

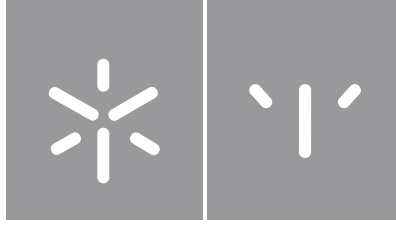


Universidade do Minho
Escola de Psicologia

Beatriz Azevedo Duarte
**Living in the Dream: A Systematic Review
of the Effects of Lucid Dream Induction**

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Masters Dissertation
Masters in Psychology of Justice

Work supervised by
Professor Doctor Mariana Gonçalves

June 2023

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Lastly, I would like to give a special thanks to everyone else that, in any way, shape, or form, was a part of this journey. You won't ever be forgotten.

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

University of Minho, June 4th, 2023

Signature:

Beatriz Azevedo

Viver no Sonho: Uma Revisão Sistemática sobre os Efeitos do Sonho Lúcido

Reality shifting é a prática de mover a nossa consciência para um universo alternativo, seja ele ficcional ou não, e utiliza técnicas da indução do sonho lúcido sob a crença de que a experiência que lhes advém é real. Esta revisão sistemática investiga os efeitos da indução do sonho lúcido para compreender as consequências da *reality shifting*. Dos 276 estudos encontrados através de várias bases de dados, fontes específicas e *handsearching*, apenas 16 eram estudos empíricos publicados em revistas científicas entre 2000 e 2022, escritos em inglês, e focados no efeito da indução do sonho lúcido no funcionamento executivo, nas habilidades e no bem-estar dos participantes. Os resultados encontrados são demasiado escassos e heterogêneos para tirar conclusões viáveis. Apenas se pode propor a existência de uma transferência de experiências entre o sonho e a vigília, e que estas podem ter repercussões, tanto positivas como negativas, na nossa vida. Isto sugere que um efeito mais intenso e grave pode resultar da *reality shifting*, pois os seus praticantes acreditam que as suas experiências são reais e as *realidades desejadas* mais populares são baseadas em obras que exploram temas mais sombrios, como a morte e a violência. Algumas fragilidades na literatura incluída foram realçadas, uma vez que a maioria não menciona o método de indução usado nos seus procedimentos ou apresenta lacunas no fornecimento dos dados ao não serem facultadas descrições dos participantes e informações sobre aprovação ética, o que influencia os resultados do presente estudo. Sugestões para estudos futuros são discutidas no final desta revisão.

Palavras-chave: adolescente, consequência, *reality shifting*, revisão sistemática, sonho lúcido

Living in the Dream: A Systematic Review of the Effects of Lucid Dream Induction

Reality shifting is the practice of moving one's awareness to an alternate universe, whether fictional or non-fictional, and takes inspiration from techniques used in lucid dream induction under the belief that the later experience is real. This systematic review investigates the effects of lucid dream induction to understand the consequences of *reality shifting*. Out of 276 studies found through various databases, specific sources and handsearching, only 16 were empirical studies published in scientific journals between 2000 and 2022, written in English, and focused on the effect of lucid dream induction on the participants' executive functioning, skills, and well-being. The results found are too scarce and heterogeneous to draw viable conclusions. It can only be proposed the existence of a transference of experiences between dreaming and wakefulness, and that those can have both positive and negative repercussions on our waking lives. This suggests a stronger and more serious effect might result from *reality shifting* as the users believe their experiences to be real and most popular *desired realities* are based on works that explore darker themes, such as death and violence. Some issues within the included literature were highlighted as most failed to mention the induction method used in their procedures or showed weaknesses in their report by not providing participant descriptions and information on ethical approval, impacting the findings of the present study. Suggestions for future studies are discussed at the end of this review.

Keywords: consequences, lucid dreaming, reality shifting, systematic review, teen

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Introduction

The imposed lockdowns to contain the spread of COVID-19 significantly impacted the daily routines of children and adolescents as they witnessed the closures of their schools and restrictions on social gatherings with friends (Fernandes et al., 2020). While these interpersonal connections could be preserved using online groups that could help reduce one's feelings of loneliness (Flannery et al., 2021), the lack of stability in one's life proved to be a huge contributor to the development of onset symptoms (Bartek et al., 2021) of various mental disorders. A study by Fernandes et al. (2020) showed that, during the pandemic, teens had increased their social media use to stay in touch with their peers, and that their exacerbated internet use, coupled with the overall concerns about the pandemic, was linked to higher levels of depression, loneliness, and escapism.

According to the APA Dictionary of Psychology (n.d.), *escapism* is “the tendency to escape from the real world to the delight or security of a fantasy world” and, although with a negative connotation, it can be both harmless (e.g., periodic daydreaming) or damaging (e.g., symptoms of mental pathology) to a person. One of the escapism methods that grew in popularity on various social media platforms (e.g., Amino; Reddit; TikTok) during the pandemic was a cognitive process named *reality shifting* (RS) (Somer et al., 2021).

Reality Shifting

In a research article on the subject, Somer et al. (2021) define the phenomenon of *reality shifting* (RS) as “the experience of being able to transcend one's physical confines and visit alternate, mostly fictional, universes” (p. 1), being the Harry Potter literary and cinematic universes one of the most common choices. Other chosen fictional universes include the Shadowhunters and Star Wars universes, as well as various Anime and Manga worlds (e.g., Hetalia; My Hero Academia; Somer et al., 2021).

As of March 22nd, 2023, the biggest community of RS on Amino called *Reality Shifting* has nearly 78.5k members (Amino, c/RealityShifting, n.d.), while the Reddit communities by the name of *Shifting Realities* and *DimensionJumping* have over 85k and 47.1k members, respectively (Reddit, r/ShiftingRealities, n.d.; Reddit, r/DimensionJumping, n.d.). Similarly, the TikTok hashtags *#shifting*, *#shiftingrealities* and *#realityshifting* have over 15.6B, 6.7B and 2.3B views total, respectively (TikTok, #shifting, n.d.; TikTok, #shiftingrealities, n.d.; TikTok, #realityshifting, n.d.).

The growth within these communities was analysed for a year, from April 18th, 2022, to March 22nd, 2023, and it was found an average increase of 43.8% in engagement. The Amino community *Reality Shifting* and the Reddit communities *Shifting Realities* and *DimensionJumping* experienced an increase

of 8.4%, 41% and 4.7% in members, respectively. Likewise, the TikTok hashtags *#shifting*, *#shiftingrealities* and *#realityshifting* saw an increase of 50%, 81.6% and 76.9% in views total, respectively.

Somer et al. (2021) further explain that users of this practice believe it to work based on Hugh Everett III's many-worlds interpretation of quantum mechanics. This interpretation proposes the idea that there might be an infinite number of universes with their own set of rules that exist simultaneously alongside ours. This, however, does not mean that people can generate their realities if they so desire. Another influential base for this phenomenon is the CIA's declassified *Analysis and Assessment of Gateway Process* research paper, written and conducted by Lieutenant Colonel Wayne McDonnel (Somer et al., 2021). This study aimed to investigate out-of-body states and their consequent ability to perform various tasks—for instance, time travelling to both the past and the future—, with the use of sound recordings that synchronized both brain hemispheres (McDonnel, 1983). Nevertheless, the author admits the possibility that the information recovered from the out-of-body state might be distorted and, thus, unreliable (McDonnel, 1983).

To shift to one's *desired reality* (DR), Somer et al. (2021) describe that one must follow two preparation steps: a short meditation of five to ten minutes to clear the mind and focus on the shifting process, and a comprehensive *script* for the DR experience. This script is often a guide with specific information about the experience one is seeking, including preferred looks, languages used, acquired abilities, and vicinities. Some users suggest the use of *subliminals*. These are audio recordings of music, ambient noise, and affirmations that are believed to help the shifting process and shape it. After doing all of this, the authors (Somer et al., 2021) then explain that one might induce the shifting using several methods, namely: (a) the Raven Method—the most popular one—, where one lies in a starfish position and counts to 100; (b) the Alice in Wonderland Method, where one imagines falling down a rabbit hole and finding a key to one's DR, like the character in the novel; (c) the Pillow Method, where one writes affirmations on a piece of paper, repeats them and sleeps with it under the pillow; (d) the Elevator Method, where one imagines being inside an elevator going up to the DR; and (e) the Lifa App Method, where one uses an imaginary app that allows one to script and go to their preferred DR.

There are many reasons why one might choose to engage in the practice of RS, such as a general curiosity over something new or simply as a means for pleasure and fun, however feelings of dissatisfaction with one's current state, as previously mentioned, seem to be the main cause (Somer et al., 2021). In an online news article by Colombo (2022), three former shifters aged between 17 and 18 years-old reported that they began to shift as a form of escapism, stating feeling depressed and even

suicidal. They further confessed seeking feelings of happiness, excitement, and newness from it as “people were saying you could create the perfect reality and live there” (Colombo, 2022, para. 11).

This experience can be compared to other related phenomena, such as tulpamancy, hypnosis, lucid dreaming, dissociative absorption, as well as maladaptive daydreaming (Somer et al., 2021). However, this study will focus on lucid dreaming specifically as a related phenomenon of RS.

Lucid Dreaming

Lucid dreaming (LD) is described as the awareness that one is dreaming while staying asleep (Somer et al., 2021), sometimes giving the sleeper control over said dream’s environment (Pacheco & Rehman, 2022). The existence of this phenomenon was only empirically verified in the late 1970s to early 1980s through the unpublished doctoral dissertations of Hearne (1978) and LaBerge (1980) respectively, however, the first published article on the subject only came out a year later by LaBerge et al. (1981), as described by Stumbrys et al. (2012). The authors proved, by the means of polysomnograms (i.e., electroencephalogram; electro-oculogram; chin electromyogram) and physiological signals of the eyes and the left and right wrists, that LD seemed exclusive to rapid eye movement (REM) sleep, and that it is possible to signal from within the dream to the surrounding environment without waking up (LaBerge et al., 1981).

However, lucid dreams don’t just occur by accident through REM sleep. They can also occur during non-REM sleep—though rare—, and one can learn how to lucid dream and, therefore, use techniques that aim to increase the occurrence of such dreams, despite their initial state (i.e., awake vs. dreaming; Stumbrys et al., 2012).

In a systematic review of the different induction techniques for LD and their effectiveness, Stumbrys et al. (2012) propose a new classification of these methods based on the following categories: (a) cognitive techniques (e.g., suggestion; hypnagogic techniques); (b) external stimulation (e.g., sound; vibration); and (c) miscellaneous techniques (e.g., specific substance use). The authors (Stumbrys et al., 2012) expand each category as follows:

Cognitive Techniques

MILD. The Mnemonic Induction of Lucid Dreams (MILD) technique is the preparation of a dream before sleeping and the consequent visualisation of lucidity while maintaining the intention to remember that one will be dreaming. This technique proved to be highly effective in inducing LD.

Reality Testing. This method requires checking repeatedly throughout the day, whether one is dreaming. This is because actions, such as attempting to inhale while closing both the nose and mouth, create contradictory sensations of still being able to breathe when done while in a dream (Aspy et al.,

2017; Love, 2013), which has been proven to increase the occurrence of lucid dreams (Stumbrys et al., 2012).

Intention. This technique is like the MILD one, as it involves imagining oneself being in a dream and identifying that it is a dream. Despite their similarities, these induction methods differ in their premise as the focus of MILD is to remember one will dream and the focus of intention is to recognise one is dreaming. This technique, although effective, it appears to be less successful than reality testing.

Autosuggestion. Through this practice, one is in a calm disposition and suggests to themselves to have a lucid dream that night. Despite its ambiguous results regarding its effectiveness, it appears to have similar success as the intention technique.

Tholey's Combined Technique. This method integrates aspects of the last three techniques as it proposes to reflect on what one is experiencing, to identify that one is dreaming and to autosuggest to lucid dream once asleep. This technique proved to be effective in inducing LD whether the participants had previous experience with the phenomenon or not.

