and anxiety remains still relatively undeveloped and not very widely investigated. In addition, with the exclusion of posttraumatic stress disorder (PTSD) and Obsessive-compulsive disorder from the list of anxiety disorders in the DSM-5 (American Psychiatric Association, 2013), it should be noted that studies regarding this particular topic are even more scarce. It is not yet undoubtedly clear also how some particular anxiety disorders, for example, specific phobias or agoraphobia affect dream content. Several studies suggest that an association between trait and state anxiety and dream disturbances exists, which implies that heightened trait or state anxiety or presence of different kinds of anxiety disorders leads to a higher frequency of nightmares or bad dreams and higher level of nightmare distress. Though there were few studies which did not confirm this presupposition that higher trait or state anxiety or presence of anxiety disorders influences and affects dream content or specific features and traits of dreams, it still seems reasonable to assume that such associations exist. Although several dream theories, such as, the continuity hypotheses of dreaming or the sentinel function theory of dreaming, allow us to give unambiguous and clear predictions regarding the influence of anxiety and anxiety disorders on dreams and dream content, for example, lowering its emotional tone, increasing the frequency of nightmares or overall negativity, anxiety and aggressiveness in dreams, there is still some empirical data which contradicts such expectations and gives more support to the other theoretical views on dreams' formation reflected in the discontinuity hypothesis of dreaming. Considering the mentioned relative deficit of empirical evidence and studies on this particular topic, as well as certain heterogeneity in the results of existing studies, it seems necessary to conduct further research and study on dream contents and characteristics of anxious patients to obtain more conclusive, comprehensive and definitive data on the relationships and associations between anxiety and dreams.

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7.2.

Analysis of Dream Contents of Patients with Anxiety Disorders and their Comparison with Dreams of Healthy Participants

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Running Title: Content analysis of dreams in anxiety disorders

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Abstract

Although anxiety disorders are well investigated, little is known about the dream content of patients suffering from anxiety disorders. The aim of the present study was to investigate specific characteristics manifested in dreams of patients with clinical anxiety disorders and to compare them with dreams of healthy persons. The sample consisted of 38 participants with anxiety disorders and a matched healthy control group of 38 individuals. As soon as they woke up in the morning, each participant filled in written dream diaries during a period of 21 days, and thus provided written dream logs. Dream reports of the participants were analysed according to the Hall and Van de Castle (1966) system of content analysis of dreams. The results of our study showed that the presence of an anxiety disorder resulted in significant differences in dream contents, compared to the dreams of healthy individuals. Dreams of anxiety patients contained more characters, higher numbers of different activities, social interactions, aggressive and sexual interactions, lower numbers of friendly interactions, higher frequencies of failures and misfortunes, unlucky, dangerous and threatening situations and events and a lower prevalence of successes and fortune and fortunate situations, as well as more negative and less positive emotions. In addition, they had higher numbers of locations and settings, different body parts, more negative evaluations and assessments, and were characterized by bright and chromatic colors, objects of different sizes, and differences in other modifiers. The results thus indicate a clear difference in the content and structure of dreams in anxiety patients compared to healthy persons, although anxiety themes are not always prevalent in their dreams.

Keywords: anxiety disorders, content-analysis, dreams, dreaming, Hall and Van de Castle system

Introduction

A large amount of psychological studies indicates that dream contents are directly influenced and affected by an individual‘s psychopathology (Cartwright et al., 2006; Desroches & Kaiman, 1964; Free et al., 1993; Gentil & Lader, 1978; Hartmann, 1996; Kirschner, 1999; Miller et al., 2015; Nadorff et al., 2014; Simon et al., 2016; Swart et al., 2013). According to these studies we can assume that dreams and dream content of individuals suffering from anxiety disorders will directly reflect their mental state and be immediately associated with it. While there are a number of studies which address and explore relationships between anxiety disorders and nightmare or bad dreams frequency (Kellner et al., 1991; Levin & Hurvich, 1995; Nadorff et al.,

2014; Nielsen et al., 2000; Ohayon et al., 1997; Picard-Deland et al., 2018; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013), there is still an evident lack of psychological research concerning the subject of associations between anxiety disorders and dream contents in general (Rimsh & Pietrowsky, 2020; Skancke et al., 2014). It is also necessary to note that not only are such studies scarce, the existing investigations on this particular topic bear mostly an unsystematic, segregated and isolated character (DeCicco et al., 2013; Foss, 1994; Free et al., 1993; Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999; Miller et al., 2015; Sikka et al., 2018). Anxiety disorders, however, still remain one of the most prevalent and common psychiatric disorders in the contemporary western world, and become more and more wide-spread among European and U.S. populations each year (Remes et al., 2016). Therefore, due to this particular situation, it seems essential to explore and analyse dreams and dream contents of clinically ill anxiety patients and to compare these contents with the contents of dreams of healthy persons. Understanding the dreams of patients with anxiety disorders may further contribute to understand these disorders or may be beneficial in the psychological treatment of anxiety disorders.

The existing data regarding specific qualities and characteristics of dreams of patients with different anxiety disorders (which included, primarily, generalized anxiety disorder, panic disorder, social anxiety disorder and agoraphobic disorder) indicate that their dreams are distinguished by a considerably lower general emotional tone, a significantly more negative, sad and despondent mood and affect, higher frequencies of aggressive interactions and higher levels of overall aggression, lower numbers of friendly or welcoming interactions and actions fewer successful and fortunate events, happenings or occasions, higher frequencies of failures and unsuccessful events, highly unpleasant, traumatic, frightening and fearful experiences, lower numbers of known characters and acquaintances, higher rate of change frequency of locations and scenes (Foss, 1994; Free, et al., 1993; Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999; Sikka et al., 2018). We might clearly see that dreams of anxiety patients suffering from specific anxiety disorders are distinguished by the presence of particular contents, which are specific only for a certain kind of anxiety disorder: dreams of patients with panic disorder contain higher rates of separation anxiety (Free et al., 1993); dreams of an agoraphobic sufferer involve higher numbers of wide, big open spaces, areas and places, which are, in fact, highly frightening, threatening, traumatic and unpleasant for patients with this disorder (Foss, 1994); dreams of a social anxiety sufferer exhibit higher frequencies of frightening and threatening individuals of the opposite gender as well as frightening and fearful social situations and events, such as public speeches and examinations (Khodarahimi, 2009). Likewise, it is highly evident that the presence

of various clinical anxiety disorders instigates a higher frequency of nightmares and frightening dreams (Burgess et al., 1998; Cellucci & Lawrence, 1978b; Desroches & Kaiman, 1964; Levin, 1998; Kellner et al., 1991; Levin & Hurvich, 1995; Mallon et al., 2000; Miller & DiPilato, 1983; Nadorff et al., 2014; Ohayon et al., 1997; Picard-Deland et al., 2018; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013), which may also indicate that dreams of patients with anxiety disorders involve notably higher numbers of various unpleasant, traumatic, frightening, and threatening events.

The main objective of the present study was to identify the contents of dreams of anxiety patients and to conduct a comparison of contents and characteristics of their dreams with the dreams of age- and gender-matched healthy persons. To our knowledge, such a comparison in a sample of patients suffering from different clinical anxiety disorders has never been done before. The analysis of dream content was performed according to the Hall & Van de Castle coding system of dreams and according to the rules and coding units presented in this system (Hall & Van de Castle, 1966). The primary hypothesis of the present study was that dream contents of anxiety patients would be significantly different from the dream contents of healthy people and would contain more anxiety related topics and more negative and unpleasant experiences such as aggressive interactions, misfortunes, failures, negative emotions and negative evaluations, as well as a lower frequency of friendly interactions, good fortune, successes, positive emotions and positive evaluations.

Method

Sample and Participants

The sample consisted of 38 outpatients with different anxiety disorders and 38 age- and gender- matched healthy persons without any prior or current mental disorder. Patients were recruited from the outpatient psychotherapy centre of our Department, who had been referred for the treatment of their anxiety disorders. The patients were diagnosed with different anxiety disorders and were currently in a cognitive-behavioral psychotherapeutic treatment. Anxiety outpatients were sampled for the study during the course of their psychotherapeutic treatment and were investigated in the first third of the therapy. The number of their psychotherapy sessions prior to the investigation ranged from 8-10 sessions. Specifically, the diagnoses of the anxiety patients included the following kinds of anxiety disorders: generalized anxiety disorder (n = 11), social anxiety disorder (social phobia; n = 6), panic disorder (n = 5), agoraphobia (n = 1), separation anxiety disorder (n = 2), specific phobia (n = 4). One patient was diagnosed with comorbid generalized anxiety disorder and specific phobia (arachnophobia), three patients were

diagnosed with comorbid generalized anxiety disorder and social anxiety disorder, two patients were diagnosed with comorbid generalized anxiety disorder and panic disorder, and three patients were diagnosed with comorbid social anxiety disorder and panic disorder. For the control group with healthy participants, individuals without any mental disorders were recruited with the help of flyers and advertisements, distributed at the university campus as well as through ads and announcements on the internet: in social networks, job and advertisement sites. Matching in pairs was performed on the basis of similar gender (male/female) and approximately similar age of subjects (with the maximal gap of 2 years between two matched subjects). The study involved 54 (71.05%) adult female participants and 22 (28.95%) adult male participants in total, ranging from 18 to 54 years old, with the mean age of 29.20 ± 9.57 years. The control group contained 38 healthy participants with the mean age of 30.08 ± 10.39 years, while the group of anxiety patients had a mean age of 28.32 ± 8.75 years ($t(74) = 0.80$, $p = .43$). All participants gave written informed consent and the study was approved by the local ethics committee. Each participant received a compensation of 36 Euros for participation in the study.

Procedure

Participants completed a dream diary for a period of three weeks (21 days), and wrote down their dreams as soon as they woke up in the morning. All participants attended two meetings with the research coordinator: one in the beginning of the 3-week period, when they received study materials (dream diaries for dream reports) and provided their sociodemographic data, and one after this period, when they handed in the study materials (dream diaries with written dream reports) and provided their feedback in an oral form. The explicitly expressed dream contents from the dream reports of participants were then codified according to the coding rules and norms of the Hall & Van de Castle system of dream content analysis (Domhoff, 1996; Hall & Van de Castle, 1966). This codification allowed us to assess and evaluate the frequencies of different categories of dream contents in accordance with the coding categories from the Hall & Van de Castle coding system (see below).

Materials

Sociodemographic questionnaire. A short standardized questionnaire was used to gather personal sociodemographic data. The questionnaire contained questions regarding name, age, gender, education, occupation, presence and kind of mental disorder and intake of psychoactive drugs.

Dream diary. A dream diary was used to gather dream reports from the participants. Dream diaries were filled in every day during a 21-day study period. They contained one checklist for all of the 21 days, where participants noted whether they had had any dreams or not during the

previous night, and a 21-page journal to write down their dreams as they remembered them as soon as they woke up every morning, in case they had had any dreams that night.

Content Analysis

Content analysis was performed according to the coding rules of the Hall & Van de Castle system of content analysis of dreams (Domhoff, 1996; Hall & Van de Castle, 1966). To assess and estimate inter-rater reliability between independent judges for the content analysis of dreams, a certain proportion of all dream reports from the two groups (10% of all dream reports from both groups) was coded by a second independent coder (judge/rater), in addition to the main coder (judge/rater), who coded all dream reports from the two groups of the study. The second judge was „blind", and thus had no access to other data or information about the participants while performing the codification of dream reports. Inter-rater reliability between the two independent judges (raters) was at acceptable levels with respect to all ratings (moderate correspondence, correspondence level at 75%) (Koo & Li, 2016; McHugh, 2012). Dream reports were coded on the basis of the list of specific dream categories from this system. These categories included (for a more detailed description of the subcategories see Domhoff (1996) and Hall & Van de Castle (1966)):

1. *Characters* – presence of different characters in dreams. This category contains two subcategories.
2. *Social Interactions* – presence of different social interactions in dreams. This category contains three subcategories.
3. *Activities* – presence of different types of activities in dreams. This category contains eight subcategories.
4. *Success and Failure* – presence of successful or unsuccessful outcomes.
5. *Good Fortune and Misfortune* – presence of lucky, fortunate, or unlucky, unfortunate outcomes, events, or episodes in dreams
6. *Emotions* – presence of different types or classes of emotions in dreams. This category contains five subcategories.
7. *Settings and Locations* – locations, environments, settings and surroundings in which dreams manifest themselves, surrounding scenery of a dream. This category contains three subcategories.
8. *Objects* – different types or classes of objects, items and things in dreams. This category contains 13 subcategories.
9. *Descriptive Elements.* Modifiers – different types and classes of adjectives, adverbs or phrases, which are used for descriptions and descriptive elaborations, assessments, evaluations or judgments and assertions. This category involves nine subcategories.

10. *Descriptive Elements.* Temporal scale – any types or forms of mentions or references to certain time or periods of time, various time intervals, particular points of time or different time indications and notions.

11. *Descriptive Elements.* Negative scale – any types of negative particles, negative linguistic forms or formulations in explicit and manifested descriptions and definitions of dream reports.

Data Analysis and Statistical Evaluation

The coded dream contents were statistically analysed and compared between two groups (anxiety patients, control group), with the help of statistical software packages (Statistica 10; SAS JMP 11; SPSS Software) by using *t* tests to compare differences for each coding category and subcategory. The most frequent anxiety-related dream topics and themes in dreams of anxiety outpatients were obtained with the help of chi-square test statistics which allowed to compare the frequencies of different dream themes and topics in the anxiety and healthy groups.

Results

The dream diaries sample consisted of 941 dream reports in total: 472 (50.2%) dream reports from the experimental group of anxiety disorder sufferers, and 469 (49.8%) dream reports from the control group of mentally healthy individuals. 723 (76.84%) dream reports were from female participants and 218 (23.16%) dream reports from male participants. The average number of dream reports per group during 21 days did not show any significant difference between the two groups (12.43 ± 6.10 vs. 12.35 ± 5.95, respectively, t (939) = 0.20, p = .84).

In the dream reports of the anxiety patients, several frequent topics could be observed. These themes could be considered as anxiety-related. Dream themes were taken from the Typical Dream Questionnaire (TDQ), which contains 56 typical dream themes in total (Nielsen et al., 2003). The themes presented in Table 1 were more frequent in the group of anxiety patients.

- Insert Table 1 about here -

Dreams of anxiety patients exhibited a significantly higher overall general number of characters (*M:* 3.92; *SD:* ± 3.49) than the control group (*M*: 2.99; *SD:* ± 2.57; t (939) = 4.65, p < .001). Their dreams also contained significantly higher numbers of male characters (*M:* 1.16, *SD*: ± 1.51 vs. *M:* 1.59, *SD:* ± 1.84; t (939) = 3.92, p < .001) and higher numbers of joint groups of characters containing both genders than dreams of healthy people (*M*: 0.54, *SD:* ± 0.78 vs. *M:* 0.69, *SD*: ± 1.29; t (939) = 2.16, p < .05). Further results on the subcategories concerning characters can be seen in Table 2.

- insert Table 2 about here –

With regard to different types of interactions between various characters in dreams (Table 3), both groups presented high numbers of overall social interactions. However, the total number of various social interactions was significantly higher in the anxiety group (*M:* 3.56, *SD:* ± 3.60 vs. *M:* 2.62; *SD:* ± 2.47; t (939) = 4.67, $p < .001$). Results on the subcategories of types of interaction can be seen in Table 3. Aggressive interactions were the most prevalent type of interactions within the anxiety group, while friendly interactions were the most frequent class of interactions within the control group, and sexual interactions were the least frequent type of interactions within both groups.

All of the different types and classes of activities in the participants' dreams showed significant differences, though with various degrees of significance (Table 3). The general number of different activities in dream reports, correspondingly, was higher for the anxiety group in comparison with the healthy controls (*M:* 15.67, *SD*: ± 13.42 vs. *M:* 13.54, *SD:* ± 11.99; t (939) = 2.57, $p < .05$). Results on the subcategories of types of activities can be seen in Table 3.

- Insert Table 3 about here –

Dream reports of anxiety sufferers exhibited a significantly lower number of successful outcomes, results and events due to their intentional actions (*M:* 0.47, *SD:* ± 0.87 vs. *M*: 0.68, *SD*: ± 0.96; t (939) = 3.52, $p < .001$), as well as a significantly lower number of fortunate and lucky events and occasions unrelated to any intentional or deliberate activity or efforts (*M:* 0.44, *SD:* ± 0.83 vs. *M:* 1.40, *SD:* ± 1.59; t (939) = 11.62, $p < .001$). Similarly, dream reports of anxiety sufferers showed a considerably higher number of failures (*M:* 0.95, *SD*: ± 1.26 vs. *M:* 0.35, *SD*: ± 0.66; t (939) = 9.141, $p < .001$), and a substantially higher number of misfortunate events and occasions unrelated to any intentional or deliberate activity or efforts (*M:* 2.71, *SD:* ± 2.45 vs. *M:* 0.97, *SD:* ± 1.33; t (939) = 13.53, $p < .001$). The number of successes was higher than the number of failures within the healthy group, as well as the number of good fortune events exceeded the number of misfortune events. Within the anxiety group, the number of failures was higher than the number of successes, while the frequency of good fortune events was considerably lower than the number of misfortune events. In addition, it is worth to note that within the control group of healthy participants the frequency of "good fortune" events in dreams was much higher than the number of successes, while within the anxiety group both of these two frequencies in dreams were equally low. Within the anxiety group the frequency of misfortunate events and incidents in dreams was considerably higher than the frequency of failures in dreams. Within the healthy

group, the number of misfortunes in dreams was also higher than the number of failures, although this difference was not as large and vivid as in the anxiety group.

As expected, emotions in dreams were more negative in the anxiety patients and more positive in the healthy controls. For details see Table 4. The most frequent types of emotions in dreams within the anxiety group were apprehension and fear and confusion, while the least frequent emotions were happiness and joy. The most frequent types of emotions in dreams within the control group were happiness and joy and confusion, while the least frequent types were emotions of sadness and emotions of apprehension and fear.

The overall number of different locations and settings in dream reports of anxiety sufferers was higher than the overall number of locations in dream reports of healthy controls (*M:* 2.00, *SD:* ± 1.25 vs. *M:* 1.49, *SD:* ± 0.83; t (939) = 7.37, $p < .001$). Results on the subcategories of settings and locations can be seen in Table 4. Concerning objects in dreams, the dream reports of individuals with anxiety disorders differed in some subcategories from the dream reports of healthy persons (Table 4).

