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Feasibility of a Self-Administered Hypnosis Intervention for Improving Sleep in College Students

Morgan Snyder, Cameron T. Alldredge, Samuel R. Stork, and Gary R. Elkins

Department of Psychology and Neuroscience, Baylor University, Waco, Texas, USA

ABSTRACT

Approximately two out of three college students report experiencing suboptimal sleep quality. The aim of this study was to examine the feasibility of a self-administered hypnosis intervention to improve sleep in college students. Twenty-two college students who self-reported poor sleep quality were enrolled in a 4-week study comprising 1 baseline week and a 3-week self-administered hypnosis intervention. Sleep onset latency and sleep efficiency as measured by wrist actigraphy were significantly improved. The mean average nightly sleep duration during the baseline week was 398.88 minutes (SD = 56.44), which increased to a mean of 413.88 minutes (SD = 57.80) during the 3rd week of intervention. However, the results show that there was no statistically significant difference between weeks on objective nightly sleep duration, 95% CI [−11.13, 41.13], t (15) = 1.224, p = .240. Also, results showed that there was no significant difference between weeks on self-reported nightly sleep duration, F(3, 57) = 2.155, p = .103. Twenty participants (91%) completed the study intervention and adherence to daily self-hypnosis practice with an audio recording was high. Zero study-related adverse events were reported, and participants perceived the intervention as easy to use and helpful for improving sleep. These results provide evidence for the feasibility and safety of a self-administered hypnosis intervention to improve sleep in college students. A larger randomized clinical trial is warranted to determine efficacy.

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Feasibility; hypnosis intervention; sleep

Introduction

Poor sleep is common among college students. For instance, one recent study showed that 62% of college students in the sample had poor sleep, and 36% reported getting less than 7 hours of sleep a night (Becker et al., 2018). Another study showed that 27% of college students in the sample were at risk for a sleep disorder (Gaultney, 2010). Poor sleep among college students is associated with various negative outcomes such as daytime sleepiness, lower academic performance, and mental health issues such as depression, stress, anxiety, and lower quality of life (Alapin et al., 2000; Gaultney, 2010; Sing & Wong, 2010; Taylor et al., 2013).

Sleep problems may arise from a variety of factors. Potential causes of sleep problems include those in the pharmacological (e.g., caffeine, stimulants, alcohol), physiological (e.g., somatic arousal, pain), psychological (e.g., cognitive arousal, anxiety, poor sleep

CONTACT Gary R. Elkins gary_elkins@baylor.edu Department of Psychology and Neuroscience, Baylor University, 801 Washington Ave., 2nd Floor, Waco, TX 76701 USA.

hygiene), and medical (e.g., sleep apnea, cardiovascular diseases) domains (Graci & Hardie, 2007). Hyperarousal is one mechanism of sleep disturbance, and it can manifest both cognitively (e.g., rumination, worry) and physiologically (e.g., muscle tension, racing heart rate; Perlis et al., 1997; Pigeon & Perlis, 2006; Riemann et al., 2010). Several studies have demonstrated that rumination is associated with longer sleep-onset latency, lower sleep efficiency, wakefulness after sleep onset, and poorer sleep (Carney et al., 2010; Pillai et al., 2014).

Current treatments for improving sleep include sedative medications and cognitive behavioral therapy for insomnia (CBT-I). Sedative medications are commonly prescribed yet have many disadvantages such as a high risk of addiction, disruption of slow wave sleep patterns, and increased risk of mortality, infection, depression, and cancer (Kripke, 2017; Riemann & Perlis, 2009). Behavioral treatments, such as CBT-I, are typically more effective and carry lower risk compared to pharmacological treatments. Limitations of CBT-I include suboptimal compliance with CBT-I protocols and a shortage of therapists trained in CBT-I (Van Straten et al., 2018).

Another potential nonpharmacological intervention for improving sleep is hypnosis. Research indicates that hypnosis intervention may reduce mental overactivity (i.e., worry and rumination) and physiological arousal (Elkins et al., 2007; Hammond, 2010; Kohen & Olness, 2012; Kuttner, 2012; Lang et al., 2006; Lew et al., 2011; Lynn et al., 2010; Montgomery et al., 2002, 2010).