Post-hypnotic Suggestion. This technique, unlike the ones previously mentioned, requires the assistance of a professional in hypnotherapy. Their job is to suggest to their patient—while in a hypnotic trance—to have a lucid dream later that night. However, despite the professional intervention of this method, its efficiency isn't certain.

Alpha Feedback. Because of the high degrees of alpha frequency during LD, a study was conducted to evaluate whether training in electroencephalogram (EEG) biofeedback for alpha frequency before sleep would lead to the induction of lucid dreams. Yet, it did not cause any effects on the lucidity or the alpha levels during the REM stage.

Dream Re-entry. This practice aims at inducing lucid dreams shortly after waking up after a dream, where one should be still and focus on a particular activity (e.g., counting) while falling back asleep. The results on the efficiency of this method were mixed as the pilot study that explored it only had 23% of the LD attempts resulting in lucidity.

External Stimulation

Light Stimulation. This technique uses commercial devices (e.g., DreamLight) that emit light cues during REM sleep to trigger lucidity. While the use of light stimuli can be effective in inducing lucid dreams, the combination of it with the MILD appears to be more fruitful.

Acoustic Stimulation. This method incorporates sound stimuli (e.g., voices; musical tones; buzzer noises) to achieve lucidity. Findings indicate it might be possible for acoustic stimulus to increase the frequency of lucid dreams, however, the results aren't clear on how that can be attained yet.

Vibro-tactile Stimulation. This procedure resorts to sending vibrating stimuli to the fingertips to prompt lucidity and, while resulting in LD, due to it being used in combination with other techniques (i.e., reality testing; acoustic stimuli) and under multiple conditions (e.g., duration), it is not possible to be certain of its effectiveness.

Electro-tactile Stimulation. This technique involves stimulating the skin of the wrist using a small electrical current and it appears to increase the frequency of LD as 50% of the participants experienced the phenomenon because of the stimulation. However, 25% of them, despite having lucid dreams, either had them after falsely perceiving the stimulation or were woken up at signalling. Because of these results, the efficiency of this method is ambiguous.

Vestibular Stimulation. In this approach, the participants were asked to sleep in hammocks and, during REM sleep, were rocked at a constant rhythm. Despite this resulting in inconclusive findings, it is thought that it can improve dream reflectiveness, which can later lead to dream lucidity.

Water Stimulus. This method attempted to use water, whether splashed on the face or hand of the subjects, to trigger their lucidity. However, it didn't show any effect on it.

Miscellaneous Techniques

Donepezil Administration. Various substances (e.g., marijuana; alcohol; tryptamines) can alter one's sleep cycle by delaying the start of REM sleep, leading to a longer and more intense experience of the stage once the dose has worn off (LaBerge, 2004). Because of this increase in brain activity, nightmares and dream lucidity can emerge during the REM period (LaBerge, 2004). Therefore, and since cholinergic mechanisms cause REM sleep and dreaming, LaBerge (2004) proposed altering the cholinergic levels using Acetylcholine Esterase inhibitors (e.g., donepezil) to enhance dream recall and lucidity. However, as Stumbrys et al. (2012) mention in their systematic review, despite donepezil increasing the occurrence of lucid dreams, it also increased the occurrence of sleep paralysis and the time awake during the night, as well as produced adverse side effects (i.e., mild insomnia; nausea; vomiting) in the participants.

WBTB. The Wake-up-Back-To-Bed (WBTB) method involves waking up in the early morning hours and then going back to sleep after staying awake for a certain period (e.g., 30-120 min). Even though this method was tested with the MILD, there seems to be evidence to suggest its success when applied with other techniques, as the time of induction appears to be an important factor in the production of lucid dreams.

Despite of method employed and intentionality, the prime reason most people seek to lucid dream seems to be quite clear: it's to have a good time. Through an online survey by Schädlich and Erlacher

(2012), it was found that 84.7% of their sample had experienced at least one lucid dream in the months prior to the questionnaire and used it to have fun (81.4%) and changing nightmares into more pleasant dreams (63.8%). Similarly, Stumbrys and Erlacher (2016) found that 73.1% of their sample had experienced at least one lucid dream in their lives, using it for wish fulfilment (e.g., flying; dancing; laughing) (42.8%). However, age and gender seem to play a role in the interaction with lucidity in dreams. Younger participants showed a preference for wish fulfilment dreams, whereas older participants showed a preference for problem solving, meditation, and healing (Stumbrys & Erlacher, 2016). Male participants also engaged more in meditation and wish fulfilment dreams, while female participants opted for using lucidity to overcome fears and healing (Stumbrys & Erlacher, 2016).

Comparing Reality Shifting and Lucid Dreaming

After going over the definitions, induction methods, and motivations for both RS and LD, it becomes clear the multiple commonalities between the two: In LD, the key factors to achieve lucidity while dreaming include preparing the dream, having the intention to remember or recognize one is dreaming, and enforcing the autosuggested belief that one will experience a lucid dream once asleep. These then seem to be followed by the assistance of external elements, such as the use of a hypnotherapist and various kinds of stimulation, which appear to enhance the experience of LD rather than induce it to the extent of other methods. This preparation, intention and autosuggestion seem to blend in with the induction method of RS, as part of it involves writing extensive and detailed *scripts* of the experiences one seeks to have in their DRs, as well as the firm belief that they will shift into another reality afterwards. Similarly, the use of external stimulation is also present in RS in the *subliminals* that are believed to help and enhance the shifting process and experience.

However, as noted in the comparison drawn by Somer et al. (2021), despite the similarities between RS and LD, it is unlikely that the experience of LD can ever be as detailed and controlled as RS, as it is experienced within the context of a dream, whereas RS is believed to be experienced within another reality. This difference in perceived realms is crucial to understand the motivations behind its practice, but also to understand the consequences of partaking in each phenomenon.

Effects of Reality Shifting and Lucid Dreaming

From these similarities, it is possible to extrapolate the potential risks of RS based on the risks associated with lucid dream induction. In an online publication for the *Sleep Foundation*, Summer and Rehman (2022) warn that its use may cause less restful sleep, poor memory consolidation and emotional regulation as the practice may interfere with the natural processes of the brain during REM sleep. Using LD may also raise some concerns for the user's mental health as its impact seems to depend on their

individual experiences with the phenomenon. For instance, some studies have shown that LD can help reduce anxiety and depression in individuals who experience posttraumatic stress disorder (PTSD) and nightmares (Holzinger et al., 2020), with some studies showing evidence of a reduction in nightmare frequency and better quality of sleep when LD is used as an add-on therapy (Holzinger et al., 2015). However, it may be dangerous for those that experience psychosis. LD involves thinking of oneself from a third-person perspective, which is like what happens in dissociative mental states and the initial stages of psychosis (Voss et al., 2018). Therefore, engaging in LD might make one's dreams feel more like reality, worsening their illness (Mota et al., 2016). It is important to note that we still need a lot more research on this topic to draw a conclusion on this matter, as the research is scarce, and the results are conflicting.

Summer and Rehman (2022) also give tips on experiencing LD safely, particularly, being aware of why one has the desire to use it. As mentioned previously, this aspect is vital when discussing RS, as many teens are open about the hardships they face in their *current realities* (CRs) and their desires to go elsewhere (i.e., their DRs) so that they can feel positive emotions (Somer et al., 2021). Adding to that, the users often believe that they are experiencing real alternate realities rather than just a vivid dream, with some having the desire to permanently move to their DRs (Somer et al., 2021). This concept is known as *respawning*, and it is the radical belief that one can cut ties with their CR and move to their chosen DR, leaving a "clone" behind that will stay and live in the CR in their place (Somer et al., 2021). Former shifters admitted to Colombo (2022) that they began neglecting their lives and distancing themselves from their CRs because of this belief that they could go to their DRs forever, making their mental health worse.

This distortion of boundaries between waking and dreaming is often related to schizotypy and dissociative symptoms, as previously examined, and it was shown to increase with engagement in LD induction (Soffer-Dudek, 2020). However, the same appears to be the case with the participation in RS, as a former shifter shared her experience with Colombo (2022) and confessed that the practice had "made her delusional" (i.e., believing her soulmate lived in her DR) (para. 22).

Similarly, given the idealized nature of these experiences, it leaves room to wonder whether this phenomenon may have some addictive component to it—also seen in maladaptive daydreaming—, that lures the users back each time and lessens their ability to command their experiences (Somer et al., 2021), turning what was a coping mechanism into a full-fledged pathology. When questioned on the matter, former shifters were honest about its addicting nature and reported constantly thinking about

their DRs to the detriment of their interests, with one describing the practice as “kind of like how people describe drugs. The higher the euphoria, the lower the crash” (Colombo, 2022, para. 21).

Objectives

This study proposes an analysis, through systematic reviewing of published empirical evidence, of the impact of LD induction on its users’ mental and physical functioning and well-being. As the prevalence and interest surrounding RS increases, this study hopes to benefit those looking forward to investigating it by providing them with ethical concerns that might arise in their research. It also hopes to provide answers to those who feel drawn to the phenomenon of whether there are significant risks associated with the practice for a more weighted decision before participating.

Method

The data reported in this systematic review followed the PRISMA guidelines. This 27-item checklist is used to ensure a valuable report in systematic reviews and offers recommendations and examples on how to report each item (Page et al., 2021). In accordance, this review has been registered in PROSPERO under the ID CRD42022361902.

Literature searches were conducted by one independent investigator. They occurred once a week from September 23rd, 2022, to October 28th, 2022, lasting for exactly five weeks, and aimed to identify relevant studies from both electronic databases and specific resources. The list of electronic databases was as follows: Clinicaltrials.gov, Cochrane Library, Embase, PsycArticles, PubMed, Scopus, and Web of Science. Specific resources were scientific journals dedicated to the research of dreams (i.e., Lucidity Letter; International Journal of Dream Research; Dreaming), references in relevant articles and handsearching using Google Scholar. The search query used when searching in the databases previously mentioned was: *[(“lucid dream” OR “reality shifting”) AND (“teen” OR “adolescence” OR “adolescent” OR “young adult” OR “child”) AND (“impact” OR “consequence” OR “effect” OR “dynamic” OR “developing brain” OR “neurodevelopment”)]*. However, this produced no results in some selected dream-specific journals. To solve this, a more simplified version was also used on these resources every two weeks: *[(“lucid dream” OR “reality shifting”)]*. If this new search query yielded less than 25 results, those were handsearched before being included for further reviewing, but if it yielded over 25 results, those were all included for more extensive reviewing to avoid biases.

All studies found through the literature search were extracted to Rayyan and were analysed and graded by two independent reviewers based on their titles and abstracts. They later discussed between themselves whether a specific article should be included. If there wasn't an agreement on the matter, the

reviewers assessed the full text of the study and discussed its inclusion again. If the disagreement remained, a third independent reviewer was asked to make the final judgement.

The articles were assessed according to the inclusion and exclusion criteria. The authors decided to include empirical studies written in English and published in scientific journals between the years 2000 and 2022 that investigated the effect of lucid dream induction. Others, such as book chapters, systematic reviews, opinion articles, and grey literature, as well as literature in languages other than English, were excluded from this study.

All data of the included studies were then extracted to Excel and sorted for future analysis and overview into the following variables: Authors, Year, Title, Country, Focus, Main goals and hypothesis, Sample size, Age, Sex, Inclusion and exclusion criteria, Data collection strategy, Methodology, Induction method used, Instruments, Main results, Limitations, and Quality. This step was done individually but later reviewed and approved by an independent researcher. A polished version of this table (Table 1) can be found in the Appendix.

The methodological quality and risk of bias of all studies was assessed individually and later reviewed and approved by an independent researcher, using the Version 1.4 of the Crowe Critical Appraisal Tool (CCAT) developed by Crowe et al. (2012). This tool was selected because it can be applied to both qualitative and quantitative studies. It contains both a user guide and a form that should always be used together to assure the reliability of the scores obtained. The CCAT form is divided into eight categories (i.e., preliminaries; introduction; design; sampling; data collection; ethical matters; results; discussion) and 22 items, with each category receiving its own score on a scale from 0 (*lowest score*) to 5 (*highest score*) (Crowe et al., 2012). The total score can be expressed as a percentage by dividing the *Total* by 40 and writing the result on the first page of the form to the nearest full per cent (Crowe et al., 2012). A third reviewer was also consulted in situations of disagreement.