- insert Table 4 about here –

With respect to the Modifiers category, the dreams of anxiety patients varied in a number of subcategories from the dreams of the healthy persons, indicating that the dreams of anxiety patients were less chromatic, contained a higher number of objects, characters or places of different sizes than the dreams of the healthy group. In addition, a higher number of crowded places, or filled areas (high density) was found in the dreams of anxiety sufferers than in the healthy group. Dreams of anxiety patients showed a higher frequency of high velocity ("fast") actions or movement. The frequency of intense activities was also substantially higher in the anxiety group. Importantly, anxiety patients displayed less positive and more negative evaluations, assessments and particles in their dreams compared to the healthy participants. Table 5 displays the complete results of the Modifiers category.

- insert Table 5 about here –

Discussion

The results of the present study reveal that according to our hypotheses, the dream contents of anxiety patients differed from the dream contents of healthy persons and contained more negative and unpleasant elements. Several particular anxiety-associated dream topics were found

to be more prevalent in anxiety patients compared to healthy persons. These themes included, among others, being chased and pursued, being physically attacked and facing aggressive actions, being frozen with fright, quarrels and verbal aggressive interactions, anxiety and fear about aggressive actions from others, fear of falling and being in danger of falling, being excluded and being rejected in social situations, death of parents and family members, accidents and car or plane crashes, facing failures and being unsuccessful.

In detail, dreams of anxiety patients contained a higher number of characters in total than dreams of healthy people. We may conclude that this is related to the notion that patients with anxiety disorders (Desroches & Kaiman, 1964; Gentil & Lader, 1978), or with higher levels of trait and state anxiety (Brown & Donderi, 1986; Duke & Davidson, 2002; Gentil & Lader, 1978; Yu, 2007; Zadra et al., 1998) tend to recall their dreams better and in a more detailed, precise way, and are generally prone to remembering specific details and particularities of their dreams, such as specific characters or figures. Dreams of anxiety patients were distinguished by a higher number of different male human characters. Likewise, a higher frequency of different characters of indefinite gender was found in the dreams of anxiety sufferers, which in our study encompassed also non-human creatures and animals. These results are concordant with the findings of several previous studies with individuals with higher rates of trait and state anxiety (DeCicco, 2007; Jones & DeCicco, 2009), clinical anxiety disorders (Miller et al., 2015) and a female with social anxiety disorder (Khodarahimi, 2009), and allow us to conclude that the presence of an anxiety disorder leads to higher numbers of animals and other non-human creatures in dream imagery of such patients. Mixed groups or groupings of several individuals of both genders were also more often represented in dream imagery of the anxiety patients. Images of dreamers' father characters were significantly more frequent in their dreams, which is also consistent and concordant with the above-mentioned notion that the numbers of male characters in their dreams were also higher. Our study showed that the prevalence of unknown characters and strangers is considerably higher in the dreams of anxiety sufferers, although such characters are also relatively often present in the dreams of healthy people. The results contradict, however, the results of a previous study, which found that dreams of patients suffering from generalized anxiety and panic disorders contained low numbers of known familiar characters (Kirschner, 1999), and partly contradicts the results of another study, which found that dream imagery of individuals with higher levels of state anxiety exhibited higher numbers of familiar characters (King & DeCicco, 2007). The present results show that dreamers' relatives and family members are more frequent in dream contents of anxiety-disordered individuals. We may assume that this can be explained by the fact that individuals with anxiety disorders might be more preoccupied with thoughts about their relatives or family

members than healthy people, and tend to worry about them, which may be reflected in their dreams.

Different social interactions between characters in dreams were highly prevalent in dream contents of both healthy individuals and anxiety patients, although their number was much higher in dreams of anxiety sufferers. The presence of various aggressive interactions was evidently and significantly higher in the dreams of anxiety participants. Thus, we may also conclude that levels of general aggression and hostility are high in dream contents of anxiety patients. These results correspond with previous research with individuals with higher rates of trait anxiety (Brown & Donderi, 1986; Gentil & Lader, 1978; Pesant & Zadra, 2006), state anxiety (King & DeCicco, 2007), and clinical patients with anxiety neurotic disorder (Gentil & Lader, 1978) and generalized anxiety and panic disorders (Kirschner, 1999), and may reflect in dreams inner fears, frights, worries, and concerns of anxious individuals about aggressive interactions in their waking life, such as being attacked, threatened or endangered by aggressive intentions of others. Dreams of anxiety patients contained fewer friendly interactions than dreams of healthy individuals. Although friendly interactions and activities were not completely absent in their dreams, their frequency was considerably lower than in the dream contents of healthy participants. Likewise, anxiety patients exhibited much lower numbers of friendly interactions and activities than aggressive interactions in their dreams. Such results regarding friendly interactions in dreams of anxiety sufferers also correspond with prior data regarding individuals with higher rates of trait anxiety (Gentil & Lader, 1978; Pesant & Zadra, 2006), as well as clinical patients with anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999). We may assume that such prevalence of aggressive interactions and relative lack of friendly activities in dream contents of participants with anxiety disorders is also connected with their fears and apprehensions during their everyday life. Sexual interactions and activities were also found to be more prevalent and frequently present in dreams of anxiety patients, although this kind of social activity still represents a rather unfrequently manifested type of social interactions and activities in comparison with other forms of social interaction in dreams. This is in line with the results of previous research, which also revealed that higher levels of state anxiety increased levels of manifested sexuality and sexual symbolism in dreams (Robbins et al., 1985).

Regarding different activities in dreams, physical activities, physical movements, location changes and traveling, talking and verbal communications, non-verbal and expressive communications, listening and auditory activities and thinking were all more frequent in dreams of anxiety sufferers. These results are partly consonant with the data from previous research that dreams of clinical patients with anxiety disorders (DeCicco et al., 2013; Miller et al., 2015) as well

as of non-clinical individuals with higher levels of trait and state anxiety (Jones & DeCicco, 2009) are characterized by higher scene and location change frequency.

The total number of different types of successes as a result of the dreamer's deliberate actions was lower in dreams of anxiety patients, while failures were significantly more prevalent in dream contents of anxiety sufferers. Similarly, different random, unexpected, accidental and occasional fortunate, lucky and happy events and situations were much fewer in dreams of anxiety patients, while different random, unexpected, accidental and occasional events of misfortune, trouble or disaster were substantially more prevalent in all of their dreams. These results correspond with the findings of several previous studies which dealt with trait anxiety or clinical anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999; Pesant & Zadra, 2006). These data indicate that dream contents of clinical anxiety sufferers are distinguished by higher levels of general negativity and failures. Likewise, such results indicate that dreams of individuals with anxiety disorders may contain higher numbers of various threats, misfortunes and dangerous situations and events which could not be successfully coped with, avoided or overcome.

With respect to dream emotions of anxiety patients, their dreams contained a higher presence of anger, fear, apprehension and sadness than dreams of healthy individuals. In addition, their dreams were clearly distinguished by a much fewer number of positive and happy emotions, such as joy and happiness. Emotions of confusion and surprise were equally prevalent in dreams of healthy people and anxiety patients. The high presence of negative emotions, namely anxiety, fear and apprehension, and the lower numbers of positive emotions in dreams of anxiety patients allow to conclude that their dreams may represent the experience of a frightening, fearful, hostile and dangerous environment in their waking life. These results are in line with previous research in clinical patients with anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999; Sikka et al., 2018) and non-clinical, healthy individuals with higher levels of trait and state anxiety (Brown & Donderi, 1986; Gentil & Lader, 1978; King & DeCicco, 2007; Pesant & Zadra, 2006).

Different locations and settings in dreams of anxiety patients were substantially and significantly more numerous, while dreams of healthy subjects were distinguished by fewer numbers of various places or locations. This is fully concordant and consistent with the previously mentioned findings that dreams of individuals with clinical anxiety disorders (DeCicco et al., 2013; Miller et al., 2015) and people with higher levels of trait and state anxiety (Jones & DeCicco, 2009) are characterized by a higher rate of changes in location and settings. Accordingly, several kinds of locations were more frequent in dreams of anxiety patients: indoor and closed settings; ambiguous settings of unknown character (whether indoor or outdoor); settings which are new, strange, unknown and threatening to the dreamer. Interestingly, dreams

with no specific settings or locations, which occur “in a vacuum”, nowhere, in terms of a certain place or site, were also much more common among the group of anxiety patients.

With regard to different objects in dreams, two specific types of items were more frequent in dreams of anxiety patients than in dreams of healthy individuals: objects of architecture and body parts. While the first type seems to not represent any specific association with clinical anxiety, dreams of body parts seem to be related with fearful concerns about the dreamer’s own body and health, which is a typical feature of panic disorder and general anxiety disorder. This result corresponds with a previous finding that dreams of individuals with higher state anxiety contain higher numbers of limbs of a human body (King & DeCicco, 2007). Moreover, the dream reports of anxiety patients contained more frequent remarks about seeing different internal body organs and, particularly, blood or blood stains.

Dreams of anxiety patients were generally less colorful and contained fewer numbers of different colors, colorful and bright tones than dreams of healthy participants. Various references and mentions of different sizes, measures or scales were much more frequent and common in dream reports of the anxiety group, which indicates that dreams of anxiety patients contain substantially higher amounts of both large and big objects, items, places or characters, as well as small, tiny and little ones. Dreams of anxiety sufferers contained higher numbers of young characters and new objects, items or places, although not higher amounts of old and aged characters, objects or places. Crowded places and locations with many characters and groups of characters, as well as big crowds and large groups of characters were considerably more prevalent and frequent in dreams of anxiety patients. The number of empty, hollow, deserted and lonely places and spaces with very few or no characters at all, however, were also significantly higher in the dreams of the anxiety group, though it is necessary to note that such places, areas and spaces were still fewer and more infrequent in their dreams than crowded and overflowing places and big crowds and large groups. Dreams of anxiety disordered patients were also characterized by common presence of high velocity and fast speed, in general, and, subsequently, fast-moving characters, objects, transport and vehicles. Likewise, their dream reports used a higher frequency of describing things, actions or situations as intense, and as negatively assessed. Thus, we can assume that the presence of an anxiety disorder instigates a higher overall subjective intensity of dream experiences and dream imagery. In accordance with such notion, we conclude that all of the described dream contents in anxiety patients not only exist in large numbers in their dream contents, but also are experienced by them in their dreams with a particularly high subjective intensity, expression and emphasis.

Limitations and methodological shortcomings of our study should be acknowledged. First,

the sample of the study was not very large – 38 participants in each of the two groups. Second, due to a substantially larger presence of females in the study sample and its relative gender homogeneity, there was a slight underrepresentation of males in the sample. This, however, reflects the prevalence of anxiety disorders with respect to gender distribution of different types of anxiety disorders. Third, our sample was distinguished by a relatively lower heterogeneity and narrow variability in terms of representativity of various types of anxiety disorders in participants – the majority of the participants of the study were diagnosed with generalized anxiety disorder, social anxiety disorder, and panic disorder, while only four outpatients were diagnosed with specific phobias, two with separation anxiety disorder, and one with agoraphobia. Therefore, these three types of anxiety disorders were significantly underrepresented in our study. Further, our sample could have been biased by an intrinsic interest in dream research, which could have influenced the study results. Finally, as the main research method of the study was dream diaries filled in directly after sleep, there could be false or incomplete dream reports when the participants had forgotten to fill in the diary in the morning and completed this later during the day. Taking into consideration these methodological shortcomings and limitations, we suggest that future research in the similar field could be carried out with larger sample of participants with an equal gender distribution and covering all types of anxiety disorders in an adequate manner.

In sum, despite the mentioned limitations and methodological shortcomings of the present study, the results show significant differences in dream contents between anxiety patients and healthy controls and can be summarized that dreams of anxiety outpatients contain higher numbers of negative dream characters, interactions and activities, emotions and settings than the dreams of the healthy controls. In addition, several specific anxiety-related typical dream topics were significantly more frequent in the dreams of anxiety patients, which included mainly negative situations, interactions or experiences in dreams.

Compliance with Ethical Standards

Conflicts of interests. The authors declare not having any conflicts of interest or competing interests.

Research involving human participants. All procedures performed in this study were in accordance with ethical standards and norms of the institutional ethics and research committee. The study was approved by the ethics committee of our University.

Informed Consent. Informed consent was obtained from all individual participants included in the study.

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Table 1: Rank order of most frequent topics in dreams of anxiety outpatients in comparison with the frequency of these topics in dreams of healthy participants.

Dream theme	**Percentage of dream reports in anxiety patients**	**Percentage of dream reports in the healthy control group**	X^2 **(1,** N **= 941)**	p**-level**
Being chased or pursued	12.23 %	8.11 %	4.36	**<0.05**
Aggressive actions from other people and being physically attacked	12.23 %	8.32 %	3.90	**<0.05**
Being frozen with fright or anxiety	11.66 %	5.97 %	9.46	**<0.01**
Quarrels and verbal aggressive interactions	11.66 %	7.68 %	4.26	**<0.05**
Feeling anxiety and fear about aggressive actions from other characters, fear of aggression and evil deeds from others	11.44 %	3.84 %	19.21	**<0.001**
Being in danger of falling and fear of falling	10.6 %	6.83 %	4.20	**<0.05**
Being excluded in social interactions or being rejected in social situations	9.96 %	4.91 %	8.70	**<0.01**
Death of family members, especially, parents	9.33 %	5.33 %	5.53	**<0.05**
Accidents or car and plane crashes	9.33 %	2.56 %	19.23	**<0.001**
Trying again and again and failing to complete a task; facing a failure	9.11 %	3.42 %	12.94	**<0.001**
Arriving too late on an important event or meeting	8.69 %	5.12 %	4.66	**<0.05**
Illness or injury of family members, especially, parents	8.48 %	1.28 %	26.19	**<0.001**
Being paralyzed or being unable to move	8.27 %	4.91 %	4.31	**<0.05**
Falling down from heights and being in state of falling	8.05 %	4.69 %	4.45	**<0.05**
Seeing injuries, bleeding or blood	8.05 %	2.14 %	16.95	**<0.001**
Being left or being alone	7.63 %	4.48 %	4.10	**<0.05**
Dead persons appearing alive	7.21 %	2.99 %	8.64	**<0.01**
Natural disasters (earthquakes; floods and tidal waves; tornadoes or strong winds)	7.21 %	4.06 %	4.38	**<0.05**
Feeling anxiety and fear about being late and not on time on an important event or meeting	6.57 %	2.99 %	6.61	**<0.05**
Being locked up in a room or locked space	6.36 %	2.56 %	7.95	**<0.01**
Being killed or dying	6.15 %	2.99 %	5.38	**<0.05**
Sensing some sort of unnatural frightening presence or entity	5.94 %	3.20 %	4.04	**<0.05**
Loss of job or leaving a university	5.72 %	2.56 %	5.91	**<0.05**
Attacking or hurting someone (by a dreamer)	5.72 %	2.14 %	7.97	**<0.01**
Feeling anxiety and fear about being rejected by other characters or not liked by other characters	5.51 %	0 %	26.55	**<0.001**
Feeling fear or anxiety about death or dying	5.3 %	0 %	25.51	**<0.001**
Being kidnapped or abducted	5.09 %	2.14 %	5.86	**<0.05**
Aggressive wild dangerous animals or creatures	4.88 %	1.92 %	6.26	**<0.05**
Failing an examination	4.45 %	0 %	21.33	**<0.001**
Experiencing sexual harassment or sexual violation	4.24 %	0 %	20.30	**<0.001**

Being annihilated, destroyed, jammed, crushed, smashed, ruined or demolished	4.03 %	0 %	19.27	**<0.001**
Feeling anxiety and fear about being left alone	3.82 %	0 %	18.25	**<0.001**
Falling out teeth or hair	3.61 %	0 %	17.23	**<0.001**
Insects or spiders	2.97 %	0 %	14.13	**<0.001**
Drown in water	2.33 %	0 %	11.05	**<0.001**
Feeling anxiety and fear about going outside, going into outer world and outer environment	2.12 %	0 %	10.04	**<0.01**
Claustrophobia and anxiety and fear of closed narrow tight areas and spaces	1,49 %	0 %	7.03	**<0.01**
Snakes	1.06 %	0 %	4.99	**<0.05**

Table 2: Dream content of healthy participants and anxiety patients for the category "Characters" in terms of quantitative indicators (means ± standard deviations).

Variable	Group		*t*-value (*df* = 939)	*p*-level
	Healthy	Anxiety		
Characters (Total Number)	2.99 ± 2.57	3.92 ± 3.49	4.65	**<0.001**
Male	1.16 ± 1.51	1.59 ± 1.84	3.92	**<0.001**
Female	1.14 ± 1.40	1.31 ± 1.65	1.70	n.s.
Both	0.54 ± 0.78	0.69 ± 1.29	2.16	**<0.05**
Indefinite	0.16 ± 0.45	0.37 ± 0.86	4.69	**<0.001**
Father	0.11 ± 0.39	0.20 ± 0.49	3.12	**<0.01**
Mother	0.23 ± 0.48	0.21 ± 0.54	0.60	n.s.
Other Family/Relatives	0.32 ± 0.93	0.45 ± 1.04	2.02	**<0.05**
Infants	0.13 ± 0.35	0.15 ± 0.40	0.82	n.s.
Spouse; Partner	0.23 ± 0.48	0.21 ± 0.54	0.60	n.s.
Ex-Spouse; Ex-Partner	0.07 ± 0.32	0,17 ± 0.74	2.69	**<0.05**
Known	1.85 ± 2.02	2.09 ± 2.38	1.67	n.s.
Prominent	0.06 ± 0.34	0.12 ± 0.44	2.34	**<0.05**
Strangers	1.07 ± 1.54	1.62 ± 2.17	4.48	**<0.001**
Occupation	0.52 ± 0.99	0.59 ± 1.07	1.04	n.s.

Table 3: Dream contents of healthy participants and anxiety patients for the categories “Social Interactions” and “Activities” in terms of quantitative indicators (means ± standard deviations).

