



My Dream, My Rules: Can Lucid Dreaming Treat Nightmares?

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Nightmares are defined as repeated occurrences of extremely dysphoric and well-remembered dreams that usually involve subjective threats to survival, security, or physical integrity. Generally, they occur during rapid eye movement sleep (REMS) and lead to awakenings with distress and insufficient overnight sleep. Nightmares may occur spontaneously (idiopathic) or as recurrent nightmares. Recurrent nightmares cause significant distress and impairment in occupational and social functioning, as have been commonly observed in post-traumatic stress disorder, depression and anxiety. By contrast, during lucid dreaming (LD), subjects get insight they are dreaming and may even control the content of their dreams. These features may open a way to help those who suffer from nightmare disorder through re-significations of the dream scene, i.e., knowing that they are dreaming and having control over their dream content. Thus, lucid dreamers might be able to render nightmares normal dreams, thereby assuring a restoring sleep. The aim of the present study is to review the existing literature of the use of LD as an auxiliary tool for treatment of nightmares. We conducted a careful literature search for eligible studies on the use of LD treatment for nightmares. We observed that whereas LD may be a feasible aid in the treatment of patients with nightmares through minimizing their frequency, intensity and psychological distress, the available literature is still scarce and does not provide consistent results. We conclude therefore that more research is clearly warranted for a better estimation of the effective conductance and therapeutic outcome of LD treatment in clinical practice.

Keywords: lucid dreaming, nightmare, rapid eye movement sleep, post-traumatic stress disorder, depression, anxiety

INTRODUCTION

According to the International Classification of Sleep Disorders, 3rd Edition (American Academy of Sleep Medicine, 2014), nightmare disorder represents repeated occurrences of extended, extremely dysphoric, and well-remembered dreams that usually involve threats to survival, security, or physical integrity. Nightmares generally occur during rapid eye movement sleep (REMS) and often result in awakening and worsened sleep quality. On awakening from nightmares, subjects rapidly become oriented and alert, but with emotional and physical signs of stress, such as fear,

tachycardia, tachypnea, sweating, and daytime impairment in emotion regulation, cognition, and in many social areas of functioning (Levin and Nielsen, 2007; American Academy of Sleep Medicine, 2014; Scarpelli et al., 2019). Nightmares may occur occasionally in almost half of adults, but they may become recurrent, that is, repeated, especially in post-traumatic stress disorder (PTSD) (Hartmann, 1984; Aurora et al., 2010; Morgenthaler et al., 2018), anxiety (Haynes and Mooney, 1975; Levin, 1998; Nielsen et al., 2000; Zadra and Donderi, 2000; Tanskanen et al., 2001) and depression (Germain and Nielsen, 2003; Agargun et al., 2007).

An important etiological distinction made is the difference between idiopathic and posttraumatic nightmares. Idiopathic nightmares are those with unknown etiology and unrelated to other disorders (American Academy of Sleep Medicine, 2014; Robert and Zadra, 2014). Their content is unspecific and includes interpersonal conflict, failure, helplessness, apprehension, being chased, accident, evil force, disaster, and environmental abnormality (Mota-Rolim et al., 2013). According to the “threat simulation theory,” nightmares serve adaptation to stressful events in life (Revonsuo, 2000). However, recent observations point to maladaptive effects of nightmares on sleep and daytime neurobehavioral functions (Levin and Nielsen, 2007; American Academy of Sleep Medicine, 2014; Scarpelli et al., 2019). In contrast, posttraumatic nightmares refer to dreaming disturbances that are part of the stress reaction following exposure to a traumatic event, either during the acute stress response, or over the course of PTSD. Whereas approximately 2–8% of the general population suffers from idiopathic nightmares, nightmares are a core feature of PTSD, with up to 80% of individuals with PTSD reporting disturbing and suicidal dreams with some degree of resemblance to the actual traumatic event (Hasler and Germain, 2009; American Academy of Sleep Medicine, 2014).