Data included in the systematic review for synthesis was presented in tabulated form. This allowed comparisons in terms of the focus, sample size, type of induction method used, measures of the effect of said induction method on its users, and the quality of each article. A polished version of this table (Table 2) can be found in the Appendix.

Lastly, once the systematic review was complete, its overall strength was assessed to ensure its quality. This was done using the PRISMA guidelines for systematic reviews (Page et al., 2021) as previously mentioned.

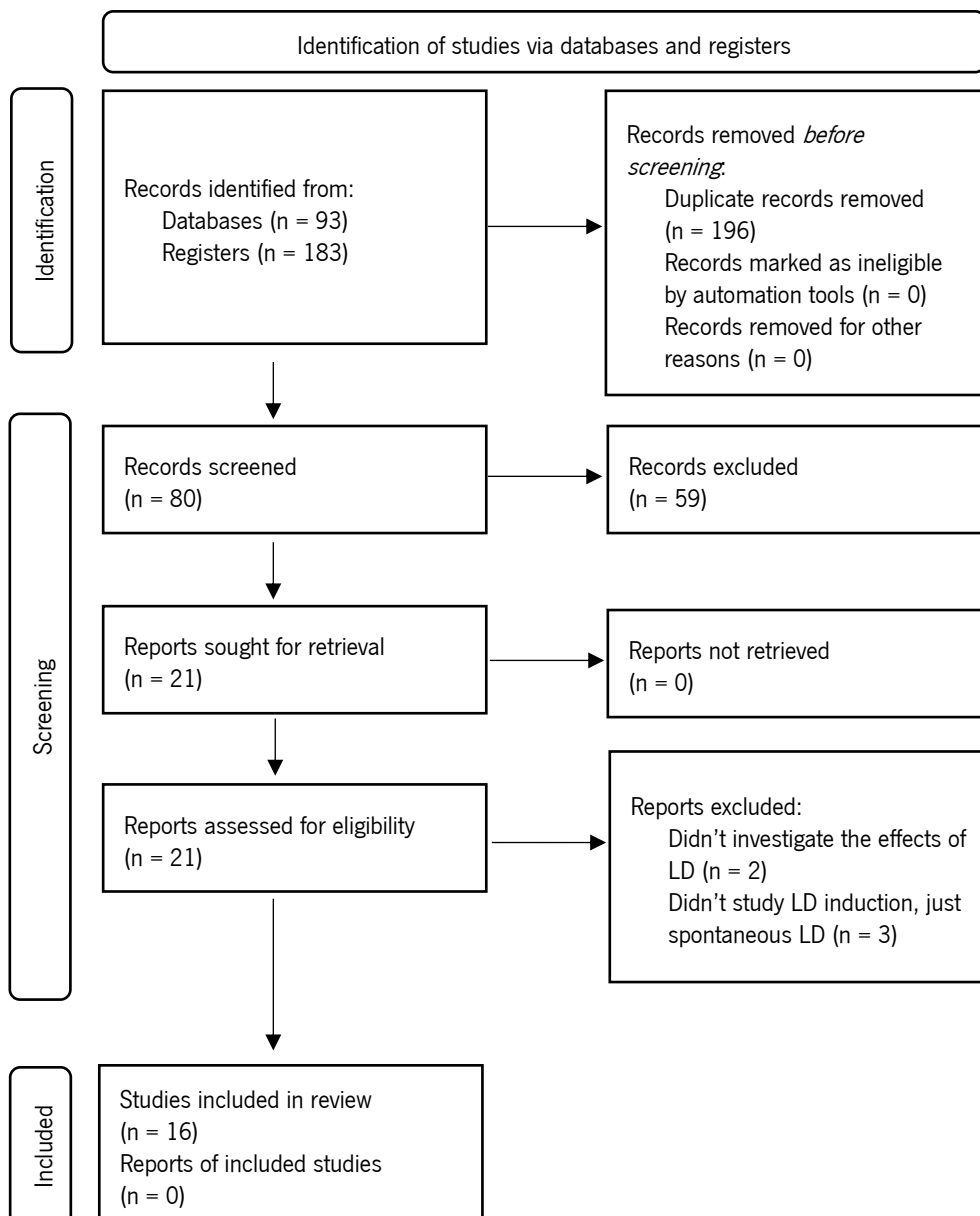
Results

A total of 276 results were found within the five weeks dedicated to the literature search, with only 80 of those being unique records. After a first examination of their titles and abstracts, 59 were deemed not relevant as they either did not meet the inclusion criteria (i.e., were book chapters, systematic reviews, or opinion articles) or did not focus on the effects of lucid dream induction.

All 21 references were retrieved and examined as full texts, and further five were rejected as they did not investigate the effects of lucid dream induction. Therefore, 16 articles were included in this review. The PRISMA 2020 flow diagram of the study identification process can be found in Figure 1 (Page et al., 2021).

Figure 1

PRISMA 2020 Flow Diagram of Study Identification



Two of the articles had their particularities, either including more than one study (Schadow et al., 2018), or using a subset of their initial pool for a different testing (Sackwild & Stumbrys, 2021). The decision to consider the article by Schadow et al. (2018) as two separate studies and the one by Sackwild and Stumbrys (2021) as a single study was based on the way each group of investigators reported their methods and results.

When looking at the year of publication, over half of the articles were published between 2010 and 2020, with only one being published between 2000 and 2010 and six since 2020. They also often took place in European countries (e.g., Germany; United Kingdom; 47%), followed by North American (i.e., United States; 23.5%) and Asian countries (i.e., China; Russia; 11.8%). Worth noting that three studies did not mention the country in which the study took place.

Most studies in this sample had up to 300 participants (76.5%), with only four surpassing that number (Min = 5; Max = 2904). Despite that, it wasn't possible to accurately analyse their mean age and standard deviation, as six studies either did not provide the global mean and standard deviation of their sample (Blagrove & Wilkinson, 2010; Blagrove et al., 2010) or failed to provide that information at all (e.g., Konkoly & Burke, 2019). The selected literature had a total of 6088 subjects, with most of them being women (54.2%). However, one study (Mallet et al., 2022) failed to describe their sample, leaving 400 participants (6.6%) uncharacterized.

On the matters of data collection strategy, the search yielded three studies done in-person (17.6%), nine done online or at-a-distance (52.9%), and three with both in-person and at-a-distance components (17.6%). Nevertheless, two of the studies included (11.8%) did not make clear the data collection strategy of their investigations.

For the methodology of the selected articles, most of the studies had a quantitative analysis (70.6%). Only three studies were qualitative (17.6%) and two were of mixed design (11.8%).

Most of the studies did not mention the type of induction method used by their participants (61.1%) or were unclear about a specific method (total of five articles), either allowing any method to be used (Raduga et al., 2020; Stumbrys et al., 2015), or using a mixture of different cognitive techniques (i.e., MILD with the Tholey's combined technique; intention with reality testing techniques; Konkoly & Burke, 2019; Spoormaker et al., 2003), or a mixture of cognitive and miscellaneous techniques (i.e., reality testing and MILD with WBTB; Stocks et al., 2020). Only one study stated that they used the WBTB technique alone (Schädlich et al., 2016). However, one study mentioned that five out of their six participants didn't use any method to achieve lucidity (Sackwild & Stumbrys, 2021).

In this last article (Sackwild & Stumbrys, 2021), only the subset of participants used for the qualitative part of the study was asked about the induction method they used. Because of this, the reference was considered as having two separate studies for this section of the analysis alone, as it was important to note both results independently.

The analysis of the instruments showed that the most employed type were existing questionnaires and inventories (48.4%), followed by self-constructed questionnaires (18.8%), reports from participants (7.8%) and tasks (7.8%), such as the change blindness task (Blagrove & Wilkinson, 2010) and the Stroop task (Blagrove et al., 2010). Further investigation showed that methods measuring a plethora of variables that were specific to the research topic chosen and that were studied in association with LD (e.g., mindfulness; self-esteem; trauma) made up 32.8% of the instruments' sample, followed by those evaluating the dreams (i.e., self-reports; questionnaires; inventories; 25%) and sleep-related tools (12.5%).

The included literature identified, on average, 3.1 limitations, with the most reported being about the method and the instruments used in the studies (44.2%), followed by design (17.3%) and participant selection (11.5%). Nevertheless, three articles didn't mention any limitations in their procedures (e.g., Schädlich & Erlacher, 2018).

All citations, except for one, were grouped into one of three categories based on the area affected by the induction of lucid dreaming: (a) executive system (total of two articles); (b) skills (total of two articles); and (c) well-being (total of 11 articles). Despite Schädlich and Erlacher (2018) focusing on if musicians practice their skills while lucid dreaming and the effects of that phenomenon on their performance, they found that none of their participants deliberately induced lucid dreaming to improve their performance. Instead, the participants focused on inspiration and pleasure, and that alone had positive effects on the waking life of four of them (e.g., increased confidence and comfort when performing in front of an audience), with only two participants reporting improvements in their performances (i.e., the voice became less restricted; playing the guitar became easier). Because of these findings, the article was deemed as having a "Mixed" focus of the "Skills" and "Well-being" categories and labelled as such.

Executive System

Two studies analysed the effect of LD induction on aspects related to the executive system (Blagrove & Wilkinson, 2010; Blagrove et al., 2010). When the Stroop task was applied, the authors found that the frequent lucid dreamers completed the incongruent condition faster than the occasional or nonlucid dreamers, existing an interaction between lucidity frequency and condition for the incongruent and control conditions, despite the differences in errors in all conditions not being significant between the

groups (Blagrove et al., 2010). Nevertheless, when it came to the change blindness task (Blagrove & Wilkinson, 2010), the results showed no difference between the groups.

Skills

Two studies focused on the effect of practising basic skills in lucid dreams, such as darts throwing (Schädlich et al., 2016) and sequential finger tapping (Stumbrys et al., 2015). Both studies showed that participants would improve between 18% and 20% after practising these skills in their lucid dreams when compared to the control groups. However, in the study by Schädlich et al. (2016), the effect size of this improvement was 3.84, unlike the effect size of 0.91 found by Stumbrys et al. (2015). It is also important to note that the number of distractions present in the dream also seems to play a part, as the lucid dream practice group of Schädlich et al. (2016) that had many distractions showed a decline of 14%. As previously mentioned, Schädlich and Erlacher (2018) also found that two of their participants reported improvements in their performances after experiencing lucid dreams where they interacted with and practised their preferred instrument, even if they experienced difficulties doing so within the dream (e.g., problems with their vision; stiff hand).

Well-being

A total of 13 studies analysed the effects of LD induction on the overall well-being of their participants. It was possible to identify their focus and group them in the following subcategories: (a) sleep quality (e.g., nightmare frequency and distress; tiredness during the day); (b) mental health (e.g., self-esteem; depression); and (c) miscellaneous (e.g., physical pain).

Sleep Quality

Six studies (Barngrover et al., 2021; Harb et al., 2016; Schadow et al., 2018; Spoomaker et al., 2003; Stocks et al., 2020) investigated the effects of LD on sleep quality and waking. The authors found that the relationship between LD and nightmare distress seems to be influenced by participants' characteristics (e.g., mindfulness levels; Barngrover et al., 2021), and that the poor sleep quality resulting from LD appears to be due to nightmare frequency, rather than the phenomenon itself (Schadow et al., 2018). Some authors (Stocks et al., 2020) also reported positive correlations between lucidity score and positive dream intensity, sensory vividness, and positive waking mood, and that nights with higher lucidity were associated with more dream intensity and a more positive waking mood in their participants, as well as longer REM sleep periods (115.8 ± 31.72 min) when compared to the lowest lucidity night (63.2 ± 38.25 min). However, others (Konkoly & Burke, 2019) noted that participants who reported a lucid dream also reported waking more frequently that night, demonstrating a significant effect of disrupted sleep.

