Nightmares, nightmare distress and their treatment through an internet-based self-help intervention

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Abstract

A considerable amount of persons suffer from recurrent nightmares. Nightmares go hand in hand with psychological strain and/or can be a comorbid condition within other psychological disorders, like PTSD, depression or personality disorders. Imagery Rehearsal Therapy (IRT) and exposure therapy are effective treatments in reducing nightmare frequency and related symptoms. However, the dissemination of these treatments is poor. Therefore, the main goal of this dissertation was the development and evaluation of an internet-based, guided, self-help intervention for nightmares, based on Imagery Rehearsal Therapy. Within study one the development process of the internet-based Imagery Rehearsal Treatment (IBI IRT) for nightmares as well as the results of two pilot studies in order to evaluate the usability and feasibility of the intervention are described.

In spite of the empirical support and the great potential of IBIs, there is insufficient information about potential user's acceptance and attitudes regarding IBIs. The necessity to explore user's expectations bases on observations that deficient user acceptance results in low uptake rates of IBI. Study two deals with the acceptance and the perceived advantages and worries of potential users regarding IBIs.

Nightmare distress plays a crucial role within the genesis of recurrent nightmares and within the question whether nightmares become a clinical problem. Therefore nightmare distress shall become a main treatment focus within the effectiveness evaluation of IBI IRT. Yet, it is not well defined what is meant by nightmare distress and the widely used nightmare distress questionnaire (NDQ) does not exist in a German version. That is why study three was executed to validate the German version of the NDQ.

Finally, within a randomized controlled trial (study four), IBI IRT's effectiveness, the role of support within IBI IRT and possible main therapeutic factors within IRT were investigated.

The results of study one show, that the IBI IRT nightmare intervention is feasible and utile. It resulted in first benefits regarding nightmare symptoms and delivered important recommendations for improving the intervention before the start of the randomized controlled trial (RCT). Study two revealed, that potential users were less interested to engage in IBIs and saw fewer advantages than

the control group. Data privacy concerns and fear of misunderstandings within written communication were regarded as main disadvantages of IBI. In study three, the German version of the nightmare distress questionnaire showed to have good psychometric properties and consists of three subscales explaining 51 % of variance. The questionnaire captures the general perception whether nightmares are evaluated as distressing, as well as nightmare related symptoms. The results of study four show, that Internet-based IRT seems to be an effective treatment for idiopathic nightmares even when offered with minimal therapeutic support. Exposure to the dream content appeared to be vital in reducing nightmare frequency, while IRT emerged as an essential therapeutic factor to also reduce nightmare distress.

Zusammenfassung

Eine beträchtliche Anzahl von Personen (2-5 %) leiden unter wiederkehrenden Albträumen. Albträume gehen mit psychologischer Belastung einher und/oder können als komorbides Phänomen anderer psychischen Störungen, wie PTBS, Depressionen oder Persönlichkeitsstörungen auftreten. Die Imagery Rehearsal Therapie (IRT) sowie Expositionsverfahren sind wirksame Behandlungsmethoden für die Reduzierung der Albtraumfrequenz und damit einhergehender Symptome. Die Verbreitung dieser effektiven Behandlungsmöglichkeit ist allerdings sehr eingeschränkt. Daher war das Hauptziel dieser Dissertation die Entwicklung und Evaluation einer internetbasierten, begleiteten Selbsthilfe- Intervention zur Bewältigung von Albträumen, basierend auf der Imagery Rehearsal Therapie. Innerhalb der ersten Studie werden der Entwicklungsprozess der internet-basierten Albtraum- Intervention (IBI) sowie die Resultate zweier Pilotstudien zur Evaluation der Durchführbarkeit und Anwendbarkeit der IBI beschrieben.

Trotz der empirischen Belege für und dem großen Potential von IBIen gibt es nur unzureichende Erkenntnisse hinsichtlich der Akzeptanz von und Einstellungen gegenüber IBIs von potentiellen Nutzern. Die Notwendigkeit zur Erfassung der Erwartungen von Nutzern resultiert aus Beobachtungen, dass unzureichende Akzeptanz dazu führt, dass IBIs nur von wenigen Personen in Anspruch genommen werden. Die zweite Studie setzt sich mit der Akzeptanz, den wahrgenommenen Vorteilen und erlebten Bedenken hinsichtlich IBIs auseinander.

Die Albtraumbelastung spielt eine wichtige Rolle innerhalb der Entstehung von wiederkehrenden Albträumen und bei der Frage, ob Albträume ein klinisches Problem werden. Daher soll die Reduzierung der Albtraumbelastung ein Hauptfokus der IBI IRT sein. Allerdings ist nicht klar, was genau mit Albtraumbelastung gemeint ist und es gibt keine deutsche Version des am meisten verwendeten Albtraumbelastungs-Fragebogens (nightmare distress questionnaire, NDQ). Aus diesem Grund beschäftigt sich die dritte Studie mit der Validierung der deutschen Version des NDQs.

Schließlich soll in einer randomisierten kontrollierten Studie (RCT) (Studie 4) die Wirksamkeit der IBI IRT, die Rolle von Begleitung innerhalb der IBI IRT und mögliche therapeutische Wirkmechanismen der Imagery Rehearsal Therapie erforscht werden.

Die Resultate der ersten Studie zeigen, dass IBI IRT eine durchführbare und anwendbare Intervention ist. Die Studie gibt Hinweise auf einen möglichen Nutzen von IBI IRT und die Ergebnisse liefern wichtige Vorschläge zur Verbesserung der Intervention vor dem Start des RCTs. In der zweiten Studie waren potentielle Nutzer weniger interessiert daran, eine internetbasierte Therapie in Anspruch zu nehmen, als Personen aus der Kontrollgruppe. Bedenken bezüglich des Datenschutzes und die Angst vor Missverständnissen innerhalb der schriftlichen Kommunikation wurden als Hauptnachteile einer IBI angegeben. Die dritte Studie zeigt, dass die deutsche Version des NDQ gute psychometrische Eigenschaften besitzt und aus drei Subskalen besteht, die insgesamt 51 % der Varianz erklären. Der Fragebogen erfasst die generelle Wahrnehmung, ob Albträume als belastend erlebt werden sowie Symptome, die mit Albträumen einhergehen. Innerhalb der vierten Studie erwies sich die internetbasierte IRT Behandlung als wirksame Intervention zur Behandlung von idiopathischen Albträumen, auch dann, wenn es nur mit geringer therapeutischer Begleitung angeboten wurde. Exposition mit den Albtrauminhalten scheint der zentrale Mechanismus zur Reduzierung der Albtraumfrequenz zu sein, während es Hinweise gibt, dass IRT ein entscheidender Faktor für die Reduzierung der Albtraumbelastung ist.

Introduction

At the beginning of this research project, the DSM-IV-TR (American Psychological Association, APA, 2000) was the current classification system of mental disorders. Within the time of this research project, the fifth revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychological Association, APA, 2013) was published. According to DSM-5 a nightmare can be defined as an "extended, extremely dysphoric" dream that "usually involve[s] efforts to avoid threats to survival, security, or physical integrity". After awakening, a nightmare is well remembered and the dreamer is quickly orientated and alert. The nightmare definition of DSM-5 differs from DSM-IV-TR. First, the DSM-5 takes into account previous findings, i.e. that other emotions than fear may occur within nightmares (e. g. Robert & Zadra, 2014): It defines nightmares as "extremely dysphoric dreams", whereas the DSM-IV writes "extremely frightening dreams". Second, within criterion A of the DSM-5 the awakening criterion is left out. That means that "bad dreams" can now also fall under the category of nightmares. This is explained as follows: "Some nightmares, known as ´bad dreams´ may not induce awakening and are recalled only later" (p. 405). This is different from the DSM-IV where it says that there have to be "repeated awakenings". Third, while in DSM-IV it says that a nightmare “usually involve[s] threats to survival, security, or self-esteem”, DSM-5 adds that a nightmare usually involves efforts “to avoid” these threats. A fourth change is the fact, that “self-esteem” was replaced by “physical integrity”. In order to diagnose a nightmare disorder, nightmares have to "cause clinically significant distress or impairment in social, occupational, or other important areas of functioning” (criterion C). The nightmares cannot be attributed to the physiological effects of a substance (criterion D) and they cannot adequately be explained by coexisting mental or medical disorders (criterion E). This is similar to DSM-IV, with the small difference that the DSM-IV summarizes criteria D and E. A fifth novelty is that the DSM-5 now includes four specifiers. It can (a) be specified if nightmares occur during sleep onset or (b) if they are associated with a non-sleep disorder, another medical condition or another sleep disorder. Furthermore, the duration (c) of the disorder can be specified with acute (duration one month or less), subacute (duration greater than one month and less than six months) and chronic (duration more than six months). Finally, the

severity can be rated by the frequency with which nightmares occur: Mild = less than one episode per week on average; Moderate = one or more episodes per week on average; Severe = Episodes nightly.

The new International Classification of Sleep Disorder (ICSD-3, 2014) uses a similar nightmare definition as the DSM-5 but it elaborates on the operationalization of "clinically significant impairment", by stating that there have to be impairments in one of the following areas: 1. Mood; 2. Resistance to sleep; 3. Cognition; 4. Impairment of family/partner; 5. Behavior (e. g. avoidance of sleep); 6. Sleepiness during the day; 7. Fatigue or loss of energy; 8. Occupational impairment; 9. Interpersonal social function (Mayer, Rodenbeck, Geisler, & Schulz, 2015). This is an interesting novelty within the diagnostic considerations of nightmares and nightmare disorder, because it links the occurrence of nightmares with specific, empirically known negative consequences of nightmares: For example, Köthe and Pietrowsky (2001) found that nightmares affect mood and wellbeing on the next day. In addition, nightmares are associated with daily distress (Lancee & Schrijnemakers, 2013), like sleepiness, loss of energy during the day and problems to concentrate. Furthermore, cognitive avoidance and its behavioral consequences (fear to go to sleep) are regarded as main factors within the etiology of nightmares (Spoormaker, 2008). Lastly, Nardorff, Lambdin, and Germain (2014) argue that nightmares also might put a strain on relationships.

Nightmares should be distinguished from other sleep disorders, mainly night terror, sleepwalking and REM behavior disorder. During night terror, people awaken from non REM sleep, which goes hand in hand with loud screaming, strong physical arousal, the absence of memories regarding dreaming and the difficulty to be calmed down by another person. This is in contrast to the nightmare definition described above. During sleepwalking, there is - in contrast to nightmares - no awakening. It takes place during the deep sleep phases and there is no detailed recall of dreaming after awakening. In addition, nightmares usually do not go along with episodes of sleepwalking. Besides some similarities of nightmares and REM-sleep-behavior disorder, the latter is accompanied by a wide spectrum of behavioral release during sleep. The main feature is the loss of motor inhibition, which normally occurs during sleeping (APA, 2013). Nightmares can be idiopathic, that

means, they are not clearly related to a specific cause. But they can also result as a consequence of a traumatic event, so called posttraumatic nightmares. People with posttraumatic nightmares seem to have more nocturnal awakenings than individuals with idiopathic nightmares (Germain & Nielsen, 2003). Furthermore, whereas idiopathic nightmares usually occur during rapid eye movement sleep (REM; APA, 2013), posttraumatic nightmares also occur during non-REM sleep (Wittmann, Schredl, & Kramer, 2007). In their critical review the same authors state that the content of posttraumatic nightmares can vary from more or less replications of the traumatic event to nightmares without a relation to the trauma. This and the fact that both, posttraumatic and idiopathic nightmares respond to the same nightmare treatment is why Spoormaker (2008) argues that "differences between post-traumatic and idiopathic nightmares should not be overemphasized" (p. 16).

The prevalence rate of recurrent nightmares (more than once a week) in the general public is between 2 and 5 % (Bixler, Kales, Soldatos, Kales, & Healey, 1979; Li, Zhang, Li, & Wing, 2010; Janson et al., 1995; Ohayon, Moreselli, & Guilleminault, 1997; Schredl, 2010, Stepansky et al., 1998). Within psychiatric samples, recurrent nightmares are much more common, during PTBS (66.7 %), mood disorders (37.3 %), anxiety disorder (15.6 %) and personality disorders (31.1 %; Swart, van Schagen, Lancee,& van den Bout, 2013), yet nightmare disorder is hardly diagnosed. Nadorff et al. (2014) review the link between nightmares and psychopathology in more detail. They summarize that nightmares are often a co-morbid condition to psychiatric conditions, like suicidality, borderline personality disorder, dissociative disorder, anxiety, depression and PTSD. In addition, they found that nightmares individually account for the exacerbation of clinical outcomes. The latter idea is supported by the remarks of Pace-Schott, Germain, and Milad (2015a). In their review they find evidence that insomnia, nightmares and fragmented REM sleep predict PTSD symptoms. They hypothesize that this might be explained through a mechanism by which sleep disturbances "may result in failure of extinction memory to persist and generalize".

Women tend to have more nightmares than men during adolescence, as well as during early and middle age adulthood. For children and older persons such a gender difference was not found (Schredl & Reinhard, 2011). This gender effect seems to be mediated through neuroticism and

through the dream recall frequency (Schredl, 2014). Women seem to recall their dreams more often (Schredl & Reinhard, 2008).

Within a representative German sample, Schredl (2010) found that “falling”, “being chased”, “being paralyzed”, “being late” and “disappearance/death of close persons” were the five most often reported nightmares. However, until now there is only vague evidence on the relationship between these nightmare topics and waking life stressors or personality traits (for an overview see Schredl, 2010).

Nightmare Treatment

There are effective nightmare treatments. Interventions with the most evidence on their effectiveness use either imagery rescripting or exposure as well as the combination of both (Hansen, Höfling, Kröner-Borowik, Stangier, & Steil, 2013). The most widespread and most studied intervention is Imagery Rehearsal Therapy (IRT). During IRT, the patient (1) writes down his original nightmare and then (2) rescripts it to make it more positive. Then, (3) the new nightmare is written down and (4) rehearsed through imagination (Neidhardt, Krakow, Kellner, & Pathak, 1992). There is a large amount of research, which proves the effectiveness of IRT (Hansen et al., 2013; Augedal, Hansen, Kronhaug, Harvey, & Pallesen 2013; Casement & Swanson, 2012). Within the best practice guide of the American Academy of Sleep Medicine, IRT is recommended as a Level A treatment (Cranston, Davis, Rhudy, & Favorite, 2011). IRT effectiveness, however, has been investigated within different study designs. The meta-analysis of Hansen et al. (2013) included 15 studies, which investigated the effectiveness of IRT. Only three studies used an active control group in their study design. When one only looks at these studies, previously cited results are relativized: Neidhardt, Krakow, Kellner, and Pathak (1992) compared IRT to a recording control group, which had to write down their nightmares for four weeks. They did not find significant differences between the groups regarding nightmare frequency. Kellner, Neidhardt, Krakow, and Pathak (1992) compared IRT to desensitization treatment and did not find significant differences between the groups. Cook et al. (2010) used an active comparison condition and also did not find between group differences in

primary outcome measures (nightmare frequency and sleep quality). In addition, Lancee, Spoormaker, and van den Bout (2010) compared IRT to a recording control group and only found small effects preferring IRT regarding nightmare frequency (d = 0.21) and anxiety (d = 0.31). Thus, regarding IRT, there seems to be a lack of randomized controlled trials which use active control conditions.

During exposure therapy, the patient confronts himself in imagination with his nightmare until it is not distressing anymore. This therapy shows promising and long lasting effects (Burgess, Gill, & Marks, 1998) but there are only a few studies, which prove the effectiveness of exposure therapy for nightmares (Hansen et al., 2013; Lancee, Spoormaker, and van den Bout, 2010).

Exposure, Relaxation, and Rescripting Therapy (ERRT, Davis & Wright, 2006) combines IRT with exposure and relaxation therapy. There are a few randomized controlled trials which successfully proved its effectiveness on posttraumatic nightmares (Davis & Wright, 2007; Swanson, Favorite, Horin, & Arnedt, 2009; Davis et al., 2011). Yet, it is unclear whether ERRT has an additional benefit above IRT (Nadorff, Lambdin, & Germain, 2014).

In their meta-analysis, Hansen et al. (2013) carved out the distinct effects of imagery rescripting and exposure within nightmare interventions and conclude that well designed studies are needed, to "draw methodologically reliable conclusions regarding the effective components of psychological treatments for chronic nightmares" (p. 153).

Effectiveness evaluations of nightmare treatments mainly focus on the course of nightmare frequency. In their meta-analysis, Augedal et al. (2013) list psychological and pharmacological RCTs and their use of outcome measures, respectively. From in total 14 psychological trials, only 6 studies also considered nightmare distress as an outcome measurement. This is not in line with the distinct role of nightmare distress within the question whether nightmares become a clinically relevant problem. In both of the most comprehensive models regarding the etiology of nightmares (Spoormaker, 2008; Nielsen & Levin, 2007), nightmare distress has an important role within the genesis of (recurrent) nightmares and it seems to be nightmare distress and not the mere nightmare frequency which is related to psychopathology (Belicki, 1992a; Blagrove, Farmer, & Williams, 2004;

Levin & Fireman, 2002; Wood & Bootzin, 1990). Yet, it remains unclear what is meant by nightmare distress and different questionnaires (e. g. nightmare distress questionnaire, Sleep 50, Nightmare effect survey, self-report) seem to focus on diverse concepts regarding nightmare distress (Böckermann, Gieselmann, & Pietrowsky, 2014).

Etiological models of nightmares and active therapeutic factors of nightmare treatments

Nielsen and Levin (2007) describe a neuro-cognitive theory on the function of nightmares. The so called affect network dysfunction (AND) model of nightmare production states, "that nightmares result from dysfunction in a network of affective processes that, during normal dreaming, serves the adaptive function of fear memory extinction" (p. 300). This latter note on the adaptive role of sleep is also supported through the notes of Pace-Schott, Germain, and Milad (2015b), who review literature which support the importance of sleep and especially REM sleep (the sleep stage, where nightmares usually occur) for the consolidation of fear extinction memory. The AND model of Nielsen and Levin has a cognitive and a neural level: On the cognitive level, dreaming has a fear memory extinction function through the creation or maintenance of fear extinction memories. At the neural level, Nielsen and Levin state, that the fear extinction function is supported by a network of limbic, paralimbic (amygdala, hipocampal-complex) and pre-frontal regions (medial pre- frontal cortex, anterior cingulate cortex ACC), which control the perception and representation of emotional stimuli and the regulation of emotional response. Affect load determines whether there is need for fear memory extinction. Affect load is a state factor that reflects the influence of stressful events (e. g. daily hassles, interpersonal conflicts) on the emotion regulation capacity. Bad dreams or nightmares occur, when there are distortions within the affective network. In addition, the question whether nightmares become a clinical problem, depends again on the more trait like factor "affect distress" which "is defined as a dispositional or trait-like factor consisting of a long-standing tendency to experience heightened distress and negative affect in response to emotional stimuli" (p. 302). Nielsen and Levin (2007) state, that it is affect distress which determines how much distress one will have during and after a nightmare.