Regarding anxiety disorder, it has been found that whereas stress increases frequencies of negative emotions in dreams and nightmares occurrence (Lauer et al., 1987; de Koninck and Brunette, 1991; Köthe and Pietrowsky, 2001), nightmares in turn increase anxiety (Schredl, 2003; Scarpelli et al., 2019). Levin and Fireman (2002) found that in a long run, the reported distress associated with nightmare experience impacted more negatively on quality of life than their frequency did. This finding appears to significantly challenge the “threat simulation theory” (Revonsuo, 2000). It is important to note that whereas nightmare frequency is the number of occurrences of the nightmare, nightmare distress refers to the negative feelings upon awakening following nightmare (Belicki, 1992; Blagrove et al., 2004). In depressed patients, there is a relationship between nightmares and suicides (Agargun et al., 1998; Agargun and Cartwright, 2003; Bernert et al., 2005; Sjöström et al., 2007). The bad feeling soon after awaking from nightmares persists during the rest of the day, being associated with a melancholy and increased suicide risk (Agargun et al., 2007).

The etiology of nightmares is still elusive (Gieselmann et al., 2019). According to the neurocognitive theory, dreams are not mainly generated by the brainstem REMS control, but rather by complex forebrain mechanisms independently of the REMS

state (Solms, 2000). According to the impaired fear extinction model (Germain et al., 2008; Nielsen and Levin, 2007), a process of recombining fearful memories with novel and dissociated contexts is continuously activated in nightmare disorder. As stipulated by the affect network dysfunction model (Nielsen and Levin, 2007), individuals high in affect load and affect distress are particularly prone to such impaired fear extinction. In addition, this model is proposed in the trait susceptibility theory of nightmares, which suggests that individuals with frequent nightmares display an increased depth of processing of both negative and positive semantic stimuli (Carr et al., 2016). Finally, all the above factors may contribute to the condensing of recurrent nightmare elements into a nightmare script (Spoomaker, 2008).