Two studies attempted to use LD to reduce nightmare frequency, with one (Spoormaker et al., 2003) finding no significant results at the time, despite observing a reduction of more than 60% in nightmare frequency and a slight increase in sleep quality with no changes in state and trait anxiety. However, the authors (Spoormaker et al., 2003) noticed that the nightmare content or frequency didn't change for two of their participants, with one of them experiencing an increase in nightmare frequency in the weeks that followed that declined to pre-treatment levels at follow-up. On the other hand, Harb et al. (2016) found medium to large correlations between an increase in content control and a decrease in nightmare frequency, nightmare distress, and general sleep disturbance for their total sample, and saw no relationship between LD constructs (i.e., awareness, content control, purposeful waking) and nightmare frequency, nightmare distress, PTSD severity, or global sleep disturbance.

Mental Health

Five studies (Hausberger et al., 2016; Konkoly & Burke, 2019; Sackwild & Stumbrys, 2021; Schädlich & Erlacher, 2018; Yu & Wong, 2020) contributed to understanding the impact of LD on mental health. The studies found that there doesn't seem to be an association between LD frequency and depression scores (Sackwild & Stumbrys, 2021) and that LD appears to have positive effects on the waking life of their users, such as increased confidence (Schädlich & Erlacher, 2018), higher vigour and less stress (Konkoly & Burke, 2019). Similarly, the positive impact on problem-solving skills, goals, inspirations, mindfulness, and healing was also mentioned, and participants suggested that LD could be highly beneficial for depression, as it enabled them to work on and explore their emotions and take back control over their negative thought patterns (Sackwild & Stumbrys, 2021).

However, the degree of impact seems to be dependent on the participants' characteristics, with one study (Konkoly & Burke, 2019) finding no differences between groups in personal growth, but later noticed a tendency for those who were better adjusted at baseline to report more personal growth due to experiencing lucid dreams. Another study (Hausberger et al., 2016) also observed no significant correlations between physical self-concept and LD and nightmares frequency in their sample other than participants with a higher physical self-concept would report slightly fewer nightmares. LD frequency also doesn't seem to reflect one's resilience, as it appears to be one's self-reflectiveness while dreaming that indicates the degree of their recovery (Yu & Wong, 2020).

Worth noting as well that the participants in Konkoly and Burke (2019)'s study were more likely to opt into the lucid dreaming group if they were higher in perceived stress. They also displayed lower levels of extraversion at baseline than the participants in other conditions.

Miscellaneous

Two of the studies (Mallet et al., 2022; Raduga et al., 2020) didn't fit the categories above as one has an exploratory approach to the benefits and concerns of LD use within an online community, and the other studied the transference of physical sensations from LD into wakefulness, respectively.

Through searching the Reddit community titled *Lucid Dreaming* (Reddit, r/LucidDreaming, n.d.), Mallet et al. (2022) found that the number of positive and negative posts wasn't statistically different, nor did they differ in popularity. However, they noticed that posts that included a full LD experience, or a dream experience with high levels of dream control, were more likely to be positive than those that did not (Mallet et al., 2022). The most common theme among these posts was dream enhancement, with many also mentioning a positive waking mood, suggesting that LD might translate to a better mood upon waking (Mallet et al., 2022). The authors also observed negative themes within the posts (e.g., sleep paralysis; poor sleep), but these seemed to be limited to certain circumstances and could be reduced if done in controlled settings by efficiently inducing lucid dreams with high levels of control (Mallet et al., 2022).

On the other hand, Raduga et al. (2020) highlighted the significant relationship between experiencing pain in LD (PLD) and the subsequent experience of pain variants (e.g., numbness; tingling) in wakefulness, with strong PLD being associated with more lasting pain variants after waking. They also found that PLD seems to be linked to the induction method used: the pain seems to be more present when using indirect induction methods (i.e., upon awakening, like the WBTB technique) and those used to become conscious while dreaming (e.g., reality testing). It's worth noting that gender appears to play a role in PLD as well, as women achieved it more often (84%) than men did (65%), and the results showed a significant difference between genders and their experience of strong PLD and pain variants. However, only the relationship between intentional LD ending and the duration of pain after waking was statistically significant, not the type of LD ending and the duration of pain after waking.

Discussion

To understand the possible consequences of engaging in *reality shifting* (RS), this systematic review analysed *lucid dreaming* (LD), a related phenomenon with similarities in induction methods. The authors included a total of 16 articles that were divided into three categories based on the area affected by LD to facilitate the analysis: executive system, skills, and well-being. Yet, one was considered as having a "mixed" category and mentioned in both. Most of the literature used had a quantitative methodology but didn't mention the type of induction method used in their studies and the results were either far too scarce or too heterogenous to be able to draw a strong conclusion on the highlighted topics.

Concerning the impact of LD on the executive system, the two studies found used tasks aimed at understanding the participants' attention (Blagrove & Wilkinson, 2010; Blagrove et al., 2010), such as the Stroop and the change blindness task. However, the results were incongruent, with one suggesting that frequent lucid dreamers might be better at focusing their attention when awake, and the other showing no significant differences between frequent and nonlucid participants. Due to the low number of articles found that approached the subject, lack of clarity about the induction method used, and discordance in findings, it isn't possible to conclude about the effect of LD induction on the executive system functions.

Nevertheless, when the focus was on the training of a basic skill, the two studies included showed more compatible results (Schädlich et al., 2016; Stumbrys et al., 2015). Both found an increase between 18% and 20% in the practice of their respective exercise, albeit with discrepant effect sizes, with one highlighting the possible interference of distractions during the dream. Similarly, in a different study (Schädlich & Erlacher, 2018), two participants also reported improvements in their musical performances after practising it in their dreams. These findings lead to the hypothesis that rehearsing a skill in LD might lead to its improvement when awake, even if the size of the effect is uncertain. Something worth noting is the possible influence of the induction method used in this experience, as the effect size was greater when the participants used the Wake-up-Back-To-Bed (WBTB) technique alone, while the other two studies did not mention or allowed any method to be used. These findings are particularly interesting because it highlights the role of awareness in the formation of experiences—whether those experiences are real or just a by-product of our imagination—and the possibility of our day-to-day being affected by what happens to us or what we choose to do in our dreams if given the chance to.

Analysing the impact of LD on sleep quality, it was found that while there seems to be an association between LD and poor sleep quality, this relationship appears to be mediated by other factors, such as the presence of nightmares (Schadow et al., 2018) and one's mindfulness levels (Barngrover et al., 2021), with the phenomenon often leading to a longer REM sleep and a more positive waking mood (Stocks et al., 2020). However, one study (Konkoly & Burke, 2019) highlighted that their participants woke up more often during the nights in which they experienced LD, and another (Harb et al., 2016) found no associations between LD constructs and nightmare frequency, nightmare distress, PTSD severity, or global sleep disturbance. It was hypothesised that this disparity in results, could be due to the induction method used in each study, still, it wasn't possible to reach a viable conclusion as only two studies in this sample mentioned the induction methods used, with both using similar techniques, but reaching different results. These findings appear to contradict those of Summer and Rehman (2022) that

warned LD may affect sleep quality, however, they do confirm the interference of LD on the natural processes of REM sleep as some participants experienced a longer REM sleep period and others woke up more frequently the nights in which they had a lucid dream.

Similarly, two studies aimed at analysing the nightmare reduction capacity of LD (Harb et al., 2016; Spoomaker et al., 2003) led to mixed results as well. While one study found no significant results, despite observing a reduction of over 60% in nightmare frequency, the other found medium to large correlations between an increase in content control and a decrease in nightmare frequency, nightmare distress, and general sleep disturbance. Because of the limited number of articles found, vagueness about the induction method used, and discordance in outcomes, the effect of LD induction on nightmare reduction is still not understood. However, existing literature suggests that the use of LD could be beneficial in nightmare reduction when used as an add-on therapy (Holzinger et al., 2015, 2020) as this approach indicates better outcomes.

Concerning the consequences of LD on one's mental health, participants often reported feeling more confident, inspired, healed, and empowered (Sackwild & Stumbrys, 2021; Schädlich & Erlacher, 2018), as well as feeling higher vigour and less stress with the experience of LD (Konkoly & Burke, 2019), with one studying finding no association at all between the phenomenon's frequency and one's depression score (Sackwild & Stumbrys, 2021). However, some studies suggested that this impact might be dependent on the participants' characteristics. One study (Konkoly & Burke, 2019) that initially found no differences between pre and posttest for personal growth indicators, later noticed a tendency for those who were better adjusted at baseline to report more personal growth due to experiencing LD, even if nonsignificant. Similarly, other two studies also seem to support this idea, with one noting that subjects with a higher physical self-concept would report slightly fewer nightmares (Hausberger et al., 2016), and the other concluding that it's one's self-reflectiveness while dreaming that is a better indicator of recovery, rather the frequency and amount of LD (Yu & Wong, 2020). This would be due to the possibility of encountering a larger range of viable options that could help in the solution of one's problems and is a different interpretation of the previous findings that place the healing effect of LD on the experience itself, rather than on the participants' reflectiveness of it (Yu & Wong, 2020).

These contradictory results could be due to the induction method used in each study, however, only two studies mention this aspect, with one of them stating that only one of their participants intentionally induced LD. For these reasons, it's unfeasible to determine the impact of lucid dream induction on one's mental health, and the assumption that one's characteristics might play a part in the experience should be accounted for.

These findings appear in line with the assumption that the impact of LD is dependent on one's personal experiences with it and their idiosyncrasies (e.g., predisposition to psychosis; Mota et al., 2016; Voss et al., 2018), making it hard to predict the effects it might have on the users in general. Similarly, they also highlight one of the reasons people might be inclined to experience both LD and RS, as one study (Konkoly & Burke, 2019) noted that participants were more likely to pick the LD group if they were in higher stress, which is congruent with the experience of former shifters (Colombo, 2022). This desire to take a break from reality can be exacerbated by the extreme belief of *respawning*, if the struggles felt in one's *current reality* (CR) aren't situational and don't feel temporary, which can progress to schizotypy and dissociative symptoms (Soffer-Dudek, 2020) and even become addicting (Somer et al., 2021), as reported by former shifters (Colombo, 2022).

Two studies were too heterogenous to be included in the previous subcategories of well-being, and so were analysed separately. One of them (Mallet et al., 2022) took an exploratory approach and investigated an online community to understand the benefits and concerns of attempts to engage in LD. Their results, however, weren't always in line with this main goal as they ended up showing more of the prevalence of what is discussed in the community. The authors found that the posts in r/LucidDreaming (Reddit, n.d.) were equally positive and negative and neither of them was more popular, however, those that mentioned a full LD experience or high levels of dream control would be more positive. This is expected as these online communities thrive on their shared interests, seeking familiarity in their experiences—both positive and negative—, and so are more inclined to display more positive emotions when they achieve their goal within the community (i.e., a full LD experience; high levels of dream control). The authors also found that the most common theme was dream enhancement and that it was often accompanied by the mentioning of a positive waking mood. This is congruent with some of the findings within this review, however, the lack of rigour that the online community provides can lead to possible biased views of the phenomenon as the anonymity of Reddit can sway the accuracy of a report—in both positive and negative ways—, depending on the intentions of the poster, which is something the authors are aware of and recognize as a limitation in their study. Of relevance, from the analysed posts, it's plausible that there could be an association between the MILD induction technique and sleep paralysis as they often co-occurred, but more research is needed on the subject.

Another study (Raduga et al., 2020) focused on the transference of pain from LD (PLD) to wakefulness and found that the pain one feels in LD can still be felt after waking up through pain variants, with stronger PLD leading to longer-lasting pain variants upon waking, and women achieving PLD and experiencing pain variants afterwards more often. In this study, it was shown a significant difference

between induction methods when it came to this transference, as the pain appears to be more present when using indirect induction methods (e.g., WBTB) and techniques used to become conscious while dreaming (e.g., reality testing).