Variable	Group		*t*-value (*df* = 939)	*p*-level
	Healthy	Anxiety		
Social Interactions				
Social Interactions (Total Number)	2.62 ± 2.47	3.56 ± 3.60	4.67	**<0.001**
Aggressive Interactions	0.70 ± 1.38	2.46 ± 2.73	12.47	**<0.001**
Friendly Interactions	1.84 ± 1.67	1.06 ± 1.53	7.47	**<0.001**
Sexual Interactions	0.10 ± 0.61	0.17 ± 0.41	2.07	**<0.05**
Activities				
Types of Activities (Total Number)	13.54 ± 11.99	15.67 ± 13.42	2.57	**<0.05**
Physical Activities	3.05 ± 2.79	3.93 ± 3.69	4.12	**<0.001**
Movement activities	2.57 ± 2.80	3.12 ± 3.04	2.89	**<0.01**
Location Change, Transportation	0.38 ± 0.80	1.00 ± 1.26	9.00	**<0.001**
Verbal Activities	1.61 ± 1.99	2.29 ± 2.53	4.58	**<0.001**
Expressive Communications	0.21 ± 0.56	0.57 ± 0.96	7.02	**<0.001**
Visual Activities	4.87 ± 4.68	3.38 ± 3.62	5.46	**<0.001**
Auditory Activities	0.13 ± 0.37	0.30 ± 0.69	4.71	**<0.001**
Thinking Activities	0.69 ± 0.90	1.02 ± 1.27	4.60	**<0.001**

Table 4: Dream content of healthy participants and anxiety patients for the categories "Emotions", „Settings and Locations“, and “Objects” in terms of quantitative indicators (means ± standard deviations).

Variable	Group		*t*-value (*df* = 939)	*p*-level
	Healthy	Anxiety		
Emotions				
Anger	1.38 ± 2.03	2.39 ± 2.79	6.35	**<0.001**
Apprehension & Fear	1.20 ± 1.95	2.84 ± 3.03	9.87	**<0.001**
Sadness	1.12 ± 1.80	2.38 ± 2.80	8.21	**<0.001**
Confusion	2.51 ± 2.40	2.81 ± 3.06	1.67	n.s.
Happiness & Joy	2.25 ± 2.17	0.71 ± 1.08	13.79	**<0.001**
Locations				
Settings/Locations (Total Number)	1.49 ± 0.83	2.00 ± 1.25	7.37	**<0.001**
Indoor	0.84 ± 0.72	1.09 ± 0.92	4.64	**<0.001**
Outdoor	0.54 ± 0.68	0.57 ± 0.76	0.64	n.s.
Ambiguous	0.04 ± 0.24	0.12 ± 0.33	4.25	**<0.001**
No Setting	0.07 ± 0.25	0.22 ± 0.47	6.11	**<0.001**
Familiar	0.90 ± 0.83	0.88 ± 0.82	0.37	n.s.
Distorted	0.06 ± 0.24	0.13 ± 0.37	3.44	**<0.001**
Geographical	0.19 ± 0.47	0.16 ± 0.39	1.07	n.s.
Unfamiliar	0.39 ± 0.65	0.58 ± 0.85	3.85	**<0.001**
Questionable	0.14 ± 0.37	0.31 ± 0.59	5.29	**<0.001**
Objects				
Architectural Objects	1.35 ± 1.98	1.61 ± 1.98	2.01	**<0.05**
Household Objects & Items	0.48 ± 1.09	0.55 ± 1.05	1.00	n.s.
Food & Nutrition	0.43 ± 1.27	0.32 ± 0.93	1.52	n.s.
Tools & Instruments	0.26 ± 0.71	0.32 ± 0.71	1.30	n.s.
Travel Objects	0.59 ± 0.99	0.71 ± 1.12	1.74	n.s.
Street Objects	0.85 ± 1.21	0.77 ± 1.16	1.04	n.s.
Regions & Zones	1.39 ± 1.60	1.08 ± 1.46	3.11	**<0.01**
Objects of Nature and Environment	0.86 ± 1.75	0.90 ± 1.69	0.36	n.s.
Body Parts	0.38 ± 1.07	0.66 ± 1.37	3.49	**<0.001**
Clothes & Clothing Objects	0.34 ± 0.86	0.29 ± 0.75	0.95	n.s.
Communication	0.77 ± 1.15	0.81 ± 1.25	0.51	n.s.
Money & Money-related Objects	0.14 ± 0.45	0.18 ± 0.63	1.12	n.s.
Miscellaneous Objects	0.03 ± 0.21	0.33 ± 0.70	8.89	**<0.001**

Table 5: Comparison of healthy participants and anxiety patients for the categories "Descriptive Elements (Modifiers)" in terms of quantitative indicators (mean ± standard deviations).

Variable	Group		*t*-value (*df* = 939)	*p*-level
	Healthy	Anxiety		
Modifiers				
Color Modifier: Chromatic and Bright Colors	0.41 ± 0.96	0.26 ± 0.67	2.78	**<0.05**
Color Modifier: Achromatic and Dark Colors	0.02 ± 0.12	0.03 ± 0.17	1.04	n.s.
Size Modifier: Big	0.34 ± 0.82	0.87 ± 1.24	7.73	**<0.001**
Size Modifier: Small	0.12 ± 0.42	0.21 ± 0.51	2.95	**<0.01**
Age Modifier: Old	0.10 ± 0.43	0.15 ± 0.47	1.70	n.s.
Age Modifier: Young	0.11 ± 0.39	0.17 ± 0.47	2.13	**<0.05**
Density Modifier: High Density	0.11 ± 0.39	0.25 ± 0.56	4.45	**<0.001**
Density Modifier: Low Density	0.06 ± 0.26	0.12 ± 0.42	2.63	**<0.01**
Thermal Modifier: High Temperature	0.05 ± 0.32	0.07 ± 0.36	0.90	n.s.
Thermal Modifier: Low Temperature	0.02 ± 0.17	0.04 ± 0.25	1.43	n.s.
Velocity Modifier: Fast	0.32 ± 0.82	1.01 ± 1.40	9.22	**<0.001**
Velocity Modifier: Slow	0.03 ± 0.18	0.05 ± 0.23	1.49	n.s.
Linearity Modifier: Straight	0.03 ± 0.18	0.03 ± 0.23	0.00	n.s.
Linearity Modifier: Wavy	0.04 ± 0.20	0.04 ± 0.22	0.00	n.s.
Intensity Modifier: Intense	0.65 ± 0.97	1.82 ± 2.21	10.50	**<0.001**
Intensity Modifier: Weak	0.09 ± 0.32	0.05 ± 0.27	2.07	**<0.05**
Positive Evaluations & Assessments	1.70 ± 1.81	1.08 ± 1.50	5.72	**<0.001**
Negative Evaluations & Assessments	1.18 ± 1.43	3.26 ± 2.92	13.86	**<0.001**
Time Modifier, Indications of Time	0.52 ± 0.83	1.04 ± 1.42	6.85	**<0.001**
Negatives & Negative Particles	1.18 ± 1.43	2.00 ± 2.10	7.00	**<0.001**

7.3.

Characteristics of Dreams and Nightmares in Patients with Anxiety Disorders

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Running Title: Characteristics of dreams and nightmares in anxiety disorders

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Abstract

Characteristics of dreams of clinical outpatients with anxiety disorders still remain a relatively poorly investigated field of psychology. The present study aimed at investigating several dream characteristics of outpatients with anxiety disorders in comparison to dream characteristics of healthy individuals. In the study, 38 adult participants with anxiety disorders and a matched healthy control group of 38 individuals were investigated. During a period of 21 days all participants filled in written dream diaries directly after sleep, which contained two scales for positive and negative emotions and one scale for the general intensity of emotions in a dream, two dream questionnaires, The Multidimensional Düsseldorf Dream Inventory (MDTI) and the Mannheim Dream Questionnaire (MADRE), and two nightmare questionnaires, the Nightmare Behavior Questionnaire (NBQ) and the Nightmare Distress Questionnaire (NDQ). Results showed that patients with anxiety disorders tended to provide longer dream reports and possessed a higher dream recall frequency, their dreams were distinguished by a more negative emotional tone and a lower dream mood, more intense and vivid emotionality, more aversive dreams, a higher rate of incorporations of waking life into dreams, their waking-life mood was found to be more often influenced by dreams, they had a higher nightmare frequency and more nightmare distress and were more interested in the interpretation of their dreams. Within the group of anxiety patients, nightmare distress was higher in men than in women, as well as several specific behavioral consequences and effects after nightmares were more pronounced in men than in women (physiological and emotional reactions and behavioral coping attempts after nightmares). The results indicate marked differences in the way anxiety patients experience dreams, irrespective of the dream contents.

Keywords: anxiety disorders, dreams, dream characteristics, nightmares, gender differences

Introduction

Previous research has shown that anxiety disorders directly influence, affect and alter dreams and dream contents of clinical patients diagnosed with such disorders (Desroches & Kaiman, 1964; Foss, 1994; Free et al., 1993; Gentil & Lader, 1978; Khodarahimi,2009; Kirschner, 1999; Miller et al., 2015; Nadorff et al., 2014; Simon et al.; Swart et al., 2013). In terms of the influence of anxiety disorders on dreams and dream characteristics, it might be assumed that the presence of a clinical anxiety disorder may lead to more frequent and more intense, fearful,

frightening and harming dreams, instigate anxiety-related feelings, thoughts or emotions in dreams and may also enhance nightmare frequency, as well as increase subjective distress from nightmares. In accordance with this assumption, data indicate that individuals with diagnosed clinical anxiety disorders, including generalized anxiety disorder, panic disorder, social anxiety disorder and separation anxiety disorder, also suffer from more frequent and repeated nightmares or bad dreams (Desroches & Kaiman, 1964; Kellner et al., 1991; Nadorff et al., 2014; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013).

However, despite a relatively large body of research on dreams and nightmares in anxiety disorders, studies on the relationships between anxiety disorders and specific dream characteristics and on nightmare distress are very scarce (Rimsh & Pietrowsky, 2020; Skancke et al., 2014). The scarce existing data indicate that dreams of anxiety patients often contain different kinds of threats and dangers and various frightening, unpleasant, threatening and negative events of high emotional intensity (Foss, 1994; Free et al., 1993; Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999; Sikka et al., 2018). Investigating the emotionality of dreams of clinical patients with anxiety disorders showed that their dreams exhibit a generally lower emotional tone, more negative and sad mood and affect, higher levels of general anxiety, fright, fear and sadness and other negative emotions and contain various frightening, unpleasant and negative events of high emotional intensity (Desroches & Kaiman, 1964; Free et al., 1993; Gentil & Lader, 1978). With regard to other dream characteristics of anxiety disorders outpatients, the most investigated area of research is the influence of different anxiety disorders on nightmares and bad dreams. A number of studies indicate that the presence of different anxiety disorders is directly related to a higher frequency of nightmares and bad dreams (Desroches & Kaiman, 1964; Kellner et al., 1991; Levin, 1998; Levin & Hurvich, 1995; Nadorff et al., 2014; Picard-Deland et al., 2018; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013). With regard to dream recall frequency in patients with anxiety disorders, the existing data are not univocal. There is evidence that patients suffering from anxiety disorders possess a decreased level of dream recall frequency (Miller et al., 2015; Zanasi et al., 2010), while, on the other hand, there is also evidence that patients with anxiety reaction disorders (Desroches & Kaiman, 1964) and anxiety neurotic disorder (Gentil & Lader, 1978) exhibit a higher dream recall frequency (Desroches & Kaiman, 1964; Gentil & Lader, 1978). With regard to other specific dream characteristics of patients with anxiety disorders, there is still an evident lack of research on such topics, although anxiety disorders are still one of the most common mental disorders in the contemporary western world (Remes et al., 2016).

The main objective of the present study was to explore dreams characteristics, dream

emotionality, nightmare frequency, nightmare distress, and behavioral consequences of nightmares of anxiety patients and compare them with the dreams of age- and gender-matched healthy persons. Dream characteristics were assessed with the Multidimensional Düsseldorf Dream Inventory (MDTI; Pietrowsky et al., unpublished) and the Mannheim Dream Questionnaire (MADRE; Schredl et al., 2014). Nightmare distress was assessed with the Nightmare Distress Questionnaire (NDQ; Belicki, 1992; German version by Böckermann et al., 2014). Nightmare consequences were assessed with the Nightmare Behavior Questionnaire (NBQ; Pietrowsky & Köthe, 2003). The primary hypothesis of the present study was that dream characteristics of anxiety patients would be significantly different from dream characteristics of healthy people, and their dreams would be distinguished by a lower and more negative emotional tone, more intense emotions, higher nightmare frequency, higher distress due to nightmares and they would suffer more from nightmare behavioral consequences. With regard to nightmare distress and behavioral consequences after nightmares within the anxiety outpatients group, our secondary hypothesis was that men and women would differ significantly in terms of their nightmare distress and their behavioral consequences after nightmares, with women reporting more nightmare distress than men and displaying more intense behavioral consequences of nightmares. This hypothesis was based on the evidence that females generally report a higher frequency of nightmares than males in the general adult population (Nielsen et al., 2006; Ohayon et al., 1997; Schredl, 2014; Schredl & Reinhard, 2011) and more nightmare distress (Schredl & Reinhard, 2011).

Method

Sample and Participants

The sample consisted of 38 outpatients with different anxiety disorders and 38 age- and gender-matched healthy persons without any prior or current mental disorder. Patients were recruited from the outpatient psychotherapy center of our department, who were referred for the treatment of their anxiety disorders. The anxiety patients were diagnosed with different anxiety disorders and were currently in a cognitive-behavioral psychotherapeutic treatment. Anxiety outpatients were sampled for the study during the course of their psychotherapeutic treatment and were investigated in the first third of the therapy. The number of their psychotherapy sessions prior to investigation ranged from 8-10 sessions. The diagnoses of the anxiety patients included: generalized anxiety disorder (n = 11), social anxiety disorder (social phobia; n = 6), panic disorder (n = 5), agoraphobia (n = 1), separation anxiety disorder (n = 2), specific phobia (n = 4). One patient was diagnosed with comorbid generalized anxiety disorder and specific phobia (arachnophobia), three patients were diagnosed with comorbid generalized anxiety disorder and

social anxiety disorder, two patients were diagnosed with comorbid generalized anxiety disorder and panic disorder, and three patients were diagnosed with comorbid social anxiety disorder and panic disorder. Healthy participants for the control group were recruited with the help of flyers and advertisements, distributed at the university campus as well as through ads and announcements on the internet, in social networks, job and advertisement sites. Matching in pairs was performed on the basis of similar gender (male/female) and approximately similar age (with the maximal gap of two years between two matched subjects). The study involved 54 (71.05%) adult female participants and 22 (28.95%) adult male participants in total, ranging from 18 to 54 years old, with the mean age of 29.20 ± 9.57 years. The mean age of the control group was 30.08 ± 10.39 years, while the mean age of the anxiety patients was 28.32 ± 8.75 years (t (74) = 0.799, p = .43).

All participants gave written informed consent, and the study was approved by the local ethics committee. Participants received a compensation of 36 Euros for participation in the study.

Procedure

All of the participants attended two meetings with the research coordinator: one in the beginning of the 3-week period, when they received study materials (dream diaries for dream reports and two questionnaires – the NBQ and NDQ (see below) and provided their sociodemographic data. They also gave their written informed consent and were instructed to complete the dream diary as soon as they woke up in the morning and write down their dreams as they remembered them during this 3-week period (21 days). During the study period of 21 days, participants also filled in the two questionnaires (NBQ, NDQ), only after nights when they had a nightmare, as soon as they woke up in the morning. On the second meeting with the research coordinator after the three weeks, the participants handed in the study materials (dream diaries, NBQ, NDQ) and filled in the MDTI and the MADRE questionnaires. They then received their financial compensation.

Materials

Sociodemographic questionnaire. A short standardized questionnaire was used to gather personal sociodemographic data. The questionnaire contained questions regarding name, age, gender, education, occupation, current or lifetime presence and kind of any mental disorder and intake of psychoactive drugs.

Dream diary. A dream diary was used to gather dream reports from participants. Dream diaries were filled in every day during the 21-day study period. They contained one checklist for all of the 21 days, where participants noted whether they had had any dreams or not during the previous night, and a 21-sheet journal to write down their dream reports as they remembered them as soon as they woke up every morning, in case they had had any dreams that night. Dream diaries

also contained two 4-unit scales for positive and negative emotions, respectively (from 0 – "no emotions" to 3 – "strong emotions") and one 10-unit scale for the general intensity of emotions in each dream (from 0 – "not intensive", "insignificant", to 10 – "highly intensive"), which were filled in for each dream separately, even if the participants had two or more dreams per night.

The Multidimensional Düsseldorf Dream Inventory (MDTI) is a multidimensional questionnaire to assess dream characteristics. The MDTI allows to assess dream characteristics independently from dream contents and to compare dream experience intra- and inter-individually. The questionnaire consists of six scales (factors): aversive dreams, dream recall, personal significance of dreams, incorporation of waking life into dreams, wish fulfillment in dreams, and dream vividness. The questionnaire involves 38 items which were derived from a pool of attitudes and descriptions of dreams and had to be rated by the degree of agreement with four answer options – "I fully disagree", "I rather disagree", "I partly agree", "I fully agree". The questionnaire represents an instrument which allows to study features and characteristics of dreams of a person in a quantitative manner, irrespective of specific dream contents.

The Mannheim Dream Questionnaire (MADRE) is a questionnaire which assesses dream characteristics and subjective dream experiences. The questionnaire allows to obtain dream features, which include dream recall, emotional intensity of dreams, nightmare frequency, lucid dreaming, attitudes towards dreams and effects of dreams on waking life mainly in a quantitative manner. Answers for the item "dream recall frequency" contain seven options from 1 – "almost every morning" to 7 – "never", answers for the items "nightmares frequency and prevalence" and "frequency of influence of dreams on mood" contain eight options from 1 – "several times a week" to 8 – "never", answers for the items "emotional intensity of dreams" and "nightmare distress level" contain five options from 1 – "not at all intense"/"not at all distressing" to 5 – "very intense"/"very distressing", answers for the item "average emotional tone of dreams" contain five options from 1 – "very negative" to 5 – "very positive", answers for the eight items on "attitudes toward dreams" contain five options from 1 – "not at all" to 5 – "totally". In addition, the questionnaire contains an open-ended question which allowed the participants to describe and characterize the most common and prevalent topics and themes of nightmare dreams, if they had had any during the study period.

The Nightmare Behavior Questionnaire (NBQ) is a questionnaire which assesses behavioral consequences after a nightmare. It allows to explore behavioral effects and influences caused by a nightmare. The questionnaire consists of 43 items which belong to six scales (factors): physiological effects (4 items), emotional effects (9 items), cognitive effects (worries and concerns after a nightmare) (10 items), behavioral coping attempts and strategies (9 items), attempts to find

an explanation for the nightmare (5 items), and trivializing the nightmare (3 items). The four answer options for each item include - "I fully disagree", "I rather disagree", "I partly agree", "I fully agree".