The cognitive model of recurrent nightmares of Spoormaker (2008) elaborates on the model of Nielsen and Levin (2007) and additionally captures the question how nightmares become recurrent and frequent. Spoormaker proposes that elements of a recurrent nightmare are represented in memory as a script which is a "typical sequence of events" and which "allows for variability" (p. 16). A nightmare occurs when (a) neutral dream elements, which are continuously produced during REM sleep, are interpreted as threatening and (b) when these elements are similar to the elements of a recurrent nightmare script. The perceived similarity between the dream elements and nightmare script is mediated through an interpretative bias and the accessibility of the script. Both of these mediating factors depend again on the level of state anxiety. Another crucial factor to explain that nightmares can become recurrent is cognitive avoidance which (a) makes memory integration of the nightmare script into the memory less probable, (b) prevents the emotional normalization of the script (fear extinction) and (c) prevents the brainstorming about alternate responses to the threatening situation in the nightmare.

Both models have many overlaps and both models give ideas on the underlying therapeutic factors of nightmare treatments: First, both include actual emotional distress as vulnerability for the genesis of nightmares. Nielsen and Levin (2007) name this "affect load", Spoormaker speaks of "state anxiety". Spoormaker (2008) argues that a reduction in state anxiety through relaxation may increase the threshold for activation of a nightmare script, which might explain positive results of relaxation as a nightmare treatment (Miller & DiPilato, 1983). Furthermore**,** both models state that the general tendency to experience heightened distress and negative affect in response to emotional stimuli plays a crucial role within the question whether nightmares become a clinical problem. Nielsen and Levin (2007) propose that nightmares occur when there is an inability of the hippocampus to produce sufficiently incompatible contexts for fear extinction to function. This might explain the effectiveness of Imagery Rehearsal Therapy (IRT, for a detailed description see below), where nightmare sufferers have to add new and nightmare incompatible elements to their nightmares. Spoormaker (2008) argues, that IRT "certainly breaks down the expectation pattern of the script" (p. 19) to explain IRT effectiveness. Spoormaker explains that exposure, which breaks down cognitive

avoidance, might support the consolidation and integration of the nightmare script into (autobiographic) memory, so that emotional normalization of the script can take place. Nielsen and Levin propose that nightmares might occur - amongst others - as a consequence of an overactive Amygdala or a failure of the prefrontal cortex to regulate amygdala output. Exposure therapy for nightmares might operate within this mechanism, because studies regarding the neuronal effects within anxiety treatments show that exposure therapy reduces amygdala activity and increases prefrontal activity (e. g. Hauner, Mineka, Voss, & Paller, 2012).

There is a growing body of studies, which focus on imagery rescripting and its underlying mechanisms as intervention for various psychological disorders. The Imagery Rehearsal Therapy can be seen as an imagery rescripting intervention because in both, persons are instructed to relive a memory or fantasy and change the course of events in a more desired direction (Dibbets & Arntz, 2015). The underlying therapeutic mechanism remains relatively unexplored but Dibbets and Arntz (2015) summarize different explanations. Therefore they might provide explanations for the effectiveness of IRT: 1. during imagination, the aversive memory and the accompanying fear network are activated. This might lead to a changed and reconsolidated meaning of mental representation leading to a diminished fear response. 2. The alternative “retrieval competition hypothesis” (Brewin, Gregory, Lipton, & Burgess, 2010) bases on the assumption, that there are two different types of memory representations: One, which is abstract, flexible, contextualized (C-rep), and one, which is inflexible and more sensory-bound (S-rep). By adding new information within imagery rescripting, a “novel and more elaborated and accessible C-rep is formed which might be able to win the retrieval competition over the S-rep”.

Dissemination of nightmare treatments

Despite the existence of effective treatments for nightmares, dissemination of these treatments seems to be limited: Recently, Thünker, Norpoth, von Aspern, Ozcan, and Pietrowsky (2014) took a closer look at the knowledge and attitudes of health care providers and nightmare sufferers on nightmares in Germany: Health care providers seem to have little knowledge about

possibilities to treat nightmares. The need for treatment only seems to be of moderate importance and hardly any professional health care provider stated, that they recommended an evidence based nightmare treatment. Even more relevant, only 30 % of nightmare sufferers reported that they asked for professional help for their nightmares and nobody out of 335 nightmare sufferers asked for psychological help. These results are confirmed by Nardorff, Nadorff, and Germain (2015), who found that only 37 % (study 1) and 11 % (study 2) of persons with clinically significant nightmare symptoms discussed their nightmares with a healthcare professional. In addition, only 33 % of nightmare sufferers thought that nightmares are treatable. This is supported by data from a big German sample (*n* = 1022), where only 15% of persons with frequent nightmares (at least every other week) sought professional help (Schredl, 2013). Thus, there is a lack of knowledge and usage of effective nightmare treatments. Dissemination of knowledge about nightmares and their treatment has to be improved. An effective internet-based intervention (IBI) for nightmares may fill this gap and promote and disseminate an effective treatment. Internet interventions can enlarge the reach of effective treatments. They are highly accessible everywhere at every time. In addition, they might promote self-management competencies. Due to the possibilities to create attractive, interactive intervention features, they can strengthen patients' motivation and compliance. Furthermore, IBIs might lower the inhibition threshold for treatment engagement, thus possibly enabling treatments to take effect before chronic manifestation of psychological complaints (Bauer & Kordy, 2008).

Internet Interventions

A representative study in Germany (ARD/ZDF Onlinestudie, Van Eimeren, & Frees, 2014) found that a majority of Germans (79.1 %, status 2014) make use of the internet and the number of internet users is still increasing. On average, an internet user spends 5.9 days per week online with a mean of 166 min of online activity being online per day. On average every user has 2.8 end devices available. Most popularly the internet access takes place via laptop (69 %), smartphone/mobile phone (60 %) and personal computer (59 %), while the proportion of users accessing the internet via

tablets seems to rise rapidly (2013: 16 %; 2014: 28 %). In addition, mobile internet usage is rapidly increasing (2012: 23 %; 2013: 41% and 2014: 50 %).

In Germany the internet was considered an important informational medium for health purposes in 2007 already (Lausen, Potapov, & Prokosch, 2008). Within a representative German sample (status 2012), 37.3 % used the internet to gather information and get advice regarding health related topics and 64.5 % of internet users used it for health related information seeking. 18.4 % of the latter group indicated, that the internet has a large or very large influence on health related behavior. Regarding mental health conditions, 90 % of internet users state that they would look up information in case of need (Eichenberg & Brähler, 2012).

There is a large amount of different interventions, which make use of the internet to deliver mental health content. Becker and Jensen-Doss (2013) distinguish (a) computer-based therapies and (b) computer-assisted therapies, the latter including therapist guidance and face to face contact. Their definition also includes interventions which are not offered via the internet (e.g. via CD Rom). Kenter et al. (2015, p. 77) define therapies, which are delivered via the internet "as structured programs offered via the Internet which are based on evidence based therapies". They expanded this definition by the note, that these internet delivered treatments can be executed (a) independently in an unguided form or (b) within a guided form with telephone, email or face-to-face contact. In this dissertation, this definition is used. However, the latter discrimination is hard to do, because most often, unguided interventions also include some contact in order to clarify eligibility, validate the diagnosis or remind participants to undertake post and follow up measures (Richards & Richardson, 2012).

Many studies and some meta-analyses prove the effectiveness of interventions which use the internet to treat psychological disorders (Baumeister, Reichler, Munzinger, & Lin, 2014; Cuijpers, Donker, van Straten, Li, & Andersson, 2010; Richards & Richardson, 2012; Samoocha, Bruinvels, Elbers, Anema, & van der Beek, 2010; Spek et al.2007), including disorders which are related to nightmares, like PTBS and insomnia (Lancee, van den Bout, Sorbi, & van Straten, 2013; Lange, van de Ven, Schrieken, & Emmelkamp, 2000).To the best knowledge of the author, until now, there is no

such internet-based intervention for the treatment of nightmares. Thus it is unknown whether an IBI nightmare intervention can effectively reduce nightmare frequency and related symptoms.

There is quite some evidence, that support from a coach or therapist improves IBIs effectiveness, compliance and reduces drop out (Richards & Richardson, 2012). The validity of these results is limited through the fact that they are mainly based on between trial comparisons. Evidence from within trial comparisons in fact supports superiority of guided interventions, but it is limited to interventions focusing on anxiety and depression (Baumeister et al., 2014). Furthermore, the same authors state that there is still limited knowledge on specific effects (e. g. dose response relationship) of guidance on IBI effectiveness.

Despite IBIs effectiveness and its great potential of reaching a big target group, there are barriers to engage in internet-based interventions (Waller & Gilbody, 2009). There are some studies which suggest that deficient user acceptance of IBI might explain low uptake to IBIs (Baumeister, Seifferth, Lin, Nowoczin, Lüking, & Ebert, 2015; Baumeister, Nowoczin, Jin, Seifferth, Seufert, Laubner, & Ebert, 2014). In a representative German sample, the majority of respondents were reserved in their attitude to possibly use online coaching and a minority of participants found it likely to participate in a mobile phone or internet-based therapy (Eichenberg & Brähler, 2013). Yet, the latter study did focus on persons with psychological complaints and there are hardly any studies which explore potential users' (with mental complaints) attitudes to engage in IBIs.

Objectives of this dissertation

The above outlined remarks result in different research questions, which are the focus of this dissertation and summarized below and in Table 2.

Table 2.

Summary of research questions

Gap of knowledge	Dissertation goal/ Research question	Study
No effective internet-based nightmare intervention available.	Development of an internet-based nightmare intervention based on IRT (IBI IRT). Evaluation of IBI IRT feasibility und applicability.	Study 1
Only few RCTs on IRT effectiveness with active control groups.	Does IBI IRT reduce nightmare frequency and related symptoms compared to a recording control group?	Study 4
Hardly any studies which evaluate user expectations regarding IBIs of potential users available.	Do potential IBI users accept IBIs? What are the perceived advantages and obstacles of IBI?	Study 2
No validated German version of the nightmare distress questionnaire available.	Validation of the German version of the nightmare distress questionnaire (NDQ)	Study 3
Ambiguity of what is meant by nightmare distress.	Gaining clarity of what is meant by nightmare distress and what exactly is measured through the NDQ.	Study 3
Limited knowledge of role of support on IBIs effectiveness	Does support improve IBI IRT outcomes?	Study 4
Ambiguity of effective components of psychological interventions for nightmares	Clarification of the role of exposure within IRT for nightmares.	Study 4

Note. RCT: Randomized controlled trial; IRT: Imagery Rehearsal Therapy; IBI: Internet-based intervention

Development of the IBI and usability evaluation. The main goal of this dissertation is the development and effectiveness evaluation of a feasible and utile internet-based intervention for nightmares, based on the Imagery Rehearsal Therapy (IBI IRT). The first study describes the development process of the website and the operationalization of support within IBI IRT. It is based on nine development steps of internet-based interventions described by Ritterband et al. (2003) and includes the results of two pilot studies to address feasibility and usability as well as to identify possible weak points and possible improvement possibilities of IBI IRT portal. Study 1 serves as a preliminary work in order to investigate research questions regarding the effectiveness and therapeutic factors of IBI IRT (study 4).

Exploring potential users' attitudes towards IBI. Whether an IBI can unfold its effectiveness depends on the question, whether potential users engage with an IBI. Their willingness to do so in turn depends on their expectations and characteristics. Ritterband, Thorndike, Cox, Kovatchev, & Gonder-Frederick (2009) describe, that user expectations are one of seven important areas of such user characteristics. While there are intense discussions on the advantages and risks of IBI, there is a lack of studies which systematically deal with expectations and attitudes of potential IBI users. Therefore the second study evaluates user expectations with regard to internet interventions. Several perceived opportunities and concerns of potential users of internet interventions are explored. In addition, disorders, which are regarded to be best targeted by IBIs, are identified. Implications for the development and implementation of internet interventions are discussed.

Nightmare Distress. Most intervention studies focused on nightmare frequency as a primary outcome measurement. Little attention was paid to the effects on nightmare distress, which seems to play a significant role within nightmares and their relationship to psychopathology (see above). Yet there are different definitions of nightmare distress and insufficient questionnaires in the German speaking area. In study 3 these aspects are picked up: Different definitions of nightmare distress are summarized. In addition, it includes the validation of the German version of the nightmare distress

questionnaire, which is the most widely used questionnaire to capture nightmare distress. This questionnaire validation serves as preliminary work for the effectiveness study (4, see below), in order to exhibit a well understood and validated German speaking nightmare distress measure.

Effectiveness analysis of IBI IRT. Finally - in study four - an effectiveness analysis of IBI IRT was performed. The main research question deals with the issue, whether IRT improves nightmare frequency, nightmare distress, sleep quality and depression when it is delivered as an internet-based intervention. A randomized controlled trial was conducted in order to evaluate IBI IRT effectiveness and to further explore two additional research questions: First, as outlined above, it remains unclear which mechanism of change takes place within IRT interventions. Within IRT, imaginal rescripting is the main part of the intervention, yet it also includes confrontation with the nightmare. Study four thus aimed to clarify the role of exposure within IRT. Second, the research issue, whether the absence or presence of motivational and content related support by a psychologist has an influence on compliance, drop out (website use) and the effectiveness (symptom improvement) of the IBI IRT intervention, was included.

The above described research questions were dealt with within four studies, which are summarized below.

Study 1

Within study one, an internet- based, guided self-help intervention aimed at effectively coping with nightmares was developed. The 9 step model of Ritterband et al. (2003) was used for the development process. It included (1) the identification of a problem area, (2) the determination of the effectiveness of established treatments, (3) the complete operationalization of the treatment, (4) the consideration of ethical and legal issues, (5) the transformation of treatment elements internet/digital components, (6) the personalization of the intervention, (7) the incorporation of feedback (8) the construction of the internet intervention and (9) the testing of the intervention.

The testing of the intervention included two pilot studies in order to evaluate feasibility and applicability of the intervention. Because of the unsatisfactory dissemination of effective nightmare treatments, the development of an IBI nightmare intervention is highly attractive and needed. Imagery Rehearsal Therapy is the most widely researched and most effective treatment. An already existing treatment manual, which operationalized imagery rehearsal rational (Thünker & Pietrowsky, 2011) was used for development. The development took place in cooperation with the data protection officer of Heinrich Heine University and was approved by the ethical commission of the German Psychological Society (DGPs). Treatment components were transformed to a content management system (MyCareCMS), which was originally developed for the use of health related internet interventions (Sorbi & van der Vaart, 2010). Personalization and incorporation took place via the involvement of coaches, who gave personal feedback within an email program. Five experts in the field of nightmare treatments were surveyed to identify suitable support possibilities. It consisted of motivational and content related support, as well as technical assistance (on demand) and was provided at previously defined points of time during the intervention. The construction of the nightmare intervention (albtraumcoach) was executed by a Dutch software company. The Design was created by a media designer.

In pilot 1, the feasibility of the training was tested with 10 participants who had suffered from bad dreams in the past. Feasibility was assessed through the Computer System Usability Questionnaire (CSUQ) and self-designed questions regarding the quality of the navigation structure, appearance, readability and perceived fun during the session. In pilot 2, 12 persons with recurrent nightmares evaluated the applicability and utility of the intervention. Dependent variables were: quality of the separate sessions, satisfaction with the intervention, nightmare frequency, nightmare distress, sleep quality and depression.

The training through the internet yielded good evaluations of its feasibility and applicability. But participants did not have fun during the sessions. Preliminary indications of training benefits revealed a decrease in nightmare frequency, improvement of sleep quality and reduction in depressive symptoms. The drop-out rate with 42 %, however, was relatively high. The latter finding

resulted in thoughts to improve the intervention before the start of the randomized controlled trial. Improvement possibilities included the (a) shortening of the training, (b) implementation of strategies to improve time management within the intervention period and (c) adding of reinforcements to improve the engagement with the intervention

Study 2

The usage of internet-based health intervention platforms depends on user characteristics and their attitudes towards and acceptance of internet-based interventions. To address this issue, the attitudes towards internet-based interventions of psychotherapy patients (n = 58) and wait-listed patients (n = 54) were assessed and compared to a matched control group (n = 50). Participants received a general definition of internet-based interventions and were presented an example of the internet-based nightmare intervention (www.albtraumcoach.de). They were asked, whether they could generally imagine to participate within an IBI. In addition, they received a list with advantages and disadvantages of IBI to state whether they agree with them or not.

Participants received a list with symptoms of ICD-10 disorders and were asked – irrespective of their own symptoms – if they could imagine treating the symptoms via IBI. Compared to the control group, especially wait-listed candidates showed up to have a reduced interest to engage in internet-based interventions. Furthermore, both patient groups perceived fewer advantages of IBIs. Whereas all groups appreciated the enhanced flexibility of IBIs, both patient groups worried more about privacy issues and a possible misinterpretation within written communication. In addition, both patient groups considered internet-based psychotherapy as imaginable to aim at fewer kinds of psychopathological conditions than the control group. Patients indicated panic disorder, posttraumatic stress disorder, depression, and generalized anxiety disorder as least imaginable to participate in internet-based interventions. There appears to be an interest in treatment for sexual dysfunctions through the internet. Taken together, potential users view IBIs critically. While cognitive dissonance might partly explain these results, the study shows that potential users have some serious concerns regarding IBIs. To address reservations regarding privacy protection, paper and

pencil registration procedures may be provided. Face-to-face or video contacts could be added to help to satisfy patients' needs.