These findings deepen and strengthen the results of the impact of LD on the practice of a basic skill, as the authors here expand on it and propose that even negative aspects (i.e., physical pain) from our dreaming experiences can be transferred to our waking life. These notions beg the question of the impact a lucid nightmare can have on one's mental well-being, as control over the dream content isn't a guarantee (Pacheco & Rehman, 2022), but all the vividness of a lucid dream remains. Similarly, and since the premise of RS is that one's experiences are real, it is reasonable to wonder about the further influence those can have, especially if they deviate from the *script* and escape the control of the users, as the most popular *desired realities* (DRs) are based on works that explore darker themes, such as death, prejudice, and violence, albeit fantastical in nature.

Based on the results of this systematic review, the strongest evidence of the effect of LD appears to be in the transference of experiences from the dream into wakefulness, whether those involve the practice of a skill or physical sensations, and that it is plausible that a more positive waking mood and related outcomes (e.g., higher vigour; increased confidence) could result from them. Other than that, its impact on executive functioning and mental well-being is still inconclusive, despite its empirical verification nearly half a century ago and its prevalence, showing a clear gap in the literature on the subject that appears to be mending in the last decade. Because of this, we advise caution when engaging in RS, as the benefits seem dependent on the personal experiences of the users, rather than on the phenomenon.

There are some limitations concerning the present review, namely: (a) despite the best efforts to find all existing literature on the effects of LD induction, there might still be studies left unidentified as the present review included only articles published in scientific journals that were written in English, and excluded literature, such as book chapters, systematic reviews, opinion articles, and grey literature; (b) this resulted in a low number of articles included which might impact the accuracy of the findings; (c) similarly, the heterogeneity of studies didn't allow for a strong analysis of some of the areas at hand, as sometimes only two articles shared the same focus, or the information wasn't enough to confirm the results, only build upon them.

However, some of the limitations emerged from methodological issues within the reviewed studies, such as: (a) as mentioned throughout this review, most literature didn't mention the induction method used, making it hard to understand how lucidity was achieved; (b) in the same vain, in most studies it was left ambiguous whether the LD studied was spontaneous or purposefully induced; (c) while

most studies reviewed are of good methodological quality, some of them still showed drawbacks when it came to the report of participant, procedure and data collection descriptions (e.g., information is missing or insufficient for replication), ethical approval (e.g., informed consent forms and approvals by ethics committees not being mentioned), results (e.g., missing tables) and limitations (e.g., limitations not being reported when appropriate).

Due to the scarcity of empirical research about RS, we find that it might be of interest to attempt to verify its existence and draw comparisons to what is known about LD. This could be done using polysomnograms, as the patterns of LD are well documented in the literature, to analyse the similarities between the two phenomena and understand the manifestations of RS in the brain. Similarly, it could be of interest to invite RS users to share their testimonies and experiences of the practice to breach the stigma around the concept, and to understand the beliefs, motivations, and consequences behind it.

Lastly, this review wishes to highlight the gap in the literature about the effects of LD induction and how, despite the availability of a variety of induction methods, many studies still don't mention how lucidity is achieved, and hopes to help improve how studies in this area are reported by emphasizing some of the mishaps that appear in current research. It would also like to urge shifters and those curious about the practice to reflect on why they desire to engage in RS in the first place and to seek professional help if their interest is based on the desire to escape their lives and the struggles they face.

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Appendix

Table 1

Data Extraction of Included Literature

#	REFERENCE	MAIN GOAL & HYPOTHESIS	SAMPLE	INCLUSION & EXCLUSION CRITERIA	METHODOLOGY & DATA COLLECTION STRATEGY	INSTRUMENTS
1	Barngrover et al. (2021) USA	The present study proposed a moderated mediation model; Expected higher lucid dreaming will be associated with reduced nightmare distress and this reduction will be stronger for people reporting higher mindfulness.	$n = 259$ 22.7 ± 44.5 [M \pm SD] (range=18–71) F = 188 (68.4%); M = 86 (31.3%)	Eligibility requirements included being at least 18 years of age and being capable of speaking English.	Quantitative Cross-sectional Distance/Online	Demographic questionnaire MacArthur Scale of Subjective Social Status PCL-5 Lucidity and Consciousness in Dreams Scale Kentucky Inventory of Mindfulness Skills Modified version of the Nightmare Distress Questionnaire Pittsburgh Sleep Quality Index
2	Blagrove & Wilkinson (2010) United Kingdom	The present study hypothesizes that there is a continuity of cognitive ability in error detection between waking and dreaming cognition, with individuals who are frequent lucid dreamers having a higher performance on change blindness tasks than do nonlucid dreamers.	$n = 38$ Frequent (20.7 ± 1.3 [M \pm SD]); Occasional (21.3 ± 1.8 [M \pm SD]); Nonlucid (20.6 ± 1.4 [M \pm SD]) Frequent (F = 8; M = 5); Occasional (F = 7; M = 6); Nonlucid (F = 8; M = 4)	N/A	Quantitative N/A	Dreaming Questionnaire Six change blindness tasks
3	Blagrove et al. (2010) United Kingdom	Assess waking life attentional ability as a correlate of this capacity for having lucid self-reflection while participating in dreams, using the Stroop task.	$n = 45$ Frequent (20.7 ± 2.8 [M \pm SD]); Occasional (21.3 ± 3.7 [M \pm SD]); Nonlucid (21.8 ± 6.8 [M \pm SD]) Frequent (F = 13; M = 2); Occasional (F = 13; M = 2); Nonlucid (F = 11; M = 4)	Potential participants had to meet the criteria of recalling dreams at least three times per week, and having normal or correct to normal vision, including not being color blind.	Quantitative In-person	Dreaming Questionnaire Stroop Task (120 trials total)

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#	REFERENCE	MAIN GOAL & HYPOTHESIS	SAMPLE	INCLUSION & EXCLUSION CRITERIA	METHODOLOGY & DATA COLLECTION STRATEGY	INSTRUMENTS
4	Harb et al. (2016) USA	Only the IR-containing treatment would enhance LD and that this increase in LD would be associated with a reduction in nightmare symptoms	$n = 33$ 37.91 ± 10.60 [M \pm SD] F = 7; M = 26	They had current PTSD, assessed with the Clinician-Administered PTSD Scale by an independent assessor blind to treatment assignment, deployment-related recurrent nightmares, and a global sleep disturbance as assessed by the Pittsburgh Sleep Quality Index. Exclusion criteria were schizophrenia and other psychotic disorders, bipolar disorder, severe traumatic brain injury, current substance dependence, and evidence for "at-risk" drinking.	Quantitative Randomized controlled trial In-person	Lucid Dreaming subscale of the Iowa Sleep Experiences Survey Nightmare Frequency Questionnaire Nightmare Distress Questionnaire Pittsburgh Sleep Quality Index PTSD Checklist-Military
5	Hausberger et al. (2016) Austria	Physical self-concept and dream recall frequency are negatively associated and physical self-concept and lucid dream frequency as well as nightmare frequency are negatively associated.	$n = 2904$ 34 ± 15.35 [M \pm SD] (range=18-104) F = 54%; M = 46%	N/A	Quantitative Hybrid	Physical Self-Concept Scales Item taken from Schredl (2004) Two items taken from Spadafora and Hunt (1990)

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#	REFERENCE	MAIN GOAL & HYPOTHESIS	SAMPLE	INCLUSION & EXCLUSION CRITERIA	METHODOLOGY & DATA COLLECTION STRATEGY	INSTRUMENTS
6	Konkoly & Burke (2019) USA	Tests if successfully experiencing lucid dreams can lead to personal growth above and beyond a journaling and mindfulness practice.	$n = 33$ N/A F = 17; M = 16	Recruited those who did not have previous experience with lucid dreaming techniques, who either recalled at least one to two or three to four dreams per week and used alcohol at most one to two (or three to four, if they recalled at least three to four dreams) times per week, respectively.	Quantitative Hybrid	Prescreening and posttest measures questionnaires Big Five Inventory Rosenberg Self-Esteem Scale Perceived Stress Scale Satisfaction With Life Scale Coping Self-Efficacy Scale Emotion Regulation Questionnaire Modified Remote Associates Test Scale based on the Profile of Mood States Report of the quantity and quality of sleep the night before Description of the biggest difficulty they encountered that day, how they coped, and how effective these coping mechanisms were
7	Mallet et al. (2022) USA	Characterize the full spectrum of benefits and concerns of attempts to engage in lucid dreaming.	$n = 400$ N/A N/A	Posts on r/LucidDreaming. Posts were coded as to whether they involved a lucid dream experience of any kind (yes/no) and the presence of dream control (high/little-to-none). Posts that did not include a dream experience at all, or had no identifiable level of control were removed from this analysis.	Qualitative Distance/Online	Pushshift dataset PSAW Python package Doccano
8	Raduga et al. (2020) Russia	Focus on examining whether pain that is induced during LD (PLD) can continue during wakefulness (PLDW).	$n = 151$ N/A F = 74; M = 77	People confirmed absence of psychological and physiological issues, that could be affected by practicing lucid dreaming and related to it REM-sleep phenomena	Qualitative Field experiment Distance/Online	Self-report on Project Elijah

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#	REFERENCE	MAIN GOAL & HYPOTHESIS	SAMPLE	INCLUSION & EXCLUSION CRITERIA	METHODOLOGY & DATA COLLECTION STRATEGY	INSTRUMENTS
9	Sackwild & Stumbrys (2021) N/A	Investigate and highlight how lucid dreamers can utilize their lucid dreams to purposefully and practically access and alleviate the crux of their depression.	<p>$n = 163$</p> <p>37.8 ± 14.2 [M \pm SD] (range was 18–78)</p> <p>F = 94; M = 66</p> <p>$n = 6$</p> <p>29.2 ± 8.8 [M \pm SD] (range was 18–45)</p> <p>F = 3; M = 3</p>	<p>The inclusion criteria were (1) responding affirmatively to having been previously prescribed with antidepressants or diagnosed as depressed or with some form of depressive disorder; (2) a lucid dream frequency of 1/month or more; (3) selected “strongly agree” or “agree” to one or more on the four statements about positive effects of lucid dreaming.</p> <p>The exclusion criteria were responding positively to being currently prescribed with antidepressants or being currently diagnosed as depressed or with some form of depressive disorder</p>	Mixed Distance/Online	<p>Lucid dream questionnaire</p> <p>Patient Health Questionnaire</p> <p>Medication questionnaire</p> <p>Semistructured interviews</p>
10	Schädlich & Erlacher (2018) Germany	Determine if musicians use lucid dreams to practice instruments and singing, if this practice has an effect on waking performance, and how these dreams are experienced.	<p>$n = 5$</p> <p>(range was 23–51)</p> <p>F = 1; M = 4</p>	<p>Musicians who had practiced musical instruments or singing at least once in a lucid dream, and have played in front of audiences at some point, ranging from performances in small groups to concerts with audiences of several thousands and CD recordings.</p>	Qualitative Distance/Online	Semistructured interviews