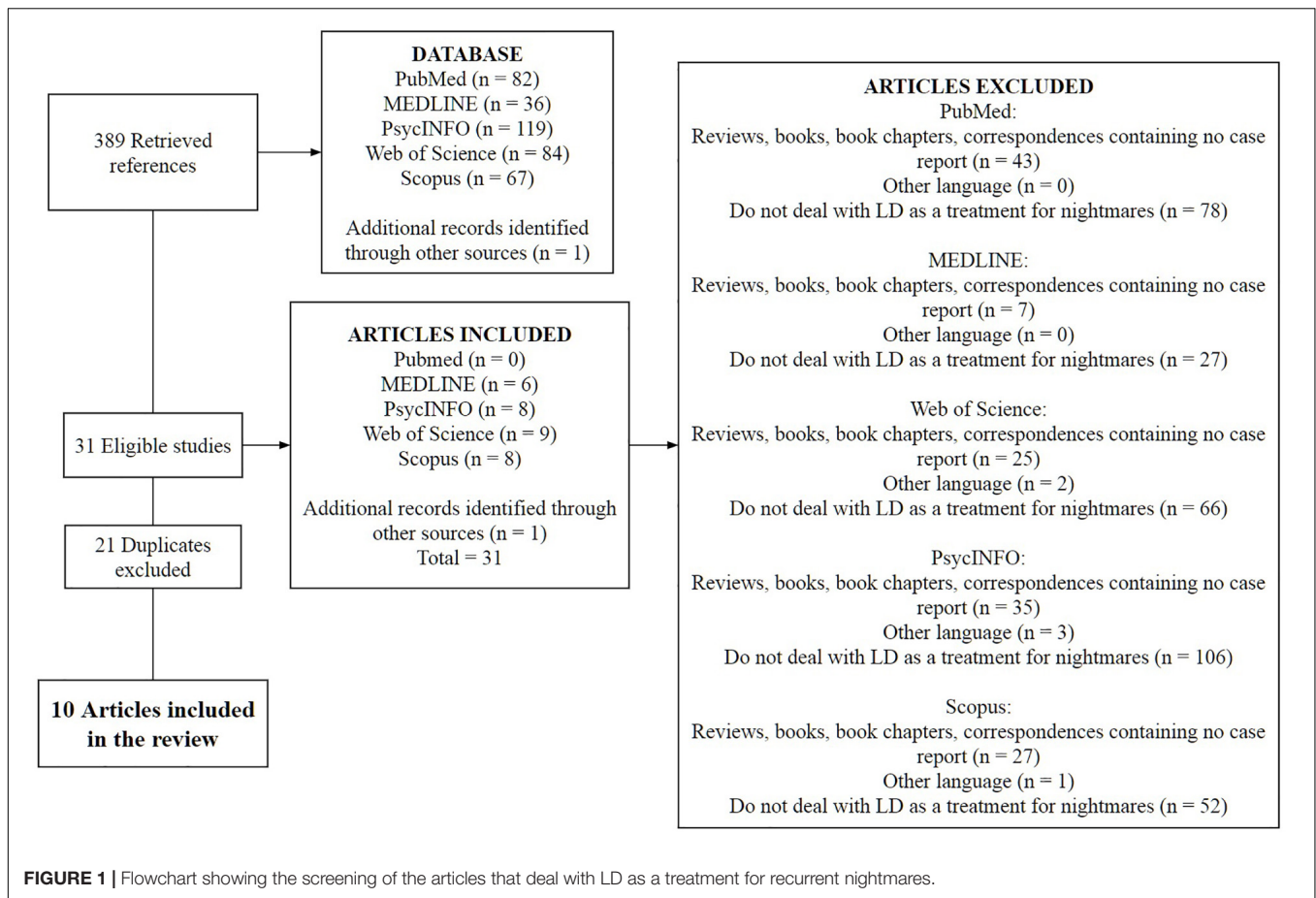
Idiopathic nightmares and those related to PTSD, anxiety, depression and other disorders can be treated with lucid dreaming therapy (LDT). Lucid dreams (LD) are those in which the subjects are aware that they are dreaming during the dream, and even may control the oneiric plot (LaBerge, 1980; Mota-Rolim and Araujo, 2013; Baird et al., 2019). This possibility opens a way to help the bearers of nightmares from what is known as re-signification of the dream scene: Being lucid in a nightmare, one can stop fearing the threats by knowing that it is only a dream, and that it could never bring real physical damage. Another tactic would be to face the source of fear, such as monsters, for example (Saint-Denys, 1982), or talk to these monsters in an attempt to find out if they have any specific reason for being there (Tholey, 1988). According to Mota-Rolim and Araujo (2013), individuals can also wake up during the nightmare, try to neutralize it, or even make it enjoyable. Here we would like to answer three basic questions: (1) Is LDT effective for treating nightmares? (2) What are the mechanisms by which LDT works? (3) What are the most used procedures, and the limitations of the LDT?

MATERIALS AND METHODS

We searched for original research articles in scientific databases, such as PubMed, Medline, PsycINFO, Web of Science, and Scopus using the keywords “lucid dream(s)” or “lucid dreaming” and “nightmare(s)” or “recurrent nightmare.” Our inclusion criteria were: (1) original research articles; (2) written in English; (3) investigated LDT for nightmares. Our exclusion criteria were: (1) original findings replicated in books, book chapters and reviews; (2) purposed on for issues different from clinical use of LDT for recurring nightmares (**Figure 1**). Data was extracted by three researchers and then reviewed by three (including one that extracted data as well).

RESULTS

We found 10 original research articles dealing with LDT as a therapeutic approach for nightmares (**Table 1**). Five case report studies demonstrated beneficial effects of LDT on nightmares and related distress (Halliday, 1982; Brylowski, 1990;



Abramovitch, 1995; Tanner, 2004; Been and Garg, 2010). However, case reports cannot prove statistically the beneficial effect of LDT on nightmare frequency, associated distress and worsened sleep quality. Further, several cross-sectional and randomized studies reported for effects of LDT and other psychotherapeutic approaches used to induce LD in order to alleviate basic features of nightmares. Zadra and Pihl (1997) applied long-lasting progressive muscle relaxation and imagery rehearsal therapy (IRT), as a cue for induction of LD in a small sample of recurrent nightmare sufferers. They showed some positive but insignificant effects on nightmare features. Spoormaker et al. (2003) found a positive but also not significant effect of LDT on nightmare frequency and sleep quality. Spoormaker and van den Bout (2006) demonstrated that participants who received individual LDT showed a stronger decrease in nightmare frequency compared to the group that received LDT. Lancee et al. (2010) subjected a larger group of volunteers with self-reported nightmares to IRT, IRT with sleep hygiene and IRT with sleep hygiene and a LD session. They found that application of IRT only was more effective than the other interventions. More recently, Holzinger et al. (2015) subjected participants who suffered from frequent nightmares, and who did not make use of any medication to gestalt therapy (GT) and a combination of GT and LDT. The major results from this randomized

study showed that the group that received GT plus LDT had better effects on nightmare features than those subjected to GT only (Table 1).