Study 3

Even though nightmares go along with various sleep-related complaints, it is nightmare distress and not the mere frequency of nightmares, which is associated to well-being and psychopathology. This is supported through the only small to moderate relationship between nightmare distress and nightmare frequency (Belicki, 1992b). On this basis, nightmare distress and nightmare frequency should therefore be treated as distinct constructs. Yet, nightmare distress has been conceptualized in different ways: (a) nightmare intensity, (b) nightmare effects, (c) nightmare related symptoms, and (d) the perception of nightmare distress. The Nightmare Distress Questionnaire (NDQ) is the most often used questionnaire to measure nightmare distress. However, there is insufficient information about its psychometric properties. Martinez, Miro and Arriaza (2005) made an attempt to analyze the factorial structure of the NDQ, but their participants were restricted to students and only 7 % had nightmares on a weekly basis. Thus, it stays unclear what exactly is measured by the NDQ. This study attempted to replicate the previously found good reliability within the self-translated German version of the questionnaire and it was aimed to identify probable subscales with good psychometric properties as well. It was hypothesized, that higher NDQ ratings would go along with worsened subjective sleep quality, and a higher degree of depressive symptoms. For this reason, 213 men and women, suffering from recurrent nightmares (one or more nightmares per week), filled in the self-translated German version of the NDQ, as well as depression (ADS-L) and sleep quality (PSQI) measures. To assess the nightmare frequency, we asked the participants to indicate the number of nightmares they had during the last week as well as during the last four weeks. To control for the critically discussed nightmare criteria, participants were asked to rate the occurrence of awakenings through nightmares and whether participants experienced fear or anxiety during the nightmares. Recruitment took place within the screening procedure within the randomized controlled trial, described below. Three subscales had been identified, which explained

52 % of the total variance: (a) general nightmare distress (23 %), (b) impact on sleep (16 %) and (c) impact on daytime reality perception (14 %). In line with the hypothesis, the reliability of the NDQ was good (Cronbach's α = .80). The internal consistencies of the subscales were at α = .80 for "general nightmare distress", α = .64 for "impact on sleep", and α = .51 for "impact on daytime reality perception". Moderate correlations between nightmare distress scores, depression and sleep quality have been found. All subscales correlated highly significantly with the overall NDQ score.

As for nightmare frequency, PSQI sleep quality, and ADS-L depression, the overall NDQ score showed moderate relationships with all three variables. The factor assessing "general distress" was more strongly associated with nightmare frequency than with sleep quality. By contrast, the factor "impact on sleep" was only weakly associated with the nightmare frequency, but more strongly with sleep quality. All factors were equally associated with symptoms of depression and the above described results remained after the influence of depressive symptoms was partialized out. Besides that, the higher the level of anxiety and fear during a nightmare, the higher the level of NDQ nightmare distress the individual reported. The DSM-IV criterion to wake up from a nightmare was not found to be associated with NDQ nightmare distress.

Taken together, the multifactorial structure of the NDQ questionnaire in a sample of participants with frequent nightmares was confirmed. It measures mainly two aspects of nightmare distress, the general subjective evaluation whether one feels distressed by his or her nightmares as well as its detrimental impact on sleep quality. The NDQ thus seems to be a reliable and valid measure of nightmare distress in frequent nightmare sufferers. The fact, that no relationship between the frequency of nightmare awakenings and the different factors of the NDQ has been found, further supports the note, that bad dreams can provoke distress, independent from the fact whether one woke up from the dream or not. This is in line with the newly formulated diagnostic criteria as described by the DSM-5 (APA, 2013).

Study 4

This randomized controlled trial investigated (1) the effectiveness of Imagery Rehearsal Therapy (IRT) when applied as an internet-based intervention (IBI), (2) distinct therapeutic factors within IRT and (3) the role of support during IBI IRT. Inclusion criteria were (1) the presence of chronic nightmares (> sixth month) with at least one nightmare per week (according to DSM-IV, without awakening criterion), (2) age of ≥18 years, and (3) capacity to handle a computer and internet. Exclusion criteria were: depressive symptoms, suicidal ideations, the presence of PTSD symptoms, dissociative symptoms, psychotic symptoms, drug- or alcohol abuse, and the use of psychotropic medication. 127 participants suffering of mainly idiopathic nightmares (93 %) were randomly assigned to one of two IRT groups (guided; unguided) or to one of two active control groups (nightmare recording; nightmare documentation) and were assessed at pre, post and two month follow up.

The present IBI IRT intervention is based on the manual of Thünker and Pietrowsky (2011) and was adapted to IBI delivery (Böckermann et al., 2015). The content is suitable for the treatment of idiopathic and posttraumatic nightmares (Thünker & Pietrowksy, 2012). The training was offered in six consecutive sessions to be executed within six weeks. Participants of the guided IRT group received additional motivational and content related support from a coach. The unguided group did not receive this feedback. However, both groups received technical support on demand and reminders via email in case of non-adherence. The recording control group registered their weekly nightmare frequency and intensity. The documentation control group described their nightmares as detailed as possible conform to the instructions of the two IRT groups. Primary outcome measures of all four groups were nightmare frequency, nightmare distress, measure of sleep disturbance due to bad dreams and general sleep quality. Secondary outcome measures were depression and general satisfaction with the training. In addition the dropout rate and compliance with the training was assessed. To evaluate the nightmare frequency progress during the training and during the control group tasks, prospective nightmare frequency was assessed. Statistical comparisons between groups

were conducted according to the intention-to-treat (ITT) principle employing multiple imputation (MI) based on the "missing at random assumption".

IRT was more effective than recording regarding nightmare frequency, nightmare distress and sleep disturbances due to bad dreams only. However, there was only a trend to significance regarding nightmare frequency at post time point. Compared to documentation control, however, IRT was only superior in improving nightmare distress, at post and follow up assessments. Guidance had no additional effect on effectiveness, compliance or drop out. Within the IRT group, nightmare frequency already significantly declined after the first session. Similarly, a significant reduction in weekly nightmare frequency was found within the documentation group (after week 2). No such effect was found within the recording group. It also found, that nightmare distress scores before the training and conscientiousness as a personality trait predicted drop out: The higher pre nightmare distress and the less conscientious the participants at pre measurement, the much higher the probability of study drop out.

Thus, internet-based IRT seems to be an effective treatment for idiopathic nightmares even when offered with minimal therapeutic support. Exposure to the dream content seems to be vital in reducing nightmare frequency, while IRT may be the essential therapeutic factor to also reduce nightmare distress.

Discussion

The main goal of this dissertation was the development of an effective internet-based IRT self-help nightmare intervention. Within the first study which described the development of the IBI IRT for nightmares, two pilot studies revealed good evaluations of its feasibility and applicability. But relatively high dropout rates (42 %) were found. The studies also brought up some possible measures to further improve the intervention, especially by reducing total training time and the amount of sessions, as well as measures to improve participants compliance through straight forward reminding systems and through adding time management support to participants. The fact that dropout rates within the randomized controlled trial declined to 23 % within the IBI IRT group at post measurement

(study 4) suggest that the implementation of these measures was successful. A limiting aspect is technical evolvement: While usability and applicability was good for this present intervention during pilot testing, technical characteristics and features of the internet platform became gradually obsolete during the course of the effectiveness trial (lacking responsiveness to mobile usage, outdated email system). This was reflected by some acknowledgements of participants within the RCT, who wished to use the mobile apps or tablets for the intervention.

Feasibility tests are regarded as an indispensable part within the development process of IBIs (Ritterband et al., 2003). To support this, in the present project they brought up important improvements before executing the RCT to evaluate IBI IRT effectiveness. The indemnity of high feasibility and applicability is important to avoid false conclusions about effectiveness, drop-out and adherence of an IBI. Simultaneously, they reflect the difficulties in the independent and scientifically driven development of modern IBIs, which should fulfill actual technical requirements and comply to user needs expectations. Technical innovations evolve rapidly, resulting in applications, which shortly after their release are not up to date anymore. In contrast, the development of a well- grounded internet intervention takes time, with the risk, that at the point of completion of evidence based IBIs, it is obsolete again. On the other hand, the diffusion of technical innovations happen in stages and people adapt to these innovations at different paces (Rogers, 2003). This might result in situations where technical modern and innovative IBIs might not be suited for the technical level of a large amount of potential users. Therefore, the development of IBIs should be performed within the area of conflict between keeping up with technical innovations and user expectations on the one hand and the importance to adapt to the available technical innovations and skills of the majority of potential users on the other hand. This disparity can be explained through the increase in smartphone usage in Germany during the development and evaluation period of the current internet-based nightmare intervention. When IBI IRT was built up in 2009, the number of smartphone users was limited to 6.31 million in Germany. With begin of the RCT in October 2012 the number had risen to 29.5 million and in February 2015 it exceeded the amount of 45 million smartphone users (comScore MobiLens, 2015). The development of MyCareCMS, which is the basis

for the present IBI IRT intervention, began 2008 where smartphone usage was virtually not prevalent. Currently, one cannot think of an IBI without including a mobile application (app). The amount of commercial health related mobile applications gains importance rapidly (Lucht, Bredenkamp, Boeker, & Kramer, 2015) and many applications already target mental health conditions (Torous & Powell, 2015). Mental health care patients increasingly own smartphones and seem to be interested to use them for monitoring mental health conditions (Torous, Friedman, & Keshavan, 2014a; Torous et al., 2014b). Yet, while they enjoy great popularity, it is questionable, whether they were formally evaluated (e. g. Savic, Best, Rodda, & Lubman, 2013). Future research on IBI effectiveness should take these aspects into account and formally describe feasibility and applicability tests in order to exclude a lack of user friendlessness and/or technical shortfall as confound variables. The great potential of using mobile applications should be pushed forward: They might be useful for diagnostic issues (e. g. monitoring symptoms), delivering interventions (e. g. improving self-awareness, delivering CBT treatments) or using passive data (e. g. context sensing) to identify mental health related states (Torous & Powell, 2015). Furthermore due to its permanent availability mobile applications might be well suited to be included within regular psychotherapy for implementing acquired skills into daily life (Berge, 2014).

The results of the second study show, that potential users of IBIs were less interested in engaging in an internet-based intervention compared to a control group. They perceived less advantages and regarded data privacy risks and fear of misunderstandings during IBI as main concerns. In addition, they named less psychological disorders as suitable for being targeted through an IBI. In summary, despite the much discussed advantages and the empirical evidence on (cost) effectiveness of IBIs for various psychological disorders, potential users critically evaluate IBIs.

While it is possible, that these results are partly based on the fact that the group of potential users consisted of patients, who were currently involved in or waited for an ambulatory face to face psychotherapy so that answers might have been affected by a cognitive dissonance mechanism, these results help to critically evaluate the application of IBIs: From a usability perspective, the results should motivate to improve IBIs in order to face potential users concerns. Data privacy

concerns might be met through the implementation of registration procedures, which allow for the omission of the obligation to electronically name personal (health) information through the adding of pen and pencil registration procedures. Fear of misunderstandings could be faced trough underlining contact possibilities (e. g. on demand) to a coach, via telephone, video conference or face to face setting. Acceptance facilitating interventions (e. g. short information video) which seem to positively influence engagement and acceptance of IBIs (Baumeister et al., 2015; Mitchell & Gordon, 2007) could be applied before the start of the intervention and should include information about IBIs methods, its effectiveness and the handling of typical concerns.

From a more general perspective these results might indicate that personal contact to a therapist is still regarded as an important part within therapy. Within a blended care approach, which combines internet-based and face-to-face therapy components, the expectations/concerns of potential users are allowed for, while the advantages of IBIs are utilized as well. This aspect will be discussed in more detail below. However, the RCT results, which are discussed below, show that there are individuals who benefit from a self-help intervention, even with minimal support.

That is why considerations regarding the indication for either a self-help intervention or a more guided intervention with personal contact through a therapist should, on the one hand, respect the skeptical attitudes regarding IBI without personal contact to a therapist. On the other hand, it also should include findings which show that some individuals already benefit from unguided or hardly guided self-help interventions. To continue thoughts on IBI treatment indication, the RCT results suggest that more conscientious individuals with less severe symptoms at pre measurement might have a lower probability to drop out, indicating that IBI might be useful for certain kinds of individuals. Future research should address this aspect in order to identify meaningful predictors for the successful application of IBIs in order to make more sophisticated statements on indication criteria for IBIs.

This study was the first to access potential users' attitudes regarding IBIs in comparison to a control group. This is important because participants of clinical IBI research trials tend to have a

positive attitude towards IBIs. But this group of participants might only represent a selected group of participants (e.g. higher educated).

The result of the third study revealed, that the German version of the nightmare distress questionnaire (NDQ) has good psychometric properties. Therefore, the German version of the NDQ can be regarded as a useful measure to capture the degree of nightmare distress. Furthermore, the present questionnaire study sheds light on the question of what is actually measured by the NDQ. This was found to be (a) the general subjective evaluation whether one feels distressed by his or her nightmares as well as (b) its detrimental impact on sleep quality and its influence on reality perception (nightmare symptoms). In contrast to Spoormaker's (2008) nightmare distress definition which also included the intensity with which nightmares are perceived during the night (nightmare intensity) the NDQ does not measure this aspect. The result, that there was a relationship between NDQ scores and anxiety/fear during the nightmare might indicate that both constructs are indeed closely related. Lastly, the absence of a relationship between nightmare distress and the quantity of nightmare induced awakenings supports the changes in the current DSM-5, where "awakenings from a nightmare" is no longer part of the nightmare definition.

Future research on nightmare treatment effectiveness should include nightmare distress as a primary outcome measure and thereby clearly define the used nightmare distress definition. While it is clear what is measured by the NDQ, a theory based nightmare distress measure has not been established, yet. It is suggested to focus on this by creating a theory supported nightmare distress questionnaire.

The results of the RCT show that IBI IRT is effective in the treatment of idiopathic nightmares. It is in line with previous findings regarding the effectiveness of IBIs for depression, anxiety disorders (Baumeister et al., 2014) as well as with regard to studies examining the effect of IRT within face-to-face therapies, group therapies or as a self-help intervention (Hansen et al., 2013). The present results were found in comparison to an active control group, which was previously only found from Lancee, Spoorkmaker, and van den Bout (2010). Yet, the present study population was limited to a relatively healthy group of persons without comorbid conditions and mainly idiopathic nightmares.

This latter aspect might explain why there no effect of support on effectiveness, compliance and drop out has been found. The target group might benefit from IBI self-help IRT, also with minimal support. IBI self-help IRT might function as a first line intervention within a stepped care model (van Straten, Hill, Richards, & Cuijpers, 2015). However, the absence of a support effect might base on the unclear differentiation between the guided and unguided intervention, where also participants of the unguided group had personal contact via the telephone interview, within the reminding system and (for ethical reasons) on demand.

While the target group improved from IBI IRT, in both studies - the pilot study and the RCT - more than 60% of interested persons had to be excluded from the trials, mostly because of comorbid depressive symptoms, which were regarded as a risk during IBI without personal contact. When one takes into account, that nightmares are often related to psychiatric disorders (Nadorff et al., 2014) and that IRT is also effective within samples with comorbid disorders (Thünker & Pietrowsky, 2012), IBIs for nightmares have to be offered in a way that more individuals can be reached. Blended care interventions, where a part of the treatment is delivered via internet and a part is delivered via face-to-face contacts, might have such a greater reach and therefore be effective for a bigger target group. However, there is not much empirical evidence on the (cost) effectiveness of blended intervention. In one Dutch study, blended care was more expensive than regular face-to-face treatment, whereas the same improvement rates were found. However, these results might have followed a suboptimal implementation plan (Kenter et al., 2015). To continue these considerations, a proper implementation plan should account for the fact, that internet-based interventions focus on the use of evidence based treatments with the goal of changing behaviors and cognitions (change interventions), which are related to specific psychological disorders. Yet, cognitive-behavioral psychotherapeutic face-to-face treatments and the way they are implemented in Germany, are complex and they commonly base on multilevel phase models, like the seven phase model within the self-regulation-therapy of Kanfer, Reinecker, & Schmelzer (2012). In this model, the planning, selection and realization of specific change interventions (phase 5) follow preceding therapy phases, which are the (phase 1) creation of a therapeutic working condition, (phase 2) the creation of

“change motivation”, (phase 3) the realization of a multi-attribute analysis model, and (phase 4) the clarification and selection of therapeutic goals. In addition, these preceding therapeutic phases are often impeded by cloudiness with regard to symptoms, therapy goals and change motivation. Therefore, blended care interventions should account for the complexity of psychotherapeutic treatments. CBT internet-based change interventions should be added at the point where there are sufficient working conditions and change motivation, as well as clarified understanding of how a problem functions and clarified therapeutic goals. Furthermore, IBI acceptance is a precondition to engage in these additional therapy features. Therefore, acceptance facilitating interventions, as described above, seem to be important. Future research on the effectiveness of blended care should describe a specified plan, when, how and on which theoretical basis internet features are included into face-to-face therapy.

It was found, that higher scores of nightmare distress at pre measurement time was associated with reduced compliance. This is in line with the results of Gun, Titov, and Andrews (2011) who found that acceptance of IBI was higher for persons with mild and moderate conditions of anxiety and depression.

The RCT also examined the role of exposure within IRT for nightmares. Evidence was found that the confrontation with nightmares during IRT reduces nightmare frequency, whereas the imagery rescripting (and rehearsal) part of IRT might reduce nightmare distress. This result is in line with parts of the (neuro) cognitive models described above (Nielsen & Levin, 2007, Spoormaker, 2008): Confrontation with the nightmare might support emotional normalization through the integration of the nightmare script into memory (Spoormaker, 2008) and/or the confrontation might reduce amygdala activity (Nielsen and Levin, 2007). The results do not support the notes of Spoormaker that IRT breaks down the expectation pattern of the nightmare script, because in this case superior results of IRT in comparison to nightmare documentation regarding nightmare frequency would have been expected to be found. However, IRT might more specifically function in reducing nightmare distress, which might be explained through the note of Germain et al. (2004) who state, that increased mastery is the core change mechanism of IRT. This is similar to the line of

argumentation of Arntz (2012) who states, that imagery rescripting might restore a sense of control (in PTBS patients). When one takes into account the important mediating role of nightmare distress outlined in study two, imagery rescripting seems to have great importance within IRT. Both, exposure and imagery rescripting seem to be fundamental parts of IRT, each having its distinct effects on nightmare complaints.

This study adds important evidence on IRT effectiveness by being one of few studies, which compared IRT to an active control group and which tried to draw conclusions on the specific effects of exposure and imagery rescripting within IRT.

One limitation of the study design was the somewhat loose fitting (exposure) documentation control group, so that other factors than exposure through writing down the nightmare cannot definitely be ruled out. Factors might be (a) more intervention time, (b) information about nightmares and sleep hygiene in general as well as (c) lower treatment effectiveness expectancies in the control group due to lacking blinding.

Future research should replicate the present findings by (a) investigating IRTs effectiveness by comparing IRT to active control groups and (b) by further focus on effective therapeutic components of nightmare interventions by including placebo control groups. To draw reliable conclusions, adequate sample sizes are needed. Internet based interventions might help to reach a great amount of individuals.