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#	REFERENCE	MAIN GOAL & HYPOTHESIS	SAMPLE	INCLUSION & EXCLUSION CRITERIA	METHODOLOGY & DATA COLLECTION STRATEGY	INSTRUMENTS
11	Schädlich et al. (2016) Germany	Examine the effect of lucid dream practice in a sleep laboratory setting, using a dart throwing task.	$n = 18$ 26.6 ± 6.6 [M \pm SD] (range was 18–45) Few distractions (F = 1; M = 3) Many distractions (F = 3; M = 2) Physical practice (F = 4; M = 5) Control (F = 4; M = 5)	Lucid dreamers were included who had at least 1 lucid dream per month over the last 4 months.	Quantitative In-person	Darts skills, dream recall frequency, and lucid dream recall frequency were estimated on Likert scales Electroencephalogram, electro-oculogram, and electromyogram Darts board
12	Schadow et al. (2018) STUDY 1: Germany STUDY 2: N/A	Aims at investigating the relationship between lucid dreams and sleep quality.	STUDY 1: $n = 444$ 23.52 ± 5.67 [M \pm SD] F = 376; M = 68 STUDY 2: $n = 1380$ 51.63 ± 14.13 [M \pm SD] (range was 17–93) F = 777; M = 603	STUDY 1: N/A STUDY 2: N/A	STUDY 1: Quantitative Distance/Online STUDY 2: Quantitative Distance/Online	STUDY 1: Dream recall frequency, and lucid dream recall frequency were estimated on Likert scales Subjective sleep quality and feeling of being refreshed in the morning of the SF-B sleep questionnaire LISST Sleep Questionnaire STUDY 2: A selection out of the MADRE questionnaire Dream recall frequency, and lucid dream recall frequency were estimated on Likert scales Perceived sleep quality was measured by a five-point scale
13	Spoormaker et al. (2003) Netherlands	Lucid dreaming treatment would reduce both nightmare frequency and state/trait anxiety, and improve sleep quality.	$n = 8$ 27.8 ± 12.2 [M \pm SD] F = 6; M = 2	All participants had suffered from nightmares for over one year. None of the participants suffered from sleep terrors.	Quantitative Hybrid	Self-constructed sleep questionnaire
14	Stocks et al. (2020) United Kingdom	Aimed to investigate the relationship between lucidity, dream emotional content, and positive waking mood.	$n = 20$ 24.6 ± 2.93 [M \pm SD] (range was 21–33) F = 12; M = 8	N/A	Mixed Distance/Online	Sleep and dream diary Dream Lucidity Questionnaire and Lucid Skills Questionnaire Positive and Negative Affect Schedule scale Portable headbands (Hypnodyne ZMax)

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#	REFERENCE	MAIN GOAL & HYPOTHESIS	SAMPLE	INCLUSION & EXCLUSION CRITERIA	METHODOLOGY & DATA COLLECTION STRATEGY	INSTRUMENTS
15	Stumbrys et al. (2015) N/A	The gains from PP were expected to be higher than the ones from MP, whereas the gains from LDP were expected to fall in between, as the cognitive simulation in the dream state is much more realistic.	$n = 68$ 31.3 ± 7.3 [M \pm SD] (range was 19–54) F = 36; M = 32	N/A	Quantitative Field experiment Distance/Online	Computerised online version of the sequential finger-tapping task Demographic questionnaire Lucid dream frequency was assessed on an 8-point scale Vividness of Motor Imagery Questionnaire Edinburgh Handedness Inventory – Short Form
16	Yu & Wong (2020) China	First, dream lucidity, dream intensity, internal locus of control, and resilience are positively correlated with each other. Second, dream lucidity, locus of control, and certain DIS subscales can significantly predict resilience and its problem-solving dimension. Third, locus of control significantly mediates the relation between dream lucidity and resilience and between the DIS Dream Work subscale and resilience, especially problem-solving.	$n = 119$ 20.71 ± 1.43 [M \pm SD] F = 71; M = 48	N/A	Quantitative N/A	The Lucidity and Consciousness in Dreams scale Dream Intensity Scale Resilience Assessment Questionnaire Locus of Control Scale

Table 2

Data Synthesis of Included Literature

#	REFERENCE	FOCUS	INDUCTION METHOD USED	EFFECTS	QUALITY
1	Barngrover et al., 2021	Well-being	N/A	<p>About 9% of the variance was significantly predicted for nightmare distress in the model. Total scores on the KIMS were considered to have a significant contribution with a negative effect ($b = -.16, p < .01$). Lucid dreaming also significantly contributed to nightmare distress ($b = .07, p = .03$). In predicting sleep quality, a total of 18% of the variance was significantly explained ($R^2 = .18, p < .001$). Nightmare distress was associated with an increase in PSQI scores ($b = .11, p < .001$), whereas mindfulness was associated with an overall decrease ($b = -.06, p < .001$). For individuals of low KIMS, a nonzero confidence interval was observed showing a positive effect ($b = .0099$; bootstrapped with 10,000 samples confidence interval of .0006 to .0226). Similarly, individuals with average mindfulness saw a positive effect in the interaction onto nightmare distress and sleep quality ($b = .0079$; bootstrapped with 10,000 samples confidence interval of .0005 to .0180).</p> <p>KIMS facets:</p> <p>Nonjudgment: Predicting nightmare distress, 11% ($R^2 = .11, p < .001$) of the variance was significantly explained. Nonjudgement contributed significantly to nightmare distress ($b = -.39, p < .001$). For predicting sleep quality, 20% of the variance was significantly explained by our model ($R^2 = .20, p < .001$). Nightmare distress was associated with higher PSQI scores ($b = .10, p < .001$). The nonjudgement score notably had a significant negative contribution ($b = -.15, p < .001$). No significant effects were found in examining a bootstrapped confidence interval for the overall moderated mediation.</p> <p>Awareness: The predictors explained 9% ($R^2 = .09, p < .001$) of the variance in nightmare distress. Lucid dreaming contributed significantly with a positive relationship ($b = .45, p = .01$) to the nightmare distress score. Both the KIMS awareness score and the interaction between awareness and lucid dreaming were shown to have significant negative effects (awareness: $b = -.34, p < .001$; interaction: $b = -.01, p = .025$) on nightmare severity. For the sleep quality outcome, the predictors significantly explained 19% ($R^2 = .19, p < .001$) of the model. Nightmare distress contributed positively to sleep quality ($b = .11, p < .001$). Higher awareness was also significantly associated with better sleep quality ($b = -.16, p < .001$). Low awareness was shown to have a nonzero positive effect on global PSQI scores ($b = .0144$; Bootstrapped with 10,000 samples confidence interval of .0006 to .0226). At high levels of trait awareness, a possible negative effect was observed, though zero could not be ruled out ($b = -.0007$; confidence interval [-.0108, .0089]).</p> <p>Observing and describing experiences: Did not show significant results for the contribution of lucid dreaming, mindfulness, or the interaction between them.</p> <p>The model run for the describing sub facet was significant (mediator: $R^2 = .03, p < .04$; outcome: $R^2 = .19, p < .001$), and both models for observing and describing had a significant positive contribution of nightmare distress onto sleep quality. The three models for the overall score, nonjudgement, and awareness saw a significant contribution from nightmare distress onto sleep quality. Higher mindfulness scores were associated non significantly with lower nightmare distress, and the interaction between lucid dreaming and these three facets was positive. In predicting sleep quality, nonreacting and observing experiences were</p>	39 (98%)

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#	REFERENCE	FOCUS	INDUCTION METHOD USED	EFFECTS	QUALITY
				associated with greater overall sleep quality, and their interaction with lucid dreaming was associated with poorer quality. Describing saw that higher mindfulness and interaction between mindfulness and lucid dreaming both decreased PSQI scores.	
2	Blagrove & Wilkinson, 2010	Executive system	N/A	There was no significant difference between the groups in number of change blindness items answered correctly, $F(2, 35) = 1.38$, and no significant difference between the groups in dream recall frequency, $F(2, 26) = 0.02$.	16 (40%)
3	Blagrove et al., 2010	Executive system	N/A	<p>The three groups did not differ on frequency of dream recall per week [frequent lucid dreamers, $M = 4.6$ per week ($SD = 1.4$); occasional lucid dreamers, $M = 3.9$ per week (1.3); nonlucid dreamers, $M = 3.6$ per week (1.6)].</p> <p>There were no errors on the congruent condition and only the nonlucid dream group had errors on the XXXXX condition (mean errors = 0.13, $SD = 0.35$). On the incongruent condition errors were: frequent lucid dreamers, mean errors = 0.27 ($SD = 0.80$); occasional lucid dreamers, mean errors = 0.40 (0.63); nonlucid dreamers, mean errors = 0.67 (0.72). The three groups did not differ significantly in number of errors on the incongruent (Kruskal Wallis test ($df = 2$), chi sq statistic = 4.60) nor XXXXX (Kruskal Wallis test ($df = 2$), chi sq statistic = 4.09) conditions.</p> <p>The one-way analysis of variance (ANOVA) for time to complete on each of the three conditions shows a significant difference between groups on the incongruent condition, $F(2, 42) = 4.53$, $p = .016$ and on the congruent condition, $F(2, 42) = 4.31$, $p = .020$, but not on the XXXXX condition, $F(2, 42) = 1.11$.</p> <p>There was not a significant interaction between group and condition when incongruent and congruent conditions were analysed, $F(2, 42) = 2.15$, $p = .13$, but the interaction between group and condition was significant for the incongruent and XXXXX conditions, $F(2, 42) = 4.18$, $p = .022$.</p> <p>There was a significant difference between the frequent and nonlucid dreamers on time to complete the incongruent condition ($p = .009$). This became marginal ($p = .066$) when time to complete the congruent condition was used as a covariate but remained significant ($p = .002$) when time to complete the XXXXX condition was used as a covariate.</p>	31 (78%)
4	Harb et al., 2016	Well-being	N/A	<p>Baseline: The LD constructs (awareness, content control, purposeful waking) demonstrated no significant relationships with nightmare frequency, nightmare distress, PTSD severity, or global sleep disturbance. More than a third of participants reported frequent awareness of ongoing dreams, but only 9% endorsed frequent dream content control. Dream awareness occurred, on average, several times a year ($M = 3.65$, $SD = 2.07$, range: 1–7); content control, on average, less than once a year ($M = 1.96$, $SD = 1.37$, range: 1–5); and purposeful waking, on average, once or twice a year ($M = 3.38$, $SD = 1.77$, range: 1–7).</p> <p>After treatment: There were no significant treatment condition by time (baseline vs. posttreatment) interaction effects on awareness, content control, or purposeful waking, $F(1, 48) = .00$, $p = 1.00$, $ES = .55$; $F(1, 48) = 1.14$, $p = .290$, $ES = .68$; $F(1, 48) = .19$, $p = .665$, $ES = .33$. Follow-up pairwise comparisons demonstrated significantly greater change in content control for participants in the IR+cCBT-I group compared to the cCBT-I group, $M(SD) = 2.92 (.31)$ versus 1.62 (.31), respectively, $p = .004$. There were no main effects of time and treatment condition on awareness, or purposeful waking. There was no significant main effect of time on content control, however, the main effect of treatment was significant, $F(1, 48) = 9.18$, $p = .004$, with increased content control in the IR+cCBT-I group compared to the cCBT-I group.</p> <p>For the IR+cCBT-I group only, the increase in dream content control was strongly and significantly related to decreased nightmare distress, $r = .77$, $p = .002$. For the total sample, the increase in content control with treatment demonstrated medium to large</p>	40 (100%)