Studies have examined the effects of a hypnosis intervention for sleep in various populations and have shown that it is a promising intervention for improving sleep. In one study, hypnosis increased the amount of slow wave sleep during a nap by 81% in highly hypnotizable females (Cordi et al., 2014). Hypnosis was also shown to increase the amount of slow wave sleep during nighttime sleep in highly hypnotizable participants (Cordi et al., 2020). Hypnosis delivered via in-person sessions has been shown to significantly improve sleep in postmenopausal women (Elkins et al., 2013) and adults with chronic pain (Tan et al., 2015). Hypnosis delivered in person and by phone was shown to improve sleep quality in postmenopausal women (Elkins et al., 2021). In another study, sleep efficiency improved among individuals with insomnia after the hypnosis interventions using both sleep-specific and generic suggestions (Lam et al., 2018). However, no studies to date have examined the feasibility of a hypnosis intervention for improving sleep in college students.

Given the need for nonpharmacological interventions to improve sleep among college students, the purpose of this study was to evaluate the feasibility and safety of a self-administered hypnosis intervention for improving sleep in college students. It was hypothesized that (1) the attrition rate for this study would not exceed 10% and that the average adherence rate (as assessed by hypnosis practice logs) would be at least 65%. In addition, participants' ratings of global impression of change, program satisfaction, and intervention ease of use were examined. Safety was assessed through self-reported adverse events. A second aim of the study was to explore the potential effects of the study intervention on objective and self-reported nightly sleep duration, time in bed, sleep-onset latency, and sleep efficiency. It was hypothesized that objective nightly sleep duration, as measured by actigraphy, would be significantly increased during the final week of the intervention compared to the baseline week. It was also hypothesized that self-reported nightly sleep duration, as measured by the Consensus Sleep Diary – Core (CSD-Core), would be significantly increased during the intervention compared to the baseline week.

Method

Participants

Participants included 22 undergraduate students who were recruited from a large university in the South. Inclusion criteria were as follows: (1) 18 years of age or older, (2) proficient in English, and (3) have poor sleep quality as defined by a score of 6 or greater on the Pittsburgh Sleep Quality Index (PSQI). Exclusion criteria consisted of (1) a past or current diagnosis of any psychotic disorder or borderline personality disorder due to contraindication with hypnosis (Walker, 2016), (2) a past or current diagnosis of any sleep disorder, (3) current treatment for major depressive disorder, and (4) current treatment to improve sleep. Approval for the study was obtained through the Institutional Review Board at the university.

Procedures

Pre-Enrollment Screening

Potential participants were screened for eligibility via an online questionnaire. A series of questions were asked to confirm whether the individual met the inclusion/exclusion criteria for the study, using a YES/NO format. The online screening questionnaire also included items one through nine of the PS to assess inclusionary criteria of poor sleep quality (i.e., global PSQI score ≥6). If a candidate self-reported the use of medications intended for sleep during the past 2 weeks, a washout period (no use of sleep medications for a minimum of 2 weeks) was required prior to the scheduling of the initial visit. All other eligible candidates were invited to participate in the study.

Enrollment Visit

At the beginning of the initial visit, the informed consent process for study procedures, the study purpose, and the study requirements were explained by a graduate student researcher. Participants were asked to confirm that they had not used sleep medications in the prior 2 weeks. Once written informed consent was obtained, participants were asked to complete a demographic questionnaire. Next, each participant was provided with a 7-day sleep diary, an actigraphy device to wear on his or her nondominant wrist, along with instructions on actigraphy device use and care. Participants were asked to complete the sleep diary and wear the actigraphy device each night over the next 7 days to provide baseline sleep data. Participants were then scheduled to return to the research lab in approximately 7 days. The initial visit (i.e., enrollment visit) was approximately 30 minutes in length.

Education Visit

Approximately 7 days after the initial visit, participants returned to the research laboratory for the education visit (approximately 60 minutes in length). Participants returned the actigraph and baseline sleep diary and were then asked to complete baseline questionnaires. Next, each participant received a binder with a toolkit regarding the use of hypnosis for improving sleep that included specific instructions for each week, instructions about the actigraphy device, sleep diaries for each week, hypnosis practice logs, and the accompanying audio recordings containing the hypnosis tracks for self-administration.

Participants were asked to listen to audio recordings of hypnosis inductions designed for improving sleep quality each night when they were ready to go to sleep. This lasted throughout the entire 3-week intervention. The recorded inductions provided for weeks 1 and 2 consisted of suggestions for increased physical and mental relaxation, along with imagery (lake or mountain imagery). The recorded induction provided for week 3 included suggestions for increased physical and mental relaxation, as well as suggestions specifically for deeper sleep. Each recording was approximately 20 minutes long. Participants were provided access to the prerecorded digital audio files by internet link. Participants were asked to document each time they practiced self-administered hypnosis with the recordings on the hypnosis practice log.