Main theses

- The internet-based Imagery Rehearsal Intervention for nightmares is a feasible und applicable intervention. But the training needed a shortening and some improvements to reduce drop out.
- Potential users critically evaluate internet-based interventions. They have concerns regarding data privacy and they fear misunderstandings during written communication. This should be taken into account within the development of IBIs and might be faced through acceptance facilitating interventions.
- The German version of the nightmare distress questionnaire has good psychometric properties. It has three subscales – explaining 51 % of variance – and it captures the general perception whether nightmares are evaluated as distressing, as well as nightmare related symptoms.
- Internet- based Imagery Rehearsal Therapy effectively reduces nightmare frequency and nightmare distress, even with minimal therapeutic support.
- Exposure to the nightmare content seems to reduce nightmare frequency and imagery rehearsing seems to be essential for reducing nightmare distress.

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Publication overview

Study 1:

Böckermann, M., Gieselmann, A., Sorbi, M.,& Pietrowsky, R. (2015). Entwicklung und Evaluation einer internetbasierten begleiteten Selbsthilfe-Intervention zur Bewältigung von Albträumen. *Zeitschrift für Psychiatrie, Psychologie und Psychotherapie*, *63*, 117-124. doi: 10.1024/1661-4747/a000230.

Study 2:

Gieselmann, A., Böckermann, M., & Pietrowsky, R. (2015). Internetbasierte Gesundheitsinterventionen: Eine Evaluation aus der Perspektive von Patienten vor und während ambulanter Psychotherapie. *Psychotherapeut, 60,* 433-440. doi: 10.1007/s00278-015-0038-3.

Study 3:

Böckermann, M., Gieselmann, A.,& Pietrowsky, R. (2014). What does nightmare distress mean? Factorial structure and psychometric properties of the Nightmare Distress Questionnaire (NDQ). *Dreaming*, *24*, 279-289. doi: 10.1037/a0037749

Study 4:

Böckermann, M., Gieselmann, A., Sorbi, M.J., & Pietrowksy, R. (under review). The effects of an internet-based imagery rehearsal intervention: A randomized controlled trial. *Psychotherapy and Psychosomatics.*

Entwicklung und Evaluation einer internetbasierten geleiteten Selbsthilfe-Intervention zur Bewältigung von Albträumen

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Zusammenfassung

Hintergrund: Dieser Artikel beschreibt die Entwicklung eines internetbasierten geleiteten Selbsthilfe Trainings (Albtraumcoach) zur Bewältigung von Albträumen, das innerhalb zweier Pilotstudien auf seine Durchführbarkeit und Anwendbarkeit getestet wurde. *Methoden:* Innerhalb eines neunstufigen Modells wird die Entwicklung der Intervention beschrieben. Dabei wird neben der wissenschaftlichen Evidenz, die die Basis für die Intervention bildet, auf technische, ethische, datenschutzrechtliche und weitere spezifische Maßnahmen innerhalb der Interventionsentwicklung eingegangen. In zwei Pilotstudien evaluierten zudem 10 Personen mit schlechten Träumen in der Vergangenheit die Durchführbarkeit (Studie 1) und 12 Personen mit wiederkehrenden Albträumen die Anwendbarkeit sowie den Nutzen der Intervention (Studie 2). Abhängige Variablen waren die Qualität der einzelnen Sitzungen, die Zufriedenheit mit der Intervention sowie Albtraumfrequenz, Albtraumbelastung, Schlafqualität und Depressivität. *Ergebnisse und Diskussion:* Die Durchführbarkeit und Anwendbarkeit des Trainings wurden positiv beurteilt. Während die Dropout Rate verhältnismäßig hoch war, ergaben sich erste, zurückhaltend zu beurteilende, Hinweise für einen Nutzen der Intervention.

SCHLÜSSELWORTE: Albtraum, Imagery Rehearsal Therapy, webbasierte Therapie

Abstract

Background: This article presents the development of a web-based guided self-help intervention aimed at effectively coping with nightmares. Two pilot studies tested the feasibility and applicability of this intervention. *Methods:* The description of the development of the intervention is based on a 9 stepped model, which includes technical, ethical and data privacy aspects as well as other specific precautions. In pilot 1, the feasibility of the training was tested with 10 participants who in the past had suffered from bad dreams. In pilot 2, 12 persons with recurrent nightmares evaluated the applicability and utility of the intervention. Dependent variables were: quality of the separate sessions, satisfaction with the intervention, nightmare frequency, nightmare distress, sleep quality and depression. *Results and discussion.* The training through the internet yielded good evaluations of its feasibility and utility. Preliminary indications of training benefits were obtained. The drop-out rate was relatively high, however.

Entwicklung und Evaluation einer internetbasierten begleiteten Selbsthilfe-Intervention zur Bewältigung von Albträumen

Albträume werden nach dem Diagnostischen und Statistischen Manual Psychischer Störungen (DSM-5; American Psychological Association APA, 2013) als anhaltende, extrem dysphorische Träume definiert. Nach dem Aufwachen wird der Albtraum erinnert und der Träumer ist schnell orientiert. Albträume gehen mit physiologischen Symptomen wie Schwitzen und Kurzatmigkeit einher und können einen idiopathischen Ursprung haben oder als Folge von traumatischen Erlebnissen auftreten. Die vorherrschende Emotion ist Angst (Köthe & Pietrowsky, 2001), wobei auch andere Emotionen, wie Wut, Scham oder Trauer mit Albträumen assoziiert sein können (Schredl, 1999).

Albträume und die Albtraum-Störung sind ein weit verbreitetes Phänomen. So liegt die Punktprävalenz für wiederkehrende Albträume bei 2-5 % (Li, Zhang, Li& Wing, 2010; Schredl, 2010). Chronische Albträume gehen mit der Beeinträchtigungen der Schlafqualität (Lancee & Schrijnemakers, 2013), erhöhter Angst- und Depressionswerten (Zadra & Donderi, 2000) sowie mit allgemeiner Psychopathologie und Einschränkungen des Wohlbefindens (Levin & Fireman, 2002) einher.

Jedoch sind Albträume allein selten ein Grund, professionelle Hilfe aufzusuchen. Dies könnte unter anderem daran liegen, dass häufig nicht bekannt ist, dass Albträume wirksam behandelt werden können (Thünker & Pietrowsky, 2011). Zudem suchen nur wenige Betroffene professionelle Hilfe (Schredl, 1999). Hier kann das Internet eine Brücke schlagen.

Metanalysen belegen die Wirksamkeit internetbasierter Interventionen, insbesondere in der Behandlung von affektiven Störungen und Angststörungen (vgl. Cuijpers, Donker, van Straten, Li & Andersson, 2010). Auch für Schlafstörungen (Lancee, van den Bout, Sorbi & van Straten, 2013) wurden wirksame Internetinterventionen entwickelt.

Im vorliegenden Artikel berichten wir über die Entwicklung einer internetbasierten begleiteten Selbsthilfe-Intervention für Albträume. Die Entwicklung beinhaltet auch die Ergebnisse

zweier Pilotstudien zur Erhebung der Anwendbarkeit der Intervention. Die Pilotstudien dienten einer ersten Beantwortung der Frage, inwiefern die Selbsthilfe-Intervention als Ganzes und dessen einzelne Sitzungen durchführbar sind. In der zweiten Pilotstudie sollte die Anwendbarkeit der Intervention getestet werden und der erlebte Nutzen des Trainings grob erfasst werden.

Methoden

Entwicklung des Albtraumcoaches

Bei der Entwicklung orientierten wir uns an dem Modell zur Entwicklung von internetbasierten Interventionen (IBI), wie es von Ritterband et al. (2003) beschrieben wurde.

Schritt 1: Identifikation des Problemfeldes. Hier widmeten wir uns der Frage, inwiefern die Notwendigkeit für die Entwicklung eines Selbsthilfe Trainings für Albträume besteht. Aufgrund der obigen Darstellung ergaben sich klare Hinweise für die Notwendigkeit und Sinnhaftigkeit der Entwicklung einer internetbasierten Selbsthilfeintervention für Albträume.

Schritt 2: Bestimmung von wirksamen Therapieverfahren. Ritterband et al. (2003) beschreiben die Notwendigkeit, die Wirksamkeit von verschiedenen Behandlungsmöglichkeiten zu inventarisieren. In zahlreichen Studien (Hansen Höfling, Kröner-Borowik, Stangier & Steil, 2013, für eine gute Übersicht) wurde insbesondere die Wirksamkeit von kognitiv-behavioralen Ansätzen in der Behandlung von Albträumen nachgewiesen. Neben den häufig angewandten Expositionsverfahren wurde die Imagery Rehearsal Therapy (IRT) in zwei Metaanalyasen (Hansen Höfling et al., 2013; Augedal, Hansen, Kronhaug Harvey & Pallesen, 2013) und in einem Übersichtsartikel (Lancee, Spoormaker, Krakow & van den Bout, 2008) als die meist untersuchte und wirksamste Möglichkeit zur Behandlung von Albträumen identifiziert. Bei der IRT lernt der Klient, nach der detaillierten Rekonstruktion des Albtraums, das Albtraumskript im Wachzustand so zu ändern, dass ein ähnlicher, aber nicht mehr so angstbesetzter Traum entsteht. Kognitive Umstrukturierung durch das Aufbrechen des Albtraumskriptes (Spoormaker, 2008) oder die durch IRT verbesserte Fähigkeit,

belastende Albtraumelemente zu meistern (Germain et al., 2004), wurde als mögliche Wirkmechanismen beschrieben. Die IRT erwies sich auch dann als wirksam, wenn sie als reines Selbsthilfetraining angeboten wurde (Lancee, Spoormaker & van den Bout, 2010).

Schritt 3: Operationalisieren des Therapieverfahrens. Das hier angewandte Manual (Thünker und Pietrowsky, 2011) wurde auf Basis der IRT entwickelt. Es richtet sich an Personen mit idiopathischen und traumatischen Albträumen und erwies sich im Rahmen einer randomisierten kontrollierten Studie für beide Arten von Albträumen als wirksam (Thünker & Pietrowsky, 2012). Die Inhalte dieses Manuals wurden für die Gestaltung des Trainings übernommen. Teilnehmende begannen mit einer Psychoedukation über die Ziele des Trainings sowie über Ätiologie und Behandlung von Albträumen, Regeln der Schlafhygiene und einer Einführung in die Albtraumdokumentation (Sitzung 1). Anschließend erlernten sie ein Entspannungsverfahren (Sitzung 2) und trainierten ihre Imaginationsfähigkeiten (Sitzung 3). Es folgte eine ca. vier Wochen andauernde Phase der Albtraumveränderung nach den Prinzipien der IRT (Sitzung 4-7). Das Training endete mit einer Abschlusssitzung zur Reflexion der erzielten Veränderungen (Sitzung 8).

Schritt 4: Berücksichtigung juristischer und ethischer Aspekte. Die Studie wurde von der Ethikkommission der Deutschen Gesellschaft für Psychologie (DGP) als ethisch unbedenklich eingestuft. Die zu klärenden Punkte umfassten insbesondere den sicheren Ausschluss von Personen, bei denen eine Intervention ohne persönlichen Kontakt, kontrainduziert ist. Diesem Problem konnte durch die obligate Einbindung eines telefonischen Interviews durch einen Klinischen Psychologen vor Beginn der Intervention begegnet werden (siehe Methodenabschnitt der 2. Pilotstudie). Des Weiteren erfolgte die Entwicklung und Implementierung des Albtraumcoachs in Absprache mit dem Datenschutzbeauftragten der Heinrich- Heine- Universität Düsseldorf (HHU). Die Studie wurde ins Verfahrensverzeichnis der HHU aufgenommen und erfüllt die datenschutzrechtlichen Anforderungen des Datenschutzgesetzes NRW. Da die Datenspeicherung und Sicherung von einer Niederländischen Firma übernommen wurde (siehe Schritt 5) wurden Maßnahmen zur IT-Sicherheit, basierend auf § 10

DSG NRW und § 9 BDSG, umgesetzt. Die Maßnahmen beinhalteten die verschlüsselte Speicherung von Daten, ein sicheres Passwort Management, automatisches Abmelden bei längerer Inaktivität sowie die verschlüsselte Übertragung beim Exportieren der Daten.

Schritt 5: Umwandeln von Therapieelementen mit Hilfe von Internet/Computer Applikationen. Internetbasierte Interventionen sollten laut Ritterband et al. (2003) Komponenten beinhalten, die das technische Potential des Internets (Audio, Grafiken, Videos) nutzen, um die Interventionen gegenüber "einfachen Selbsthilfebüchern" weiterzuentwickeln. Für das Angebot der Intervention über das Internet wurde ein ‚Content Management System' (CMA) benutzt, welches an der Universität Utrecht, Niederlande, zu diesem Zweck entwickelt wurde (MyCareCMS^{TM}). Ein CMS ist eine Software Applikation, die verschiedenste Funktionen beinhaltet und die je nach Bedürfnis benutzt werden oder unbenutzt bleiben können. Beispiele sind Symptom- oder Verhaltenstagebücher, Einsatz von Audio, Video und einer Erzählerstimme für Texte (voice over), separate Menüknöpfe für Hausarbeiten (mit Abspeicherung und Druckfunktion), spezifische Übungen sowie eine "Bibliothek", in welcher Hintergrundinformationen hinterlegt werden können. Zudem beinhaltet das CMS ein mehrschichtiges ‚Back Office': Hier können (1) Therapeuten (Coaches) und (2) Supervisoren den Trainingsverlauf der Teilnehmenden nachverfolgen und mit ihnen Kontakt aufnehmen. Zudem (3) können Inhalte der Intervention verändert oder Instrumente hinzugefügt werden sowie erhobene Daten exportiert werden. MyCareCMS^{TM} wurde erstmals in 2008/2009 in Zusammenarbeit mit einer Patienten Fokusgruppe für eine Internetintervention zur Bewältigung von Migräne entwickelt. Nachdem die Durchführbarkeit erfolgreich festgestellt wurde (Sorbi & van der Vaart, 2010), konnte das CMS bereits für andere Anwendungen benutzt werden, die sich als wirksam erwiesen haben (Lancee et al., 2013). Für den Albtraumcoach wurden ein Albtraumtagebuch und -monitor geschaffen, in denen die Teilnehmenden über eine Kalenderfunktion ihre Albträume eintragen konnten. Im Albtraummonitor erhalten die Teilnehmer dann eine graphische Übersicht über die Entwicklung ihrer Albträume. Der Entspannungs- und Imaginationsteil der Intervention beinhaltete Audiodateien. Außerdem wurde ein vereinfachtes E-Mail-Programm in die Applikation

integriert. Hierüber konnte der Coach mit den Teilnehmenden kommunizieren. Über automatisierte Fragemodelle (Multiple Choice, Offene Fragen, etc.). konnten Teilnehmer ihre Meinung und Erfahrungen zu einzelnen Trainingsbausteinen mitteilen. Die Antworten konnten vom Coach eingesehen werden. Das einheitliche Design der Homepage sowie der verwendeten Bilder und Grafiken wurden durch einen studierten Mediendesigner entwickelt.

Schritt 6: Personalisierung der Intervention. An verschieden Stellen wurde die Intervention persönlich auf die Bedürfnisse der Teilnehmenden zugeschnitten. In Abhängigkeit von der Art und Diversität der Albträume wurden unterschiedliche Trainingsbausteine empfohlen und alle Teilnehmenden wurden persönlich mit ihrem Namen angeschrieben. Zudem konnte jeder Teilnehmende selbst entscheiden, welche Arbeitsblätter er in seinen "persönlichen Bereich" abspeichern wollte.

Schritt 7: Einbauen von Feedback-Möglichkeiten. Bei der Intervention handelt es sich um eine Selbsthilfe Intervention, die selbstständig durchlaufen werden kann. Jedoch wurde die Intervention in einer begleiteten Form angeboten, sodass die Teilnehmer Rückmeldungen von einem Coach bekamen. Diese Rückmeldungen gliederten sich in therapeutisches und unterstützendes Feedback.

Die Identifizierung geeigneter therapeutischer Rückmeldungen erfolgte mit Hilfe von Expertenratings. Fünf Experten auf dem Gebiet der Erforschung und Behandlung von Albträumen wurden gebeten, einzuschätzen, wie wichtig es aus ihrer Sicht nach den einzelnen Sitzungen sei, ein therapeutisches Feedback zu geben (7-stufige Likert-Skala). Zudem konnten sie drei Sitzungen bestimmen, nach denen ein therapeutisches Feedback aus ihrer Sicht am wichtigsten ist. Auf diese Weise konnten für Teilnehmende mit idiopathischen Albträumen drei (Sitzung 4, 5 und 7), für Teilnehmende mit posttraumatischen Albträumen vier Feedbackmomente (Sitzung 3,4,5 und 7) identifiziert werden. Die Experten gaben ebenfalls Hinweise darauf, welche inhaltlichen Rückmeldungen aus ihrer Erfahrung hilfreich sind.

Das unterstützende Feedback wurde nach jeder Sitzung gegeben und unterteilte sich in motivationale Rückmeldungen und technische Hilfestellungen (bei Bedarf). Die Rückmeldungen wurden von einem klinischen Psychologen mit Master-Abschluss, aktuell in Weiterbildung zum Psychologischen Psychotherapeuten und einer Psychologischen Psychotherapeutin, gegeben. Zuvor fand eine eintägige Schulung zur Behandlung von Albträumen statt, die von einer Autorin des Therapiemanuals zur Behandlung von Albträumen (Thünker & Pietrowsky, 2011) geleitet wurde.

Schritt 8: Entwicklung der Internet-Intervention. Das CMS wurde in Zusammenarbeit mit der niederländischen Software Firma infi.bv entwickelt. Besonderen Wert wurde darauf gelegt, dass alle Inhalte innerhalb der zur Verfügung stehenden Internet-Browsern nutzbar sind und auch bei wenig Interneterfahrung verstanden werden. Das CMS ermöglicht es, oben beschriebene Internet-Komponenten (siehe Schritt 5) variabel zuzufügen.