The Nightmare Distress Questionnaire (NDQ) is a questionnaire which assesses subjective nightmare distress. The questionnaire consists of 13 items which belong to three factors in the German version (Böckermann et al., 2014): general nightmare distress, impact on sleep, impact on daytime reality perception. The five answer options for the items, except the items 5, 8 and 13, include "Never", "Rarely", "Sometimes", "Often", "Always". The five answer options for the items 5 and 8 include "Not at all", "A little", "Somewhat", "Distinctly", "Substantially". The five answer options for the item 13, include "Not interested at all", "A little interested", "Somewhat interested", "Very interested", "Extremely interested". The reliability (internal consistency) of the questionnaire is good (Cronbach's $\alpha = .80$; Böckermann et al., 2014).

Data Analysis and Statistical Evaluation

The obtained data from the MDTI, MADRE, and the dream diaries were compared between the two groups (anxiety patients, healthy control group) by using *t* tests for independent groups. Results concerning nightmares were evaluated only for the group of anxiety patients, because the NBQ and NDQ questionnaires were obtained only from 10 control participants since nightmares were highly uncommon in the healthy control group (15 nightmares in total in this group). The obtained data from the NBQ and NDQ questionnaires were statistically analyzed and compared between males and females within the anxiety group in order to obtain gender differences by using *t* tests for independent groups. We could not perform any comparisons between the experimental and control groups on nightmare data due to the aforementioned significant lack of nightmares among the healthy controls and, therefore, lack of the NBQ and NDQ questionaries received from healthy participants.

All statistical comparisons were run with the statistical software packages (Statistica 10, SAS JMP 11, SPSS Software) and a p value of $< .05$ was regarded as significant. Required and optimal sample sizes of the control and experimental groups (38 participants in each) were evaluated with the help of G-Power statistical analysis (Faul et al., 2009) in accordance with the anticipated statistical power of no less than .80.

Results

Dream Reports

The dream diaries contained 941 dream reports in total: 472 (50.2%) dream reports from the anxiety patients and 469 (49.8%) dream reports from the mentally healthy control group.

Female participants (71.05% of the participants) reported 723 (76.84%) dreams and male participants (28.95 % of the participants) reported 218 (23.16%) dreams. The average number of dream reports per group during 21 days did not show any significant difference between the two groups (anxiety patients: 12.42 ± 6.10 and controls: 12.34 ± 5.95, respectively, t (939) = 0.204, p = .84). The length of dream reports was evaluated on the basis of a total word count of each dream report, which included all dream-related words, excluding repeated words and repetitions, fillers, corrections and non-dream related waking commentaries. According to the average dream lengths based on the total word count of dream reports, patients with anxiety disorders had longer dreams reports with a higher average word count (anxiety patients: 58.23 ± 41.58 vs. controls: 44.13 ± 32.46, t (939) = 5.80, p < .001).

With regard to positive and negative emotionality and emotions in dreams of anxiety patients and healthy participants as well as their overall emotional intensity, several significant differences were found between anxiety patients and healthy controls. These results can be seen in Table 1.

- Insert Table 1 about here –

Dream Characteristic in Anxiety Patients and Controls

Differences between the groups with regard to the dream characteristics as assessed by the MDTI and the MADRE are shown in Table 2. The results show that anxiety patients report more aversive dreams, a better dream recall and more incorporations from waking life into dreams. Moreover, their dreams are rated as having a higher emotional intensity, a lower dream mood, a higher (retrospective) nightmare frequency, more nightmare distress, they attend more significance to their dreams, feel their life is more enriched by dream interpretation, and report that their mood is much more often affected by their dreams.

- Insert Table 2 about here –

Nightmare Prevalence, Nightmare Distress and Nightmare Consequences in Anxiety Patients

The mean number of nightmares during the study period of 21 days was significantly higher in the group of anxiety patients (105 nightmares; 74 from female and 31 from male participants) than in the healthy control group (15 nightmares). Thus, the mean number of nightmares per participant was significantly higher in the anxiety patients (2.76 ± 2.10 vs. 0.39 ± 0.82, t (74) = 6.48, p < .001). Similarly, only 10 (26.32%) of the 38 healthy participants from the control group reported having nightmares during the 3-week study period (at least 1 nightmare

during the period), while the majority of the patients in the anxiety group – 36 (94.74%) out of 38 outpatients – reported having at least one to maximally eight nightmare dreams within the 3-week study period. Descriptive results regarding behavioral consequences of nightmares in anxiety patients, as measured by the NBQ in the sample of 105 nightmares, are reported in Table 3. Table 4 shows results of between-gender comparisons of behavioral consequences after nightmare dreams in anxiety patients.

- Insert Table 3 about here –
- Insert Table 4 about here –

Descriptive results regarding nightmare distress as measured by the NDQ in the sample of 105 nightmares are reported in Table 5. Table 6 shows results of between-gender comparisons with regard to nightmare distress in anxiety patients.

- Insert Table 5 about here -
- Insert Table 6 about here –

Discussion

The results of the study indicate that our primary hypothesis, which suggested that dream characteristics in anxiety patients would be different from those in healthy persons, was confirmed. Anxiety outpatients had longer dream reports, their dreams exhibited a lower dream mood, negative rather than positive emotionality and generally more intense emotions. Anxiety patients had more aversive dreams, more incorporations from waking life into dreams, a higher retrospective nightmare frequency and more distress from nightmares. They were inclined to attribute more meaning and significance to their dreams, feel that their life was more enriched by dream interpretation and their mood was much more often affected by their dreams than healthy control participants. Our secondary hypothesis, however, was not confirmed, since men and women differed significantly with respect to nightmare distress and nightmare consequences. But in contrast to our hypotheses, nightmare distress and nightmare consequences were more enhanced in men than in women. Thus, this study was able to demonstrate dream features in a common clinical sample of anxiety patients with objective measures of dream experience and dream characteristics.

With regard to the emotional tone of dreams of anxiety patients, the results of our study indicate that positive emotions were considerably less frequent in their dreams than in dreams of healthy subjects. Likewise, negative emotions were more prevalent in their dreams compared to the dreams of healthy participants. Finally, the overall general emotional intensity and

expressiveness of dreams of anxiety patients was significantly higher, their dreams were more vivid, salient and bright in terms of emotionality, which was reflected both in the dream diaries' emotionality scales and the MADRE questionnaire. This is in accordance with previous results obtained in samples of clinical patients with anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999) and non-clinical individuals with higher levels of trait and state anxiety (Brown & Donderi, 1986; Gentil & Lader, 1978; King & DeCicco, 2007; Pesant & Zadra, 2006), which all found more negative affect than positive emotions in dreams of persons with high levels of anxiety.

Dream characteristics of anxiety patients contained significantly higher frequencies of aversive dream contents than dreams of the healthy group. Aversive dream content, as assessed by the MDTI, does not only cover nightmares but aversive dreams on a broader range. This result is partly concordant with previous results obtained in samples of clinical patients with anxiety disorders (Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999), which also confirmed a presence of negative, aversive and unpleasant dream contents. Further, anxiety patients showed considerably and significantly higher dream recall. This, together with the already mentioned notion that they had longer dream reports, confirms that patients with anxiety disorders remember and recall their dreams better. It may be speculated that the better dream recall and the longer dream reports of anxiety patients go along with a higher number of recalled details and peculiarities of their dreams, however, this was not explicitly investigated in the present study. Concordantly, previous research had shown that clinical outpatients with anxiety disorders (Desroches & Kaiman, 1964; Gentil & Lader, 1978) as well as non-clinical individuals with higher levels of trait and state anxiety (Brown & Donderi, 1986; Duke & Davidson, 2002; Gentil & Lader, 1978; Yu, 2007; Zadra et al., 1998) were able to recall their dreams better, more precisely and provide longer and more detailed dream reports with a higher amount of specific particularities and details.

In the present study, anxiety patients also showed a significantly higher rate of incorporations from waking life into dreams, which may imply that their dreams were more associated with real waking life experiences than dreams of healthy people. Additionally, we found that anxiety patients paid more significance to their dreams in general and felt their life was enriched by their dreams, which allows us to hypothesize that their dreams, which are in general more negative, may worsen their anxiety symptoms and mood in waking life. However, the increased significance of dreams is not transferred to an increased personal significance of their dreams or that participants can seek help from their dreams for waking life, which looks somehow contradictory.

Regarding nightmares, the mean numbers of nightmares in the 21-days study period were

significantly higher in the anxiety patients than in the healthy group. This result fully corresponds with data from previous studies (Kellner et al., 1991; Nadorff et al., 2014; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013). Similarly, distress from nightmares was also higher in anxiety outpatients than in healthy subjects. Comparable results regarding nightmare distress were obtained earlier only in samples of non-clinical anxious individuals with high rates of trait and state anxiety, though not in samples of clinical patients with specific anxiety disorders (Belicki, 1992; Berquier & Ashton, 1992; Blagrove et al., 2004; Levin & Fireman, 2002; Mindell & Barrett, 2002; Nielsen et al., 2000; Ohayon et al., 1997; Picard-Deland et al., 2018; Zadra et al., 2000). In addition, nightmare distress was found to be more intense in male anxiety disorder patients than in female anxiety disorder patients.

With regard to behavioral consequences after nightmares assessed with the NBQ within the anxiety group, physiological reactions, which included sweating, shivering, accelerated heart rate and nausea, were more prevalent in male than in female patients. Emotional reactions after nightmares such as feeling distressed, frightened, discouraged, nervous and restless, being afraid to go to sleep again and being afraid that a nightmare could come true, were also more pronounced in male anxiety patients than in female patients. Behavioral coping strategies which included being interested in a resolution of a nightmare, trying to interpret the nightmare, talking with somebody about a nightmare, trying to distract oneself by other activities, asking for psychotherapeutic help because of a nightmare, trying to distract oneself by imagining beautiful things, reading literature concerning dreams and reading horoscopes, were also reported significantly more frequently by male than by female anxiety patients. Cognitive effects and consequences after nightmares, which included, among others, being occupied with a nightmare content, obsessive memories about a nightmare during the day, finding important messages in a nightmare, worrying that something may be wrong with oneself and feeling guilty about dreaming such things, did not differ significantly between male and female patients, as was nightmare trivialization, which included feeling relieved after awakening that it was only a dream, trying to ignore a nightmare, regarding dreams as being nonsense which should be forgotten quickly, and regarding a nightmare as a waste of time. Finally, attempts to explain a nightmare, such as considering a nightmare as an indication that something is wrong in waking life, attributing a nightmare to a special event in waking life, a nightmare reminding about an unsolved problem, seeing a nightmare as a reason to solve a problem, were not significantly different between males and females. All of the behavioral consequences of nightmares, as assessed by the NBQ, were rated in a comparable degree, except the attempts to explain a nightmare, which was scored higher by the anxiety patients.

Nightmare distress as one factor of the NDQ was significantly higher in male than in

female anxiety patients. From the three factors of the NDQ, „Impact on Sleep" had the highest scoring while "Daytime Reality Perception" had the lowest scoring. In contrast to nightmare distress, the other factors of the NDQ were not significantly different between the genders. The NBQ and NDQ results indicate that male anxiety patients exhibit more nightmare consequences and suffer more from their nightmares than the female anxiety patients. However, as the nightmare contents were not analyzed, we cannot evaluate whether the nightmares of the male participants were more harmful and frightening than the nightmares of the female anxiety patients.

Limitations and methodological shortcomings of our study should be reported. First, the sample of participants was not very large – 38 participants in each of the two groups. Second, due to a substantially larger presence of females in the study sample and its relative gender homogeneity, there was an underrepresentation of males. This, however, reflects the prevalence of anxiety disorders with respect to gender distribution of different types of anxiety disorders. Third, our sample was characterized by a relatively lower heterogeneity and narrow variability in terms of representativity of various types of anxiety disorders in participants – the majority of the participants of the study were diagnosed with generalized anxiety disorder, social anxiety disorder, and panic disorder, while only four outpatients were diagnosed with specific phobias, two with separation anxiety disorder, one with agoraphobia and several participants were diagnosed with comorbid anxiety disorders. However, since we were not primarily interested in the influence of specific anxiety disorders on dreaming, but rather on a typical sample of outpatients and external validity, we accepted the heterogeneity of anxiety diagnoses. Further, our sample could have been biased by an intrinsic interest in dream research, which could have influenced the study results. In addition, as the dream diaries were filled in as soon as the participants woke up, there could have been a subjective recall bias in the participants' dream reports. Taking these methodological shortcomings and limitations into account, we suggest that future research in this field should be carried out with larger samples of participants and with an equal gender distribution and covering all types of anxiety disorders in an adequate manner, or to focus only on one anxiety disorder for a greater homogeneity of the sample.

In sum, in spite of the reported limitations of the present study, we found marked differences in dreams of patients with anxiety disorders compared to healthy persons. Patients with anxiety disorders were found to provide longer dream reports and possess a higher dream recall level. Dreams of anxiety patients were distinguished by a more intense and vivid emotionality, higher prevalence of negative emotions and less positive emotions. Their dreams also contained more aversive contents, had a higher rate of incorporations from waking life into dreams, their everyday life mood was found to be more often related with their dreams and affected by their

dreams more frequently. Anxiety outpatients also attributed more meaning and significance to their dreams than healthy participants and were more interested in the interpretation of their dreams. They exhibited a higher frequency of nightmares as well as higher levels of nightmare distress, and this nightmare distress was more intense in male patients than in female patients. Several specific types of behavioral consequences and effects of nightmares within the group of anxiety outpatients were significantly more pronounced in men than in women (physiological and emotional reactions and behavioral coping attempts after nightmares). This study thus adds further knowledge of dreams and dreaming in anxiety disorders, which may be helpful for the understanding of these mental disorders and their treatments in the future.

Compliance with Ethical Standards

Conflicts of interests. The authors declare not having any conflicts of interest or competing interests.

Research involving human participants. All procedures performed in this study were in accordance with ethical standards and norms of the institutional ethics and research committee. The study was approved by the ethics committee of our University.

Informed Consent. Informed consent was obtained from all individual participants included in the study.

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Table 1: Comparison of the emotionality scales from dream diaries in terms of quantitative indicators (mean ± standard deviations).

Emotionality	Group		*t*-value (*df* = 939)	*p*-level
	Healthy	Anxiety		
Level of Positive Emotions in Dreams	1.38 ± 1.06	0.74 ± 0.84	10.27	**<0.001**
Level of Negative Emotions in Dreams	0.98 ± 0.88	1.89 ± 0.97	15.07	**<0.001**
General Emotional Intensity in Dreams	3.03 ± 2.15	5.01 ± 2.49	13.05	**<0.001**

Table 2: Comparison of the two groups of participants on the average scorings of the MDTI and MADRE questionnaires (mean ± standard deviations).

Variable	Group		*t*-value (*df* = 74)	*p*-level
	Healthy	Anxiety		
MDTI				
Aversive Dreams	1.81 ± 0.63	2.60 ± 0.66	5.33	**<0.001**
Dream Recall	2.59 ± 0.68	3.09 ± 0.58	3.44	**<0.001**
Personal Significance of Dreams	2.14 ± 0.59	2.27 ± 0.60	0.95	n.s.
Incorporations of Waking Life into Dreams	2.36 ± 0.70	2.71 ± 0.66	2.24	**<0.05**
Wishes Fulfillment	2.07 ± 0.63	2.01 ± 0.77	0.37	n.s.
Dream Vividness	3.00 ± 0.90	3.25 ± 0.62	1.41	n.s.
MADRE				
Dreams Recollection Frequency	1.97 ± 0.75	2.29 ± 1.01	1.57	n.s.
Dreams Emotional Intensity	3.30 ± 0.75	3.69 ± 0.93	2.01	**<0.05**
Average Dreams Mood	3.13 ± 0.84	2.32 ± 0.77	4.38	**<0.001**
Nightmare Dreams Frequency	3.11 ± 1.45	5.13 ± 1.83	5.33	**<0.001**
Nightmare Distress Level	1.76 ± 1.50	3.53 ± 1.08	5.90	**<0.001**
Significance of Dreams (Attitude towards Dreams 1)	2.03 ± 0.91	2.53 ± 0.92	2.38	**<0.05**
Interest in Dreams (Attitude towards Dreams 2)	2.89 ± 0.89	3.11 ± 0.95	1.04	n.s.
Dreams Meaningfulness (Attitude towards Dreams 3)	3.03 ± 0.85	2.89 ± 0.89	0.70	n.s.
Interest in Dreams (Attitude towards Dreams 4)	3.08 ± 0.88	2.97 ± 1.03	0.50	n.s.
Life Enrichment by Dream Interpretation (Attitude towards Dreams 5)	2.08 ± 1.10	2.71 ± 0.93	2.70	**<0.05**
Dreaming as an Interesting Phenomenon (Attitude towards Dreams 6)	3.42 ± 0.64	3.42 ± 0.76	0.00	n.s.
Self-Knowledge through Dreams (Attitude towards Dreams 7)	2.71 ± 1.04	2.87 ± 1.02	0.68	n.s.
Getting Help for Waking Life by Dreams (Attitude towards Dreams 8)	2.13 ± 1.02	2.53 ± 1.13	1.62	n.s.
Attitude towards Dreams	2.67 ± 0.72	2.88 ± 0.69	1.30	n.s.
How Often Dreams affect Mood	3.26 ± 2.01	4.82 ± 2.09	3.32	**<0.01**

Table 3: Descriptive statistics of behavioral consequences of nightmares as assessed by the NBQ questionnaire.

Variable	***M* ± *SD***	***Median (Q1-Q3)***	***Min; Max***
Physiological Reactions	2.06 ± 0.72	2.00 (1.50-2.50)	(1.00; 4.00)
Emotional Reactions	2.05 ± 0.65	1.89 (1.56-2.44)	(1.00; 3.67)
Cognitive Effects	2.04 ± 0.58	2.00 (1.60-2.40)	(1.10; 3.50)
Behavioral Coping Attempts	1.90 ± 0.46	1.89 (1.56-2.22)	(1.00; 3.11)
Nightmare Trivialization	2.06 ± 0.50	2.00 (1.80-2.40)	(1.00; 3.20)
Attempts to Explain a Nightmare	2.37 ± 0.95	2.33 (1.67-3.33)	(1.00; 4.00)

Table 4: Comparison between genders on behavioral consequences of nightmares as assessed by the NBQ questionnaire (mean ± standard deviations).

Variable	**Anxiety Group**		***t*-value (*df* = 103)**	***p*-level**
	Female	**Male**		
Behavior Consequences after Nightmares				
Physiological Reactions	1.89 ± 0.66	2.47 ± 0.71	4.02	**0.001**
Emotional Reactions	1.96 ± 0.64	2.26 ± 0.65	2.18	**<0.05**
Cognitive Effects	2.00 ± 0.55	2.14 ± 0.62	1.15	n.s.
Behavioral Coping Attempts	1.80 ± 0.45	2.13 ± 0.41	3.52	**<0.001**
Nightmare Trivialization	2.07 ± 0.50	2.03 ± 0.49	0.38	n.s.
Attempts to Explain a Nightmare	2.34 ± 1.00	2.44 ± 0.85	0.49	n.s.

