Insomnia sufferers can tolerate laboratory REM sleep dream collection which may improve their sleep perception

Alexandra D. Pérusse[1,2], Joseph De Koninck[3], & Célyne H. Bastien[1,2]

[1]École de psychologie, Université Laval, Québec, QC, Canada
[2]Laboratoire de sommeil et potentiels évoqués cognitifs du Centre de recherche de l'Institut universitaire en santé mentale de Québec, Québec, QC, Canada
[3]École de psychologie, Université d'Ottawa, Ottawa, ON, Canada

Summary. This project assessed the feasibility of in-lab dream collection in insomnia sufferers which have been limited, considering their reported sleep difficulties and heightened arousal. Eleven insomnia sufferers and 10 good sleepers underwent 5 consecutive polysomnography recording nights including 2 in-lab REM sleep full narrative dream collection. Dream recall frequency and sleep onset latency after each dream collection procedure were calculated. Analyses revealed no group effect (p=.14) for in-lab dream recall frequency (.96 for insomnia sufferers vs. .88 for good sleepers). Groups did not differ (p=.33) on sleep onset latency after dream collection. For sleep perception, insomnia individuals significantly underestimated their total sleep time at home (p≤.03) but not in the lab. Good sleepers correctly estimated their total sleep time at home but underestimated it in lab. For wake after sleep onset, insomnia sufferers correctly estimated it at home but underestimated it in the lab, while good sleepers underestimated it both at home and in the lab (p≤.02). These results suggest that in-lab full length dream collection can be successfully conducted with insomnia sufferers. Interestingly, dream collection also appeared to contribute to the underestimation of wake after sleep onset in insomnia individuals and good sleepers. It might be that externally induced awakenings attenuate the distress related to sleep difficulties especially in insomnia sufferers, since awakenings are attributed to dream collection.

Keywords: Dream, insomnia, polysomnography, sleep difficulties, sleep mentation

1. Introduction

The high prevalence of insomnia in the general population (Morin et al., 2011) incites researchers to conduct studies that explore a broad spectrum of potential contributing factors and maintenance mechanisms. Even though investigations on insomnia are numerous, very few have examined dreams of insomnia sufferers (INS). The majority have used dream diaries, a procedure consisting of reporting dreams in the morning at home upon awakening (for a review see Schredl, 2009; Schredl et al., 1998). Though dream collection through diaries is privileged since it is the simplest and most cost effective procedure, it carries important limitations such as intrusions from the waking state, censorship and increased risk of poor compliance. A solution to these methodological issues is in-lab dream collection, which is the most reliable procedure to study dreams, reducing intrusions and enhancing recall capacity (Domhoff, 2003). However, to our knowledge, in-lab dream collection has been used only once with a population suffering from insomnia (Ermann, 1995). The reluctance to use this type of procedure with INS might be due to feasibility concerns, considering INS' reported sleep difficulties (AASM, 2014) and hyperarousal (Perlis et al., 1997). There have been studies of sleep perception in INS using REM sleep waking protocols (Borkovec, Lane, & VanOot, 1981; Coates et al., 1983; Mercer, Bootzin, & Lack, 2002) but the procedures involved were short awakenings to answer short questions without full dream collections. Indeed, in-lab full dream collection is a demanding procedure since it includes full length dream narrations from the dreamer and mood levels estimations, forcing participants to remember their dreams which could act as a further source of cognitive arousal. Bearing in mind the heightened arousal of INS, this procedure might exacerbate their sleep difficulties, increasing the time required to fall back asleep after dream collection.

Thus, the present investigation aimed at assessing the feasibility of this type of procedure with INS and determine if dream collection influence their perception of sleep quality and quantity.

Corresponding address:
Alexandra D. Pérusse, Pavillon Félix-Antoine-Savard, 2325 rue des Bibliothèques, Bureau 1010, Université Laval, Québec, Qc, G1V 0A6, Canada.
Email: alexandra.duchesne-perusse.1@ulaval.ca

Submitted for publication: December 2014
Accepted for publication: March 2015

2. Method

2.1. Participants

Eleven INS and 10 good sleepers (GS), aged between 30 and 45 years, were included in this study. INS all met the International Classification of Sleep Disorders, second edition (ICSD-2; AASM, 2005) criteria for chronic insomnia, whereas GS reported satisfaction with their sleep (See Figure 1 for detailed inclusion/exclusion criteria).