Schritt 9: Test der Internet-Intervention. Hilgart, Ritterband, Thorndike und Kinzie (2012) betonen die Wichtigkeit der Qualität der Homepage auf das Nutzungsverhalten. So konnten Kerr, Murray, Stevenson, Gore und Nazerath (2006) zeigen, dass sowohl die Qualität des Inhalts der Webseite, als auch die Art, wie der Inhalt präsentiert wird als wichtige Kriterien für die Qualität einer Internet Intervention darstellen. Die Präsentation der Inhalte bezieht sich unter anderem auf eine klare Navigationsstruktur, ein ansprechendes Design sowie leserliche, klare Texte. Daher war es von großer Wichtigkeit, das Training im Rahmen zweier Pilotstudien auf seine Durchführbarkeit und Anwendbarkeit hin zu testen. In der ersten Pilotstudie widmeten wir uns der Fragestellung, inwiefern das Training und die einzelnen Sitzungen durchführbar sind. Hierbei richtete sich das Augenmerk auf die Qualität der zur Verfügung gestellten Informationen, die Gebrauchstauglichkeit (Navigation) der Homepage sowie die Wahrnehmung des Designs. In der zweiten Pilotstudie wurde die Anwendbarkeit getestet. Hierbei lag der Fokus darauf, wie leicht es den Teilnehmenden gefallen ist, die einzelnen Sitzungen zu absolvieren und wie viel Zeit sie dafür aufwendeten. Wir widmen uns

ebenfalls der Frage, wie die Probanden die Rückmeldungen von ihrem Coach beurteilen. Gleichzeitig sollte eine erste Erhebung des erlebten Nutzens des Trainings durchgeführt werden.

Pilotstudie 1

Teilnehmende. An der Studie nahmen 10 volljährige, gesunde Personen (7 Frauen) zwischen 21 und 56 Jahren (*M* = 34.72, *SD* = 15.61) teil. Die Teilnehmenden hatten aktuell oder in der Vergangenheit „schlechte Träume“, konnten sich mindestens an einen schlechten Traum detailliert erinnern und besaßen einen funktionierenden Internetanschluss. Rekrutiert wurden die Teilnehmenden über E-Mail-Verteiler. Sie erklärten schriftlich ihr Einverständnis zur Teilnahme.

Ablauf. Interessierte registrierten sich auf der Homepage www.albtraumcoach.de für die Studie. Nachdem eine schriftliche Einverständniserklärung vorlag, wurden die Teilnehmenden für den Trainingsbereich des „Albtraumcoachs“ freigeschaltet. Sie durchliefen das Training und füllten unten beschriebenen Fragebögen zur Evaluation der jeweiligen Sitzungen und zur Beurteilung des Gesamttrainings aus.

Messinstrumente. Die Durchführbarkeit des Albtraumcoaches wurde durch das ins Deutsche übersetzte *Computer System Usability Questionnaire* (CSUQ; Lewis, 1995) erfasst, wobei das Wort „Software“ durch „Homepage“ ersetzt wurde. Der Fragebogen umfasst 19 Fragen, z.B. „Die Homepage war einfach zu benutzen“, die auf einer 7-stufigen Likert-Skala (1 = stimme ich überhaupt nicht zu, 7 = stimme ich voll und ganz zu) beantwortet werden. Die Reliabilität des Fragebogens ist in der vorliegenden Stichprobe mit $\alpha = .89$ als sehr gut zu beurteilen.

Zusätzlich wurden die Teilnehmenden gebeten, nach jeder Sitzung einige Fragen zur Anwendbarkeit zu beantworten. Diese Fragen bezogen sich pro Sitzung auf die Qualität der Navigationsstruktur, die Aufmachung, die Zielsetzung, die Lesbarkeit der Texte sowie den erlebten Spaß und wurden auf einer 7-stufigen Likert-Skala beantwortet, z. B. "Es fiel mir leicht, mich durch die dritte Sitzung zu klicken".

Pilotstudie 2

Teilnehmende. Einschlusskriterien bei der zweiten Studie waren Volljährigkeit, das Vorhandensein chronischer Albträume (> 6 Monate) mit mindestens einem Albtraum pro Woche sowie die Fähigkeit, mit Computer und Internet umzugehen. Ausschlusskriterien waren schwere depressive Symptome (ein Wert > 23 auf der Allgemeinen Depressions-Skala ADS; Hautzinger & Bailer ,1993), aktuelle Suizidalität (ein Wert > 7 auf der selbst ins Deutsche übersetzten Suicide Behaviors Questionnaire- Revised SBQ-R; Osman et al. 2001), Posttraumatische Belastungsstörung (ein Wert > 0 auf der Impact of Event Scale-Revised IES-R; Maercker & Schützwohl, 1998), dissoziative Symptome (ein Wert ≥ 8 auf der Somatoform Dissociation Questionnaire SDQ-5; Nijenhuis, Spinhoven & Van Dyck,1997), psychotische Symptome (ein Wert ≥ 13 auf der deutschen Übersetzung des Dutch Screening Device for Psychotic Disorder; Lange, Schrieken, Blankers, van de Ven & Slot, 2000), Drogen- oder Alkoholmissbrauch (Alcohol Use Disorders Identification Test, AUDIT; Saunders, Aasland, Babor, de la Fuente & Grant,1993) sowie der regelmäßige Konsum von psychotroper Medikation.

Von ursprünglich 31 Personen mit wiederkehrenden Albträumen, die alle Screening-fragebögen ausfüllten, mussten 19 Personen ausgeschlossen werden, da sie nicht die oben genannten Einschlusskriterien erfüllten. Zwölf Personen begannen mit dem Training. Davon brachen fünf Personen das Training vorzeitig ab (*n* =1, keine Albträume mehr; *n*=1, keinen Internetzugang mehr; *n*=1, Schwierigkeiten mit Anforderungen an ihre Computer Fertigkeiten; *n*=2, Gründe unbekannt). Sieben Teilnehmer (davon 6 Frauen) beendeten das Training. Dies entsprach eine Drop-Out-Rate von 42 %.

Ablauf. Die Probanden wurden auf die Homepage der Internet-Intervention (www.albtraumcoach.de) geleitet. Dort bekamen sie erste Informationen zur Intervention, zum Datenschutz, zu den Ein- und Ausschlusskriterien und dem Ablauf der Studie. Um sich für die Studie zu registrieren, wählten sie Nutzername und Passwort. Die ordnungsmäßige Registrierung setzte voraus, dass die Teilnehmenden eine elektronische Einverständniserklärung abgaben und zusagten,

sich in Notfällen an entsprechende Einrichtungen zu wenden. Danach wurden sie gebeten, die oben beschriebenen Screening-Fragebögen auszufüllen. Personen, die die Einschlusskriterien erfüllten, wurden per E-Mail zu einem telefonischen Interview eingeladen. Während dieses Interviews wurde die Sektionen Affektive Störungen und Posttraumatische Belastungsstörung des Strukturierten Klinischen Interviews für Psychische Störungen (SKID; Wittchen, Zaudig & Fydrich, 1997) durchgeführt und es wurde überprüft, ob die berichteten Albträume den Kriterien des DSM-IV entsprachen. Waren die Teilnehmenden auch nach dem Interview geeignet, wurden sie zum Training zugelassen und konnten mit dem Training beginnen. Nach Abschluss des Trainings füllten sie die Fragebögen zur Erhebung der Anwendbarkeit und Nutzen des Trainings aus.

Messinstrumente. Neben der bereits für Pilotstudie 1 beschriebenen Fragebögen zur Erhebung der Durchführbarkeit wurde zur Erhebung des Nutzens des Trainings und Zufriedenheit mit der Intervention der Fragebogen zur Patientenzufriedenheit (ZUF-8, Schmidt, Lamprecht & Wittmann, 1989) eingesetzt. Der ZUF-8 besteht aus acht Fragen und erfasst, wie zufrieden Personen mit einer Behandlung sind. Die Antworten werden auf einer 4-stufigen Likert-Skala (1= sehr unzufrieden, 4=sehr zufrieden) gegeben. Die Reliabilität des ZUF-8 ist mit $\alpha = .90$ als sehr gut zu beurteilen (Kriz, Nübling, Steffanowski, Wittmann & Schmidt, 2008).

Die Albtraumfrequenz wurde retrospektiv erfasst („Wie viele Albträume hatten Sie in der vergangenen Woche?“; vgl. Thünker & Pietrowsky, 2011). In Anlehnung der Studie von Blagrove, Farmer und Williams (2004) gaben wir den Teilnehmenden keine Albtraumdefinition vor, sodass "schlechte Träume", die nicht zum Aufwachen führen, mit in die Frequenzangabe einfließen.

Die Albtraumbelastung wurde durch die deutsche Übersetzung des Nightmare Distress Questionnaires (NDQ; Belicki, 1992) gemessen. Dieser, in deutscher Version noch nicht validierte Fragebogen, hat in der englischen Originalversion eine gute Reliabilität $\alpha = .83$ -.88.

Die subjektive Schlafqualität wurde durch die deutsche Übersetzung des Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman & Kupfer, 1989) erfasst.

Datenauswertung und statistische Analyse. Die Datenauswertung erfolgte mit SPSS. Neben deskriptiven Statistiken wurden einseitige *t*-Tests für verbundene Stichproben durchgeführt. Dabei wurde ein Signifikanzlevel von $p < 0.05$ gewählt.

Ergebnisse

Studie 1

Die Ergebnisse des CSUQs weisen darauf, dass die Teilnehmenden insgesamt mit der Homepage des Albtraumcoaches zufrieden waren. Die Qualität des Interfaces wurde als ansprechend, die Qualität der durch die Homepage vermittelten Informationen als verständlich sowie die Benutzbarkeit der Homepage als gut bewertet (siehe Tabelle 1).

>> Hier Tabelle 1 einfügen >>

Neben der Evaluation der Homepage bewerteten die Teilnehmenden auch jede einzelne Sitzung nach verschiedenen Kriterien. Dabei fiel es den Teilnehmenden leicht, sich durch die Sitzung zu navigieren. Die Aufmachung der jeweiligen Sitzungen wurde durchgehend als ansprechend beurteilt und die Zielsetzungen sind den Teilnehmenden deutlich geworden. Die Texte wurden durchgehend als gut lesbar bewertet. Einzig der Spaß beim Absolvieren der Sitzungen wurde im Gegensatz dazu durchgehend als vergleichsweise gering eingeschätzt (siehe Tabelle 2).

>> Hier Tabelle 2 einfügen >>

Studie 2

Anwendbarkeit der Homepage. Die guten Ergebnisse bezüglich der Beurteilung der Homepage mit Hilfe des CSUQ (siehe Tabelle 2) konnten auch in der zweiten Pilotstudie gefunden werden. Gleichzeitig zeigten sich die Teilnehmenden sehr zufrieden mit dem Training, das ihnen geboten wurde. Auf der 4-Punkte-Skala des ZUF bewerteten die Teilnehmenden das Training mit 3.58 (*SD* = 0.51).

Im Durchschnitt benötigten die Teilnehmer 27.84 Min. (*SD* = 8.12) zum Absolvieren einer Sitzung. Mit der letzten Sitzung beschäftigten sie sich durchschnittlich nur 10 Min. (*SD* = 7.45).

Während die Teilnehmenden das Absolvieren der ersten (*M*=6.33, *SD*=0.52), sechsten (*M*=6.60, *SD*=0.59), siebten (*M*=6.40, *SD*=0.89) und achten (*M*=6.83, *SD*=0.41) Sitzung sehr leicht fanden, fiel es Ihnen in der dritten (Imagination; *M*=5.25; *SD*=1.28), vierten (Albtraumrekonstruktion und Albtraumanalyse; *M*=5.14, *SD*=1.46) und fünften Sitzung (Erstellen neuer Elemente *M*=5.50, *SD*=0.59) etwas schwerer. Am schwersten fiel ihnen die zweite Sitzung (M=4.00, *SD*= 2.38), in der die Teilnehmenden ein Entspannungstraining durchführen sollten.

Wie wurde der persönliche Coach wahrgenommen? Die teilnehmenden Personen hatten sehr stark das Gefühl, dass während des Trainings individuell auf sie eingegangen wurde (*M* = 6.83, *SD* = .41). Gleichzeitig schätzen die Teilnehmenden die Rückmeldungen durch einen Coach als wichtigen Bestandteil des Trainings ein (*M* = 5.83, *SD* = 1.47) und gaben an, dass die Rückmeldungen sie moderat motiviert haben, das Training fortzusetzen (*M* = 5.67, *SD* = 1.51).

Nutzen der Intervention. Während die Anzahl an Albträumen pro Woche im Prä-Post-Vergleich nicht signifikant abnahm, kam es zu einer signifikanten Reduktion ($t(5) = 2.02$, $p = .05$) der Anzahl der Albträume pro Monat (prä: *M* = 13.83, *SD* = 4.17; post: *M* = 8.83, *SD* = 6.3).

Zudem fühlten sich die Teilnehmenden nach dem Training weniger durch ihren Albträumen beeinträchtigt als vorher ($t(5) = 3.65$, $p < .01$; prä: *M* = 3.03, *SD* = 0.51; post: *M* = 2.26, *SD* = 0.56). Gleichzeitig verbesserte sich die allgemeine Schlafqualität im Prä-Post-Vergleich signifikant ($t(5) = 2.54$, $p < .05$; prä: *M* = 7.67, *SD* = 2.81; post: *M* = 5.33, *SD* = 3.72), ebenfalls wie die Depressionswerte, die sich signifikant verringerten ($t(5) = 4.30$, $p < .01$; prä: *M* = 12.50, *SD* = 4.93; post: *M* = 7.83, *SD* = 6.70).

Diskussion

Im vorliegenden Artikel berichteten wir über die Entwicklung des Albtraumcoaches, einer internetbasierten Selbsthilfe-Intervention zur Bewältigung von Albträumen. Die Durchführbarkeit und Anwendbarkeit des Albtraumcoachs konnte sowohl in seiner Gesamtheit als auch in seinen

einzelnen Sitzungen als positiv bewertet werden. Weiterhin ergaben sich erste Hinweise darauf, dass das Training die Albtraumfrequenz und -belastung positiv beeinflusst.

Jedoch ist, trotz der als positiv zu bewertenden Anwendbarkeit, die Drop-Out-Rate mit 42 % etwas höher als die Quote, die von Erin Mathieu, McGeechan, Barratt und Herbert (2013) in ihrer Übersichtsarbeit bei (vornehmlich) internetbasierten Studien gefunden wurde. Es lässt sich vermuten, dass das sich über acht Sitzungen erstreckende Training im Verhältnis zu dem vermittelten Inhalt für die spezifische, vergleichsweise weniger belastete Zielgruppe, zu lang ist. Auch in anderen Studien wurde die Imagery Rehearsal Therapy als Kurzzeitintervention (single session intervention) angeboten und zeigte sich als wirksam (Neidhardt, Krakow, Kellner & Pathak, 1992). Daher wäre eine Kürzung des Trainings sinnvoll und im Einklang mit der Argumentation von Ritterband et al. (2009), dass bereits Kernelemente einer Internetintervention zur Symptomenreduktion ausreichen und dass zu lange Interventionen zu frühzeitigem Dropout und schlechterer Wirksamkeit führen können. Die Tatsache, dass es wenig Evidenz für die Wirksamkeit von Entspannungstechniken in der Albtraumbewältigung gibt (Burgess, Gill & Marks, 1998), erscheint uns das Weglassen der Entspannungsintervention sinnvoll. Auch wenn manualisierte IRT-Programme oft auch eine Einführung in Entspannungstechniken beinhalten (Lancee et al., 2010; Thünker & Pietrowsky, 2011), ist ein Entspannungseffekt kein essentieller Wirkmechanismus der IRT-Behandlung (Spoormaker, 2008). In der vorliegenden Studie fiel es den Teilnehmenden zudem schwer, die Entspannungssitzung durchzuführen. Eine weitere Kürzung des Trainings erscheint möglich, da das Absolvieren der Sitzungen insgesamt mit einem eher geringem Zeitaufwand verbunden war. So könnten die Sitzungen 4-7, die inhaltlich ähnlich sind, von vier auf drei Sitzungen gekürzt werden. Dies würde das Training von insgesamt acht auf sechs Sitzungen verkürzen. Neben der Kürzung scheinen weitere Maßnahmen zur Steigerung der Trainingscompliance und zur Verringerung der Drop-Out-Rate wichtig. Zeitprobleme werden immer wieder als Grund für das vorzeitige Beenden von Interventionen und Therapien angegeben (Bados, Balaguer & Salanda, 2007). Strategien zur Verbesserung der projektiven Zeitplanung sollten zugefügt werden. Teilnehmende könnten vorab und während des Trainings gebeten werden anzugeben, wann sie die einzelnen Aufgaben einer

Intervention erledigen wollen (Cox, Tisdelle & Culbert, 1988). Desweiteren könnte ein effektiveres Erinnerungssystem, z.B. per E-Mail (Cavanagh, 2010) geschaffen werden.

Außerdem berichteten die Teilnehmenden, vergleichsweise wenig Spaß bei der Absolvierung der Intervention gehabt zu haben. Dies ist jedoch weniger verwunderlich, da sie sich mit ihren belastenden Albträumen auseinandersetzen und da kognitive Vermeidung ein Faktor in der Entstehung von wiederkehrenden Albträumen zu sein scheint (Spoormaker, 2008). Zudem war es die herausfordernde Aufgabe der Teilnehmenden, täglich ihre Albträume zu dokumentieren. Abhängig davon, wie viele Albträume die Teilnehmenden haben, war dies mit einem erheblichen Zeitaufwand sowie einer notwendigen Veränderung der alltäglichen Morgenroutine verbunden. Berücksichtigt man dies, ist es umso wichtiger, die Motivation und das Gefühl der "Einbezogenseins" ("Engagement", vgl. Ritterband et al., 2009) der Teilnehmenden durch explizite Verstärkungen nach der Sitzung (durch den Coach) oder in Form von auflockernden, testenden Multiple Choice Fragen (z. B.: Was ist das am häufigsten vorkommende Albtraumthema?) zu stärken.

Trotz der geringen Teilnehmerzahl lieferte die zeitintensive und ausführliche Entwicklungsphase des Albtraumcoachs wichtige, oben genannte, Hinweise zur Verbesserung der Intervention. Zu diesem Zeitpunkt kann zusammenfassend festgestellt werden, dass mit dem Albtraumcoach eine durchführbare und anwendbare Intervention zur Bewältigung von Albträumen vorliegt, die in der letzten Entwicklungsphase, nach der Umsetzung oben genannter Verbesserungsmöglichkeiten, im Rahmen einer randomisierten kontrollierten Studie auf ihre Wirksamkeit getestet werden kann.