Participants were also instructed to continue completing a daily sleep diary throughout the duration of the study. Participants were scheduled for a telephone follow-up call (or text message) for approximately 7 days after the education visit. Finally, participants were scheduled for two final in-person visits: (1) an in-person follow-up visit (scheduled for approximately 14 days after the education visit), and (2) the completion visit (scheduled for approximately 21 days after the education visit).

Follow-Up Telephone Contact

Each participant was called or sent a text message (based on participant's preference) for follow-up. The follow-up call (or text message) was intended to ensure the participant understood the intervention, answer any questions, reinforce basic instructions for completion of the sleep diary and hypnosis practice, and review any adverse events that may have occurred. Upcoming study tasks were also reviewed with each participant.

Follow-Up Visit

Participants returned for the in-person follow-up visit (approximately 15 minutes in length). During this visit, each participant was given a wrist actigraph to wear on his or her non-dominant wrist at night for the next 7 days. The follow-up visit was also intended to make sure the participant understood their treatment regimen, answer any questions, reinforce basic instructions for completion of sleep diary and hypnosis practice, and review any adverse events that may have occurred over the past week.

Completion Visit

When participants returned to the research laboratory for the completion visit (approximately 60 minutes in length), the actigraph and sleep diaries were collected. Participants were then asked to report any adverse events that may have occurred over the past week. Next, participants completed endpoint measures that contained all baseline questionnaires as well as a satisfaction-rating questionnaire. Participants were administered the Elkins Hypnotizability Scale (EHS) during the completion visit. The protocol for this study may be provided upon reasonable request for research purposes only.

Measures

Impression of Change, Intervention Satisfaction, and Ease of Use

A five-item self-report measure was used to assess participants' impressions of change, intervention satisfaction, and intervention ease of use. To assess participants'

perceptions of the value of the hypnosis intervention they received, they were asked to rate their impression of change in sleep and mood (e.g., "Since beginning the study, my sleep quality is:") and ratings were recorded on a 7-point Likert scale, ranging from −3 (*very much worse*) to 3 (*very much better*). Participants were also asked to provide intervention satisfaction ratings (e.g., "How satisfied are you with the impact of the study treatment on your sleep?") and ratings were recorded on a 5-point Likert scale, ranging from 0 (*not at all*) to 4 (*totally satisfied*). Participants were also asked to rate the ease of use of the intervention (e.g., "How do you rate this hypnosis intervention overall in regard to ease of use?") and ratings were recorded on an 11-point Likert scale, ranging from 0 (*very difficult*) to 10 (*very easy*).

Adverse Events Log

Adverse events were carefully monitored using an adverse events log. Participants were asked at the end of each intervention week to report any adverse events (related or unrelated to the study) that they had experienced in the prior 7 days. Adverse events were recorded on an adverse events log and assessed for relatedness to the study and severity.

Self-Administered Hypnosis Practice Log

To assess adherence to the intervention, participants were asked to complete a self-hypnosis practice log, which involved recording the daily frequency of self-administered hypnosis practice over the course of the 3-week intervention.

Actigraphy

Objective nightly sleep duration was assessed using the Actiwatch Score (AW-S; Mini Mitter, Respironics; Bend, Oregon), an actigraphy device worn on the wrist of the non-dominant hand. Actigraphy devices are small motion detectors (accelerometers) capable of distinguishing wakefulness from sleep based on algorithms that account for the reduced movement that characterizes the sleep state. Research on actigraphy assessment of sleep variables such as duration of sleep suggest that actigraphs are psychometrically comparable to polysomnography (PSG), the gold standard for sleep assessment (Jean-Louis et al., 2001). Research indicates that a 1-week period is representative for the assessment of sleep habits (Kahlhöfer et al., 2016).

Participants were asked to wear the actigraphy device for seven nights during the baseline week and for seven nights during the 3rd (i.e., final) week of the intervention. Participants were instructed to press the event marker button on the AW-S each night when they first got into bed with the intention of sleeping and again each morning when they got out of bed following their final awakening. Actiware, a software package, was used to retrieve recorded activity data from AW-S and to analyze the data. Only sleep at nighttime was considered for analysis. The AW-S was configured to collect data in 30-second epochs. Threshold to distinguish sleep from waking was set at 40.00 activity counts. Event markers were cross referenced with sleep diary entries for consistency. Nightly sleep duration (total amount of minutes scored as sleep) was averaged over several weeknights (minimum of three nights) for both the baseline week and for week 3 of the intervention to produce an average nightly sleep duration for each week.