Figure 1. Inclusion and exclusion criteria for insomnia sufferers (INS) and good sleepers (GS)

Inclusion criteria INS

- Subjective complaint of insomnia characterized by difficulties initiating and/or maintaining sleep;
- Three nights/week or more;
- Lasted for at least 6 months;
- At least one daytime consequence attributed to insomnia;
- Distress or significant difficulties in social and/or occupational functioning;
- Subjective sleep efficiency (SE) below 85%.

Inclusion criteria GS

- No subjective sleep complaints;
- Satisfaction with their sleep;
- Report sleeping a minimum of 7 hours/night;
- Subjective SE over 85%.

Exclusion criteria INS and GS

- Presence of a significant medical disorder, a major psychopathology and/or another sleep disorder;
- Strong dependency to tobacco;
- An ongoing psychological treatment;
- The use of a medication known to affect sleep;
- A score > 23 on the *Beck Depression Inventory* (BDI);
- A score > 15 on the *Beck Anxiety Inventory* (BAI).

2.2. Procedure

Participants went through an extensive multi-step selection procedure, including evaluation of psychological symptoms, sleep difficulties, dreams, and memory functioning. Participants meeting the study criteria underwent five consecutive nights of polysomnography (PSG) recordings using a standard montage, during which participants' habitual bedtime schedules were respected. The first night was for screening and adaptation purposes. Clinical data of objective and subjective measures were collected during nights 2 and 4, which were recorded at home. In-lab REM sleep dream collection was undertaken during nights 3 and 5, using a well validated procedure at the University of Ottawa and used for many studies (e.g. Grenier et al., 2005). REM sleep awakenings were triggered using an 80 decibels tone so participants were abruptly awoken, thus limiting intrusions and facilitating recall (Goodenough et al., 1965). An awakening was induced 10 minutes after the beginning of the second REM sleep period, 15 minutes in the third one and 20 minutes following the beginning of subsequent REM sleep periods. Before sleep, in order to limit their awakening time, thus minimizing the perturbation of their sleep, participants were instructed to narrate over the intercom their dreams as soon as they would be awaken by the buzzer.

Figure 2: Procedure

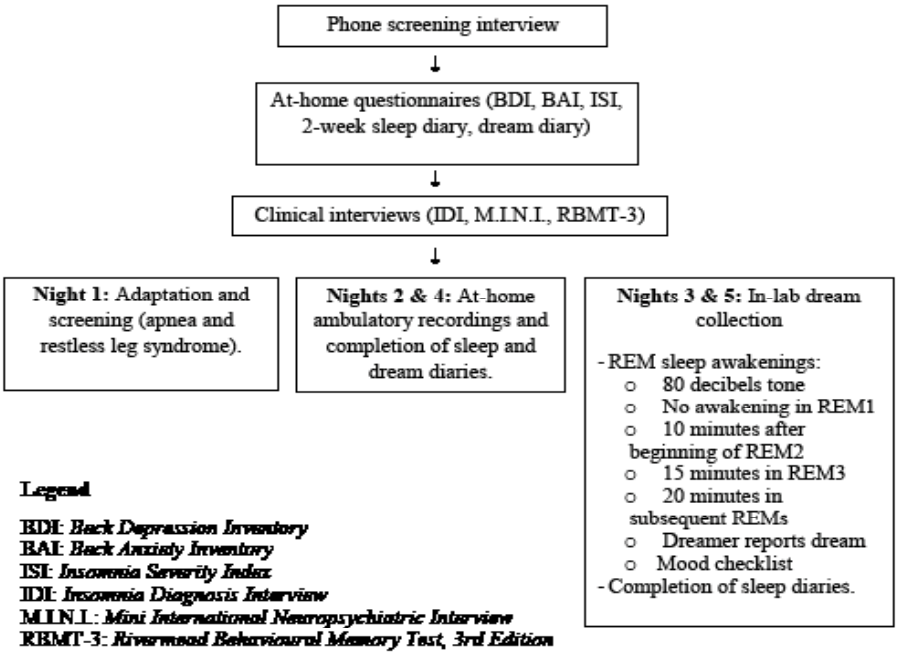

Table 1. Means (SD) of sleep parameters of insomnia sufferers (INS) and good sleepers (GS)

	INS (n = 11)		GS (n = 10)	
Variable	**Subjective**	**Objective**	**Subjective**	**Objective**
At-home TST	377.73 (43.38)[a]	426.38 (55.80)	453.00 (45.85)	445.32 (41.84)
In-lab TST	375.00 (77.94)	364.46 (83.56)	438.33 (40.93)[b]	392.43 (40.95)
At-home WASO	75.10 (42.19)	76.84 (39.63)	18.79 (15.37)[a]	38.60 (18.72)
In-lab WASO	78.50 (54.71)[a]	125.20 (62.18)	29.26 (16.47)[a]	88.50 (40.56)

[a] Subjective variable is significantly lower than objective; [b] Subjective variable is significantly greater than objective; Total sleep time (TST); Wake after sleep onset (WASO).