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#	REFERENCE	FOCUS	INDUCTION METHOD USED	EFFECTS	QUALITY
				correlations with decreases in nightmare frequency, $r = .34$, $p = .092$, nightmare distress, $r = .34$, $p = .086$, and general sleep disturbance, $r = .46$, $p = .116$.	
5	Hausberger et al., 2016	Well-being	N/A	Men and women differed significantly in their reported physical self-concept (more positive among men), dream recall frequency and nightmare frequency ($p < .001$). Neither overall dream recall frequency nor lucid dream frequency correlated significantly with total physical self-concept and subscale scores. Significant, albeit small, associations between physical self-concept and some of its subscales were observed with nightmare frequency ($p < .05$). Separately testing associations in the student and nonstudent samples did not substantially change results	28 (70%)
6	Konkoly & Burke, 2019	Well-being	Cognitive Techniques	<p>Baseline: Found that participants were more likely to opt into the lucid dreaming group if they were higher in perceived stress, $F(2, 77) = 4.63$, $p = .013$, and those in the lucid dreaming condition were less extraverted at baseline than those in the other conditions, $F(1, 77) = 4.15$, $p = .045$.</p> <p>Between-group differences: No difference between groups from pre- to posttest for self-esteem, satisfaction with life, coping self-efficacy, emotional suppression ($ps > .6$), perceived stress, creativity ($ps > .1$) or emotional reappraisal ($p = .073$). The mindfulness group reported less daily stress over time, $b = -0.02$, $t(48.16) = 2.41$, $p = .020$, but there were no significant interactions between groups. Participants in the mindfulness group also reported less evening distress over time, $b = 1.01$, $t(43.11) = 2.25$, $p = .030$.</p> <p>Within the ludic dreaming group: The morning after participants had lucid dreams, they reported significantly higher vigour, $b = 0.20$, $t(503.2) = 2.32$, $p = .021$, but no differences in distress, after adjusting for hours slept and sleep quality. Participants reported having an overall less stressful day, $b = -0.51$, $t(473.3) = 2.91$, $p = .004$, and higher vigour, $b = 0.27$, $t(469.5) = 2.54$, $p = .011$, if they reported having a lucid dream the previous night. Those who reported more lucid dreams overall reported less stressful days in general, $b = -0.09$, $t(23.9) = 2.15$, $p = .042$, but this difference did not change over the diary period. A similar main effect of total lucid dreams was found for evening distress, $t(22.5) = 2.09$, $p = .048$.</p> <p>Lucid dreaming frequency interacted with baseline self-esteem to predict posttest self-esteem, $b = 0.12$, $t(15) = 2.38$, $p = .031$. An examination of simple slopes shows no significant effect of lucid dreaming frequency for low baseline self-esteem, but a significant positive effect for high baseline self-esteem, $t(15) = 3.11$, $p = .007$. Participants with initially high life satisfaction benefitted more from having lucid dreams, $b = 0.26$, $t(15) = 3.75$, $p = .002$, whereas the effect was not significant for people with low baseline life satisfaction. Although nonsignificant, similar interaction patterns were found for coping self-efficacy and creativity. Participants who reported a lucid dream on a given night also reported waking more frequently that night, $b = 0.29$, $t(506.7) = 2.19$, $p = .029$.</p>	38 (95%)
7	Mallet et al., 2022	Well-being	N/A	<p>One-hundred forty-eight posts were coded with only one valence, where the frequency of positive-only (68) and negative-only posts (80) were statistically similar ($z = 0.99$, $p = .32$). Positive and negative themes did not differ in post popularity when operationalized as upvote ratio ($p = .82$) nor comment frequency ($p = .52$).</p> <p>Positive themes: The most common positive theme was dream enhancement, with positive waking mood and nightmare resolution roughly similar in second. Dream enhancement was the most common of all 10 themes on r/LucidDreaming with a</p>	39 (98%)

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				<p>total of 69 posts (from 69 unique users; interrater reliability = 77%, median upvote ratio = 3, median comment frequency = 2). There were 17 unique users who wrote 17 posts that included reference to lucid dreams being utilized to overcome a dysphoric dream situation (interrater reliability = 93%, median upvote ratio = 2, median comment frequency = 1). Many users described how they used lucid dreaming to overcome their nightmares during childhood or adolescence. There were 29 posts from 28 unique users that included a positive waking mood sentiment (inter-rater reliability = 88%, median up-vote ratio = 7, median comment frequency = 3). Positive waking mood seemed to follow either a particularly positive dream or one's first lucid experience that occurred after a series of failed induction attempts. We identified very few posts (2 posts from 2 unique users) that included reference to creativity, insight, or problem solving (inter-rater reliability = 99%, median up-vote ratio = 1, median comment frequency = 2). There were five unique posts from five unique users referencing lucid dreams as any kind of rehearsal space (inter-rater reliability = 98%, median up-vote ratio = 1, median comment frequency = 8).</p> <p>Negative themes: The most common negative theme on r/LucidDreaming was sleep paralysis by far, followed by lucid dysphoria, poor sleep, and reality confusion themes. The highest negative theme count was for the sleep paralysis theme, with 49 posts in total (from 44 unique users; inter-rater reliability = 81%, median up-vote ratio = 2, median comment frequency = 4). Many sleep paralysis posts were related to the use of lucid dream induction methods, some of which aim to encourage and harness sleep paralysis to achieve lucidity. In particular, the mnemonic induction method (MILD) commonly co-occurred with sleep paralysis phenomena. There were 25 posts from 25 unique users related to dysphoric lucid dream content (inter-rater reliability = 83%, median up-vote ratio = 2, median comment frequency = 3). There were 24 posts from 24 unique users related to poor sleep (inter-rater reliability = 84%, median up-vote ratio = 2, median comment frequency = 3). These posts equally mentioned lucid dreaming increasing poor sleep and poor sleep prefacing a lucid dream. There were 26 posts from 26 unique users related to dream/reality confusion (inter-rater reliability = 88%, median up-vote ratio = 2, median comment frequency = 2.5). There were 7 posts from 7 unique users related to unwanted lucid dreams (inter-rater reliability = 97%, median up-vote ratio = 1, median comment frequency = 2). In these posts, users often expressed that their lucid dreams were very vivid and cognitively active to the point of being exhausting and impeding normal sleep.</p> <p>Inter-rater reliability was high for both lucidity attainment (91%) and dream control (80%) codings. There was a significant relationship between attaining lucidity and the valence of a post, $X^2(1, N = 148) = 17.4, p < .0001$. There was a significant relationship between the presence of dream control and the valence of a dream experience, $X^2(1, N = 90) = 44.7, p < .0001$.</p>	
8	Raduga et al., 2020	Well-being	Any	<p>Pain from LD in wakefulness: PLDW in various forms was reported by 21% of all 151 participants. 27% experienced numbness, tingling, itching, and so forth, instead of pain. Of the respondents with PLD, 28% reported PLDW. The X^2 test showed a statistically significant relationship between PLDW and PLD variants, $X^2 = (20, N = 151) = 59.637, p < .001$. Post hoc tests showed a significant relationship between weak-PLD and PLDW groups, $X^2 = (5, N = 38) = 22.000, p_{\text{Bonferroni}} < .005$. Post hoc tests didn't show any significant relationship regarding strong PLDW, although strong PLDW appeared in five out of six reports of strong PLD, but If there was no PLD, then there was no PLDW.</p> <p>Duration of pain: In 31% of participants, tPLDW lasted for a few seconds, while in 54% of participants, this criterion was not defined. In 12% of the responses, it was stated that tPLDW lasted for a few minutes. e X^2 test and post hoc test did not show any significant differences between genders in terms of tPLDW. X^2 tests revealed a significant relationship between tPLDW and</p>	36 (90%)

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				<p>PLD ($X^2 = (20, N = 151) = 39.804, p = .005$). Post hoc tests showed significant relationship between weak PLD and tPLDW ($X^2 = (3, N = 38) = 11.895, p_{\text{Bonferroni}} = .04$) and between strong PLD and tPLDW, $X^2 = (5, N = 46) = 26.000, p_{\text{Bonferroni}} < .005$.</p> <p>Pain in LD: Of the participants, 74% achieved PLD in various forms, another 13% experienced unusual sensations instead of pain, and 13% did not achieve any significant sensations. Women more often than men achieved PLD (84% vs. 65%). The X^2 test confirmed a statistically significant relationship between PLD presence (positive or negative) and gender, $X^2 = (1, N = 151) = 6.998, p = .008$. Women more often than men experienced strong PLD (43% vs. 18%). The X^2 test also confirmed a statistically significant relationship between PLD variations and gender, $X^2 = (4, N = 151) = 13.982, p = .007$. Post hoc tests showed a significant difference between genders in terms of their experience of strong PLD, $X^2 = (1, N = 46) = 7.043, p_{\text{Bonferroni}} = .04$.</p> <p>Entry methods: X^2 tests revealed a significant relationship between LD entry method and PLD, $X^2 = (3, N = 151) = 12.826, p = .005$. Post hoc tests showed a significant difference between PLD appearance and indirect induction techniques, $X^2 = (1, N = 45) = 30.422, p_{\text{Bonferroni}} < .004$, and between PLD appearance and the techniques used to become conscious while dreaming, $X^2 = (2, N = 73) = 13.164, p_{\text{Bonferroni}} < .004$. When an indirect method was used, PLD occurred 91% of the time, while the PLD rate was 60% for those who used a direct method and 71% for those who became conscious while dreaming. The X^2 test showed a statistically significant relationship between LD entry method and PLD variations, $X^2 = (12, N = 151) = 24.623, p = .017$. Post hoc tests showed a significant difference between PLD and the indirect method, $X^2 = (4, N = 45) = 24.889, p_{\text{Bonferroni}} < .004$.</p> <p>Termination methods: The X^2 test did not show a statistically significant relationship between the type of LD ending and tPLDW. After deliberate awakening, tPLDW lasted several minutes in 62% of cases but only in 37% of cases when LD termination was unintentional. Post hoc tests showed a significant relationship between intentional LD ending and tPLDW, $X^2 = (3, N = 62) = 24.065, p_{\text{Bonferroni}} < .006$.</p>	
9	Sackwild & Stumbrys, 2021	Well-being	N/A	<p>For the majority of lucid dreamers (68.6%), lucid dreams occurred either entirely or more often spontaneously. The average PHQ-8 depression score was 9.3 ± 6.7 for the whole sample and 9.2 ± 6.7 for the lucid dreamers. There was no association between lucid dream frequency and depression score for the entire sample (Spearman's $\rho = -.02, p = .834$). None of independent variables were predictors of depression severity. The majority of lucid dreamers agreed or strongly agreed to the statements that lucid dreaming helped them when they were feeling depressed or low; that they have experienced some form of physical or mental healing from lucid dreaming; and that they have experienced a transformation from lucid dreaming. Less than half agreed with the statement that lucid dreaming helped them to overcome something, however, the proportion of lucid dreamers who disagreed or strongly disagreed with any of the statements was rather small.</p> <p>Experiencing new emotions: Participants recognized that their emotions could be worked with and explored in the lucid dream state in ways that were not attainable for them in the waking state.</p> <p>Speaking with conscious dream characters and parts of the self: Alongside support, characters can also facilitate a space to overcome fears or phobias.</p> <p>Re-writing depressive thought patterns: Some participants experienced terrifying and reoccurring nightmares that were extremely stressful. Lucid dreaming enabled them to take back control over the negative thought patterns. Some participants kept track of changes after lucid dreams directly working on their depression which included better appetite, a decreased desire to stay in bed, more energy and motivation, and increased self-esteem.</p>	39 (98%)
			None		

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				<p>Fun and freedom: Some of the most prevalent activities explored are flying and sexual encounters. Exploring sex lucidly, as well as providing sexual healing energetically, is also extremely beneficial and healing for those who do not have access to the sexual encounters they desire in their waking life. Similarly, flying enabled participants to feel both incredible and in control.</p> <p>Problem solving techniques: For individuals who cannot find release or may not be able to afford generalized therapeutic approaches, creating your own lucid dream techniques provides an alternative course for problem solving. It was common that participants could problem solve from seeing their life from an alternative perspective which often time filtered through to shift their waking state perspective as well.</p> <p>Goals and achievements: By engaging in lucid dream rehearsal, the participants are able to justify their experience and feel empowered.</p> <p>Inspiration and integration: Participants shared a range of ways they were inspired by their lucid dreams and the methods they used to integrate their dream experiences into their waking life. All of the participants expressed how they now wish to use lucid dreaming for helping or connecting with other people.</p> <p>Mindfulness and meditation: Some participants answered that the biggest insights gained from lucid dreaming was the deepening of spiritual and meditation practices which led them to question reality, consciousness, and connection to self and other. Some described how incorporating mindfulness and meditation in their lucid dreams enabled prolonged positive emotions in waking life. Lucid dream work therefore, has such a profound effect on the dreamer that they wish to integrate their experiences not only into their own waking lives, but additionally share this transpersonal modality with others as well.</p> <p>Mantras, messages, and magic: One technique or trainable skill that appeared useful for participants was the utilization of a mantra. When participants were asked to elucidate the overall messages they received from their individual experience of lucid dreaming, all of the participants used the word magic to describe them.</p> <p>Healing and transformation: Participants had lucid dream experiences which confronted and worked through unresolved blockages, utilized creative techniques to become more empowered, and were successful in their spiritual unfoldment, their identity was shaken, and a new relationship emerged in the way they previously defined themselves in the world. All of the participants in the qualitative study agreed or strongly agreed they had experienced some form of mental or physical healing or a dramatic change or transformation with depression in their life from lucid dream work. Participants felt lucid dreaming could be highly beneficial in particular for depression.</p>	
10	Schädlich & Erlacher, 2018	Mixed	N/A	<p>P02, P03, and P05 particularly clarified that their focus was on inspiration and intuition. Lucidity allowed the interviewees to seek particular experiences or to focus more on particular aspects of their playing or singing. All lucid dreamers experienced making music in lucid dreams as positive most of the times, and each one described dreams where they really enjoyed the whole experience. All interviewees but P04 reported positive effects on waking life. P01, P02, and P05 became more confident and less anxious in their musical performances during waking life (concerts and sessions with others). P01 reported that she was able to carry the feeling from the dream over into waking life and that her voice is now less constricted. P03 said that his guitar play in waking life became a little easier as a result of playing in lucid dreams. P05 emphasized that improvising in lucid dreams had helped him a lot for concerts in waking life because it helped him to “get into the feeling—that 'letting go’”.</p>	36 (90%)