The Consensus Sleep Diary – Core

The Consensus Sleep Diary (CSD) is a standardized, prospective tool for tracking nightly subjective sleep. Research shows that the CSD indices differentiate good sleepers from those with insomnia and was associated with similar objective indices and a subjective insomnia severity measure (Maich et al., 2018). Furthermore, the CSD has been shown to be capable of detecting treatment improvements and has a high completion rate. These findings provide support for the validity, clinical utility, and usability of the CSD (Maich et al., 2018). The Consensus Sleep Diary – Core (CSD-Core; Carney et al., 2012) is a nine-item diary that is considered by the CSD workgroup and their focus group participants to represent quantitative sleep parameters (sleep-onset latency, total sleep time, wake after sleep onset, sleep efficiency) and qualitative variables (sleep quality). Consistent with the hypotheses, this study utilized the CSD-Core as a measure of subjective nightly sleep duration.

Elkins Hypnotizability Scale

The Elkins Hypnotizability Scale (EHS; Elkins, 2014) is a brief, six-item measure of hypnotizability with an administration time of less than 25 minutes. The EHS starts with standardized introductory remarks followed by a standardized induction, which includes suggestions for relaxation and calmness. The six items are arm heaviness or immobilization, arm levitation, imagery involvement or dissociation, positive hallucination of the smell of a rose, positive hallucination of a block, and posthypnotic amnesia. Scoring is based on the respondent's subjective experience and observable behavioral responses. All item scores are summed to obtain a total score (range 0–12). The EHS has been shown to be one of the most reliable measures for hypnotizability (Kekecs et al., 2021). Validation studies have shown that the EHS has demonstrated good internal consistency in an outpatient clinical sample (a = .85; Elkins, 2014) and in a college student sample (a = .78; Kekecs et al., 2016). Correlations between the EHS and the Stanford Hypnotizability Scale, Form C (SHSS:C; Weitzenhoffer & Hilgard, 1962) range from .82 to .91, showing good convergent validity (Elkins, 2014; Elkins et al., 2015; Kekecs et al., 2016).

Data Analyses

To explore the effects of the intervention on objectively measured sleep duration, total sleep time per night (total amount of minutes scored as sleep) as measured by actigraphy was averaged for several nights (minimum of three nights) for both the baseline week and week 3 of the intervention. Only sleep at nighttime was considered for analysis. A paired samples t-test was performed to examine whether there were differences in objective average nightly sleep duration during the baseline week compared to week 3 of the intervention. To investigate the effects of the self-administered hypnosis intervention on self-reported sleep duration, 20 participants completed a daily sleep diary (i.e., CSD-Core) for 1 week before receiving the intervention and for 3 weeks while receiving the intervention. An analysis of variance for repeated measures (ANOVA) was used to compare the differences in average nightly sleep duration between weeks.

In exploratory analyses, the potential effects of the study intervention on objectively measured (i.e., as measured by actigraphy) time-in-bed (TIB), sleep-onset latency (SOL), and sleep efficiency (SE) were investigated. Paired samples t-tests were performed to

examine whether there were differences in objective TIB, objective SOL, or objective SE during the baseline week compared to the final week of the intervention.

In exploratory analyses, the effects of the study intervention on self-reported (i.e., as measured by the CSD-Core) TIB, SOL, SE, and nightly sleep quality were investigated. Repeated measures ANOVAs were used to compare the differences in average nightly TIB, nightly SOL, nightly SE, and nightly sleep quality between weeks.

Results

Sample Characteristics

The characteristics of the sample can be viewed in Table 1. The mean hypnotizability score for the sample was 4.65 (SD = 2.12). Six participants (35.3%) scored in the low hypnotizability range, nine participants (52.9%) scored in the middle range, and two participants (11.8%) scored in the high range.

Feasibility

Of the 22 participants enrolled, 20 completed the entirety of the study (91% retention rate) and 2 participants withdrew from the study (9% withdrawal rate). The participants (n = 2) that withdrew cited ongoing psychosocial stressors as the reason for leaving the study (e.g., logistics, debilitating illness).

Adherence

The frequency of hypnosis practice denoted in Table 2 displays the mean number of days practiced for the total duration of the intervention, as well as, for each week of the intervention. On average, participants practiced with the audio recording a total of 18.35 days (SD = 2.9) out of 21 days, reflecting an 87% adherence rate for the home practice with the audio recording.