DISCUSSION

What Are the Neurobiological and Psychological Mechanisms That Underlie LDT?

At the neurobiological level, LDT may work by frontal activation, which inhibits the limbic system. During normal REMS, the frontal activity decreases (Maquet et al., 1996); however, during LD the frontal gamma activity (~40 Hz) increases (Mota-Rolim et al., 2008, 2010; Voss et al., 2009). The frontal region is associated with executive control, attention, rational judgment, working memory, etc. (Hobson, 2009), while the limbic system is related to emotional processes (Peterson et al., 2002). During REMS, there is also an increase in dopamine levels in limbic areas, mainly the nucleus accumbens (Joyce and Meador-Woodruff, 1997; Gottesmann, 2006; McCarley, 2007; Skrzypiąska and Szmigielska, 2013). This neurotransmitter pattern and brain areas activity observed in non-lucid REMS are similar to those involved in psychosis (Tort et al., 2005), which may explain the bizarre

TABLE 1 | Summary of the included studies details.

Citation	Sample size and characteristics	Study design	Intervention(s)	Main results or outcomes
Halliday, 1982	Young, white male, farm worker who suffered vivid recurrent nightmares after a tractor accident.	Case report	The participant was told a story about people who could change their nightmare by introducing a small alteration of some traumatic objects of their dream scene 2–3 times weekly.	The man could change the recurrent nightmare scenario to a pleasant and “lucid” dream by transforming it to neutral and emotionally insignificant object: “the color of a metal shed.”
Brylowski, 1990	A 35-year-old woman who had nightmares associated with borderline personality and depression.	Case report	A 4- to 6-week contact was negotiated for lucid dreaming treatment (LDT), including dream journal, mnemonic induction of lucid dreaming and reading recommendation of a book about lucid dreams during 4–6 weeks.	The techniques used helped the patient to master the negative affect, while the nightmare was still occurring, but with significantly less affective states upon awakening.
Abramovitch (1995)	A 19-year-old woman who suffered an acute nightmare disorder of returning home.	Case report	Home-based (LDT) sessions. Information about the duration and number of sessions was not provided.	The woman was able to modify her nightmare through the lucid dreaming technique.
Zadra and Pihl, 1997	$N = 5$ (recurring nightmare sufferers: 4 women (age range 22–52 years) and 1 man (42-year-old).	Case reports	Two female patients underwent progressive muscle relaxation (PMR) + imagery rehearsal therapy (IRT) + LDT. Three (2 female and 1 male) patients received LDT alone.	One female patient to PMR + IRT + LDT reported no further nightmares at a 4-year follow up. One female patient on LDT tended to decrease her nightmares frequency. Other patients (one female and one male) on LDT reported no further nightmares at 6-month and at 1-year follow-up. The other female patient did not benefit from PMR + IRT + LDT intervention. The effects of both combined and LDT alone can not be assessed statistically due to the study design and low number of reported cases.
Spoormaker et al., 2003	$N = 8$ Anxiety-provoked nightmare sufferers (2 men/6 women; mean age 27.8 years (SD 12.2).	Case reports	All participants received a 1-h Individual, home-based session consisting of (1) lucid dreaming exercises, and (2) of discussing possible constructive solutions for the nightmare.	Nightmare frequency a week decreased up to 60% but not significantly mean (SD) 2.31 (3.56) vs.0.88 (1.13), and sleep quality slightly improved, but also insignificantly due the small sample size used.
Tanner, 2004	A 23 year old woman presenting with a 17 year history of nightmares.	Case report	A combination of relaxation mnemonic procedures to increase lucid dreaming and dream rehearsal upon waking from a nightmare. Four sessions.	Nightmares frequency sharply decreased after four sessions. Further improvement was reported over the next 9 months as additional techniques were introduced and other problems.
Spoormaker and van den Bout, 2006	$N = 23$ (nightmare sufferers; 6 men/17 women; mean age: 28.4 years (SD = 7.3).	Cross-sectional pilot study	12 weeks; Three groups underwent (1) a 2-h individual LDT session ($n = 8$), (2) a 2-h group LDT session ($n = 8$), and (3) waiting list (WL) ($n = 7$) during 12 weeks.	A significant reduction of nightmare frequency for participants who received an individual session ($t(7) = 4.1$, $p = 0.002$). A significant reduction of nightmare frequency was also found in participants who took part in the group session ($t(7) = 2.6$, $p = 0.02$). No significant effects were found in the waiting list group ($t(6) = 0.6$, $p = 0.30$). There were no significant changes between pre intervention and follow-up in sleep quality and overall PTSD symptoms for any of the groups.