Once their spontaneous report was completed, participants were briefly questioned over the intercom to encourage them to report all the dream elements they remembered. Finally, they verbally answered a brief mood checklist about their dream. They were then invited to go back to sleep. There were no in room intrusions. Dream reports were also recorded on audio bands. (See Figure 2 for a complete description of the procedure).

This procedure was approved by the ethics comity of the Centre de recherche de l'Institut universitaire en santé mentale de Québec (CER; # 306-2012). Written informed consent was obtained prior to participation.

The feasibility of in-lab dream collection was evaluated through dream recall frequency (DRF) and sleep onset latency after REM sleep awakenings (SOLR) in INS compared to the control group. DRF was calculated for each participant, by dividing the number of times a dream was remembered by the number of REM sleep awakenings. SOLR corresponded to the time elapsed from the end of dream collection to the first epoch of stage 2. Groups were compared using independent sample t-tests. Paired sample t-tests on each group were computed between subjective and objective sleep parameters [Total sleep time (TST) and Wake after sleep onset (WASO)] to compare the influence of dream collection on sleep perception in INS and GS.

3. Results

Analyses revealed that groups were similar on age (p=.77) and gender (p=.87). No significant difference (p=.14) was found for DRF, INS remembering their dreams on a .96 ratio after REM sleep awakenings compared to .88 for GS. As for analyses comparing both groups on the time it took them to fall back asleep after REM sleep awakenings, they were computed using 10 INS and 10 GS. In fact, during the first night of in-lab dream collection, one INS stood up after the first awakening and did not went back to bed until early morning. Therefore, his data for SOLR were excluded from the analyses. Mean SOLR of both nights of in-lab dream collection was similar between INS (29.89 minutes, SD=19.09) and GS (22.40 minutes, SD=14.04). As for perception of sleep, INS significantly underestimated their TST at home (p=.01) but not in-lab. Conversely, GS correctly estimated it at home but overestimated in-lab (p=.02). As for WASO, interestingly INS correctly estimated it at home while GS significantly underestimated it (p≤.001). In-lab, both groups significantly underestimated WASO (p≤.03) (See Table 1).

4. Discussion

These results suggest that in-lab dream collection can be successfully conducted with INS, using a well standardized procedure. In fact, even though in-lab dream collection requires extended time of wakefulness compared to previous researches using other waking probes protocols, INS were able to fall back asleep after each REM sleep awakening within a reasonable amount of time, as did GS. Therefore, it seems that induced awakenings during REM sleep for dream collection were not contributing to INS' sleep difficulties, or at least, did not exacerbate them. This might be due to the stage in which the awakenings were triggered since REM sleep is characterized by natural awakenings, especially for INS (Feige et al., 2008; Pérusse et al., 2015). Reducing the awakening time by previously explaining the procedure to participants may be mandatory to insure the success of in-lab dream collection with INS. Since in-lab dream collection is the most reliable procedure to study dreams (Domhoff, 2003), its demonstrated feasibility with INS suggests that it should be prioritized over dream diaries in further investigations in insomnia.

The absence of significant difference between INS and GS on DRF might be explained by the systematic awakenings of participants in REM sleep. However, other variables, such as dream content, should be taken into account when the capacity to recall dreams is studied. In fact, overly negative dream content, which might characterized INS' dream activity, are often repressed, which is known to reduced DRF (Koulack & Goodenough, 1976). Still, this hypothesis remains to be tested using dream content analysis with INS' in-lab dreams.