Table 1. Descriptive Characteristics of Study Participants, N = 22

Characteristics	Sample Values
Sex; *n* (%)	
Female	15 (68%)
Male	7 (32%)
Age (years)	
Mean (*SD*)	19.23 (0.69)
Range	18–20
Race; *n* (%)	
Caucasian	18 (82%)
Asian-American	1 (4%)
More than one race	3 (14%)
Ethnicity; *n* (%)	
Hispanic/Latino	1 (5%)
Classification	
Freshman	1 (4.5%)
Sophomore	13 (59%)
Junior	7 (32%)
Senior	1 (4.5%)

Table 2. Hypnosis Practice Log Data, $N = 20$

	Days practiced *minimum*	Days practiced *maximum*	Days practiced *mean*	*n*
Week 1	3	7	6.05	20
Week 2	4	7	6.15	20
Week 3	4	7	6.15	20
Full intervention	11	21	18.35	20

Global Impression of Change and Treatment Satisfaction

Descriptive statistics for participants' impression of change and treatment satisfaction ratings are presented in Table 3. When asked to rate their impression of change in sleep quality since beginning the study, 90% of participants provided a rating of 1 (*a little better*) or higher, with a mean rating of 1.65 ($SD = .93$). Participants' mean rating of their impression of change in mood since beginning the study was 0.85 ($SD = .88$). Regarding participants' satisfaction with the impact of the study intervention on their sleep, 95% of participants provided a rating of 2 (*somewhat*) or higher, with a mean rating of 2.85 ($SD = .93$). Participants' satisfaction with the impact of the study intervention on their mood yielded a mean rating of 2.15 ($SD = .88$). When asked to rate the hypnosis intervention overall regarding ease of use, 95% of participants provided a rating of 8 or higher on a 11-point Likert scale ranging from 0 (*very difficult*) to 10 (*very easy*), with a mean rating of 9.20 ($SD = 1$).

Safety

There were no reported adverse events, side effects, or unintended effects that were related to the study or hypnosis intervention. Twelve participants reported various adverse events that were unrelated to the study such as illness and psychosocial stress due to life circumstances.

Objective Nightly Sleep Duration

The mean average nightly sleep duration during the baseline week was 398.88 minutes ($SD = 56.44$), which increased to a mean of 413.88 minutes ($SD = 57.80$) during the 3rd week of intervention, a difference of 15 minutes. However, the results show that there was no statistically significant difference between weeks on objective nightly sleep duration, 95% CI [−11.13, 41.13], $t(19) = 1.224$, $p = .240$.

Table 3. Impression of Change and Treatment Satisfaction Ratings, $N = 20$

Variable	Min. anchor	Max. anchor	*Mean* (*SD*)
Since beginning the study, my sleep quality is:	−3 (*very much worse*)	3 (*very much better*)	1.65 (.93)
Since beginning the study, my mood is:	−3 (*very much worse*)	3 (*very much better*)	0.85 (.88)
How satisfied are you with the impact of the study intervention on your sleep?	0 (*not at all*)	4 (*totally satisfied*)	2.85 (.93)
How satisfied are you with the impact of the study intervention on your mood?	0 (*not at all*)	4 (*totally satisfied*)	2.15 (.88)
How do you rate this hypnosis intervention overall in regard to ease of use?	0 (*very difficult*)	10 (*very easy*)	9.20 (1.00)

The mean average nightly TIB during the baseline week was 486.31 (SD = 68.11) minutes, which decreased to a mean of 484.44 (SD = 60.11) minutes during the final week of the intervention, for a difference of −1.88 minutes. A paired samples t-test showed that this was not a statistically significant reduction in objective TIB, 95% CI [−28.90, 25.15], t (19) = −0.148, p = .884.

The mean average nightly SOL during the baseline week was 28.78 (SD = 19.08) minutes, which decreased to a mean of 14.81 (SD = 11.75) minutes during the final week of the intervention, for a difference of −13.97 minutes. A paired samples t-test showed that this was a statistically significant reduction in objective SOL, 95% CI [−21.11, −6.83], t (19) = −4.169, p = .001, d = −1.04.

The mean average nightly SE during the baseline week was 82.27% (SD = 5.71), which increased to a mean of 84.99% (SD = 4.42) during the final week of the intervention, for a difference of 2.72%. A paired samples t-test showed that this was a statistically significant increase in objective SE, 95% CI [0.29, 5.15], t(19) = 2.390, p = .030, d = 0.60.