(Continued)

TABLE 1 | Continued

Citation	Sample size and characteristics	Study design	Intervention(s)	Main results or outcomes
Been and Garg, 2010	A 39 year old man with history of depression, PTSD and alcohol dependence. He suffered from insomnia as a result of recurring nightmares. He made use of medications to control anxiety.	Case report	Sixteen days with psychoeducation in LDT based on Wikipedia to realize becoming lucid.	The patient became able to achieve lucidity during his nightmares and then to render them pleasant dreams. The patient did not present any nightmares anymore. His sleep improved and he stopped using medication for anxiety. The patient thinks that the psychoeducation was the main factor for his improvement.
Lancee et al., 2010	<i>N</i> = 278: A heterogeneous sample of patients with nightmare disorder (age range: over 33–39 years; 76% female patients).	Randomized controlled trial	Following the exclusion criteria. 67 participants underwent IRT, 75 IRT + sleep hygiene, 71 LDT, and 62 WL. Sessions duration – 6 week. Follow-up measures at weeks 4, 16, and 42.	The IRT alone was more effective than the other intervention conditions over time as measured by the large effect sizes. The effects of LDT alone on the outcome measures were insignificant.
Holzinger et al., 2015	<i>N</i> = 40. Patients with recurrent nightmares (10 males/30 females; age range: 20–59 years) who were resistant to medications.	Randomized controlled trial	Thirty-two out of the 40 patients completed the study. One group (<i>n</i> = 16) received Gestalt Therapy (GT), while the other group (<i>n</i> = 16) received GT + LDT during 10 weeks. Following-up measures at weeks 5 and 10.	Significant reduction of nightmare frequency and improvement of sleep quality in both groups. Dream recall frequency was significantly higher in the group receiving GT + LDT. Compared to the group receiving GT only, the group receiving GT + LDT showed stronger and also significant ($p \leq 0.05$) effects of the intervention on nightmare frequency and sleep quality at the end of therapy.

aspect of dreams (which are analogous to hallucinations), and the lack of rational judgment over this bizarreness (akin the delirious thinking) (Mota et al., 2016). Thus, suppression of the limbic system by the frontal lobe activation during LD could decrease both frequency and intensity of nightmares. Finally, Dresler et al. (2012) observed that the precuneus region is linked to the first-person perspective and agency during LD, which is an important aspect for the treatment of nightmares.

At the psychological level, Rousseau and Belleville (2017) gathers possible mechanisms by which LDT and other similar treatments work, which are: modification of beliefs (Krakow et al., 2000), prevention of avoidance (Pruiksma, 2012), decreased arousal (Davis, 2009), restoration of sleep functions (Germain, 2002), emotional processing (Davis et al., 2007), and sense of mastery (Spoormaker et al., 2003). Change in beliefs can happen both through psychoeducation about the aspects of dreams (Krakow, 2015) and through psychotherapy, focusing on the nightmare theme (Harb et al., 2012). In the case reported by Been and Garg (2010), for example, the patient believes that the psychoeducation was the main factor for his improvement. Avoidance, i.e., trying not to think about the nightmare content or avoiding sleep, is associated with nightmare maintenance (Hansen et al., 2013), and being afraid to fall asleep correlates with higher nightmare frequency (Neylan et al., 1998). Relaxation exercises, as well the sense of mastery itself could help to decrease arousal (Rousseau and Belleville, 2017). Once nightmares are diminished, the subject awakes less, which allows the restoration of sleep functions such as memory consolidation and emotional processing (Germain, 2002). Finally, the belief in control, i.e., the