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Abbildungslegenden

Tabelle 1. Benutzerfreundlichkeit der Homepage www.albtraumcoach.de

Tabelle 2. Bewertung der einzelnen Sitzungen des internetbasierten Albtraumtrainings nach Qualität der Navigation, Aufmachung, Zielsetzung, Lesbarkeit, Spaß (*N* = 10)

Tabelle 1

Benutzerfreundlichkeit der Homepage www.albtraumcoach.de

	Studie 1 (*N*=10)		Studie 2 (*N*=7)	
Subskalen des CSUQ	*M**	*SD*	*M**	*SD*
Gesamtzufriedenheit	6.11	0.93	6.00	2.45
Qualität der Informationen	5.93	1.03	5.67	1.19
Qualität des Interfaces	6.06	0.71	5.72	1.73
Benutzbarkeit der Homepage	6.07	0.74	5.88	1.25

Anmerkungen: *Antworten auf einer Likert-Skala von 1 (stimme überhaupt nicht zu) bis 7 (stimme voll und ganz zu); CSUQ = Computer System Usability Questionnaire

Tabelle 2

Bewertung der einzelnen Sitzungen des internetbasierten Albtraumtrainings nach Qualität der Navigation, Aufmachung, Zielsetzung, Lesbarkeit, Spaß (*N* = 10)

Sitzung	Navigation		Aufmachung		Zielsetzung		Lesbarkeit		Spaß	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	6.06	1.03	6.06	.97	6.24	1.03	6.53	.62	5.24	1.25
2	6.33	1.05	6.13	1.19	6.47	.64	6.40	.83	5.13	1.73
3	6.67	.65	6.25	1.06	6.33	.78	6.25	.87	5.33	1.50
4	6.18	.87	6.55	.82	6.64	.51	6.73	.47	4.36	1.43
5	6.50	.85	6.50	.71	6.70	.48	6.60	.70	4.70	1.34
6	6.70	.48	6.40	.70	6.70	.48	6.60	.52	5.30	1.06
7	6.00	1.25	6.40	.70	6.50	.71	5.90	1.29	5.50	1.42
8	5.90	1.10	6.40	.52	5.90	1.00	-	-	5.90	1.10

Anmerkungen. Antworten auf einer Likert-Skala von 1 (stimme überhaupt nicht zu) bis 7 (stimme voll und ganz zu); - fehlende Daten

Internetbasierte Gesundheitsinterventionen:

Eine Evaluation aus der Perspektive von Patienten vor und während ambulanter Psychotherapie

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Zusammenfassung

Internetbasierte Gesundheitsinterventionen stellen nur dann eine sinnvolle Ergänzung der Regelversorgung dar, wenn sie von den Patienten angenommen werden. Daher wurden Psychotherapiepatienten und Personen, die sich auf der Warteliste für eine ambulante Psychotherapie befanden, befragt und ihre Einstellungen mit einer gematchten Kontrollgruppe verglichen. Im Vergleich zur Kontrollgruppe berichteten insbesondere die Befragten der Warteliste über ein geringeres Interesse an internetbasierten Interventionen und beide Patientengruppen nahmen weniger Vorteile wahr. Alle Gruppen schätzten die erhöhte Flexibilität, die mit internetbasierten Interventionen einhergeht. Jedoch sahen die beiden Patientengruppen in der größeren Anonymität und der gesenkten Hemmschwelle, Hilfe aufzusuchen, weniger einen Vorteil als die Kontrollgruppe. Hingegen sorgten sich die Patienten stärker um den Datenschutz sowie darum, dass das Geschriebene falsch interpretiert werden könnte. Beide Patientengruppen konnten sich eine Behandlung für weniger Störungsbilder vorstellen als die Kontrollgrupe. Insbesondere konnten sie sich die Behandlung der Panikstörung, posttraumatischer Belastungsstörung, Depressionen und generalisierter Angststörung am wenigsten vorstellen, obwohl hierzu relativ viele Angebote bestehen. Es scheint Interesse an Programmen zur Behandlung sexueller Funktionsstörungen zu geben. Zur Berücksichtigung der Vorbehalte bezüglich des Datenschutzes könnten Angebote durch Papier-und-Bleistift-Registrierungen ergänzt werden. Auch durch ein deutliches Hervorheben, dass die Möglichkeit zur Kontaktaufnahme zu einem Therapeuten besteht sowie durch persönliche Kontakte von Angesicht zu Angesicht oder per Videokonferenz könnten internetbasierte Angebote stärker auf die Bedürfnisse der Patienten ausgerichtet werden.

Schlüsselwörter: Internetbasierte Gesundheitsintervention; Psychotherapie; Einstellungen; Patienten; Warteliste

Abstract

Internet-based health interventions serve as useful supplement of therapy only if they are accepted by the clients. To address this issue, psychotherapy patients and wait-listed patients were interrogated about their attitudes towards internet-based interventions compared with a matched control group. Compared with the control group, especially wait-listed candidates declared a reduced interest in engaging in internet-based interventions and both patient groups perceived fewer advantages. All groups appreciated its enhanced flexibility, but both patient groups worried more about privacy issues and a possible misinterpretation of their written statements. Both patient groups considered internet-based psychotherapy as imaginable to aim at fewer kinds of psychopathological symptoms than the control group. Patients indicated panic disorder, posttraumatic stress disorder, depression, and generalized anxiety disorder as least imaginable to participate in internet-based though most programs available at the moment address these symptoms. There appears to be interest to be treated for sexual dysfunctions through the internet. To address reservations concerning privacy protection, paper and pencil registration procedures may be provided. The adding of face-to-face or video contacts could also help to satisfy patients' needs.

Key words: internet based health interventions; psychotherapy, attitudes, patients, waitlist

What does nightmare distress mean? Factorial structure and psychometric properties of the Nightmare Distress Questionnaire (NDQ)

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Abstract

Nightmares are extremely dysphoric dreams. But nightmare distress, and not the mere frequency of nightmares, is associated with well-being and psychopathology. Nightmare distress has been conceptualized in different ways: (a) nightmare intensity; (b) nightmare effects, (c) nightmare related symptoms, and (d) the perception of nightmare distress. The Nightmare Distress Questionnaire (NDQ) is the most often used questionnaire to capture nightmare distress. However, there is insufficient information about its psychometric properties and it remains unclear what exactly it measures. In order to investigate the psychometric quality and factorial structure of this questionnaire, 213 men and women suffering from recurrent nightmares filled in the German version of the NDQ, as well as depression (Center for Epidemiologic Studies Depression Scale, CES-D) and sleep quality (Pittsburgh Sleep Quality Inventory, PSQI) measures. The reliability of the NDQ was good (α = .80). We identified three subscales, which explained 52 % of the total variance: (a) general nightmare distress, (b) impact on sleep, (c) impact on daytime reality perception. We found moderate correlations between nightmare distress scores, nightmare frequency, depression, and sleep quality. The psychometric properties of the NDQ are good. The questionnaire captures the general perception whether nightmares are evaluated as distressing, as well as nightmare related symptoms.

Keywords: nightmare - nightmare distress - nightmare related symptoms

The effects of an internet-based imagery rehearsal intervention: A randomized controlled trial.

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Böckermann, M., Gieselmann, A., Sorbi, M.J., & Pietrowksy, R. (under review). The effects of an internet-based imagery rehearsal intervention: A randomized controlled trial. *Psychotherapy and Psychosomatics.*

Abstract

Background: Nightmares are extremely dysphoric dreams, which are prevalent and associated with psychological strain. This study investigated (1) the effectiveness of Imagery Rehearsal Therapy (IRT) when applied as an internet based intervention (IBI), (2) distinct therapeutic factors within IRT and (3) the role of support during IBI IRT.

Methods: 127 participants suffering of mainly idiopathic nightmares (93 %) were randomly assigned to one of two IRT groups (guided; unguided) or to one of two active control groups (nightmare recording; nightmare documentation) and were assessed at pre, post and two month follow up.

Results: IRT was more effective than recording control regarding nightmare frequency, nightmare distress and sleep disturbances due to bad dreams. Compared to documentation control, however, IRT was only superior in improving nightmare distress. Guidance had no effect on effectiveness, compliance or drop out.

Conclusion: Internet-based IRT seems to be an effective treatment for idiopathic nightmares even when offered with minimal therapeutic support. Exposure to the dream content appeared to be vital in reducing nightmare frequency, while IRT emerged as an essential therapeutic factor to also reduce nightmare distress.

Key Words: Nightmare, imagery rehearsal therapy, internet-based therapy, randomized controlled trial

Introduction

In the general public, between 2 and 5 % suffer from recurrent nightmares (Bixler, Kales, Soldatos, Kales, & Healey, 1979; Janson et al., 1995, Li, Zhang, Li, & Wing, 2010; Ohayon, Moreselli, & Guilleminault, 1997; Schredl, 2010; Stepansky et al., 1998). However, nightmares often remain untreated (Thünker, Norpoth, von Aspern, Özcan, & Pietrowsky, 2014). The Internet may increase the availability of treatment but it is to a large degree unclear how internet-based interventions (IBI) should be applied. This paper presents results of a controlled treatment intervention that included different levels of exposure and therapeutic support.

According to the fifth revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013), a nightmare can be defined as an "extended, extremely dysphoric" dream that "usually involves efforts to avoid threats to survival, security, or physical integrity". Irrespective of awakening, a nightmare is well remembered and, after awakening, the dreamer is quickly orientated and alert. In comparison to the DSM-IV (APA, 2000) the DSM-5 leaves out the awakening criteria. Nightmares are associated with physical symptoms like sweating and shortening of breath. The prevalent emotion is fear (Köthe & Pietrowsky, 2001), although different researchers emphasize that other emotions, such as anger, shame, and sadness also arise in nightmares (e. g., Robert & Zadra, 2014). The cause of nightmares may be idiopathic, but they also can emerge as a consequence of a traumatic event (posttraumatic nightmare). Recurrent nightmares occur in 16 % to 67 % in psychiatric samples (Swart, van Schagen, Lancee, & van den Bout, 2013). Nightmares are associated with increased psychological distress (Levin & Fireman, 2002), disturbance of sleep quality (Ohayon et al., 1997), daily sleep distress (Lancee & Schrijnemakers, 2013) and general psychopathology (e.g., Zadra & Donderi, 2000; Blagrove, Farmer, & Williams, 2004).

Meta-analyses confirmed the effectiveness of psychological interventions to reduce nightmare frequency and related symptoms. Hansen, Höfling, Kröner-Borowik, Stangier and Steil (2013) found consistently large effect sizes of psychological intervention - using either imaginal confrontation, or rescripting and rehearsal, or both - on nightmare frequency, nights with nightmares and PTSD severity. Compared to the control group, Augedal, Hansen, Kronhaug, Harvey and Pallesen

(2013) found medium effect sizes for psychological interventions in general and Imagery Rehearsal Therapy (IRT) in particular. These results are confirmed by the meta-analysis of Casement and Swanson (2012) concerning the effects of IRT on posttraumatic nightmares. Seda, Sanchez-Ortuno, Welsh, Halbower and Edinger (2015) found moderate effects of IRT on nightmare frequency, posttraumatic stress symptoms and sleep quality. Consequently, the Oxford Centre for Evidence-based Medicine identified IRT as a Level A treatment for nightmares (Cranston, Davis, Rhudy, & Favorite, 2011).

In IRT, the patient (1) writes down a selected nightmare and (2) changes the nightmare script in order to make it less threatening and more positive. Afterwards (3) the revised dream (which should be no longer a nightmare) is written down devoid of nightmare properties and (4) rehearsed through imagination (Neidhardt, Krakow, Kellner, & Pathak, 1992). IRT proved to be effective when applied as part of a self-help intervention (Lancee, Spoormaker, & van den Bout, 2010). But effects of self-help nightmare interventions seem to be smaller than interventions applied within a face-to-face setting (Casement & Swanson, 2012). Furthermore, self-help nightmare interventions produced considerable dropout rates, ranging from 29 % to 52 % (Hansen et al., 2013).

Despite the fact, that effective nightmare treatments exist, only a minority of nightmare sufferers seek professional help. Those who did, rated the support as little helpful (Thünker et al. 2014). IBI can address this by disseminating an effective treatment.

There is extensive evidence of the effectiveness of IBI in mental health care (Baumeister, Reichler, Munzinger, & Lin, 2014; Cuijpers, Donker, van Straten, Li, & Andersson, 2010; Richards & Richardson, 2012; Samoocha, Bruinvels, Elbers, Anema, & van der Beek, 2010; Spek, Cuijpers, Nyklíček, Riper, Keyzer, & Pop, 2007), including PTSD (Klein et al., 2010; Knaevelsrud & Maercker, 2007; 2010; Lange, van de Ven, Schrieken, & Emmelkamp, 2001) and sleep disorders such as insomnia (Espie et al.,2012; Lancee, van den Bout, Sorbi, & van Straten, 2013; Ritterband et al., 2009).

We developed an internet-based IRT intervention for nightmares (IBI IRT) based on a manualized and evaluated IRT- treatment program (Thünker & Pietrowsky, 2011; 2012). IBI IRT was

tested for applicability and usefullness in pilot studies (Böckermann, Gieselmann, Sorbi, & Pietrowsky, 2015). The focus of the current paper is on IBI IRT effectiveness compared to a recording control condition regarding improved nightmare frequency, nightmare distress and sleep quality. Our *first hypothesis* is that IBI IRT will be more effective than an active control condition engaged in nightmare recording.

In addition, the present study aims to clarify two research issues, (1) the role of exposure, and (2) the importance of guidance in IBI IRT. First, exposure and imagery rehearsal are the predominant interventions for psychological treatment of nightmares. Evidence suggests that more exposure elements increase treatment effectiveness, while IRT seems to work faster with less effort (Hansen et al., 2013); however, adding exposure components to IRT did not strengthen treatment gain in posttraumatic nightmares (Augedal et al., 2013). The distinct therapeutic factors are not as yet unraveled (Hansen et al., 2013), since IRT contains exposure components as well: nightmares are written down in their original version either before restructuring (Krakow, Kellner, Neidhardt, Pathak, & Lambert, 1993) or during the entire intervention (Lancee, Spoormaker, & van den Bout, 2010). The latter authors directly compared exposure with IRT and concluded that exposure to nightmare imagery might be the crucial therapeutic factor. The present study aims to clarify the role of exposure within IRT by comparing IBI IRT, which also includes nightmare documentation (the exposure task) to an active control group of nightmare documentation only. The *second hypothesis* is that IRT will be more effective than exposure through nightmare documentation alone.

Second, IBI effectiveness may differ regarding whether and how much support participants receive during the intervention. Evidence suggests that IBI with support from a coach improves effectiveness, reinforces compliance and reduces drop-out rates compared to IBI without support, though the results are confined to heterogeneous studies with comparison between trials (Richards & Richardson, 2012) while RCTs with within trial comparisons are restricted mainly to the field of depression and social phobia (Baumeister et al., 2014). To examine the role of support in IBI IRT for nightmares, IBI IRT in the present study was served either as a guided or an unguided IRT condition. The *third hypothesis* is twofold. We hypothesize that (a) support will enhance the effectiveness of

and compliance with IBI IRT and will (b) reduce the drop-out rate of the intervention. Therefore this study also explores predictors of, respectively, IBI drop-out and compliance with IBI.

Method

Participants

Recruitment took place through local media (internet, flyers, newspaper articles) to direct participants to the portal of the intervention. About 28 % of the 324 potential participants who registered online took notice of the trial through articles in health related magazines; others found the portal via internet search (22 %), articles in local and national newspapers (18 %) and advice of others (family/friends: 7 %; therapists/doctors: 4 %; researchers: 3 %). Inclusion criteria were: (1) presence of chronic nightmares (> sixth month) with at least one nightmare per week (according to DSM-IV, without awakening criterion), (2) age of ≥18 years, and (3) capacity to handle a computer and internet. Exclusion criteria were: depressive symptoms (score of > 23 on the Center for Epidemiological Studies Depression Scale (CES-D; German version: Hauzinger & Bailer, 1993), suicidal ideations (score of > 7 on the Suicide Behaviors Questionnaire- Revised SBQ-R; Osman et al., 2001), the presence of PTSD symptoms (score of > 0 on the Impact of Event Scale-Revised IES-R; German version: Maercker & Schützwohl, 1998), dissociative symptoms (score of ≥ 8 on the Somatoform Dissociation Questionnaire SDQ-5; Nijenhuis, Spinhoven, & Van Dyck, 1997), presence of psychotic symptoms (score of ≥13 on the Dutch Screening Device for Psychotic Disorder; Lange, Schrieken, Blankers, van de Ven, & Slot, 2000), drug- or alcohol abuse (Alcohol Use Disorders Identification Test AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), and the use of psychotropic medication. *N* = 127 (39 %) of those who registered fulfilled the inclusion criteria. The study was approved by the ethical review board of the German Psychological Association (DGPs) and registered in the German Clinical Trials Register (DRKS00005603).

Procedure

When visiting the homepage of the intervention portal, participants first received information about privacy protection, inclusion and exclusion criteria and the procedure of the study. In order to register for the study, participants had to choose their own username and password. After the electronic provision of informed consent, the procedures for screening and pre-test were completed. Participants who fulfilled the inclusion criteria were invited for a telephone interview conducted by the first author. This interview included the sections ´Affective Disorder´ and ´Post Traumatic Stress Disorder` of the Structured Clinical Interview according to the DSM-IV (SCID; German version: Wittchen, Zaudig, & Fydrich, 1997) and ascertained that reported nightmares fulfilled the DSM-IV criteria. Eligible participants were randomized to one of the following four study groups: (i) guided IBI IRT (*n* = 34), (ii) unguided IBI IRT (*n* = 30), (iii) nightmare recording (*n* = 32), and (iv) nightmare documentation (*n* = 31). The latter two groups are referred to as control groups (see Fig. 1). Randomization took place via a computer-generated random number table and was carried out through a third person. Likewise we randomized the assignment to one of the two psychologists who continuously supervised the intervention process and - in case of guided IBI IRT - gave written support. Due to the study design, participants, study coordinator, and supervisors were not blind to the assigned condition.

After randomization, participants immediately began with the intervention. The guided IBI IRT group received personal feedback via e-mail within the intervention portal. After the two month follow up, participants of the control groups received an invitation to start the unguided IBI IRT.

Intervention

The present IBI IRT intervention is based on the manual of Thünker and Pietrowsky (2011) adapted to IBI delivery (Böckermann et al., 2015). The content is tailored to subjects with idiopathic and posttraumatic nightmares (Thünker & Pietrowksy, 2012) and was offered in six consecutive sessions to be executed within six weeks. The content and timing of support for the guided IBI IRT condition had been specified as part of the IBI IRT development through consultation of experts in the area of nightmare treatment (Böckermann et al., 2015).