Self-Reported Nightly Sleep Duration

The results show that there was no significant difference between weeks on self-reported nightly sleep duration, F(3, 57) = 2.155, p = .103. The results show that there was no significant difference between weeks on self-reported average TIB, F(3, 57) = 0.403, p = .751.

An overall analysis of variance for repeated measures showed a significant difference between weeks on self-reported average nightly SOL, F(1.95, 37.06) = 6.370, p = .004. The mean average nightly SOL during the baseline week was 29.46 minutes, which decreased to a mean of 18.46 minutes during the intervention, for a difference of −11 minutes. A contrast on this difference was significant, t(37) = −3.13, p = .003. Using the standard deviation of contrast differences for each participant produced an effect size measure of d = −0.65.

An overall analysis of variance for repeated measures showed a significant difference in self-reported average nightly sleep efficiency (SE) between weeks, F(2.10, 39.90) = 5.425, p = .007. The mean average nightly sleep efficiency during the baseline week was 84.32%, which increased to a mean of 87.79% during the intervention, for a difference of 3.4%. A contrast on this difference was significant, t(40) = 2.98, p = .005. Using the standard deviation of contrast differences for each participant produced an effect size measure of d = 0.79.

An overall analysis of variance for repeated measures showed a significant difference between weeks on self-reported average nightly sleep quality, F(3, 57) = 6.234, p = .001. The mean average nightly sleep quality rating during the baseline week was 3.08, which increased to a mean of 3.56 during the intervention, for a difference of 0.48. A contrast on this difference was significant, t(57) = 4.26, p < .001. Using the standard deviation of contrast differences for each participant produced an effect size measure of d = 0.81.

Discussion

The observed 91% retention rate provides strong support for the feasibility of the study intervention. The high retention rate suggests that the self-administered hypnosis intervention for improving sleep is an acceptable and feasible intervention among college students. Further, the rate of adherence to the recommendation of daily self-administered hypnosis

practice with an audio recording was relatively high as determined by practice logs. On average, participants practiced self-hypnosis with the audio recordings approximately six nights per week. The results of this study suggest that the home practice of the study intervention was positively reinforcing enough for individuals to complete it on a near daily basis. An examination of participants' treatment satisfaction and ease of use ratings indicates that participants perceived the intervention as easy to use, helpful for improving their sleep quality, and reported being satisfied with the impact of the study intervention on their sleep.

The safety of hypnosis is an important issue due to limited data on adverse event monitoring during studies investigating hypnotic interventions. In the present study, adverse events were monitored throughout the duration of the 3-week hypnosis intervention. While 12 participants reported various adverse events that were unrelated to the study (e.g., illness and psychosocial stress due to life circumstances), there were zero study-related adverse events reported. Thus, the data on adverse events from the present study indicate that the sleep-directed hypnosis intervention was safe. Taken together, these results suggest that a self-administered hypnosis intervention for improving sleep quality is a feasible and safe intervention for college students.

The secondary aim of the present study was to explore the potential effects of the study intervention on objective and self-reported nightly sleep duration. Exploratory analyses revealed that sleep onset latency, measured via self-report and actigraphy, was significantly improved from baseline (d = 0.65 and d = 1.04, respectively). These results indicate that a self-administered hypnosis intervention may be successful in reducing the amount of time necessary to fall asleep. Additionally, exploratory analysis revealed that sleep efficiency, measured via self-report and actigraphy, was significantly improved from baseline (d = 0.79 and d = 0.60, respectively). The effect on self-reported sleep efficiency (d = 0.79) observed in the present study is consistent with a prior study that investigated the effect of hypnosis interventions on sleep outcomes which reported within-group effect sizes of sleep-diary-derived SE from baseline to follow-up ranging from 0.70–0.90 (Lam et al., 2018). Sleep duration did not significantly change pre- to postassessment. This may have been due to participants having acceptable sleep duration at baseline, or the study may have been underpowered to detect clinically significant changes in sleep duration.