sense of mastery, seems equally important as actually controlling the dream (Spoormaker et al., 2003). Harb et al. (2016) compared the cognitive-behavioral therapy for insomnia (cCBT-I) with IRT + cCBT-I to investigate the potential role of LD as a mechanism of action of IRT in military veterans with PTSD and recurrent nightmares. Before treatment, veterans demonstrated a LD profile characterized by high dream awareness and low dream content control. Following treatment, the control of dream content increased, but lucidity has not changed. This increase in dream content control was related to a reduction in nightmare distress.

Studies show that lucidity is not the main factor to change nightmare content or to reduce nightmare frequency (Spoormaker and van den Bout, 2006). Therefore, a relevant question is: what are the advantages of using LDT over other therapies, e.g., IRT? First, even though lucidity is not the main factor, it does not mean it has no important role. The possibility to achieve lucidity may provide the opportunity to practice self-control and pacific confrontation more directly, which is important to improve the coping ability in the waking state (Brylowski, 1990). According to Lancee et al. (2010), there are two main advantages of LDT over other therapies, especially IRT: (a) once LDT targets the nightmare within the dream, it might be specifically beneficial for people that suffer from non-recurrent nightmares; (b) LDT has more effect on nightmare intensity, because nightmare sufferers achieve a sense of control with the LD technique. Moreover, unlike LDT, IRT might only ameliorate the low intensity nightmares (Lancee et al., 2010). As another advantage, even without lucidity, LDT encourages the

attitude of “this is just a nightmare, so there is no real threat.” Although IRT also helps to deal with negative imagery (Krakow and Zadra, 2006), the attitude of “this is just a dream” may play an important role in the modification of belief, decrease of arousal and prevention of avoidance (see **Supplementary Material**). Despite that, more studies are needed to clarify the mechanisms of therapies that aim to treat nightmares, and to indicate their advantages and disadvantages.

How Does LDT Work on Practice?

Lucid dreaming therapy for nightmares is a focal modality of psychotherapy. It can happen in a 6-week period (Brylowski, 1990), but can produce effects in a single session (Zadra and Pihl, 1997). The first step is to make it clear that patients have the full capacity to learn how to control their dreams. The therapist guides patients to develop LD induction techniques, and help them to deal with the fear that can follow LD discovery. Once patients feel empowered about their dreams, nightmare frequency might decrease by itself (Spoomaker and van den Bout, 2006). Beyond that, if a nightmare comes up, it will tend to be less distressing, given the sense of mastery that the patient now has. The experience of facing the oneiric threat, i.e., of having a less distressing dream, seems to be essential to the decrease of the remaining nightmares.

Further, a long-term psychotherapy may be initiated, aiming to explore more profoundly the waking life and to elucidate broader questions that even may trigger the nightmares. LDT is a good precedent of a long-term psychotherapy, once it has relatively quick results, which motivates the patient to continue in therapy (Holzinger et al., 2015). Some patients may be skeptic, may have more difficulty to achieve lucidity, or may just have no time to practice frequently at home. In these cases, we recommend using techniques of external sensory stimulation during REMS or substances to induce LD more quickly (Stumbrys et al., 2012; Baird et al., 2019; Mota-Rolim et al., 2019). Nevertheless, some studies demonstrate that even when lucidity is not achieved, exercises of induction facilitates waking up from the nightmare before it becomes too scary (Brylowski, 1990; Tanner, 2004), or changes the oneiric content even without lucidity (Spoomaker and van den Bout, 2006). In these cases, the subjects incorporated elements from the exercises into the dream (Brylowski, 1990; Zadra and Pihl, 1997; Spoomaker et al., 2003). Thus, such exercises helped patients to increase the sense of control over their dreams, consequently, increasing their self-confidence. Moreover, the positive changes in the threatening content are symbolically incorporated to the dreamer’s cognition (Brylowski, 1990).