Both IRT groups received educational information on nightmares and sleep hygiene. They were asked to keep a nightmare diary with instructions for writing down their nightmares as detailed as possible (session 1). After this, they practiced imagination (session 2) and got detailed instructions on how to convert at least one nightmare and to repeatedly imagine the new dream (sessions 3-5). The training ended with a troubleshooting session, where obstacles were identified and solutions proposed (session 6).

Participants of group 1 (guided IBI IRT) received feedback and motivational support within the shielded intervention portal from one of two psychology students of a Bachelor of Science level, who had been trained by one author of the therapy manual (Thünker & Pietrowsky, 2011). Technical support was given on demand. In addition, content-related support was provided after session 3 to 5 concerning, respectively, specifics of the nightmare revision and the process of imagery rehearsing.

Participants of group 2 (unguided IBI IRT) underwent the same intervention without motivational and content-related support. For ethical reasons, seven participants of this group received technical, motivational, or content-related support after they actively contacted the study coordinator.

Group 3 (recording control) registered their nightmares by noting the weekly nightmare frequency and averaged nightmare intensity. Intervention intensity was minimal since no attention was drawn to the type or content of the nightmare.

Group 4 (documentation control) had to describe their nightmares as detailed as possible conform the instructions for the groups 1 and 2.

In all groups, participants received e-mail reminders when they did not log-in for more than one week (see Table 1).

Measurements

Primary outcome measures were nightmare frequency (NF), nightmare distress (ND) and sleep quality (SQ). We proposed a nightmare definition according to the DSM-IV, which was the prevail classification system at the start of the study. But nightmare frequency measurement also

included bad dreams without awakenings, and nightmares with emotions other than fear, because both aspects are covered by the current nightmare definition employed in the DSM-5.

NF was measured twofold. First, we assessed NF retrospectively as part of the pre, post and follow-up measurements ("How many nightmares did you have last week?", see Thünker & Pietrowsky, 2011). Second, a prospective measure was applied, in order to assess the development of NF during the course of the training. Participants of the IRT groups were asked to record and document all nightmares promptly in the intervention portal. In addition, after every session they were asked how many nightmares they had since the last session. Group 3 was asked to record their nightmares on a daily basis and report them weekly to the intervention portal. Group 4 documented all nightmares promptly in the portal.

ND was measured through the German version of the ´Nightmare Distress Questionnaire´ (NDQ; Belicki 1992; Böckermann, Gieselmann, & Pietrowsky, 2014). The NDQ measures self-perceived distress induced by nightmares, the detrimental impact on sleep quality, and the influence of nightmares on reality perception (Böckermann et al., 2014). This questionnaire has a good reliability, for both, English version (α = .83–.88.) and German translation (α = .80); in the current sample Cronbach's alpha was at .80.

SQ was assessed through the ´Pittsburgh Sleep Quality Index´ (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989; German version: Spiegelhalder, Backhaus, & Riemann, 2011). Of this scale we used the dreaming item ("During the past month, how often have you had trouble sleeping because you had bad dreams?") and the general sleep quality scale ("During the past month, how would you rate your sleep quality overall?") and analyzed them separately.

Secondary outcome measures were depression and general satisfaction with IBI IRT. The latter was measured through the ´treatment satisfaction questionnaire´ (ZUF-8, Schmidt, Lamprecht & Wittmann, 1989). The questionnaire assesses how content participants are with a treatment with eight items. Answers are given on a four point Likert scale (1= not content at all, 4 = very content). The reliability of the ZUF-8 was found to be very good (α = .93); in the current sample Cronbach's alpha was .91.

Depression was measured through the ´Center for Epidemiological Studies Depression Scale´ (German version: ADS-L, Hautzinger & Bailer, 1993). This scale has a good reliability (α = .89-.92); in the current sample the Cronbach's alpha was .80.

Users' compliance was measured by counting the number of e-mail reminders participants received for not logging-in within one week. Furthermore, recording and documentation times were recorded, as well as the time the coaches spent on conducting the initial interview and the provision of e-mail support.

To check for perceived guidance, we asked participants of the two IRT groups, whether they felt being treated with attendance to their individual case: "During the training I felt being treated individually?". Answers were given on a Likert scale ranging from 1 (I do not agree) to 7 (I totally agree).

Conscientiousness was assessed through the scale of the NEO-Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992; German version: Borkenau & Ostendorf, 1993). It consists of 12 items to be answered on a Likert scale ranging from 1 to 5 and has a good reliability (α = .85). In the current study population Cronbach's Alpha was .79.

Statistical analyses

IBM SPSS statistics 20 was used for all analyses. Statistical comparisons between groups were conducted according to the intention-to-treat (ITT) principle employing multiple imputation (MI) based on the "missing at random assumption". For this purpose missing scores at post and follow up were replaced by a set of plausible values, resulting in the generation of ten separate datasets. The imputation model included baseline scores of dependent variables (NF, ND, SQ, depression), gender, age and the assigned condition. Comparison between baseline scores and intervention usage were calculated using χ^2 tests (for dichotomous variables) as well as independent *t*-tests (comparing guided and unguided IBI IRT intervention usage) or analyses of variance (ANOVA) (for continuous variables). Statistical significance of between-group effects was tested using ANOVAs with the within factor ´Time´ and the between factor ´Group`. The former was calculated through subtracting pre -

post and pre - FU, respectively. In order to compare the general effect of IRT with control groups, we combined the two IRT groups. ANOVAs were performed separately for different comparisons (IRT vs. recording control; IRT vs. documentation control; guided vs. unguided IRT). The sample size was calculated with G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). To reveal a moderate time x group interaction effect (f = 0.25, α = 0.05, β = 0.8) the estimated total sample size was N = 128 for the statistical effectiveness analyses outlined above.

Because SPSS is not able to generate pooled results of analysis based on multiple imputed data sets, syntaxes of Van Ginkel and Kroonenberg (2014) were used to generate 10 imputed data sets. Between-group effect sizes (Cohen's d = (M_1_pre – M_1_post) - (M_2_pre – M_2_post) / σ_pooled) were calculated by averaging all Cohen's d of the ten data sets.

One way repeated measures ANOVAs with the within factor ´Time´ were conducted for each group separately to evaluate the development of nightmare frequency over during the intervention/control group task. Analyses were only performed for treatment completers. Missing values were added by using the "last observation carried forward" (LOCF) intention to treat method.

A binary logistic regression was performed to ascertain the effects of gender, conscientiousness, pre nightmare distress and pre depression scores on the likelihood that participants drop out.

Results

Patient flow through the study and participant characteristics

Figure 1 shows the flow through the study of 127 randomized participants (guided IBI IRT: 34; unguided IBI IRT: 32; recording control: 32; documentation control: 31). The dropout rate was 21 % from pre to post (per group 26 %, 20 %, 25 %, and 13 %, respectively) and 28 % from pre to follow up. There was no difference in dropout rates between the four groups ($\chi^2(3) = 2.14$, p = .54). Nine participants (36 %) did report reasons for treatment attrition (n = 4: illness; n = 2: too busy; n = 2: no motivation; n = 1: no nightmares).

- insert Figure 1 -

Table 1 shows that participants had a mean age of 37 years (*SD* = 14), most were female (86 %) and suffered from idiopathic nightmares (93 %). A considerable number had formerly received psychotherapy (39 %), while 10 % previously underwent a nightmare specific treatment. On a 10-point Likert scale, participants had good computer skills (*M* = 7.35, *SD* = 1.80) and internet experience (*M* = 7.68; *SD* = 1.78). Successful randomization was confirmed by the absence of between group differences at baseline measurement in all demographic variables (see Table 1).

-insert Table 1 -

Behavior of the intervention- and control groups.

Compliance with instructions. As shown in Table 2, the total time in hours spent for the training did not differ between guided and unguided IBI IRT guided IBI IRT (guided IBI IRT: *M* = 3.75, *SD* = 2.30; unguided IBI IRT: *M* = 3.32, *SD* = 1.37; *t*[47] = 0.80, *p* = .43). This was the same for IRT duration, which nearly matched the intended six weeks (guided IBI IRT: *M* = 5.92; *SD* = 2.99 weeks; unguided IBI IRT: *M* = 5.52; *SD* = 2.27 weeks; *t*[45] = 0.45, *p* = .65), while the number of completed sessions was almost identical (guided IBI IRT: *M* = 5.44, *SD* = 1.39; unguided IBI IRT: *M* = 5.33, *SD* = 1.27; t[47] = 0.28, *p* = .78). All IRT participants recorded their nightmares for more than five weeks, which did not differ from the recording control group (*t*[69] = 0.82, *p* = .413). All but one participant in guided IBI IRT documented at least one nightmare in detail. The average number of documented nightmares did not differ, neither between guided and unguided IBI IRT (: *M* = 8.16, *SD* = 4.45; : *M* = 7.25; *SD* = 7.44; *t*[47] = 0.52, *p* = .604), nor between all IRT participants and the documentation control group (*M* = 6.63, *SD* = 5.72; *t*[74] = 0.76, *p* = .448).

Contact and support. Table 2 also shows that the SCID interview by phone lasted 13.31 minutes on average (*SD* = 3.17) and did not differ between the four groups, *F*(3,100) = 0.94, *p* = .427.

All participants in guided IBI IRT received on average *M* = 4.20(*SD* = 1.58) times motivational and *M* = 1.48, (*SD* = 1.12) times content-related support whereas 23 % (*n* = 7) of the participants in unguided IBI IRT received such support after they had actively contacted the study coordinator. Latter group received more e-mail reminders than the guided IBI IRT group, but the difference did not reach statistical significance (group 1: *M* = 2.44, *SD* = 2.60; group 2: *M* = 3.21, *SD* = 2.87; *t*[47] = -0.98, *p* = .331). Technical support was provided equally in the IRT groups (*n* = 4, respectively) and control groups (*n* = 1, respectively).

- insert Table 2 -

Analyses of effectiveness: Between group differences

Table 3 lists the outcomes per group; statistical results are presented in Table 4. Compared to the recording control group at post and follow up time the IBI IRT group improved more regarding nightmare distress, and amount of sleep disturbances due to bad dreams (Time x Group interaction effects, $p < .05$). Regarding weekly nightmare frequency, the IBI IRT group improved more at follow up- test. At post- test, however, there was only a tendency towards significance. Effect sizes were medium to large (*d* = 0.47 - 0.82).

Compared to the documentation control group IBI IRT was superior in improving nightmare distress (Time x Group interaction effects, $p < .05$). A medium effect size was found at post (*d* = 0.54) and follow-up test (d = 0.61).

The manipulation check for the two IRT groups was successful. Participants in guided IBI IRT felt that they were treated more individually than in unguided IBI IRT (guided IBI IRT: *M* = 5.55, *SD* = 1.63; unguided IBI IRT: *M* = 3.71, *SD* = 1.97; *t*[44] = 3.46, *p* = .001). No significant Time x Group interaction effects were found between the guided and unguided IRT group with regard to primary outcome measures and depression (see Table 4). In line with that, there was no difference regarding the contentedness with the training (guided IBI IRT: *M* = 3.29, *SD* = 0.76; unguided IBI IRT: *M* = 3.17,

SD = 0.71; *t*[38] = 0.50, *p* = .622), compliance with the training (*t*(47) = -0.98, *p* = .331), or drop-out rates ($\chi^2(1) = 0.37$, *p* = .542).

- insert Table 4 -

Within-group change in nightmare frequency over time.

Figure 2 displays the course of nightmare frequency as assessed with the diary and averaged per measure-point and week of training for IBI IRT (guided or unguided) and the two control conditions.

In IBI IRT mean nightmare frequency differed significantly between these time points (*F*(3.521, 140.847) = 9.96, *p* < .001). Post-hoc tests using the Bonferroni correction revealed a highly significant decline directly after session 1 (before session 1: *M* = 3.54, *SD* = 2.06; after session 1: *M* = 1.68, *SD* = 1.56; *p* = .001). Although nightmare frequency further declined during the training, additional changes did not reach significance (*p* > .05).

In the control conditions, nightmare documentation induced a course similar to that in the IRT groups in nightmare frequency (*F*(3.849, 50.033) = 7.42, *p* < .001) with the largest improvement after week 2 (before session 1: *M* = 4.00, *SD* = 1.57; after week 2: *M* = 1.14, *SD* = 1.23, *p* = .002), while further changes did not reach significance (*p* > .05). The recording control group, however, exhibited no significant reduction in nightmare frequency over time (*F*(2.594, 49.289) = 1.86, *p* = 0.16).

- insert Figure 2 -

Explorative analyses in search of predictors of IBI drop-out and compliance.

Logistic regression analyses did not yield any results for the prediction of compliance with IBI. For IBI study drop-out, however, the model was statistically significant ($\chi^2(4) = 22.55$, *p* < .001); it explained 25 % (Nagelkerke R^2) of the variance in drop-out, correctly classified 78 % of the cases and

identified nightmare distress at baseline and NEO-FFI conscientiousness in the respondents as relevant factors. The probability of IBI drop-out was decreased in conscientious participants as well as in those who suffered relatively little from nightmare distress prior to the training.

Discussion

This study compared an internet-based nightmare intervention grafted on Imagery Rehearsal Therapy (IBI IRT) with two active control groups. We found that internet-based IRT is an effective way in treating people with chronic idiopathic nightmares. IRT specifically reduced nightmare distress, when controlling for the exposure task. Support did not have an impact on effectiveness, compliance with IRT or IBI drop-out rate. Levels of nightmare distress at baseline, and conscientiousness in the respondents, predicted IBI drop-out.

In comparison to recording control, IRT reduced nightmare frequency, nightmare distress and sleep disturbances due to bad dreams. Thus, internet based IRT intervention is an effective treatment. Our *first hypothesis* was confirmed. The medium between-group effect sizes for the primary outcomes of internet-based IRT found in the present study match those identified for - both - IRT interventions offered face-to-face (Augedal et al., 2013) and internet -interventions in general (Richards & Richardson, 2012). In contrast to previous findings, we did not find a decrease in general sleep quality and depressive symptoms. Latter might be due to relatively strict exclusion criteria regarding depression resulting in low depressive scores at the pre measurement-point.

In comparison to the documentation control group, the IRT groups improved more regarding nightmare distress. All other differences in the outcome measures did not reach statistical significance. In addition to its effect on nightmare frequency, IRT thus induces specific therapeutic gains by reducing nightmare distress. A plausible explanation put forward by Germain et al. (2004) and Krakow et al. (2001), is that imagery rehearsal improves the perceived mastery of nightmares. Our results are also in accordance with those of previous trials, which largely identified small or insignificant differences between IRT and a documentation or an extended recording condition (Lancee et al., 2010; Neidhardt et al., 1992). The fact that our result of a superior effect of IRT on

nightmare distress is in contrast to the findings of Lancee et al. (2010) that in this respect IRT was inferior to exposure is most likely due to differences in the measure of nightmare distress employed. Lancee et al. (2010) defined this outcome measure as the immediate experience and the direct consequences of a given nightmare, while in our study it pertained to a general perception of being distressed, as well as to the impact of nightmares on sleep quality and reality perception (Böckermann, Gieselmann, & Pietrowsky, 2014). Regarding other outcome measures, however, our study yielded no evidence of IRT superiority over exposure through nightmare documentation. Therefore our *second hypothesis* was partly confirmed.

In contrast to our third hypothesis, the outcomes did not differ between the two IRT groups, while compliance and drop-out were comparable as well. Two reasons may account for this. First, participants in the unguided IRT group also had personal contacts (during the SCID interview by phone; by e-mail reminders, and by technical or motivational and content-related support on demand), which was offered for ethical reasons, to reduce risks for discontent, loss of compliance or dropout (technical support) and to control for therapeutic attention through reminders. Second, the participants in our study almost exclusively suffered from idiopathic nightmares without additional health problems. Guidance and support may be more important the more participants are troubled by concomitant problems. The present results may therefore suggest that in this relatively healthy population internet-based IRT seems to work with minimal personal contact.

To our surprise, nightmare frequency already declined after the first session of the intervention. This is striking because IRT-specific tasks had not taken place at this point of time; in addition, a similar effect occurred in the nightmare documentation group. These findings may be taken to support the assumption, outlined above, that exposure induces a decrease in nightmare occurrence, also without changing the nightmare content. This only partly explains the rapid decrease with the exposure task extending to no more than approximately one week, however. Spoormaker (2008) argued that nightmare frequency may decrease in response to a paradox intention induced by the pure instruction to document the nightmares. According to our findings an exclusive counting of the nightmares is insufficient to induce this effect, since the significant

decrease observed with documentation did not occur in the recording condition. Latter result might support the note to further shorten the nightmare intervention. But, considering the supposed distinct effects of exposure and IRT as described above, to fully assess the usefulness of shortening the training, the development of nightmare distress during the training would have been needed to be accessed as well.

We found that pre scores of nightmare distress and conscientiousness as a personality trait predicted drop-out. These results indicate that internet interventions might work better for participants with lower symptom distress, better self-control competencies and better thoroughness. This should be taken into account for treatment indications for patients.

There are some limitations within this study. (1) Content-related support and motivational support were given through an email program within the content management system. Thus, support may not have taken place immediately after completing a session and receive of support depended on the "logging in behavior" of participants. Although this procedure served the data security, it could have resulted in extended asynchrony of the communication which in turn could have inflated the motivational reinforcement of the support. (2) The personal contacts, described above, could have obscured the difference between both the guided and the unguided IRT groups and therefore might be an alternative explanation, that we did not find a difference between guided and unguided IBI IRT. (3) Participants mainly suffered of idiopathic nightmares owing to the strict selection criteria enforced by ethical obligations. Therefore our results cannot be generalized to posttraumatic nightmares. Our selection criteria also resulted in a large number of participants who had to be excluded from the trial (61 %) which, in turn, led to a relatively homogenous study population. This aspect also reflects the limitations of pure internet based interventions in general. Adding more personal contact (face-to-face screening, emergency consultation, face-to-face contact on demand) or 'blended care' integrating internet based and regular in- and outpatient interventions might overcome this limitation. (4) Nightmare diary assessment of the IRT groups and control groups differed due to the study protocol. There it was not possible to evaluate the development of nightmare frequency between the groups. (5) Another limitation was the fact that groups were not

blinded. This could be an additional explanation for the effects on nightmare distress. But this is unlikely, because this effect should be reflected in other outcome variables as well which was not the case. (6) Even though there is only a weak to moderate relationship between nightmare frequency and nightmare distress, it cannot be ruled out, that a reduction of ND is caused by the reduction of nightmare frequency. In line with this Schredl, Landgraf and Zeiler (2003) criticized the Nightmare Distress Questionnaire, because nightmare distress might be confounded by nightmare frequency. However, here, this explanation is unlikely due to the distinct differences between IRT vs. recording and IRT vs. documentation, respectively.