Limitations

Given the lack of prior research on self-administered hypnosis interventions for sleep, the current study was primarily exploratory with a small sample size. Thus, while the preliminary results are encouraging, the current study has several limitations that must be addressed. The primary aim of the current study was to examine the feasibility and acceptability of a self-administered hypnosis intervention; therefore, a single-arm design was utilized, which limits the ability to attribute causal effects to the intervention. Without a control group, it is difficult to attribute causal effects to the study intervention alone. Other variables such as the passage of time (i.e., regression to the mean, random changes in sleep that can occur over time) and nonspecific effects (i.e., therapist attention, participation in a research study, participant expectancies) can affect dependent variables and therefore cannot be ruled out as causal factors. To establish if the study intervention offers benefit beyond the effect of time

and nonspecific effects, a randomized clinical trial comparing the study intervention to a minimal-effect control condition is needed. Additionally, daytime napping was not measured in this study. Therefore, results of this study need to be interpreted with these limitations in mind. Future studies should compare the intervention to a control condition.

Conclusions

The current study was the first to investigate the potential effects of a fully self-administered hypnosis intervention on sleep outcomes in college students and on objective sleep outcomes measured with actigraphy. The results of the current study provide preliminary evidence that a self-administered hypnosis intervention for improving sleep quality is a feasible intervention with high rates of retention, adherence, and satisfaction in a college student population. Self-administered hypnosis interventions may have many advantages compared to traditional face-to-face services, including increased accessibility, reduced health care costs, and decreased clinical provider burden (Davies et al., 2014; Ryan et al., 2010). Given the results of the current study, in combination with the need for specialized treatment of sleep disturbance for college students that is brief, easily accessible, safe, and effective, future research should aim to investigate the efficacy of a self-administered hypnosis intervention for improving sleep compared to a minimally effective control condition.

The self-administered hypnosis intervention was shown to be feasible, acceptable, and have high adherence. Further, participants perceived the intervention as easy to use, helpful for improving their sleep quality and reported being satisfied with the impact of the study intervention on their sleep. In addition, both sleep-onset latency and sleep efficiency were significantly improved while the change in average nightly sleep duration was not significant. These results are consistent with the findings from a systematic review of RCTs examining the effects CBT-I, which found that CBT-I produced significant improvement in sleep quality (PSQI), insomnia symptoms (ISI), sleep-onset latency, and sleep efficiency but did not significantly improve sleep duration (Cheung et al., 2019). Further, the present results are also consistent with a previous study examining the effects of a hypnosis intervention on sleep outcomes, which found significant improvement in self-reported sleep quality and sleep onset latency but not sleep duration (Galovski et al., 2016).

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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Data Sharing Statement

A de-identified data set associated with this study may be available upon written request to the corresponding author, after all data analysis and study reporting has been completed, and in accordance with institutional data sharing policies.

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Durchführbarkeit einer Selbsthypnose-Intervention in Eigenregie zur Verbesserung des Schlafs bei College Studenten

MORGAN SNYDER, CAMERON T. ALLDREDGE, SAMUEL R. STORK, UND GARY R. ELKINS

Zusammenfassung: Annähernd 2 von 3 College Studenten berichten von nicht optimaler Schlafqualität. Ziel dieser Untersuchung war es, die Machbarkeit einer selbst durchgeführten Hypnose Intervention zur Verbesserung der Schlafqualität von College Studenten zu untersuchen. Es wurden 22 College Studenten, die von unzureichender Schlafqualität berichteten, in eine 4-wöchige Studie einbezogen, welche eine Basiswoche umfasste, sowie eine 3-wöchige selbständig durchgeführte Hypnose-Intervention. Die Latenzzeit beim Einschlafen und die Schlafeffizienz, gemessen mittels Handgelenksaktigraphie hatten sich signifikant verbessert. Die mittlere durchschnittliche Schlafdauer bei Nacht lag in der Basiswoche bei 398.88 Minuten (SD = 56,44) und verlängerte sich auf durchschnittlich 413.88 Minuten (SD = 57.80) in der 3. Interventionswoche. Allerdings zeigen die Ergebnisse keinen statistisch signifikanten Unterschied zwischen den Wochen in der objektiven nächtlichen Schlafdauer, 95% CI [−11.13, 41.13], t(15) = 1.224, p = .240. Die Ergebnisse zeigten ebenso, dass auch in der selbst-berichteten nächtlichen Schlafdauer zwischen den Wochen kein signifikanter Unterschied bestand, F (3,57) = 2.155, p = .103. Zwanzig Teilnehmer (91%) führten die Intervention der Studie vollständig durch, und die Befolgung der täglichen Selbsthypnose-Übung mittels Audioaufnahme war hoch. Es wurden keinerlei studienbezogene unerwünschte Ereignisse berichtet und die Teilnehmer nahmen die Intervention als einfach in der Anwendung und hilfreich zur Verbesserung des Schlafs wahr. Die Ergebnisse liefern Beweise für die Durchführbarkeit und Sicherheit einer selbst durchgeführten Hypnose-Intervention zur Verbesserung des Schlafs bei College Studenten. Eine größere randomisierte klinische Studie ist gerechtfertigt, um die Wirksamkeit zu bestimmen.