Table 5: Descriptive statistics of quantitative indicators of the NDQ questionnaire (mean ± standard deviations).

Variable	***M* ± *SD***	***Median (Q1-Q3)***	***Min; Max***
Nightmare Distress	3.16 ± 0.75	3.17 (2.67-3.58)	(1.33; 4.83)
Impact on Sleep	3.30 ± 0.59	3.33 (3.00-3.67)	(2.00; 5.00)
Impact on Daytime Reality Perception	2.76 ± 0.61	2.75 (2.25-3.25)	(1.25; 4.50)

Table 6: Comparison between genders of the NDQ questionnaire (mean ± standard deviations).

Variable	**Anxiety Group**		***t*-value (*df* = 103)**	***p*-level**
	Female	**Male**		
Nightmare Distress	3.07 ± 0.73	3.40 ± 0.78	2.07	**<0.05**
Impact on Sleep	3.35 ± 0.61	3.18 ± 0.54	1.35	n.s.
Impact on Daytime Reality Perception	2.75 ± 0.60	2.77 ± 0.64	0.15	n.s.

Erratum

Erratum to the dissertation "Dreams and Dream Contents of Patients with Different Anxiety Disorders" submitted by Anton Rimsh, 2021.

In the Manuscripts 2 and 3 some statistical flaws occurred which have been changed as following:

1) Calculation of the results of the dream content analysis (*Manuscript 2*) and the dream features and characteristics (*Manuscript 3*) were erroneously done on the level of each dream and then by mistake tested with independent *t* tests. This was now corrected to calculations on the averaged level of dream variables for each person and the statistical analyses were then done with independent *t* tests between the groups.
2) To control for an inflation of significant effects due to the dependency of some variables, an Alpha-error adjustment (Bonferroni correction) was done when appropriate (*Manuscript 2*).
3) Due to the correction describe above, the Results and Discussion sections were adjusted (*Manuscript 2,3*).

Analysis of Dream Contents of Patients with Anxiety Disorders and their Comparison with Dreams of Healthy Participants

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Running Title: Content analysis of dreams in anxiety disorders

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Abstract

Although anxiety disorders are well investigated, little is known about the dream content of patients suffering from anxiety disorders. The aim of the present study was to investigate specific characteristics manifested in dreams of patients with clinical anxiety disorders and to compare them with dreams of healthy persons. The sample consisted of 38 participants with anxiety disorders and a matched healthy control group of 38 individuals. As soon as they woke up in the morning, each participant filled in written dream diaries during a period of 21 days, and thus provided written dream logs. Dream reports of the participants were analysed according to the Hall and Van de Castle (1966) system of content analysis of dreams. The results of our study showed that the presence of an anxiety disorder resulted in significant differences in dream contents, compared to the dreams of healthy individuals. Dreams of anxiety patients contained more characters, higher numbers of different activities, social and aggressive interactions, lower numbers of friendly interactions, higher frequencies of failures, misfortunes and negative emotions, and a lower prevalence of successes, fortune and positive emotions. In addition, they had higher numbers of locations and settings, more negative evaluations and assessments, and were characterized by a more intense and wider range of different modifiers. The results thus indicate a clear difference in the content and structure of dreams in anxiety patients compared to healthy persons, although anxiety themes are not always prevalent in their dreams.

Keywords: anxiety disorders, content-analysis, dreams, dreaming, Hall and Van de Castle system

Introduction

A large amount of psychological studies indicates that dream contents are directly influenced and affected by an individual‘s psychopathology (Cartwright et al., 2006; Desroches & Kaiman, 1964; Free et al., 1993; Gentil & Lader, 1978; Hartmann, 1996; Kirschner, 1999; Miller et al., 2015; Nadorff et al., 2014; Simon et al., 2016; Swart et al., 2013). According to these studies we can assume that dreams and dream content of individuals suffering from anxiety disorders will directly reflect their mental state and be immediately associated with it. While there are a number of studies which address and explore relationships between anxiety disorders and nightmare or bad dreams frequency (Kellner et al., 1991; Levin & Hurvich, 1995; Nadorff et al., 2014; Nielsen et al., 2000; Ohayon et al., 1997; Picard-Deland et al., 2018; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013), there is still an evident lack of psychological research concerning the subject of associations between anxiety disorders and dream contents in general (Rimsh & Pietrowsky, 2020; Skancke et al., 2014). It is also necessary to note that not only are such studies scarce, the existing investigations on this particular topic bear mostly an isolated and segregated character and highlight and investigate only specific individual minor facets, aspects and particularities of dreams and dream contents of clinical anxiety sufferers (DeCicco et al., 2013; Foss, 1994; Free et al., 1993; Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999; Miller et al., 2015; Sikka et al., 2018). Anxiety disorders, however, still remain one of the most prevalent and common psychiatric disorders in the contemporary western world, and become more and more wide-spread among European and U.S. populations each year (Remes et al., 2016). Therefore, due to this particular situation, it seems essential to explore and analyse dreams and dream contents of clinically ill anxiety patients and to compare these contents with the contents of dreams of healthy persons. Understanding the dreams of patients with anxiety disorders may further contribute to understand these disorders or may be beneficial in the psychological treatment of anxiety disorders.

The existing data regarding specific qualities and characteristics of dreams of patients with different anxiety disorders (which included, primarily, generalized anxiety disorder, panic disorder, social anxiety disorder and agoraphobic disorder) indicate that their dreams are distinguished by a considerably lower general emotional tone, a significantly more negative, sad and despondent mood and affect, higher frequencies of aggressive interactions and higher levels of overall aggression, lower numbers of friendly or welcoming interactions and actions fewer successful and fortunate events, happenings or occasions, higher frequencies of failures and unsuccessful events, highly unpleasant, traumatic, frightening and fearful experiences, lower numbers of known characters and acquaintances,

higher rate of change frequency of locations and scenes (Foss, 1994; Free, et al., 1993; Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999; Sikka et al., 2018). We might clearly see that dreams of anxiety patients suffering from specific anxiety disorders are distinguished by the presence of particular contents, which are specific only for a certain kind of anxiety disorder: dreams of patients with panic disorder contain higher rates of separation anxiety (Free et al., 1993); dreams of an agoraphobic sufferer involve higher numbers of wide, big open spaces, areas and places, which are, in fact, highly frightening, threatening, traumatic and unpleasant for patients with this disorder (Foss, 1994); dreams of a social anxiety sufferer exhibit higher frequencies of frightening and threatening individuals of the opposite gender as well as frightening and fearful social situations and events, such as public speeches and examinations (Khodarahimi, 2009). Likewise, it is highly evident that the presence of various clinical anxiety disorders instigates a higher frequency of nightmares and frightening dreams (Burgess et al., 1998; Cellucci & Lawrence, 1978; Desroches & Kaiman, 1964; Levin, 1998; Kellner et al., 1991; Levin & Hurvich, 1995; Mallon et al., 2000; Miller & DiPilato, 1983; Nadorff et al., 2014; Ohayon et al., 1997; Picard-Deland et al., 2018; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013), which may also indicate that dreams of patients with anxiety disorders involve notably higher numbers of various unpleasant, traumatic, frightening, and threatening events.

The main objective of the present study was to identify the contents of dreams of anxiety patients and to conduct a comparison of contents and characteristics of their dreams with the dreams of age- and gender-matched healthy persons. To our knowledge, such a comparison in a sample of patients suffering from different clinical anxiety disorders has never been done before. The analysis of dream content was performed according to the Hall & Van de Castle coding system of dreams and according to the rules and coding units presented in this system (Hall & Van de Castle, 1966). The primary hypothesis of the present study was that dream contents of anxiety patients would be significantly different from the dream contents of healthy people and would contain more anxiety related topics and more negative and unpleasant experiences such as aggressive interactions, misfortunes, failures, negative emotions and negative evaluations, as well as a lower frequency of friendly interactions, good fortune, successes, positive emotions and positive evaluations.

Method

Sample and Participants

The sample consisted of 38 outpatients with different anxiety disorders and 38 age- and gender-matched healthy persons without any prior or current mental disorder. Patients were recruited from the

outpatient psychotherapy centre of our Department, who had been referred for the treatment of their anxiety disorders. The patients were diagnosed with different anxiety disorders and were currently in a cognitive-behavioral psychotherapeutic treatment. Anxiety outpatients were sampled for the study during the course of their psychotherapeutic treatment and were investigated in the first third of the therapy. The number of their psychotherapy sessions prior to the investigation ranged from 8-10 sessions. Specifically, the diagnoses of the anxiety patients included the following kinds of anxiety disorders: generalized anxiety disorder (n = 11), social anxiety disorder (social phobia; n = 6), panic disorder (n = 5), agoraphobia (n = 1), separation anxiety disorder (n = 2), specific phobia (n = 4). One patient was diagnosed with comorbid generalized anxiety disorder and specific phobia (arachnophobia), three patients were diagnosed with comorbid generalized anxiety disorder and social anxiety disorder, two patients were diagnosed with comorbid generalized anxiety disorder and panic disorder, and three patients were diagnosed with comorbid social anxiety disorder and panic disorder. For the control group with healthy participants, individuals without any mental disorders were recruited with the help of flyers and advertisements, distributed at the university campus as well as through ads and announcements on the internet: in social networks, job and advertisement sites. Matching in pairs was performed on the basis of same gender (male/female) and approximately similar age of subjects (with the maximal gap of 2 years between two matched subjects). The study involved 54 (71.05%) adult female participants and 22 (28.95%) adult male participants in total, ranging from 18 to 54 years old, with the mean age of 29.20 ± 9.57 years. The control group contained 38 healthy participants with the mean age of 30.08 ± 10.39 years, while the group of anxiety patients had a mean age of 28.32 ± 8.75 years (t (74) = 0.80, p = .43). All participants gave written informed consent and the study was approved by the local ethics committee. Each participant received a compensation of 36 Euros for participation in the study.

Procedure

Participants completed a dream diary for a period of three weeks (21 days), and wrote down their dreams as soon as they woke up in the morning. All participants attended two meetings with the research coordinator: one in the beginning of the 3-week period, when they received study materials (dream diaries for dream reports) and provided their sociodemographic data, and one after this period, when they handed in the study materials (dream diaries with written dream reports) and provided their feedback in an oral form. The explicitly expressed dream contents from the dream reports of participants were then codified according to the coding rules and norms of the Hall & Van de Castle system of dream content analysis (Domhoff, 1996; Hall & Van de Castle, 1966). This codification

allowed us to assess and evaluate the frequencies of different categories of dream contents in accordance with the coding categories from the Hall & Van de Castle coding system (see below).

Materials

Sociodemographic questionnaire. A short standardized questionnaire was used to gather personal sociodemographic data. The questionnaire contained questions regarding name, age, gender, education, occupation, presence and kind of mental disorder and intake of psychoactive drugs.

Dream diary. A dream diary was used to gather dream reports from the participants. Dream diaries were filled in every day during a 21-day study period. They contained one checklist for all of the 21 days, where participants noted whether they had had any dreams or not during the previous night, and a 21-page journal to write down their dreams as they remembered them as soon as they woke up every morning, in case they had had any dreams that night. The length of dream reports was evaluated on the basis of a total word count of each dream report, which included all dream-related words, excluding repeated words and repetitions, fillers, corrections and non-dream related waking commentaries.

Content Analysis

Content analysis was performed according to the coding rules of the Hall & Van de Castle system of content analysis of dreams (Domhoff, 1996; Hall & Van de Castle, 1966). To assess and estimate inter-rater reliability between independent judges for the content analysis of dreams, a certain proportion of all dream reports from the two groups (10% of all dream reports from both groups) was coded by a second independent coder (judge/rater), in addition to the main coder (judge/rater), who coded all dream reports from the two groups of the study. The both judges were „blind“, and thus had no access to other data or information about the participants while performing the codification of dream reports. Inter-rater reliability between the two independent judges (raters) was at acceptable levels with respect to all ratings (moderate correspondence, correspondence level at 75%) (Koo & Li, 2016; McHugh, 2012). Dream reports were coded on the basis of the list of specific dream categories from this system. These categories included (for a more detailed description of the subcategories see Domhoff (1996) and Hall & Van de Castle (1966)):

1. *Characters* – presence of different characters in dreams. This category contains two subcategories.
2. *Social Interactions* – presence of different social interactions in dreams. This category contains three subcategories.

3. *Activities* – presence of different types of activities in dreams. This category contains eight subcategories.
4. *Success and Failure* – presence of successful or unsuccessful outcomes.
5. *Good Fortune and Misfortune* – presence of lucky, fortunate, or unlucky, unfortunate outcomes, events, or episodes in dreams
6. *Emotions* – presence of different types or classes of emotions in dreams. This category contains five subcategories.
7. *Settings and Locations* – locations, environments, settings and surroundings in which dreams manifest themselves, surrounding scenery of a dream. This category contains three subcategories.
8. *Objects* – different types or classes of objects, items and things in dreams. This category contains 13 subcategories.
9. *Descriptive Elements. Modifiers* – different types and classes of adjectives, adverbs or phrases, which are used for descriptions and descriptive elaborations, assessments, evaluations or judgments and assertions. This category involves nine subcategories.
10. *Descriptive Elements. Temporal scale* – any types or forms of mentions or references to certain time or periods of time, various time intervals, particular points of time or different time indications and notions.
11. *Descriptive Elements. Negative scale* – any types of negative particles, negative linguistic forms or formulations in explicit and manifested descriptions and definitions of dream reports.

Data Analysis and Statistical Evaluation

The coded dream contents were statistically analysed and compared between two groups (anxiety patients, control group), with the help of statistical software packages (Statistica 10; SAS JMP 11; SPSS Software) by using analyses of covariance with dream lengths (total word count) as covariate to compare differences for each coding category and subcategory. When one participant reported more than one dream, the coded dream contents of this participant were collapsed and averaged for further statistical analysis. The most frequent anxiety-related dream topics and themes in dreams of anxiety outpatients were obtained with the help of chi-square test statistics which allowed to compare the frequencies of different dream themes and topics in the anxiety and healthy groups.

Results

The dream diaries sample consisted of 941 dream reports in total: 472 (50.2%) dream reports from the experimental group of anxiety disorder sufferers, and 469 (49.8%) dream reports from the

control group of mentally healthy individuals. 723 (76.84%) dream reports were from female participants and 218 (23.16%) dream reports from male participants. The average number of dream reports per group during 21 days did not show any significant difference between the two groups (12.42 ± 6.10 vs. 12.34 ± 5.95, respectively, t (939) = 0.20, p = .84). The mean number of dream reports provided by females from the both groups was significantly higher than the mean number of dream reports provided by males from the both groups (13.39 ± 5.14 vs. 9.91 ± 3.58, respectively, t (939) = 9.34, p < .001). According to the average dream length based on the total word count of dream reports, patients with anxiety disorders had longer dreams reports with a higher average word count (anxiety patients: 57.88 ± 10.74 vs. controls: 44.41 ± 8.50, t (74) = 6.07, p < .001).

In the dream reports of the anxiety patients, several frequent topics could be observed. These themes could be considered as anxiety-related. Dream themes were taken from the Typical Dream Questionnaire (TDQ), which contains 56 typical dream themes in total (Nielsen et al., 2003). The themes presented in Table 1 were more frequent in the group of anxiety patients, which was performed only in the sample of longer dream reports (including more than 35 words) (anxiety patients group: n = 330 dream reports; healthy control group: n = 328 dream reports).

- insert Table 1 about here –

Dreams of anxiety patients exhibited a significantly higher overall general number of characters (*M:* 3.75; *SD:* ± 1.95) than the control group (*M:* 2.96; *SD:* ± 1.55; F (1, 73) = 5.16, p < .05). In particular, their dreams also contained significantly higher numbers of male characters (*M:* 1.55, *SD:* ± 0.92 vs. *M:* 1.16, *SD:* ± 0.72; F (1, 73) = 5.77, p < .05), ex-spouses and ex-partners (*M:* 0.02, *SD*: ± 0.08 vs. *M:* 0.10, *SD:* ± 0.13; F (1, 73) = 6.12, p < .05) and strangers (*M:* 1.09, *SD*: ± 0.86 vs. *M:* 1.58, *SD:* ± 0.98; F (1, 73) = 9.91, p < .01). Further results on the subcategories concerning characters can be seen in Table 2.

- insert Table 2 about here –

With regard to different types of interactions between various characters in dreams (Table 3), the total number of various social interactions was significantly higher in the anxiety group (*M:* 3.48, *SD:* ± 2.03 vs. *M:* 2.57; *SD:* ± 1.35; F (1, 73) = 5.35, p < .05). Results on the subcategories of types of interaction indicate that aggressive interactions were the most prevalent type of interactions within the

anxiety group and more prevalent than in the control group, while friendly interactions were the most frequent class of interactions within the control group and more prevalent than in the anxiety group.

With regard to different types of activities several activities occurred significantly higher in anxiety patients than in the healthy control group (Table 3).

- insert Table 3 about here –

Results with regard to different types and kinds of successes and successful outcomes and results, failures, fortune and fortunate and lucky events, misfortunes and misfortunate events and occasions can be seen in Table 4. The number of successes was higher than the number of failures within the healthy group, as well as the number of good fortune events exceeded the number of misfortune events. Within the anxiety group, the number of failures was higher than the number of successes, while the frequency of good fortune events was considerably lower than the number of misfortune events (Table 4).

- insert Table 4 about here –

As expected, emotions in dreams were more negative in the anxiety patients and more positive in the healthy controls. For details see Table 5. The most frequent types of emotions in dreams within the anxiety group were apprehension and fear and confusion, while the least frequent emotions were happiness and joy. The most frequent types of emotions in dreams within the control group were happiness and joy and confusion, while the least frequent types were emotions of sadness and emotions of apprehension and fear.

The overall number of different locations and settings in dream reports of anxiety sufferers was higher than the overall number of locations in dream reports of healthy controls (*M:* 1.93, *SD:* ± 0.66 vs. *M:* 1.51, *SD:* ± 0.53; F (1, 73) = 8.08, $p < .01$). Detailed results on the subcategories of settings and locations can be seen in Table 5. Concerning objects in dreams, the dream reports of the anxiety group differed in no subcategory from the dream reports of healthy persons, except the subcategory of miscellaneous objects occurred more often in anxiety patients (Table 5).