Finally, it appears that in-lab dream collection impacted the perception of sleep quality and quantity in INS and in GS. Although it is recognized that the dream collection procedure was confounded with the location in which the participants slept (in-lab dream collection vs. at home without dream collection), it seemed to contribute to the underestimation of WASO in both INS and GS. It is possible that externally induced awakenings attenuate the importance given to sleep difficulties. Therefore, INS like GS may be feeling less distressed of being awake since the awakening is attributed to dream collection. Also, since INS were awoken during the night for dream collection (thus awoken from sleep), they knew they slept (or had been sleeping) so maybe this may have contributed to their tendency to perceive more positively their sleep quality. It might thus be worthwhile to further study induced REM awakenings as a

mean to partly restore sleep misperception in INS and as a potential adjunct behavioral treatment as it was previously suggested by Mercer, Bootzin and Lack (2002). This could be further explored by comparing morning mood following uninterrupted versus dream collection laboratory night recordings.

Acknowledgements

We would like to thank Josée Savard for her intellectual input, Alexandre Gaucher for PSG analysis and all research assistants who helped in data entry and night monitoring. The present study was also made possible by funds from the CIHR to CHB (49500 and 86571).

References

American Academy of Sleep Medicine (2005). International classification of sleep disorders, second edition. Westchester, IL: American Academy of Sleep Medicine.

Borkovec, T. D., Lane, T. W., & VanOot, P. H. (1981). Phenomenology of sleep among insomniacs and good sleepers: Wakefulness experience when cortically asleep. Journal of Abnormal Psychology, 90(6), 607-609.

Coates, T. J., Killen, J. D., Silverman, S., George, J., Marchini, E., Hamilton, S., & Thoresen, C. E. (1983). Cognitive activity, sleep disturbance, and stage specific differences between recorded and reported sleep. Psychophysiology, 20(3), 243-250.

Domhoff, G. W. (2003). The scientific study of dreams. Washington, DC: American Psychological Association.

Ermann, M. (1995). Die Traumerinnerung bei Patienten mit psychogenen Schlafstör-ungen: Empirische Befunde und einige Folgerungen für das Verständnis des Träumens. In: Leuschner W, Hau S, editors. Traum und Gedächtnis: Neue Ergebnisse aus psychologischer, psychoanalytischer und neurophysiologischer Forschung. Münster: LIT Verlag. P. 165-186. In Schredl, M. (2009). Dreams in patients with sleep disorders. Sleep Medicine Review, 13(3), p. 216.

Feige, B., Al-Shajlawi, A., Nissen, C., Voderholzer, U., Hornyak, M., Spiegelhalder, K., … Riemann, D. (2008). Does REM sleep contribute to subjective wake time in primary insomnia? A comparison of polysomnographic and subjective sleep in 100 patients. Journal of Sleep Research, 17(2), 180-190.

Goodenough, D. R., Lewis, H. B., Shapiro, A., Jaret, L., & Sleser, I. (1965). Dream reporting following abrupt and gradual awakenings from different types of sleep. Journal of Personality and Social Psychology, 2(2), 170-179.

Grenier, J., Cappeliez, P., St-Onge, M., Vachon, J., Vinette, S., Roussy, F., … De Koninck, J. (2005). Temporal references in dreams and autobiographical memory. Memory and Cognition, 33(2), 280-288.

Koulack, D., & Goodenough, D. R. (1976). Dream recall and dream recall failure: An arousal-retrieval model. Psychological Bulletin, 83(5), 975-984.

Mercer, J. D., Bootzin, R. R., & Lack, L. C. (2002). Insomniacs' perception of wake instead of sleep. Sleep, 25(5), 559-566.

Morin, C. M., LeBlanc, M., Bélanger, L., Ivers, H., Mérette, C. & Savard, J. (2011). Prevalence of insomnia and its treatment in Canada. Canadian Journal of Psychiatry, 56(9), 540-548.

Perlis, M. L., Giles, D. E., Mendelson, W. B., Bootzin, R. R., & Wyatt, J. K. (1997). Psychophysiological insomnia: the behavioural model and a neurocognitive perspective. Journal of Sleep Research, 6(3), 179-188.

Pérusse, A. D., Pedneault-Drolet, M., Rancourt, C., Turcotte, I., St-Jean, G., & Bastien, C. H. (2015). REM sleep as a potential indicator of hyperarousal in psychophysiological and paradoxical insomnia sufferers. International Journal of Psychophysiology, 95, 372-378.

Schredl, M. (2009). Dreams in patients with sleep disorders. Sleep Medicine Review, 13(3), 215-221.

Schredl, M., Schäfer, G., Weber, B., & Heuser, I. (1998). Dreaming and insomnia: Dream recall and dream content of patients with insomnia. Journal of Sleep Research, 7(3), 191-198.