ALIDA IOST-PETER
Dipl.-Psych.

Faisabilité d'une intervention d'auto-hypnose pour améliorer le sommeil des étudiants en université

MORGAN SNYDER, CAMERON T. ALLDREDGE, SAMUEL R. STORK ET GARY R. ELKINS

Résumé: Environ 2 étudiants sur 3 déclarent avoir une qualité de sommeil sous-optimale. L'objectif de cette étude était d'examiner la faisabilité d'une intervention d'auto-hypnose pour améliorer le sommeil chez les étudiants. Vingt-deux étudiants ayant déclaré une mauvaise qualité de sommeil ont été inscrits dans une étude de 4 semaines comprenant une semaine de référence et une intervention d'auto-hypnose de 3 semaines. Le délai d'endormissement et l'efficacité du sommeil mesurés par actigraphie au poignet ont été significativement améliorés. La durée moyenne de sommeil nocturne pendant la semaine de référence était de 398,88 minutes (ET = 56,44), qui a augmenté à une moyenne de 413,88 minutes (ET = 57,80) au cours de la 3e semaine d'intervention. Cependant, les résultats montrent qu'il n'y avait pas de différence statistiquement significative entre les semaines en ce qui concerne la durée objective du sommeil nocturne, IC 95% [−11,13, 41,13], t(15) = 1,224, p = 0,240. De plus, les résultats ont montré qu'il n'y avait pas de différence significative entre les semaines concernant la durée du sommeil nocturne autodéclarée, F(3, 57) = 2,155, p = 0,103. Vingt participants (91%) ont terminé l'étude et l'adhésion à la pratique quotidienne de l'auto-hypnose avec un enregistrement audio était élevée. Aucun événement indésirable lié à l'étude n'a été signalé et les participants ont perçu l'intervention comme facile à utilizer et utile pour améliorer leur sommeil. Ces résultats apportent des preuves de la faisabilité et de la sécurité d'une intervention par auto-hypnose pour améliorer le sommeil des étudiants. Un essai clinique randomisé plus large est justifié pour déterminer l'efficacité.

GÉRARD FITOUSSI, M.D.
President of the European Society of Hypnosis

Viabilidad de una intervención de hipnosis autoadministrada para mejorar el sueño en estudiantes universitarios

MORGAN SNYDER, CAMERON T. ALLDREDGE, SAMUEL R. STORK, Y GARY R. ELKINS

Resumen: Aproximadamente 2 de cada 3 estudiantes universitarios informan experimentar una calidad de sueño subóptima. El objetivo de este estudio fue examinar la viabilidad de una intervención de hipnosis autoadministrada para mejorar el sueño en estudiantes universitarios. Veintidós estudiantes universitarios que reportaron una mala calidad del sueño se inscribieron en un estudio de 4 semanas que consiste en una semana de referencia y una intervención de hipnosis autoadministrada de 3 semanas. La latencia de inicio del sueño y la eficiencia del sueño, medidas por actigrafía de muñeca, mejoraron significativamente. La duración media del sueño nocturno durante la semana inicial fue de 398.88 minutos (DE = 56.44), que aumentó a una media de 413.88 minutos (DE = 57.80) durante la tercera semana de intervención. Sin embargo, los resultados muestran que no hubo una diferencia estadísticamente significativa entre semanas en la duración objetiva del sueño nocturno, IC del 95% [−11,13, 41,13], t(15) = 1,224, p = 0,240. Además, los resultados mostraron que no hubo una diferencia significativa entre semanas en la duración del sueño nocturno autoinformado, F(3, 57) = 2,155, p = 0,103. Veinte participantes (91%) completaron la intervención del estudio y la adherencia a la práctica diaria de autohipnosis con una grabación de audio fue alta. No se informaron eventos adversos relacionados con el estudio y los participantes percibieron la intervención como fácil de usar y útil para mejorar el sueño. Estos resultados proporcionan evidencia de la viabilidad y seguridad de una intervención de hipnosis autoadministrada para mejorar el sueño en estudiantes universitarios. Se justifica un ensayo clínico aleatorizado más grande para determinar la eficacia.

VANESSA MUÑIZ
Baylor University, Waco, Texas, USA