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				<p>Altogether, the participants described visual, acoustic, tactile, and kinaesthetic impressions, even temperature: P03, P04, and P05 described their movements in lucid music dreams as realistic; P02, P03, and P05 emphasized that playing instruments in lucid dreams felt relaxed and effortless. P01 perceived her finger movements on the guitar as soft and buzzy. P02 and P05 experienced sound as more intense than in waking life—P02 said he could feel the sound with his whole body; for P05, sound dominated the dream in contrast to all other senses. Whereas for P01 and P04, the fretboard of the guitar did not feel as in waking life, for P03, the pressure on the strings was more intense; however, P01 intensely felt the calluses on her left hand and the vibration of the strings. Some of the participants experienced visual peculiarities: For example, when P03 performed very fast movements, his hands became blurry, and the movement was visually slower than what he felt and heard. P04 had a blind spot on the guitar and his right hand looked blurry. All participants but P05 experienced some problems during lucid music dreams (e.g., problems with her vision; stiff left hand; sound sometimes was too quiet or disturbed).</p>	
11	Schädlich et al., 2016	Skill	Wake-up-Back-To-Bed	<p>All lucid dreams occurred in REM sleep. None of the lucid dreamers recalled any additional non-lucid or lucid dreams involving darts or similar actions. Three of the lucid dream practice dreams occurred before and eight after Wake-up-Back-To-Bed. None of the lucid dreamers managed to perform the eye signals for the purpose of counting correctly and/or clearly visibly. On average, the lucid dreamers experienced 4.1 ± 2.9 distractions.</p> <p>Results show no significant effect of time (pre-test to post-test; $F_{1,23} = .170, P = .684, \eta^2 = .007$) or group ($F_{3,23} = .160, P = .922, \eta^2 = .020$). Group \times time interaction was significant ($F_{3,23} = 4.471, P = .013, \eta^2 = .368$), demonstrating that the 4 groups improved differently from pre-test to post-test.</p> <p>The physical practice group showed a slight improvement of 9% from pre-test to post-test on a descriptive level. However, the lucid dream practice group with few distractions significantly improved by 18%, with a large effect size of 3.84, while the lucid dream practice group with many distractions showed a decline of 14% on a descriptive level.</p> <p>The number of distractions was not correlated with lucid dream recall frequency, the number of practice trials during lucid dream practice or the time of practice. There was no significant correlation between the number of practice trials and performance within the lucid dream practice groups nor within the physical practice group. There were also no correlations between the time of practice and performance in the lucid dream practice groups and physical practice group. Furthermore, lucid dream recall frequency was not correlated with performance in any of the groups.</p>	40 (100%)
12	Schadow et al., 2018	Well-being	N/A	<p>Mean sleep quality was 3.89 ± 0.62 ($N = 437$). The mean of the feeling of being refreshed in the morning ($2.88 \pm 0.74, N = 436$) was slightly lower compared to the norm samples. The composite score of problems with sleep quality averaged to 17.56 ± 6.37 and the tiredness during the day index to 12.75 ± 4.51. The correlation between sleep quality and problems with sleep quality was very high: $r = -.738, p < .0001, N = 437$. Also, tiredness during the day was related to the feeling of being refreshed in the morning: $r = -.471, p < .0001, N = 436$.</p> <p>Lucid dream frequency was positively related to problem with sleep quality and also showed marginally significant effects on sleep quality and tiredness during the day. No systematic correlation of the feeling of being refreshed in the morning and lucid dreaming frequency was found. If nightmare frequency was entered additionally into the four regression analyses, the relationship between lucid dream frequency and the sleep variables was no longer significant (not even marginally significant). On the other</p>	34 (85%)

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				hand, nightmare frequency was related to poor sleep quality, not feeling refreshed in the morning, and tiredness during the day. Dream recall frequency showed a small but significant relationship to good sleep quality in this analysis (standardized estimate = .0679, $\chi^2 = 4.0$, $p = .0447$, age and gender was also controlled for).	
			N/A	Over half of the participants had experienced at least one lucid dream and about 75% have had nightmares. The Spearman rank correlation between these two variables reached $r = .384$ ($p < .0001$, $N = 1380$). Mean sleep quality was 3.41 ± 0.96 ($N = 1380$) and the mean frequency of tiredness during the day was 2.98 ± 1.06 ($N = 1380$). Lucid dream frequency was positively related to frequency of tiredness during the day and negatively related to sleep quality. After adding nightmare frequency into the regression analyses the relationships between lucid dream frequency and sleep quality and frequency of tiredness during the day did not reach significance. Nightmare frequency, however, was significantly related to both sleep variables,	30 (75%)
13	Spoomaker et al., 2003	Well-being	Cognitive Techniques	No significant results were found. The mean for nightmares a week decreased from 2.31 to 0.88, which is a reduction of more than 60%. The subjective sleep quality increased slightly, and there were no changes for state and trait anxiety. Only four participants were able to become lucid in one of their nightmares, and three were able to alter the nightmare lucidly. The nightmare of three other participants changed by itself. The nightmare content or frequency did not change for two participants, although one of these reported an increase in nightmare frequency in the weeks after the treatment, gradually decreasing to the starting level at follow-up.	33 (83%)
14	Stocks et al., 2020	Well-being	Mixed	High lucidity vs. low lucidity groups: Results showed no significant differences between high and low lucidity groups for number of reality checks, minutes of MILD, self-reported sleep quality, negative dream intensity, bizarreness, sensory vividness, or negative waking mood. The high lucidity group had higher positive dream intensity ($p = .014$) and positive waking mood ($p = .048$) than the low lucidity group, although these did not survive correction for multiple comparisons (one-tailed Bonferroni correction for 9 tests would require a p value < 0.011). There were positive correlations between lucidity score and positive dream intensity ($r = 0.617$, $p = .011$), sensory vividness ($r = 0.733$, $p = .001$), and positive waking mood ($r = 0.649$, $p = 0.007$), all of which survive corrections. There were no other significant correlations. High lucidity night vs low lucidity night: Results showed no significant differences for number of reality checks, minutes of MILD, self-reported sleep quality, negative dream intensity, sensory vividness, and negative waking mood. However, the highest lucidity night was associated with significantly more positive waking mood ($p = .005$), and more bizarreness ($p = .037$), although bizarreness did not survive correction. In addition, correlations were conducted between lucidity score and all variables, for the Highest Lucidity night. There was a positive correlation between lucidity and positive dream intensity ($p = .009$), and positive waking mood ($p = .015$). The highest rated lucid dream shows clear evidence of insight although there is no indication of controlling the dream, which could explain why their overall lucidity score is still only 2.6. Of interest, the amount of REM sleep is nearly twice as high in the highest lucidity night (115.8 ± 31.72 min) compared to lowest lucidity night (63.2 ± 38.25).	38 (95%)
15	Stumbrys et al., 2015	Skill	Any	There were no significant handedness differences between the groups, as well as differences in motor imagery abilities. Three practice groups did not differ in their amount of practice ($F_{3,60} = 0.08$, $P = .927$) and duration ($F_{3,60} = 0.28$, $P = .760$).	40 (100%)

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				<p>All three practice groups had significant improvements from pre-test to post-test in terms of the number of correct sequences produced, averaged across two 30s test intervals, whereas the control participants had only nonsignificant improvements. There was a significant time (pre-test to post-test; $F_{1,60} = 50.12, P < .001$) but not group ($F_{3,60} = 0.48, P = .695$) effect. Group \times time interaction was significant ($F_{3,60} = 3.43, P = .023$), showing that four groups improved differently from the pre-test to post-test. Post-hoc LSD pair-wise comparisons showed significant differences between the LDP and control group ($P = .003$), as well as between the PP and control group ($P = .031$), but not between other pairs of the groups. Increases in performance from pre-test to post-test were not associated with lucid dream frequency ($\rho = .100, P = .432$). No significant association between changes in performance and the number of trials ($\rho = -.473, P = .055$) was found in the LDP group. Practice times (since the bed time) were also not significantly associated with changes in performance ($\rho = .040, P = .785$).</p> <p>Differences between the two tests were significant for control group (more errors on the post-test; $t = 3.76, P = .002$) but not for practice groups (LDP: $t = 0.23, P = .820$; MP: $t = 1.63, P = .125$; PP: $t = 0.69, P = .504$). Overall differences for the change in the error rate between the four groups were not significant ($F_{3,60} = 0.95, P = .423$). LDP resulted in highest average gains (+20%), followed by PP (+17%) and MP (+12%), however the effect size was highest for PP (1.57), followed by MP (1.16) and LDP (0.91).</p>	
16	Yu & Wong, 2020	Well-being	N/A	<p>The RAQ was correlated negatively with the LOC, $r = -.364, p < .001$, and positively with the LuCiD, $r = .283, p = .002$. The LOC was not correlated with either the DIS or the LuCiD. The DIS total score had a positive correlation with the LuCiD, $r = .351, p < .001$, but not with the RAQ. By the same token, although the DIS Lucid Dreaming subscale, $r = .387, p < .001$, positively varied with the LuCiD, its correlations with the RAQ total, $r = .034, p = .711$, and the Problem-Solving subscale, $r = .160, p = .082$, were not significant. The Problem-Solving subscale of the RAQ was significantly correlated with the DIS Dream Work subscale, $r = .262, p = .004$, but not with any subscales of the LuCiD (all p values $> .05$).</p> <p>Multiple Linear Regression: A significant MLR model to see if the LOC, DIS, and LuCiD total scores could predict the RAQ total score was obtained ($F(3, 117) = 9.469, p < .001, R^2 = .199$). The RAQ total score was significantly predicted by the LuCiD and LOC total scores but not by the DIS total score. A second model with the DIS total score being replaced with the DIS Lucid Dreaming and Autosuggestion subscale scores was significant, $F(4, 117) = 8.096, p < .001, R^2 = .223$, but the two DIS subscales were not significant predictors. Using the DIS Dream Work subscale as a substitute for the aforementioned two DIS subscales did not alter the result, $F(3, 117) = 9.642, p < .001, R^2 = .202$. A third model to see if the DIS Dream Work subscale score could predict the RAQ Problem-Solving subscale score even with the LOC and LuCiD being controlled showed that the LOC and DIS Dream Work subscale were significant predictors, but the LuCiD was not, $F(3, 118) = 5.326, p = .002, R^2 = .122$.</p> <p>Mediation: The indirect effect of the LOC on the relationship between the LuCiD and RAQ total scores ($\beta = .028$, bias-corrected and accelerated confidence interval [-0.043, 0.096]) was not significant. Similarly, the LOC did not significantly mediate the association between the DIS Dream Work and RAQ Problem-Solving subscales ($\beta = .037$, bias-corrected and accelerated confidence interval [-0.002, 0.089]).</p>	26 (65%)