As said earlier, wake up through lucidity is an option to reduce distress related to nightmares. However, LaBerge and Rheingold (1990) believe that “just wake up” is not as therapeutic as to actually control the content of the dream or the self, once it is a way to run from the nightmare, and not to face it. These authors even suggest that controlling the self is better than controlling the dream content, since in real life, it is not possible to magically change the scenario. Tholey (1988) affirms that when the dream ego looks courageously and openly at hostile dream figures, their appearance often becomes less threatening, as recently supported by Stumbrys and Erlacher (2017) empirical study. On the other

hand, when one tries to make a dream figure disappear, it may become even more threatening (Sparrow, 1976). Finally, Tholey (1988) also argue that it is better to conciliate with the dream figure through constructive dialogue than to attack it. Although emotions such as intense fear can trigger lucidity faster (LaBerge and Rheingold, 1990), an unexperienced lucid dreamer is more prone to wake up from the dream than trying to control it, since the excitement caused by the discovery that one is dreaming may cause awakening (Mota-Rolim et al., 2013). Besides, even when subjects are lucid, the fear may not necessarily fade away (Hurd, 2014), thus a “runaway” behavior takes place. Initially, “just wake up” could be a useful weapon until a minimum sense of control is developed; however, it is necessary to practice for the LD scenario does not fade away causing the awakening, which allows the dreamer to explore other possibilities and face their fears.

What Are the Main Limitations of the LDT?

Halliday (1988) and Zadra (1990) reported case studies in which lucidity was achieved, but without control, and it actually worsened the nightmare. Lucid nightmares are LD with a scary and unpleasant content, in which dreamers have no control over the situation, thus they just “witness” the unfolding of the dream, being unable to deliberately wake up (Hurd, 2009; Schredl and Göritz, 2018; Stumbrys, 2018). Lucid nightmares may be even more terrifying than common nightmares (Halliday, 1988); however, Stumbrys (2018) found that the levels of nightmare vs. lucid nightmare distress do not differ. Sparrow (1991), signifying dreamer’s harrowing experiences with LD, warned about the wholesale advertising of LD, since lucid nightmares frequency is associated not only to nightmare frequency, but also to LD frequency (Stumbrys, 2018). This makes patients with nightmares very vulnerable to lucid nightmares in a LDT. Therefore, some care is needed when a LDT is initiated. Fortunately, community support is helpful in reducing lucid nightmares (Hurd, 2006). Besides, it was found that dopamine agonists are useful in reducing lucid nightmares frequency (McLaughlin et al., 2015a,b, 2016); however, these studies comprise only a few cases in a very special population, which limits the generalizability of the findings. Finally, one main issue in LDT is to induce LD, which is usually difficult for most of people (Stumbrys et al., 2012), who experience LD rarely (Mota-Rolim et al., 2013). However, Dodet et al. (2015) and Rak et al. (2015) observed that narcoleptic patients report more LD than the rest of population, and that some of these patients even learned to use LD to change their recurrent nightmares. These authors suggest that the experience of these patients with LD could help other narcoleptics who suffer from frequent nightmares.

CONCLUSION

Lucid dreaming therapy may be efficient for treating nightmares, and even when lucidity is not achieved, the induction exercises assisted patients by helping them develop a critical thinking over dream content. Although induction of LD may be a feasible aid in the treatment of patients with nightmares through minimizing their frequency, intensity and psychological distress, the available

literature is still scarce and does not provide consistent results. Furthermore, the samples size are limited, which precludes more significant comparisons. Therefore, more research is clearly warranted for a better estimation of the effective conductance and therapeutic outcome of LD techniques in clinical practice.

AUTHOR CONTRIBUTIONS

TM and RK conducted the literature search, selected the eligible studies, and drafted the manuscript. GF drafted the manuscript. KA selected the eligible studies and drafted the manuscript. SM-R designed the manuscript, conducted the literature search, selected the eligible studies, and drafted the manuscript. All authors worked over the first draft of the manuscript and approved the final version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02618/full#supplementary-material>

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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