Despite its limitations, this study population might represent a typical, relatively healthy population, who can benefit from pure internet based self-help interventions with minimal support to treat chronic nightmares. Drop-Out rates were comparable with these of therapist-guided internet interventions (Richards & Richardson, 2012) and face-to-face nightmare interventions (Hansen et al., 2013). Drop-out did not differ between the IRT and control groups, so that the kind of intervention can be ruled out as an explanation for attrition. To our knowledge, this study is the first, which investigated the effectiveness of an internet-based nightmare intervention and the first, which directly examined the role of exposure within IRT.

Given the poor dissemination of effective nightmare treatments within health care providers, further research should investigate possibilities to implement IBI IRT within face to face therapies (blended care) for in- or outpatients. This might help to further distribute IRT as an effective nightmare intervention, save time resources within already limited outpatient therapy facilities, and improve inpatient therapies by tailoring therapeutic interventions to the needs of the patients. Furthermore, due to the personal contact to a therapist within blended care, IBI IRT can also address patients with posttraumatic nightmares and/or co-morbid psychological disorders, like PTSD, depression, and anxiety disorders, which can go along with nightmares. To our knowledge, this is the first study examining the distinct therapeutic factors within IRT. Further research should replicate the present results.

Taken together, internet-based IRT seems to be an effective treatment for idiopathic nightmares, also with minimal therapeutic support. IRT might have its specific therapeutic factor in reducing nightmare distress, whereas exposure might reduce nightmare frequency.

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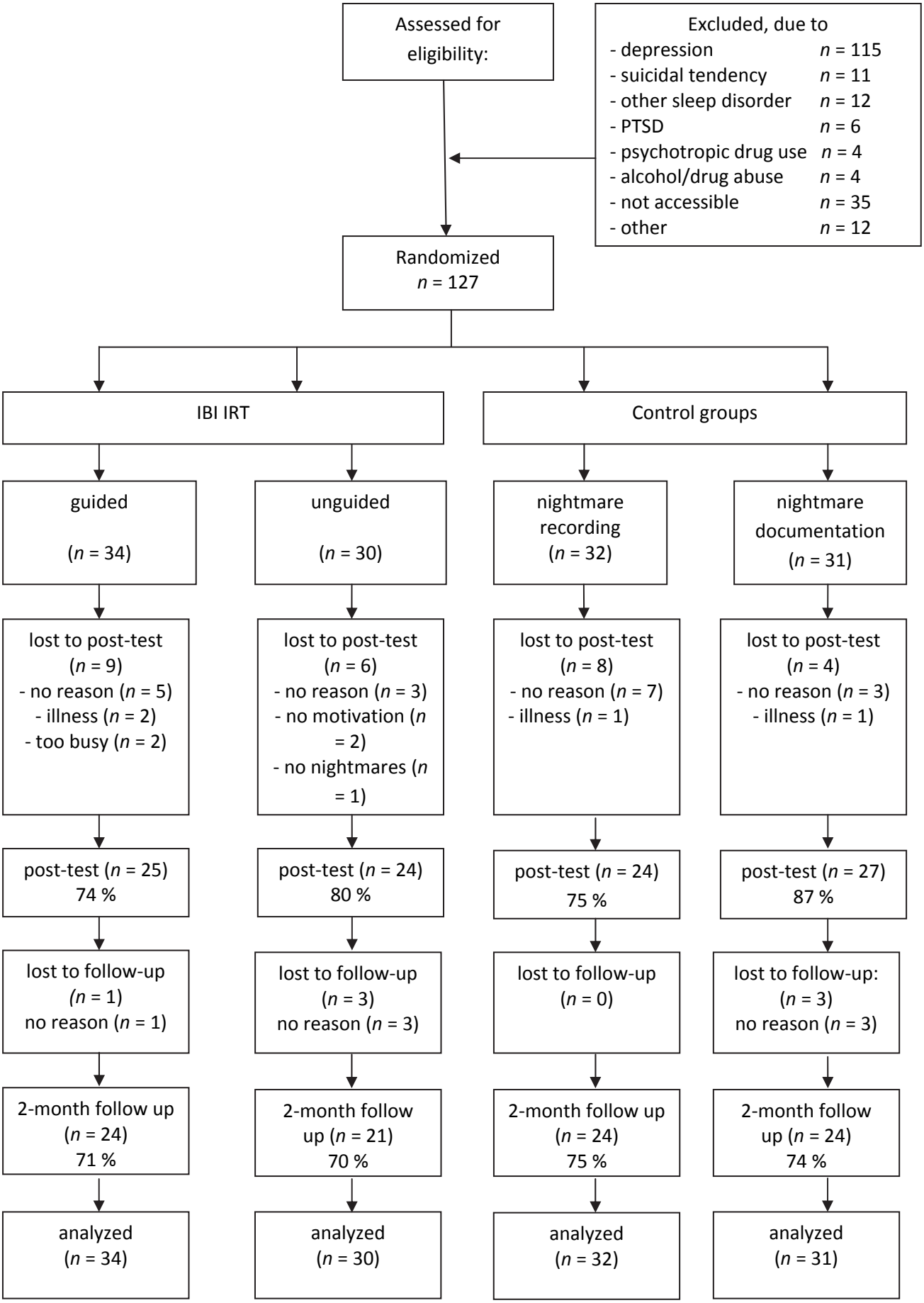

Fig. 1. Participant flow through the study

Table 1.

Demographic characteristics of participants.

	Condition					
	IBI IRT		Control groups			
	guided	unguided	nightmare recording	nightmare documentation		
	n = 34	*n* = 30	*n* = 32	n *n* = 31		*p*
Gender						
Male	4 (12 %)	5 (17 %)	6 (19 %)	3 (19 %)	$\chi^2(3) = 1.38$	.71
Female	30 (88 %)	25 (83 %)	26 (81 %)	28 (90 %)		
Age	38.71±15.87	36.97±15.21	38.16±14.433	33.29±11.44	$F(3,123) = 0.94$	.42
Computer Experience	7.41±1.52	7.50±1.98	7.53±1.72	6.94±1.91	$F(3,123) = 0.75$	.52
Internet Experience	7.74±1.52	7.67±2.16	7.66±1.91	7.65±1.66	$F(3,123) = 0.16$	.99
Former night-mare treatment						
Yes	3	6	1	3		
No	30	23	31	28	$\chi^2(3) = 5.19$	.16
Not specified	1	1	0	0		
Trauma related nightmare						
Yes	4	3	1	1	$\chi^2(3) = 2.12$	.55
No	30	27	28	28		
Not specified	0	0	3	2		
Former Psychotherapy						
Yes	14	13	12	10	$\chi^2(3) = 0.92$	.82
No	19	16	18	20		
Not specified	1	1	2	1		

Note. IBI IRT = Internet-based Imagery Rehearsal Therapy; Means ± Standard deviations; Computer and internet experience measured on a Likert scale ranging from 1 (no experience) to 10 (very much experience)

Table 2.
Description of the intervention usage, control groups tasks and amount of personal contact across all groups.

Part of the intervention	Condition											
	IBI IRT						Control groups					
	guided (*n* = 34)			unguided (*n* = 30)			recording (*n* = 32)			documentation (*n* = 31)		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Training												
Session 1: introduction (min)	25	47.40	34.70	24	47.08	23.50						
Session 2: imagination (min)	24	42.71	16.42	24	52.71	15.40						
Session 3: IRT (min)	22	50.23	41.53	21	37.14	14.02						
Session 4: IRT (min)	22	52.96	38.25	21	40.33	22.57						
Session 5: IRT (min)	22	30.68	20.60	20	23.25	13.21						
Session 6: Trouble shooting (min)	21	22.62	25.28	18	16.38	15.98						
Total time training (hours)	25	3.75	2.30	24	3.32	1.37						
Duration of the complete training (weeks)	25	5.92	2.99	24	5.57	2.27						
Quantity of completed sessions	25	5.44	1.39	24	5.33	1.27						
Nightmare diary												
Recording (number of recording weeks)	25	5.44	1.39	24	5.33	1.27	24	5.29	0.69			
Documentation (number of nightmares)	24	8.16	4.45	23	7.25	7.44				25	6.63	5.72
Personal contact												
SCID interview by phone (min)	25	13.16	2.23	24	13.00	3.19	24	13.96	2.16	27	12.48	4.42
Technical support (frequency)	4			4			1			1		
Motivational support												
Quantity per participant	25	4.20	1.58	3	0.13	0.38						
Time per participant		19.80	7.20		0.67	2.16						
Content-related support												
Quantity per participant	25	1.48	1.12	4	0.17	0.38						
Time per participant		15.08	15.91		2.08	5.70						
Reminder (quantity per participant)	17	2.44	2.60	19	3.21	2.87	11	0.79	1.10	25	1.96	1.58

Note. *n*: number of participants who completed a session, documented/recorded their nightmares, received technical support or reminders; *M* = mean; *SD* = Standard Deviation

Table 3.

Mean (*M*) and standard deviation (*SD*) of primary outcome measures and depression for the four treatment groups (guided treatment, unguided treatment, nightmare documentation, nightmare recording) at pre, post and follow up.

		Pre		Post		FU	
		M	*SD*	*M*	*SD*	*M*	*SD*
NF (per week)	IBI IRT	3.43	2.04	1.84	1.90	1.73	1.69
	gIRT	3.25	2.07	1.54	1.84	1.63	1.53
	ugIRT	3.65	2.03	2.20	1.96	1.85	1.90
	REC	3.14	1.73	2.68	1.99	2.86	1.70
	DOC	3.42	1.74	1.83	1.50	2.04	1.46
ND	IBI IRT	31.34	5.34	20.50	6.08	20.02	6.93
	gIRT	29.96	5.25	20.46	6.33	18.9	7.19
	ugIRT	33.00	5.09	20.55	5.92	21.35	6.56
	REC	31.50	4.50	28.05	6.58	26.05	6.87
	DOC	31.40	5.09	25.20	7.54	23.70	6.49
Sleep quality - bad dreams	IBI IRT	2.43	0.73	1.66	0.83	1.57	0.95
	gIRT	2.25	0.85	1.50	0.83	1.29	0.69
	ugIRT	2.65	0.49	1.85	0.81	1.90	0.97
	REC	2.09	0.87	2.05	0.84	2.00	0.98
	DOC	2.54	0.59	1.83	0.81	1.79	0.78
Sleep quality-General	IBI IRT	1.39	0.58	1.68	0.52	1.66	0.61
	gIRT	1.38	0.58	1.67	0.48	1.67	0.64
	ugIRT	1.40	0.60	1.70	0.57	1.65	0.59
	REC	1.25	0.44	1.42	0.65	1.54	0.59
	DOC	1.36	0.49	1.50	0.60	1.32	0.65
Depression	IBI IRT	12.59	5.84	11.89	9.65	11.57	10.91
	gIRT	11.71	5.35	11.00	8.60	7.71	5.70
	ugIRT	13.65	6.34	12.05	10.90	16.20	13.73
	REC	10.00	6.11	10.82	7.08	11.68	9.40
	DOC	12.5	5.98	11.54	7.31	12.83	7.73

Note. IBI IRT = internet-based Imagery Rehearsal Therapy group; gIRT = guided IRT; ugIRT = unguided IRT; REC = recording group; DOC = documentation group; NF = nightmare frequency ; ND = nightmare distress, FU = follow up

Table 4.

Changes between the different treatment conditions (guided IBI IRT, unguided IBI IRT, REC, DOC) comparing pre and post and pre and follow up measures, respectively. Statistics are beased on multiple imputated data.

	Nightmare Frequency				Nightmare Distress				Sleep Quality due to bad dream				General sleep quality				Depression			
	df	*F*	*P*	*d*	*df*	*F*	*P*	*d*	*df*	*F*	*p*	*d*	*df*	*F*	*p*	*d*	*df*	*F*	*p*	*d*
IRT vs. REC																				
Pre-Post	1,48	3.17	.081	**0.47**	1,57	8.35	**.005**	**0.69**	1,72	7.08	**.010**	**0.62**	1,55	0.39	.54	0.15	1,73	0.06	.803	0.06
Pre-Fu	1,78	8.30	**.005**	**0.67**	1,40	5.85	**.020**	**0.64**	1,41	10.13	**<.001**	**0.82**	1,53	2.56	.12	0.38	1,75	1.20	.278	0.26
IRT vs. DOC																				
Pre-Post	1,85	0.00	.97	-0.01	1,65	6.96	**.010**	**0.61**	1,74	0.32	.57	0.13	1,51	0.11	.74	0.08	1,60	0.27	.60	-0.13
Pre-Fu	1,43	0.81	.37	0.24	1,48	4.31	**.040**	**0.54**	1,63	1.18	.28	0.27	1,30	0.30	.59	-0.15	1,60	0.26	.61	0.14
gIRT vs. uIRT																				
Pre-Post	1,46	0.36	.55	-0.16	1,45	1.16	.29	-0.30	1,55	0.06	.80	0.07	1,31	0.08	.84	0.08	1,36	0.21	.65	0.13
Pre-Fu	1,36	0.01	.94	0.02	1,27	0.03	.96	-0.02	1,37	1.08	.31	0.30	1,39	0.00	.97	0.01	1,47	8.17	.01	0.76

Note. NF = IBI IRT = internet-based Imagery Rehearsal Therapy group; gIRT = guided IRT; ugIRT = unguided IRT; REC = recording group; DOC = documentation group

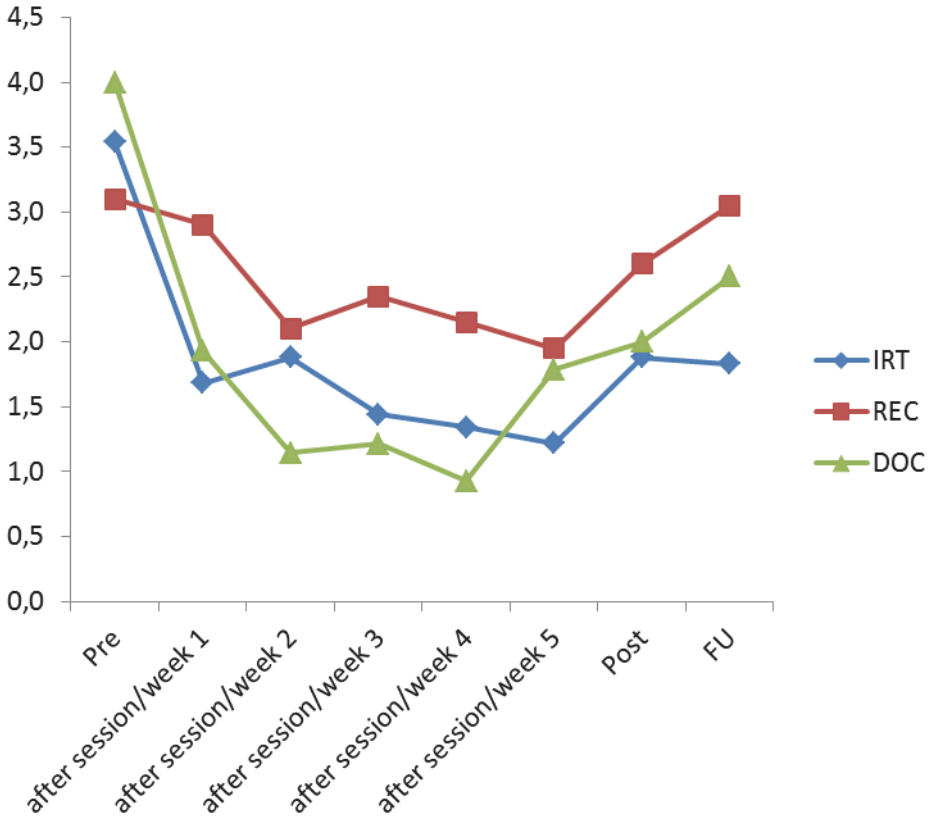

Fig. 2. Development of nightmare frequency during the intervention

Erklärung zum eigenen Beitrag an den vier Manuskripten

Manuskript 1:

Böckermann, M., Gieselmann, A., Sorbi, M.,& Pietrowsky, R. (2015). Entwicklung und Evaluation einer internetbasierten begleiteten Selbsthilfe-Intervention zur Bewältigung von Albträumen. *Zeitschrift für Psychiatrie, Psychologie und Psychotherapie*, *63*, 117-124. doi: 10.1024/1661-4747/a000230.

Eigener Beitrag zum Manuskript: Planung, Durchführung, Datenerhebung, Datenauswertung, Schreiben aller Teile des Manuskriptes

Manuskript 2:

Gieselmann, A., Böckermann, M., & Pietrowsky, R. (2015). Internetbasierte Gesundheitsinterventionen: Eine Evaluation aus der Perspektive von Patienten vor und während ambulanter Psychotherapie. *Psychotherapeut, 60,* 433-440. doi: 10.1007/s00278-015-0038-3.

Eigener Beitrag zum Manuskript: Beratung bei der Planung zuständig, Unterstützung bei theoretischer Einbettung der Resultate in die Einleitung und in die Diskussion

Manuskript 3:

Böckermann, M., Gieselmann, A.,& Pietrowsky, R. (2014). What does nightmare distress mean? Factorial structure and psychometric properties of the Nightmare Distress Questionnaire (NDQ). *Dreaming*, *24*, 279-289. doi: 10.1037/a0037749

Eigener Beitrag zum Manuskript: Planung, Durchführung, Datenerhebung, Vorbereitung der Auswertung, Schreiben des theoretischen Hintergrundes und der Diskussion.

Manuskript 4:

Böckermann, M., Gieselmann, A., Sorbi, M.J., & Pietrowksy, R. (under review). The effects of an internet-based imagery rehearsal intervention: A randomized controlled trial. Psychotherapy and Psychosomatics.

Eigener Beitrag zum Manuskript: Planung, Ethikantrag, datenschutzrechtliche Abklärung, Datenerhebung, Datenauswertung, Schreiben des gesamten Manuskriptes

Erklärung

Ich versichere an Eides Statt, dass die Dissertation von mir selbständig und ohne unzulässige fremde Hilfe unter Beachtung der „Grundsätze zur Sicherung guter wissenschaftlicher Praxis an der Heinrich-Heine-Universität Düsseldorf“ erstellt worden ist.

Düsseldorf, den 05.11.2015

(Max Julian Böckermann)