- insert Table 5 about here –

With respect to the Modifiers category, the dreams of anxiety patients varied in a number of subcategories from the dreams of the healthy persons, indicating that the dreams of anxiety patients contained a higher number of descriptive elements than the dreams of the healthy group (Table 6). In addition, a higher number of crowded places, or filled areas (high density) was found in the dreams of anxiety sufferers than in the healthy group, as well as, on the other hand, a higher number of empty and lonely places and spaces was also found in the dreams of anxiety patients. Dreams of anxiety patients showed a higher frequency of high velocity ("fast") actions or movement (Table 6). The frequency of intense activities was also substantially higher in the anxiety group. Importantly, anxiety patients displayed less positive and more negative evaluations, assessments and particles in their dreams compared to the healthy participants.

- insert Table 6 about here –

Discussion

The results of the present study reveal that according to our hypotheses, the dream contents of anxiety patients differed from the dream contents of healthy persons and contained more negative and unpleasant elements. Several particular anxiety-associated dream topics were found to be more prevalent in anxiety patients compared to healthy persons. These themes included, among others, being chased and pursued, being physically attacked and facing aggressive actions, being frozen with fright, quarrels and verbal aggressive interactions, anxiety and fear about aggressive actions from others, fear of falling and being in danger of falling, being excluded and being rejected in social situations, death of parents and family members, accidents and car or plane crashes, facing failures and being unsuccessful.

In detail, dreams of anxiety patients contained a higher number of characters in total than dreams of healthy people. We may conclude that this is related to the notion that patients with anxiety disorders (Desroches & Kaiman, 1964; Gentil & Lader, 1978), or with higher levels of trait and state anxiety (Brown & Donderi, 1986; Duke & Davidson, 2002; Gentil & Lader, 1978; Yu, 2007; Zadra et al., 1998) tend to recall their dreams better and in a more detailed, precise way, and are generally prone to remembering specific details and particularities of their dreams, such as specific characters or figures. Dreams of anxiety patients were distinguished by a higher number of different male human characters. Our study showed that the prevalence of unknown characters and strangers is considerably higher in the dreams of anxiety sufferers, although such characters are also relatively often present in the dreams of healthy people. The results contradict, however, the results of a previous study, which

found that dreams of patients suffering from generalized anxiety and panic disorders contained low numbers of known familiar characters (Kirschner, 1999), and partly contradicts the results of another study, which found that dream imagery of individuals with higher levels of state anxiety exhibited higher numbers of familiar characters (King & DeCicco, 2007). The results show that dreamers' ex-partners or ex-spouses are more frequent in dream contents of anxiety disordered individuals than in dreams of healthy people. We may assume that this can be explained by the notion that individuals with anxiety disorders may be more preoccupied with thoughts, worries or concerns about their ex-partners and generally tend to be focused more on their past and past-life events during their waking life.

Different social interactions between characters in dreams were highly prevalent in dream contents of both healthy individuals and anxiety patients, although their number was much higher in dreams of anxiety sufferers. The presence of various aggressive interactions was evidently and significantly higher in the dreams of anxiety participants. Thus, we may also conclude that levels of general aggression and hostility are high in dream contents of anxiety patients. These results correspond with previous research with individuals with higher rates of trait anxiety (Brown & Donderi, 1986; Gentil & Lader, 1978; Pesant & Zadra, 2006), state anxiety (King & DeCicco, 2007), and clinical patients with anxiety neurotic disorder (Gentil & Lader, 1978) and generalized anxiety and panic disorders (Kirschner, 1999), and may reflect in dreams inner fears, frights, worries, and concerns of anxious individuals about aggressive interactions in their waking life, such as being attacked, threatened or endangered by aggressive intentions of others. Dreams of anxiety patients contained fewer friendly interactions than dreams of healthy individuals. Although friendly interactions and activities were not completely absent in their dreams, their frequency was considerably lower than in the dream contents of healthy participants. Likewise, anxiety patients exhibited much lower numbers of friendly interactions and activities than aggressive interactions in their dreams. Such results regarding friendly interactions in dreams of anxiety sufferers also correspond with prior data regarding individuals with higher rates of trait anxiety (Gentil & Lader, 1978; Pesant & Zadra, 2006), as well as clinical patients with anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999). We may assume that such prevalence of aggressive interactions and relative lack of friendly activities in dream contents of participants with anxiety disorders is also connected with their fears and apprehensions during their everyday life.

Regarding different activities in dreams, only location changes, traveling and transportations, verbal communications, expressive communications and thinking activities were more frequent in dreams of anxiety sufferers. These results are partly consonant with the data from previous research that dreams of clinical patients with anxiety disorders (DeCicco et al., 2013; Miller et al., 2015) as well as

of non-clinical individuals with higher levels of trait and state anxiety (Jones & DeCicco, 2009) are characterized by higher scene and location change frequency.

The total number of different types of successes as a result of the dreamer's deliberate actions was lower in dreams of anxiety patients, while failures were significantly more prevalent in dream contents of anxiety sufferers. Similarly, different random, unexpected, accidental and occasional fortunate, lucky and happy events and situations were much fewer in dreams of anxiety patients, while different random, unexpected, accidental and occasional events of misfortune, trouble or disaster were substantially more prevalent in all of their dreams. These results correspond with the findings of several previous studies which dealt with trait anxiety or clinical anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999; Pesant & Zadra, 2006). These data indicate that dream contents of clinical anxiety sufferers are distinguished by higher levels of general negativity and failures. Likewise, such results indicate that dreams of individuals with anxiety disorders may contain higher numbers of various threats, misfortunes and dangerous situations and events which could not be successfully coped with, avoided or overcome.

With respect to dream emotions of anxiety patients, their dreams contained a higher presence of anger, fear, apprehension and sadness than dreams of healthy individuals. In addition, their dreams were clearly distinguished by a much fewer number of positive and happy emotions, such as joy and happiness. Emotions of confusion and surprise were equally prevalent in dreams of healthy people and anxiety patients. The high presence of negative emotions, namely anxiety, fear and apprehension, and the lower numbers of positive emotions in dreams of anxiety patients allow to conclude that their dreams may represent the experience of a frightening, fearful, hostile and dangerous environment in their waking life. These results are in line with previous research in clinical patients with anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999; Sikka et al., 2018) and non-clinical, healthy individuals with higher levels of trait and state anxiety (Brown & Donderi, 1986; Gentil & Lader, 1978; King & DeCicco, 2007; Pesant & Zadra, 2006).

Although locations and settings in dreams of anxiety patients were significantly more numerous than in dreams of healthy subjects, in the subcategories this was only substantially for no or questionable settings, indicating that the settings in dreams of anxiety patients are characterized to be unclear and thus may induce insecurity. The finding that the dreams of anxiety patients contain significantly higher numbers of different locations and settings is partly consistent with the previously mentioned findings that dreams of individuals with clinical anxiety disorders (DeCicco et al., 2013; Miller et al., 2015) and people with higher levels of trait and state anxiety (Jones & DeCicco, 2009) are characterized by a higher rate of changes in location and settings.

With regard to objects in dreams, only miscellaneous objects were more frequent in dreams of anxiety patients than in dreams of healthy individuals. This indicates that the objects of dreams, in contrast to e. g. social interactions, activities, and emotions, are not a specific feature of the dream content of anxiety patients.

Various references and mentions of different sizes, were much more frequent and common in dream reports of the anxiety group, which indicates that dreams of anxiety patients contain substantially higher amounts of both big and small objects, items, places or characters, as well as old ones. High density situations, like crowded places and locations with many characters and groups of characters, as well as low density situations are more common in dreams of anxiety patients. Thie seemingly contradictory results of size and density may point to the fact, that the dreams of anxiety patients are in general more extreme or cover a wider range of modifiers. This is supported by the result, that the intensity modifier is also significantly more pronounced in anxiety patients. Dreams of anxiety disordered patients were also characterized by common presence of high velocity and fast speed, in general, and, subsequently, fast-moving characters, objects, transport and vehicles. Likewise, their dream reports used a higher frequency of describing things, actions or situations as negatively assessed. Thus, we can assume that the presence of an anxiety disorder instigates a higher overall subjective intensity of dream experiences and dream imagery. In accordance with such notion, we conclude that all of the described dream contents in anxiety patients not only exist in large numbers in their dream contents, but also are experienced by them in their dreams with a particularly high subjective intensity, expression and emphasis.

Limitations and methodological shortcomings of our study should be acknowledged. First, the sample of the study was not very large – 38 participants in each of the two groups. Second, due to a substantially larger presence of females in the study sample and its relative gender homogeneity, there was a slight underrepresentation of males in the sample. This, however, reflects the prevalence of anxiety disorders with respect to gender distribution of different types of anxiety disorders. Third, our sample was distinguished by a relatively lower heterogeneity and narrow variability in terms of representativity of various types of anxiety disorders in participants – the majority of the participants of the study were diagnosed with generalized anxiety disorder, social anxiety disorder, and panic disorder, while only four outpatients were diagnosed with specific phobias, two with separation anxiety disorder, and one with agoraphobia. Therefore, these three types of anxiety disorders were significantly underrepresented in our study. Further, our sample could have been biased by an intrinsic interest in dream research, which could have influenced the study results. Finally, as the main research method of the study was dream diaries filled in directly after sleep, there could be false or incomplete dream

reports when the participants had forgotten to fill in the diary in the morning and completed this later during the day. Taking into consideration these methodological shortcomings and limitations, we suggest that future research in the similar field could be carried out with larger sample of participants with an equal gender distribution and covering all types of anxiety disorders in an adequate manner.

In sum, despite the mentioned limitations and methodological shortcomings of the present study, the results show significant differences in dream contents between anxiety patients and healthy controls and can be summarized that dreams of anxiety outpatients contain higher numbers of negative dream characters, interactions and activities, emotions and settings than the dreams of the healthy controls. In addition, several specific anxiety-related typical dream topics were significantly more frequent in the dreams of anxiety patients, which included mainly negative situations, interactions or experiences in dreams.

Compliance with Ethical Standards

Conflicts of interests. The authors declare not having any conflicts of interest or competing interests.

Research involving human participants. All procedures performed in this study were in accordance with ethical standards and norms of the institutional ethics and research committee. The study was approved by the ethics committee of our University.

Informed Consent. Informed consent was obtained from all individual participants included in the study.

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Table 1: Rank order of most frequent topics in dreams of anxiety outpatients in comparison with the frequency of these topics in dreams of healthy participants (longer dream reports).

Dream theme	**Percentage of dream reports in anxiety patients**	**Percentage of dream reports in the control group**	**X^2 (1, N = 658)**	***p*-level**
Being chased or pursued	15.76 %	8.54 %	8.02	**<0.01**
Aggressive actions from other people and being physically attacked	15.46 %	9.76 %	4.84	**<0.05**
Being frozen with fright or anxiety	15.16 %	5.8 %	15.32	**<0.001**
Quarrels and verbal aggressive interactions	14.55 %	8.85 %	5.16	**<0.05**
Feeling anxiety and fear about aggressive actions from other characters, fear of aggression and evil deeds from others	13.34 %	3.05 %	23.08	**<0.001**
Being in danger of falling and fear of falling	12.43 %	7.63 %	4.19	**<0.05**
Being excluded in social interactions or being rejected in social situations	11.82 %	4.88 %	10.33	**<0.01**
Death of family members, especially, parents	11.52 %	6.71 %	4.58	**<0.05**
Accidents or car and plane crashes	11.52 %	2.15 %	22.60	**<0.001**
Arriving too late on an important event or meeting	10.92 %	6.41 %	4.22	**<0.05**
Trying again and again and failing to complete a task; facing a failure	10.61 %	3.66 %	11.96	**<0.001**
Illness or injury of family members, especially, parents	10.31 %	0.92 %	27.26	**<0.001**
Being paralyzed or being unable to move	10.31 %	5.8 %	4.50	**<0.05**
Falling down from heights and being in state of falling	9.4 %	4.88 %	5.06	**<0.05**
Seeing injuries, bleeding or blood	8.79 %	1.53 %	17.66	**<0.001**
Natural disasters (earthquakes; floods and tidal waves; tornadoes or strong winds)	7.88 %	3.05 %	7.41	**<0.01**
Dead persons appearing alive	7.58 %	2.14 %	10.50	**<0.01**
Feeling anxiety and fear about being late and not on time on an important event or meeting	7.58 %	1.83 %	12.09	**<0.001**
Being killed or dying	7.58 %	1.53 %	13.80	**<0.001**
Being locked up in a room or locked space	7.28 %	1.83 %	11.20	**<0.001**
Sensing some sort of unnatural frightening presence or entity	6.97 %	2.75 %	6.32	**<0.05**
Loss of job or leaving a university	6.97 %	2.44 %	7.51	**<0.01**
Being kidnapped or abducted	6.97 %	2.14 %	8.80	**<0.01**
Feeling anxiety and fear about being rejected by other characters or not liked by other characters	6.67 %	0 %	22.60	**<0.001**
Aggressive wild dangerous animals or creatures	6.37 %	2.75 %	4.94	**<0.05**
Failing an examination	6.37 %	0 %	21.55	**<0.001**
Feeling fear or anxiety about death or dying	6.06 %	0 %	20.47	**<0.001**
Attacking or hurting someone (by a dreamer)	5.76 %	2.44 %	4.60	**<0.05**
Being annihilated, destroyed, jammed, crushed, smashed, ruined or demolished	5.76 %	0 %	19.43	**<0.001**
Feeling anxiety and fear about being left alone	3.34 %	0 %	11.13	**<0.001**
Insects or spiders	3.34 %	0 %	11.13	**<0.001**
Falling out teeth or hair	3.03 %	0 %	10.08	**<0.01**
Experiencing sexual harassment or sexual violation	3.03 %	0 %	10.08	**<0.01**

Feeling anxiety and fear about going outside, going into outer world and outer environment	2.13 %	0 %	7.05	**<0.01**
Claustrophobia and anxiety and fear of closed narrow tight areas and spaces	1.52 %	0 %	5.02	**<0.05**
Drown in water	1.52 %	0 %	5.02	**<0.05**

Table 2: Dream content of healthy participants and anxiety patients for the category "Characters" in terms of quantitative indicators (means ± standard deviations).

Variable	Group		*F*-value (1, 73)	*p*-level	η_p^2-value
	Healthy	Anxiety			
Characters (Total Number)	2.96 ± 1.55	3.75 ± 1.95	5.16	**<0.05**	0.07
Male	1.16 ± 0.72	1.55 ± 0.92	5.77	**<0.05**	0.07
Female	1.13 ± 0.86	1.23 ± 0.95	0.89	n.s.	0.01
Both Genders	0.53 ± 0.29	0.68 ± 0.38	2.17	n.s.	0.02
Indefinite Gender	0.18 ± 0.25	0.32 ± 0.38	3.78	n.s.	0.05
Father	0.09 ± 0.14	0.16 ± 0.15	2.20	n.s.	0.03
Mother	0.13 ± 0.20	0.18 ± 0.14	0.81	n.s.	0.01
Other Family/Relatives	0.32 ± 0.48	0.38 ± 0.42	0.59	n.s.	0.01
Infants	0.13 ± 0.19	0.15 ± 0.19	0.71	n.s.	0.01
Partner and Spouse	0.01 ± 0.06	0.04 ± 0.07	1.19	n.s.	0.02
Ex-Spouse and Ex-Partner	0.02 ± 0.08	0.10 ± 0.13	6.12	**<0.05**	0.08
Known	1.82 ± 1.05	1.99 ± 1.28	0.51	n.s.	0.01
Prominent	0.07 ± 0.12	0.12 ± 0.17	1.02	n.s.	0.01
Strangers	1.09 ± 0.86	1.58 ± 0.98	9.91	**<0.01**	0.12
Occupation	0.54 ± 0.36	0.61 ± 0.44	1.12	n.s.	0.01

Table 3: Dream contents of healthy participants and anxiety patients for the categories "Social Interactions" and "Activities" in terms of quantitative indicators (means ± standard deviations).

Variable	Group		*F*-value (1, 73)	*p*-level	η_p^2-value
	Healthy	Anxiety			
Social Interactions					
Social Interactions (Total Number)	2.57 ± 1.35	3.48 ± 2.03	5.35	**<0.05**	0.07
Aggressive Interactions	0.70 ± 0.66	2.44 ± 1.52	30.99	**<0.001**	0.30
Friendly Interactions	1.81 ± 0.84	0.98 ± 0.84	9.87	**<0.01**	0.12
Sexual Interactions	0.09 ± 0.24	0.10 ± 0.14	0.08	n.s.	0.001
Activities					
Types of Activities (Total Number)	13.25 ± 7.73	15.15 ± 8.87	1.99	n.s.	0.03
Physical Activities	2.96 ± 1.73	3.80 ± 2.09	3.45	n.s.	0.04
Movement Activities	2.49 ± 1.56	3.04 ± 1.72	3.69	n.s.	0.05
Location Change, Transportation	0.40 ± 0.56	0.95 ± 0.66	11.04	**0.001**	0.13
Verbal Activities	1.59 ± 0.99	2.20 ± 1.55	5.32	**<0.05**	0.07
Expressive Communications	0.20 ± 0.23	0.58 ± 0.55	13.40	**<0.001**	0.15
Visual Activities	4.70 ± 3.15	3.31 ± 2.68	1.19	n.s.	0.02
Auditory Activities	0.14 ± 0.18	0.29 ± 0.30	3.33	n.s.	0.04
Thinking Activities	0.72 ± 0.52	1.00 ± 0.70	4.30	**<0.05**	0.06

Table 4: Dream content of healthy participants and anxiety patients for the categories "Successes", "Failures ","Good fortune", "Misfortune" in terms of quantitative indicators (means ± standard deviations).

Variable	Group		*F*-value (1, 73)	*p*-level	η_p^2-value
	Healthy	Anxiety			
Successes	0.68 ± 0.38	0.46 ± 0.43	4.06	**<0.05**	0.05
Failures	0.33 ± 0.29	0.91 ± 0.69	21.13	**<0.001**	0.22
Good fortune	1.38 ± 0.74	0.44 ± 0.40	39.08	**<0.001**	0.35
Misfortune	0.97 ± 0.68	2.69 ± 1.41	31.64	**<0.001**	0.30

Table 5: Dream content of healthy participants and anxiety patients for the categories "Emotions", „Settings and Locations“ and “Objects” in terms of quantitative indicators (means ± standard deviations).

Variable	Group		*F*-value (1, 73)	*p*-level	η_p^2-value
	Healthy	Anxiety			
Emotions					
Anger	1.37 ± 1.07	2.38 ± 1.88	9.29	**<0.01**	0.12
Apprehension & Fear	1.20 ± 1.05	2.80 ± 2.04	14.59	**<0.001**	0.17
Sadness	1.11 ± 0.97	2.36 ± 1.79	11.85	**<0.001**	0.14
Confusion	2.44 ± 1.57	2.75 ± 2.30	1.14	n.s.	0.01
Happiness & Joy	2.21 ± 1.08	0.69 ± 0.58	40.70	**<0.001**	0.36
Locations and Settings					
Locations and Settings (Total Number)	1.51 ± 0.53	1.93 ± 0.66	8.08	**<0.01**	0.10
Indoor	0.85 ± 0.34	1.06 ± 0.40	3.42	n.s.	0.04
Outdoor	0.54 ± 0.29	0.56 ± 0.30	1.75	n.s.	0.02
Ambiguous	0.05 ± 0.12	0.10 ± 0.15	1.28	n.s.	0.02
No Setting	0.07 ± 0.11	0.20 ± 0.22	6.64	**<0.05**	0.08
Familiar	0.91 ± 0.47	0.85 ± 0.31	0.005	n.s.	0.00
Distorted	0.05 ± 0.08	0.13 ± 0.16	2.62	n.s.	0.03
Geographical	0.19 ± 0.18	0.15 ± 0.14	0.003	n.s.	0.00
Unfamiliar	0.39 ± 0.25	0.56 ± 0.40	2.41	n.s.	0.03
Questionable	0.14 ± 0.26	0.29 ± 0.29	5.07	**<0.05**	0.06
Objects					
Architectural Objects	1.31 ± 1.09	1.61 ± 0.93	2.00	n.s.	0.03
Household Objects & Items	0.46 ± 0.54	0.53 ± 0.46	0.34	n.s.	0.005
Food & Nutrition	0.41 ± 0.46	0.30 ± 0.31	0.21	n.s.	0.003
Tools & Instruments	0.25 ± 0.29	0.31 ± 0.31	0.29	n.s.	0.004
Travel Objects	0.59 ± 0.47	0.70 ± 0.48	1.31	n.s.	0.02
Street Objects	0.82 ± 0.61	0.76 ± 0.56	0.03	n.s.	0.00
Regions & Zones	1.30 ± 0.90	1.07 ± 0.87	0.27	n.s.	0.004
Objects of Nature and Environment	0.81 ± 0.70	0.87 ± 0.70	0.88	n.s.	0.01
Body Parts	0.35 ± 0.48	0.63 ± 0.65	3.89	n.s.	0.05
Clothes & Clothing Objects	0.30 ± 0.38	0.28 ± 0.28	0.12	n.s.	0.002
Communication	0.75 ± 0.49	0.78 ± 0.59	1.47	n.s.	
Money & Money-related Objects	0.13 ± 0.15	0.17 ± 0.25	2.52	n.s.	0.03
Miscellaneous Objects	0.04 ± 0.14	0.31 ± 0.29	16.16	**<0.001**	0.18

Table 6: Comparison of healthy participants and anxiety patients for the categories "Descriptive Elements (Modifiers)" in terms of quantitative indicators (mean ± standard deviations).

Variable	Group		*F*-value (1, 73)	*p*-level	η_p^2-value
	Healthy	Anxiety			
Color Modifier: Chromatic and Bright Colors	0.40 ± 0.53	0.26 ± 0.28	1.39	n.s.	0.02
Color Modifier: Achromatic and Dark Colors	0.02 ± 0.08	0.02 ± 0.05	0.43	n.s.	0.006
Size Modifier: Big	0.34 ± 0.41	0.87 ± 0.65	10.77	**<0.01**	0.13
Size Modifier: Small	0.12 ± 0.17	0.21 ± 0.21	5.04	**<0.05**	0.06
Age Modifier: Old	0.11 ± 0.15	0.15 ± 0.16	6.12	**<0.05**	0.08
Age Modifier: Young	0.12 ± 0.16	0.18 ± 0.20	2.52	n.s.	0.03
Density Modifier: High Density	0.22 ± 0.21	0.52 ± 0.40	14.22	**<0.001**	0.16
Density Modifier: Low Density	0.05 ± 0.07	0.13 ± 0.16	5.62	**<0.05**	0.07
Thermal Modifier: High Temperature	0.05 ± 0.09	0.07 ± 0.10	1.76	n.s.	0.02
Thermal Modifier: Low Temperature	0.02 ± 0.05	0.03 ± 0.07	1.15	n.s.	0.02
Velocity Modifier: Fast	0.33 ± 0.42	1.04 ± 0.82	20.32	**<0.001**	0.22
Velocity Modifier: Slow	0.03 ± 0.07	0.04 ± 0.08	0.86	n.s.	0.01
Linearity Modifier: Straight	0.05 ± 0.11	0.01 ± 0.14	1.45	n.s.	0.02
Linearity Modifier: Wavy	0.01 ± 0.06	0.03 ± 0.07	0.53	n.s.	0.007
Intensity Modifier: Intense	0.65 ± 0.51	1.80 ± 1.37	20.24	**<0.001**	0.22
Intensity Modifier: Weak	0.08 ± 0.10	0.05 ± 0.11	0.19	n.s.	0.003
Positive Evaluations & Assessments	1.68 ± 0.84	1.07 ± 0.72	7.30	**<0.01**	0.09
Negative Evaluations & Assessments	1.17 ± 0.76	3.27 ± 1.50	44.96	**<0.001**	0.38
Time Modifier, Indications of Time	0.52 ± 0.37	0.99 ± 0.67	11.66	**0.001**	0.14
Negatives & Negative Particles	1.12 ± 0.69	1.99 ± 1.08	22.77	**<0.001**	0.24

Characteristics of Dreams and Nightmares in Patients with Anxiety Disorders

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Running Title: Characteristics of dreams and nightmares in anxiety disorders

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Abstract

Characteristics of dreams of clinical outpatients with anxiety disorders still remain a relatively poorly investigated field of psychology. The present study aimed at investigating several dream characteristics of outpatients with anxiety disorders in comparison to dream characteristics of healthy individuals. In the study, 38 adult participants with anxiety disorders and a matched healthy control group of 38 individuals were investigated. During a period of 21 days all participants filled in written dream diaries directly after sleep, which contained two scales for positive and negative emotions and one scale for the general intensity of emotions in a dream, two dream questionnaires, The Multidimensional Düsseldorf Dream Inventory (MDTI) and the Mannheim Dream Questionnaire (MADRE), and two nightmare questionnaires, the Nightmare Behavior Questionnaire (NBQ) and the Nightmare Distress Questionnaire (NDQ). Results showed that patients with anxiety disorders tended to provide longer dream reports and possessed a higher dream recall frequency, their dreams were distinguished by a more negative emotional tone and a lower dream mood, more intense and vivid emotionality, more aversive dreams, a higher rate of incorporations of waking life into dreams, their waking-life mood was found to be more often influenced by dreams, they had a higher nightmare frequency and more nightmare distress and were more interested in the interpretation of their dreams. Within the group of anxiety patients nightmare distress did not differ between men and women, as well as any behavioral consequences and effects after nightmares. The results indicate marked differences in the way anxiety patients experience dreams, irrespective of the dream contents.

Keywords: anxiety disorders, dreams, dream characteristics, nightmares, gender differences

Introduction

Previous research has shown that anxiety disorders directly influence, affect and alter dreams and dream contents of clinical patients diagnosed with such disorders (Desroches & Kaiman, 1964; Foss, 1994; Free et al., 1993; Gentil & Lader, 1978; Khodarahimi,2009; Kirschner, 1999; Miller et al., 2015; Nadorff et al., 2014; Simon et al.; Swart et al., 2013). In terms of the influence of anxiety disorders on dreams and dream characteristics, it might be assumed that the presence of a clinical anxiety disorder may lead to more frequent and more intense, fearful, frightening and harming dreams, instigate anxiety-related feelings, thoughts or emotions in dreams and may also enhance nightmare frequency, as well as increase subjective distress from nightmares. In accordance with this assumption, data indicate that individuals with diagnosed clinical anxiety disorders, including generalized anxiety disorder, panic disorder, social anxiety disorder and separation anxiety disorder, also suffer from more frequent and repeated nightmares or bad dreams (Desroches & Kaiman, 1964; Kellner et al., 1991; Nadorff et al., 2014; Schredl et al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013).

However, despite a relatively large body of research on dreams and nightmares in anxiety disorders, studies on the relationships between anxiety disorders and specific dream characteristics and on nightmare distress are very scarce (Rimsh & Pietrowsky, 2020; Skancke et al., 2014). The scarce existing data indicate that dreams of anxiety patients often contain different kinds of threats and dangers and various frightening, unpleasant, threatening and negative events of high emotional intensity (Foss, 1994; Free et al., 1993; Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999; Sikka et al., 2018). Investigating the emotionality of dreams of clinical patients with anxiety disorders showed that their dreams exhibit a generally lower emotional tone, more negative and sad mood and affect, higher levels of general anxiety, fright, fear and sadness and other negative emotions and contain various frightening, unpleasant and negative events of high emotional intensity (Desroches & Kaiman, 1964; Free et al., 1993; Gentil & Lader, 1978). With regard to other dream characteristics of anxiety disorders outpatients, the most investigated area of research is the influence of different anxiety disorders on nightmares and bad dreams. A number of studies indicate that the presence of different anxiety disorders is directly related to a higher frequency of nightmares and bad dreams (Desroches & Kaiman, 1964; Kellner et al., 1991; Levin, 1998; Levin & Hurvich, 1995; Nadorff et al., 2014; Picard-Deland et al., 2018; Schredl et al., 2001; Simon et al., 2016; Simonds &

Parraga, 1984; Swart et al., 2013). With regard to dream recall frequency in patients with anxiety disorders, the existing data are not univocal. There is evidence that patients suffering from anxiety disorders possess a decreased level of dream recall frequency (Miller et al., 2015; Zanasi et al., 2010), while, on the other hand, there is also evidence that patients with anxiety reaction disorders (Desroches & Kaiman, 1964) and anxiety neurotic disorder (Gentil & Lader, 1978) exhibit a higher dream recall frequency (Desroches & Kaiman, 1964; Gentil & Lader, 1978). With regard to other specific dream characteristics of patients with anxiety disorders, there is still an evident lack of research on such topics, although anxiety disorders are still one of the most common mental disorders in the contemporary western world (Remes et al., 2016).

The main objective of the present study was to explore dreams characteristics, dream emotionality, nightmare frequency, nightmare distress, and behavioral consequences of nightmares of anxiety patients and compare them with the dreams of age- and gender-matched healthy persons. Dream characteristics were assessed with the Multidimensional Düsseldorf Dream Inventory (MDTI; Pietrowsky et al., unpublished) and the Mannheim Dream Questionnaire (MADRE; Schredl et al., 2014). Nightmare distress was assessed with the Nightmare Distress Questionnaire (NDQ; Belicki, 1992; German version by Böckermann et al., 2014). Nightmare consequences were assessed with the Nightmare Behavior Questionnaire (NBQ; Pietrowsky & Köthe, 2003). The primary hypothesis of the present study was that dream characteristics of anxiety patients would be significantly different from dream characteristics of healthy people, and their dreams would be distinguished by a lower and more negative emotional tone, more intense emotions, higher nightmare frequency, higher distress due to nightmares and they would suffer more from nightmare behavioral consequences. With regard to nightmare distress and behavioral consequences after nightmares within the anxiety outpatients group, our secondary hypothesis was that men and women would differ significantly in terms of their nightmare distress and their behavioral consequences after nightmares, with women reporting more nightmare distress than men and displaying more intense behavioral consequences of nightmares. This hypothesis was based on the evidence that females generally report a higher frequency of nightmares than males in the general adult population (Nielsen et al., 2006; Ohayon et al., 1997; Schredl, 2014; Schredl & Reinhard, 2011) and more nightmare distress (Schredl & Reinhard, 2011).

Method

Sample and Participants

The sample consisted of 38 outpatients with different anxiety disorders and 38 age- and gender-matched healthy persons without any prior or current mental disorder. Patients were recruited from the outpatient psychotherapy center of our department, who were referred for the treatment of their anxiety disorders. The anxiety patients were diagnosed with different anxiety disorders and were currently in a cognitive-behavioral psychotherapeutic treatment. Anxiety outpatients were sampled for the study during the course of their psychotherapeutic treatment and were investigated in the first third of the therapy. The number of their psychotherapy sessions prior to investigation ranged from 8-10 sessions. The diagnoses of the anxiety patients included: generalized anxiety disorder (n = 11), social anxiety disorder (social phobia; n = 6), panic disorder (n = 5), agoraphobia (n = 1), separation anxiety disorder (n = 2), specific phobia (n = 4). One patient was diagnosed with comorbid generalized anxiety disorder and specific phobia (arachnophobia), three patients were diagnosed with comorbid generalized anxiety disorder and social anxiety disorder, two patients were diagnosed with comorbid generalized anxiety disorder and panic disorder, and three patients were diagnosed with comorbid social anxiety disorder and panic disorder. Healthy participants for the control group were recruited with the help of flyers and advertisements, distributed at the university campus as well as through ads and announcements on the internet, in social networks, job and advertisement sites. Matching in pairs was performed on the basis of similar gender (male/female) and approximately similar age (with the maximal gap of two years between two matched subjects). The study involved 54 (71.05%) adult female participants and 22 (28.95%) adult male participants in total, ranging from 18 to 54 years old, with the mean age of 29.20 ± 9.57 years. The mean age of the control group was 30.08 ± 10.39 years, while the mean age of the anxiety patients was 28.32 ± 8.75 years (t (74) = 0.799, p = .43).

All participants gave written informed consent, and the study was approved by the local ethics committee. Participants received a compensation of 36 Euros for participation in the study.

Procedure

All of the participants attended two meetings with the research coordinator: one in the beginning of the 3-week period, when they received study materials (dream diaries for dream reports and two questionnaires – the NBQ and NDQ (see below) and provided their sociodemographic data. They also gave their written informed consent and were instructed to complete the dream diary as soon as they woke up in the morning and write down their dreams as they remembered them during this 3-week period (21 days). During the study period of 21 days, participants also filled in the two questionnaires (NBQ, NDQ), only after nights when they had a nightmare, as soon as they woke up in the morning. On the second meeting with the research coordinator after the three weeks, the participants handed in the study materials (dream diaries, NBQ, NDQ) and filled in the MDTI and the MADRE questionnaires. They then received their financial compensation.

Materials

Sociodemographic questionnaire. A short standardized questionnaire was used to gather personal sociodemographic data. The questionnaire contained questions regarding name, age, gender, education, occupation, current or lifetime presence and kind of any mental disorder and intake of psychoactive drugs.

Dream diary. A dream diary was used to gather dream reports from participants. Dream diaries were filled in every day during the 21-day study period. They contained one checklist for all of the 21 days, where participants noted whether they had had any dreams or not during the previous night, and a 21-sheet journal to write down their dream reports as they remembered them as soon as they woke up every morning, in case they had had any dreams that night. Dream diaries also contained two 4-unit scales for positive and negative emotions, respectively (from 0 – "no emotions" to 3 – "strong emotions") and one 10-unit scale for the general intensity of emotions in each dream (from 0 – "not intensive", "insignificant", to 10 – "highly intensive"), which were filled in for each dream separately, even if the participants had two or more dreams per night.

The Multidimensional Düsseldorf Dream Inventory (MDTI) is a multidimensional questionnaire to assess dream characteristics. The MDTI allows to assess dream characteristics independently from dream contents and to compare dream experience intra- and inter-individually. The questionnaire consists of six scales (factors): aversive dreams, dream recall,

personal significance of dreams, incorporation of waking life into dreams, wish fulfillment in dreams, and dream vividness. The questionnaire involves 38 items which were derived from a pool of attitudes and descriptions of dreams and had to be rated by the degree of agreement with four answer options – "I fully disagree", "I rather disagree", "I partly agree", "I fully agree". The questionnaire represents an instrument which allows to study features and characteristics of dreams of a person in a quantitative manner, irrespective of specific dream contents.

The Mannheim Dream Questionnaire (MADRE) is a questionnaire which assesses dream characteristics and subjective dream experiences. The questionnaire allows to obtain dream features, which include dream recall, emotional intensity of dreams, nightmare frequency, lucid dreaming, attitudes towards dreams and effects of dreams on waking life mainly in a quantitative manner. Answers for the item "dream recall frequency" contain seven options from 1 – "almost every morning" to 7 – "never", answers for the items "nightmares frequency and prevalence" and "frequency of influence of dreams on mood" contain eight options from 1 – "several times a week" to 8 – "never", answers for the items "emotional intensity of dreams" and "nightmare distress level" contain five options from 1 – "not at all intense"/"not at all distressing" to 5 – "very intense"/"very distressing", answers for the item "average emotional tone of dreams" contain five options from 1 – "very negative" to 5 – "very positive", answers for the eight items on "attitudes toward dreams" contain five options from 1 – "not at all" to 5 – "totally". In addition, the questionnaire contains an open-ended question which allowed the participants to describe and characterize the most common and prevalent topics and themes of nightmare dreams, if they had had any during the study period.

The Nightmare Behavior Questionnaire (NBQ) is a questionnaire which assesses behavioral consequences after a nightmare. It allows to explore behavioral effects and influences caused by a nightmare. The questionnaire consists of 43 items which belong to six scales (factors): physiological effects (4 items), emotional effects (9 items), cognitive effects (worries and concerns after a nightmare) (10 items), behavioral coping attempts and strategies (9 items), attempts to find an explanation for the nightmare (5 items), and trivializing the nightmare (3 items). The four answer options for each item include - "I fully disagree", "I rather disagree", "I partly agree", "I fully agree".

The Nightmare Distress Questionnaire (NDQ) is a questionnaire which assesses subjective nightmare distress. The questionnaire consists of 13 items which belong to three factors in the German version (Böckermann et al., 2014): general nightmare distress, impact on sleep, impact on daytime reality perception. The five answer options for the items, except the items 5, 8 and 13, include "Never", "Rarely", "Sometimes", "Often", "Always". The five answer options for the items 5 and 8 include "Not at all", "A little", "Somewhat", "Distinctly", "Substantially". The five answer options for the item 13, include "Not interested at all", "A little interested", "Somewhat interested", "Very interested", "Extremely interested". The reliability (internal consistency) of the questionnaire is good (Cronbach's $\alpha = .80$; Böckermann et al., 2014).

Data Analysis and Statistical Evaluation

The obtained data from the MDTI, MADRE, and the dream diaries were compared between the two groups (anxiety patients, healthy control group) by using *t* tests for independent groups. Therefore, the emotional ratings based on the dream diaries for each dream were collapsed for each person and analyses were performed with this average values of a person. Results concerning nightmares were evaluated only for the group of anxiety patients, because the NBQ and NDQ questionnaires were obtained only from 10 control participants since nightmares were highly uncommon in the healthy control group (15 nightmares in total in this group). The obtained data from the NBQ and NDQ questionnaires were statistically analyzed and compared between males and females within the anxiety group in order to obtain gender differences by using *t* tests for independent groups. Likewise, the ratings on the NBQ and the NDQ for each nightmare of a person were collapsed across this person and analyses were done with the average ratings. We did not perform any comparisons between the experimental and control groups on nightmare data due to the aforementioned significant lack of nightmares among the healthy controls and, therefore, lack of the NBQ and NDQ questionaries received from healthy participants.

All statistical comparisons were run with the statistical software packages (Statistica 10, SAS JMP 11, SPSS Software) and a p value of $< .05$ was regarded as significant. Required and optimal sample sizes of the control and experimental groups (38 participants in each) were

evaluated with the help of G-Power statistical analysis (Faul et al., 2009) in accordance with the anticipated statistical power of no less than .80.

Results

Dream Reports

The dream diaries contained 941 dream reports in total: 472 (50.2%) dream reports from the anxiety patients and 469 (49.8%) dream reports from the mentally healthy control group. Female participants (71.05% of the participants) reported 723 (76.84%) dreams and male participants (28.95 % of the participants) reported 218 (23.16%) dreams. The average number of dream reports per group during 21 days did not show any significant difference between the two groups (anxiety patients: 12.42 ± 6.10 and controls: 12.34 ± 5.95, respectively, t (939) = 0.20, p = .84). The length of dream reports was evaluated on the basis of a total word count of each dream report, which included all dream-related words, excluding repeated words and repetitions, fillers, corrections and non-dream related waking commentaries. The mean number of dream reports from both groups provided by females was significantly higher than the mean number of dream reports provided by males (13.39 ± 5.14 vs. 9.91 ± 3.58, respectively, t (939) = 9.34, p < .001). According to the average dream lengths based on the total word count of dream reports, patients with anxiety disorders had longer dreams reports with a higher average word count (anxiety patients: 57.89 ± 10.74 vs. controls: 44.41 ± 8.50, t (74) = 6.07, p < .001).

With regard to positive and negative emotionality and emotions in dreams of anxiety patients and healthy participants as well as their overall emotional intensity, several significant differences were found between anxiety patients and healthy controls. These results can be seen in Table 1.

- insert Table 1 about here –

Dream Characteristic in Anxiety Patients and Controls

Differences between the groups with regard to the dream characteristics as assessed by the MDTI and the MADRE are shown in Table 2. The results show that anxiety patients report more aversive dreams, a better dream recall and more incorporations from waking life into dreams. Moreover, their dreams are rated as having a higher emotional intensity, a lower dream mood, a higher (retrospective) nightmare frequency, more nightmare distress, they attend more significance to their dreams, feel their life is more enriched by dream interpretation, and report that their mood is much more often affected by their dreams

- insert Table 2 about here –

Nightmare Prevalence, Nightmare Distress and Nightmare Consequences in Anxiety Patients

The total number of nightmares during the study period of 21 days was significantly higher in the group of anxiety patients (105 nightmares; 74 nightmares from 28 female participants and 31 nightmares from 8 male participants) than in the healthy control group (15 nightmares in total). Thus, the mean number of nightmares per participant was significantly higher in the anxiety patients (2.76 ± 2.10 vs. 0.39 ± 0.82, t (74) = 6.48, $p < .001$). Similarly, only 10 (26.32 %) of the 38 healthy participants from the control group reported having nightmares during the 3-week study period (at least 1 nightmare during the period), while the majority of the patients in the anxiety group – 36 (94.74 %) out of 38 outpatients – reported having at least one to maximally eight nightmare dreams within the 3-week study period. Descriptive results regarding behavioral consequences of nightmares in anxiety patients, as measured by the NBQ in the sample of anxiety patients from the experimental group are reported in Table 3. Table 4 shows results of between-gender comparisons of behavioral consequences after nightmare dreams in anxiety patients.

- insert Tables 3 and 4 about here –

Descriptive results regarding nightmare distress as measured by the NDQ in the sample of anxiety patients from the experimental group are reported in Table 5. Table 6 shows results of between-gender comparisons with regard to nightmare distress in anxiety patients.

- insert Tables 5 and 6 about here -

Discussion

The results of the study indicate that our primary hypothesis, which suggested that dream characteristics in anxiety patients would be different from those in healthy persons, was confirmed. Anxiety outpatients had longer dream reports, their dreams exhibited a lower dream mood, negative rather than positive emotionality and generally more intense emotions. Anxiety patients had more aversive dreams, more incorporations from waking life into dreams, a higher retrospective nightmare frequency and more distress from nightmares. They were inclined to attribute more meaning and significance to their dreams, feel that their life was more enriched by dream interpretation and their mood was much more often affected by their dreams than healthy control participants. Our secondary hypothesis, however, was not confirmed, since men and women did not differ significantly with respect to nightmare distress or any behavior consequences after nightmares. Thus, this study was able to demonstrate dream features in a common clinical sample of anxiety patients with objective measures of dream experience and dream characteristics.

With regard to the emotional tone of dreams of anxiety patients, the results of our study indicate that positive emotions were considerably less frequent in their dreams than in dreams of healthy subjects. Likewise, negative emotions were more prevalent in their dreams compared to the dreams of healthy participants. Finally, the overall general emotional intensity and expressiveness of dreams of anxiety patients was significantly higher, their dreams were more vivid, salient and bright in terms of emotionality, which was reflected both in the dream diaries' emotionality scales and the MADRE questionnaire. This is in accordance with previous results obtained in samples of clinical patients with anxiety disorders (Gentil & Lader, 1978; Kirschner, 1999) and non-clinical individuals with higher levels of trait and state anxiety (Brown & Donderi, 1986; Gentil & Lader, 1978; King & DeCicco, 2007; Pesant & Zadra, 2006), which all

found more negative affect than positive emotions in dreams of persons with high levels of anxiety.

Dream characteristics of anxiety patients contained significantly higher frequencies of aversive dream contents than dreams of the healthy group. Aversive dream content, as assessed by the MDTI, does not only cover nightmares but aversive dreams on a broader range. This result is partly concordant with previous results obtained in samples of clinical patients with anxiety disorders (Gentil & Lader, 1978; Khodarahimi, 2009; Kirschner, 1999), which also confirmed a presence of negative, aversive and unpleasant dream contents. Further, anxiety patients showed considerably and significantly higher dream recall. This, together with the already mentioned notion that they had longer dream reports, confirms that patients with anxiety disorders remember and recall their dreams better. It may be speculated that the better dream recall and the longer dream reports of anxiety patients go along with a higher number of recalled details and peculiarities of their dreams, however, this was not explicitly investigated in the present study. Concordantly, previous research had shown that clinical outpatients with anxiety disorders (Desroches & Kaiman, 1964; Gentil & Lader, 1978) as well as non-clinical individuals with higher levels of trait and state anxiety (Brown & Donderi, 1986; Duke & Davidson, 2002; Gentil & Lader, 1978; Yu, 2007; Zadra et al., 1998) were able to recall their dreams better, more precisely and provide longer and more detailed dream reports with a higher amount of specific particularities and details.

In the present study, anxiety patients also showed a significantly higher rate of incorporations from waking life into dreams, which may imply that their dreams were more associated with real waking life experiences than dreams of healthy people. Additionally, we found that anxiety patients paid more significance to their dreams in general and felt their life was enriched by their dreams, which allows us to hypothesize that their dreams, which are in general more negative, may worsen their anxiety symptoms and mood in waking life. However, the increased significance of dreams is not transferred to an increased personal significance of their dreams or that participants can seek help from their dreams for waking life, which looks somehow contradictory.

Regarding nightmares, the mean numbers of nightmares in the 21-days study period were significantly higher in the anxiety patients than in the healthy group. This result fully corresponds with data from previous studies (Kellner et al., 1991; Nadorff et al., 2014; Schredl et

al., 2001; Simon et al., 2016; Simonds & Parraga, 1984; Swart et al., 2013). Similarly, distress from nightmares was also higher in anxiety outpatients than in healthy subjects. Comparable results regarding nightmare distress were obtained earlier only in samples of non-clinical anxious individuals with high rates of trait and state anxiety, though not in samples of clinical patients with specific anxiety disorders (Belicki, 1992; Berquier & Ashton, 1992; Blagrove et al., 2004; Levin & Fireman, 2002; Mindell & Barrett, 2002; Nielsen et al., 2000; Ohayon et al., 1997; Picard-Deland et al., 2018; Zadra et al., 2000). In addition, nightmare distress was found to be more intense in male anxiety disorder patients than in female anxiety disorder patients.

With regard to behavioral consequences after nightmares assessed with the NBQ within the anxiety group, all of the behavioral consequences of nightmares did not show any significant differences between males and females in the anxiety group. Thus, we may assume that behavioral consequences of nightmares are not manifested or expressed more intensively and pronounced in men or in women.

From the three factors of the NDQ, „Impact on Sleep" had the highest scoring while "Daytime Reality Perception" had the lowest scoring. The three factors of the NDQ were all not significantly different between the genders. This allows to conclude that distress from nightmares is experienced equally intensively, severely and pronounced in both men and women and levels of nightmare distress do not differ significantly in males and females. In sum, the NBQ and NDQ results indicate that male and female anxiety patients exhibit no significant differences in behavioral nightmare consequences, possess the same levels of nightmare distress and both suffer from their nightmares equally and identically. This is surprising, since in non-clinical samples nightmare distress differs between males and females with a higher nightmare distress in women than men (Schredl & Reinhard, 2011). However, as the nightmare contents were not analyzed, we cannot evaluate whether the nightmares of the male or female participants were more harmful and frightening than the nightmares of the second group.

Limitations and methodological shortcomings of our study should be reported. First, the sample of participants was not very large – 38 participants in each of the two groups. Second, due to a substantially larger presence of females in the study sample and its relative gender homogeneity, there was an underrepresentation of males. This, however, reflects the prevalence of anxiety disorders with respect to gender distribution of different types of anxiety disorders. Third, our sample was characterized by a relatively lower heterogeneity and narrow variability in

terms of representativity of various types of anxiety disorders in participants – the majority of the participants of the study were diagnosed with generalized anxiety disorder, social anxiety disorder, and panic disorder, while only four outpatients were diagnosed with specific phobias, two with separation anxiety disorder, one with agoraphobia and several participants were diagnosed with comorbid anxiety disorders. However, since we were not primarily interested in the influence of specific anxiety disorders on dreaming, but rather on a typical sample of outpatients and external validity, we accepted the heterogeneity of anxiety diagnoses. Further, our sample could have been biased by an intrinsic interest in dream research, which could have influenced the study results. In addition, as the dream diaries were filled in as soon as the participants woke up, there could have been a subjective recall bias in the participants' dream reports. Taking these methodological shortcomings and limitations into account, we suggest that future research in this field should be carried out with larger samples of participants and with an equal gender distribution and covering all types of anxiety disorders in an adequate manner, or to focus only on one anxiety disorder for a greater homogeneity of the sample.

In sum, in spite of the reported limitations of the present study, we found marked differences in dreams of patients with anxiety disorders compared to healthy persons. Patients with anxiety disorders were found to provide longer dream reports and possess a higher dream recall level. Dreams of anxiety patients were distinguished by a more intense and vivid emotionality, higher prevalence of negative emotions and less positive emotions. Their dreams also contained more aversive contents, had a higher rate of incorporations from waking life into dreams, their everyday life mood was found to be more often related with their dreams and affected by their dreams more frequently. Anxiety outpatients also attributed more meaning and significance to their dreams than healthy participants and were more interested in the interpretation of their dreams. They exhibited a higher frequency of nightmares as well as higher levels of nightmare distress. Within the group of anxiety patients levels of nightmare distress were not significantly different between men and women, and all of the behavioral consequences and effects after nightmares did not show any significant differences between males and females. This study thus adds further knowledge of dreams and dreaming in anxiety disorders, which may be helpful for the understanding of these mental disorders and their treatments in the future.

Compliance with Ethical Standards

Conflicts of interests. The authors declare not having any conflicts of interest or competing interests.

Research involving human participants. All procedures performed in this study were in accordance with ethical standards and norms of the institutional ethics and research committee. The study was approved by the ethics committee of our University.

Informed Consent. Informed consent was obtained from all individual participants included in the study.

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Table 1: Comparison of the emotionality scales from dream diaries in terms of quantitative indicators (mean ± standard deviations).

Emotionality	Group		*t*-value (*df* = 74)	*p*-level
	Healthy	Anxiety		
Level of Positive Emotions in Dreams	1.38 ± 0.49	0.72 ± 0.37	6.65	**<0.001**
Level of Negative Emotions in Dreams	0.99 ± 0.54	1.90 ± 0.44	- 8.02	**<0.001**
General Emotional Intensity in Dreams	3.02 ± 1.49	5.05 ± 1.29	- 6.35	**<0.001**

Table 2: Comparison of the two groups of participants on the average scorings of the MDTI and MADRE questionnaires (mean ± standard deviations).

Variable	Group		*t*-value (*df* = 74)	*p*-level
	Healthy	Anxiety		
MDTI				
Aversive Dreams	1.81 ± 0.63	2.60 ± 0.66	5.33	**<0.001**
Dream Recall	2.59 ± 0.68	3.09 ± 0.58	3.44	**<0.001**
Personal Significance of Dreams	2.14 ± 0.59	2.27 ± 0.60	0.95	n.s.
Incorporations of Waking Life into Dreams	2.36 ± 0.70	2.71 ± 0.66	2.24	**<0.05**
Wishes Fulfillment	2.07 ± 0.63	2.01 ± 0.77	0.37	n.s.
Dream Vividness	3.00 ± 0.90	3.25 ± 0.62	1.41	n.s.
MADRE				
Dreams Recollection Frequency	1.97 ± 0.75	2.29 ± 1.01	1.57	n.s.
Dreams Emotional Intensity	3.30 ± 0.75	3.69 ± 0.93	2.01	**<0.05**
Average Dreams Mood	3.13 ± 0.84	2.32 ± 0.77	4.38	**<0.001**
Nightmare Dreams Frequency	3.11 ± 1.45	5.13 ± 1.83	5.33	**<0.001**
Nightmare Distress Level	1.76 ± 1.50	3.53 ± 1.08	5.90	**<0.001**
Significance of Dreams (Attitude towards Dreams 1)	2.03 ± 0.91	2.53 ± 0.92	2.38	**<0.05**
Interest in Dreams (Attitude towards Dreams 2)	2.89 ± 0.89	3.11 ± 0.95	1.04	n.s.
Dreams Meaningfulness (Attitude towards Dreams 3)	3.03 ± 0.85	2.89 ± 0.89	0.70	n.s.
Interest in Dreams (Attitude towards Dreams 4)	3.08 ± 0.88	2.97 ± 1.03	0.50	n.s.
Life Enrichment by Dream Interpretation (Attitude towards Dreams 5)	2.08 ± 1.10	2.71 ± 0.93	2.70	**<0.05**
Dreaming as an Interesting Phenomenon (Attitude towards Dreams 6)	3.42 ± 0.64	3.42 ± 0.76	0.00	n.s.
Self-Knowledge through Dreams (Attitude towards Dreams 7)	2.71 ± 1.04	2.87 ± 1.02	0.68	n.s.
Getting Help for Waking Life by Dreams (Attitude towards Dreams 8)	2.13 ± 1.02	2.53 ± 1.13	1.62	n.s.
Attitude towards Dreams	2.67 ± 0.72	2.88 ± 0.69	1.30	n.s.
How Often Dreams affect Mood	3.26 ± 2.01	4.82 ± 2.09	3.32	**<0.01**

Table 3: Descriptive statistics of behavioral consequences of nightmares as assessed by the NBQ.

Variable	***M ± SD***	***Median (Q1-Q3)***	***Min; Max***
Physiological Reactions	1.99 ± 0.63	1.84 (1.50-2.48)	(1.00; 3.25)
Emotional Reactions	1.91 ± 0.56	1.83 (1.47-2.38)	(1.00; 3.17)
Cognitive Effects	1.91 ± 0.49	1.90 (1.56-2.28)	(1.00; 2.80)
Behavioral Coping Attempts	1.78 ± 0.36	1.79 (1.56-2.09)	(1.06; 2.50)
Nightmare Trivialization	2.07 ± 0.40	2.00 (1.80-2.40)	(1.33; 3.00)
Attempts to Explain a Nightmare	2.24 ± 0.78	2.33 (1.53-2.98)	(1.00; 3.67)

Table 4: Comparison between genders on behavioral consequences of nightmares as assessed by the NBQ (mean ± standard deviations).

Variable	Anxiety Group		*t*-value (*df* = 34)	*p*-level
	Female	Male		
Behavior Consequences after Nightmares				
Physiological Reactions	1.93 ± 0.59	2.22 ± 0.73	- 1.16	n.s.
Emotional Reactions	1.89 ± 0.58	2.00 ± 0.47	- 0.48	n.s.
Cognitive Effects	1.92 ± 0.48	1.88 ± 0.55	0.22	n.s.
Behavioral Coping Attempts	1.72 ± 0.36	2.00 ± 0.24	- 2.03	n.s.
Nightmare Trivialization	2.10 ± 0.43	1.96 ± 0.30	0.89	n.s.
Attempts to Explain a Nightmare	2.21 ± 0.85	2.34 ± 0.49	- 0.42	n.s.

Table 5: Descriptive statistics of quantitative indicators of the NDQ (mean ± standard deviations).

Variable	***M ± SD***	***Median (Q1-Q3)***	***Min; Max***
Nightmare Distress	2.82 ± 0.85	2.87 (2.21-3.51)	(1.00; 4.53)
Impact on Sleep	3.28 ± 0.64	3.33 (3.00-3.67)	(2.00; 5.00)
Impact on Daytime Reality Perception	2.57 ± 0.60	2.52 (2.25-3.06)	(1.12; 3.75)

Table 6: Comparison between genders of the NDQ (mean ± standard deviations).

Variable	Anxiety Group		*t*-value (*df* = 34)	*p*-level
	Female	Male		
Nightmare Distress	2.70 ± 0.86	3.23 ± 0.71	- 1.58	n.s.
Impact on Sleep	3.27 ± 0.70	3.31 ± 0.41	- 0.17	n.s.
Impact on Daytime Reality Perception	2.57 ± 0.65	2.57 ± 0.42	- 0.13	n.s.