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Dealing with sleep problems during home confinement due to the COVID-19 outbreak: practical recommendations from a task force of the European CBT-I Academy

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Abstract

In the current global home confinement situation due to the COVID-19 outbreak, most individuals are exposed to an unprecedented stressful situation of unknown duration. This may not only increase daytime stress, anxiety and depression levels but also disrupt sleep. Importantly, because of the fundamental role that sleep plays in emotion regulation, sleep disturbance can have direct consequences upon next day emotional functioning. In this paper we summarize what is known about the stress-sleep link and confinement as well as effective insomnia treatment. We discuss those effects of the current home confinement situation that can disrupt sleep but also those that could benefit sleep quality. We suggest adaptations of cognitive behavioral therapy elements that are feasible to implement for those facing changed work schedules and requirements, those with health anxiety and those handling childcare and homeschooling, whilst also recognizing the general limitations imposed on physical exercise and social interaction. Managing sleep problems as best as possible during home confinement can limit stress and possibly prevent disruptions of social relationships.

Introduction

Since the COVID-19 outbreak in December 2019 and its societal consequences of mass home confinement, a stressful situation has developed for many across the globe. Being forced to stay at home, work from home, do homeschooling with children, drastically minimize outings, reduce social interaction or work many more hours under stressful circumstances, and in parallel manage the attendant health risks, can have a major impact on daily functioning and nighttime sleep. In this short paper we want to address possible consequences of this home confinement situation on sleep, and to give practical advice on how to handle sleep problems. We will not only focus on the negative consequences of long-term home confinement upon sleep quality, but also on those confinement consequences that might, in particular situations, benefit sleep quality and daytime functioning. We present adaptations of some of the elements of cognitive behavioral therapy for insomnia (CBT-I) that might be applied to improve sleep quality. The focus of this paper is primarily upon the largest group of citizens affected, that is those who are not ill or whose workload has considerably increased (e.g. medical and paramedical staff, suppliers and

governmental staff). However, advice to healthcare workers and to those whose workload has significantly increased is also incorporated.

Stress and sleep in confinement: what do we know?

Sleep pressure, the homeostatic drive to sleep, is key to sleeping well. The circadian rhythm keeps us awake during the day, and makes us sleepy at night. The circadian rhythm is governed by daylight, but other factors, such as meal times and exercise, also affect it. Light exposure affects melatonin release, a hormone playing a key role in inducing sleepiness. Bright light exposure during the day gives a better melatonin increase during the night. Activity levels during the day also affect sleep during the following night; low levels of activity (whether due to e.g. depression or confinement) affect sleep negatively, as do too high levels of activity (e.g. due to stress or work overload). Physical activity during the day (but not late at night) improves sleep quality (Fuller et al., 2006, Potter et al., 2016).

Stress-related sleep problems are common (Altena et al., 2016) and those sensitive to stress-related sleep disruption are more likely to develop chronic insomnia (Akerstedt et al., 2007, Drake et al., 2004, Gouin et al., 2015, Ellis et al., 2012). Pre-existing insomnia is also a major risk factor for developing post-traumatic stress disorder (PTSD) when exposed to a major stressor (Gehrman et al., 2013), which then in itself is associated with an increase of sleep disruption (Miller et al., 2017). A recent study showed that PTSD symptoms were reported by 7% of Wuhan residents after the COVID-19 outbreak, in particular by women. Being younger than 35 years of age and following COVID-19 news updated for more than 3 hours a day was associated with elevated levels of anxiety compared to those who were older than 35 years and those who were less exposed to COVID-19 news updates (Huang and Zhao, 2020). Those with better sleep quality and fewer early morning awakenings also reported less PTSD symptoms during the COVID-19 outbreak (Liu et al., 2020). Treatment of PTSD symptoms but also of milder forms of stress is possible using physical exercise, cognitive interventions, relaxation techniques or a combination of those (Rosenbaum et al., 2015, Van Rhenen et al., 2005).

Most confinement studies are not comparable to the current COVID-19 outbreak related confinement situation. Studies investigating isolation and its effects on psychological well-being and sleep quality usually entail changes in environment, light exposure, diet, and environmental temperature. However, global long-term home confinement of masses of people to prevent the disease from spreading, as is currently ongoing, albeit with access to digital tools to ensure

continuation of social communication, work and education is unprecedented. Also, most studies investigating the psychological effects of confinement during viral outbreaks have not used specific sleep questionnaires, and have mostly focused on medical staff or those who have actually been exposed to or suffered from the virus itself, with a typical quarantine period of 10-14 days (Brooks et al., 2020). One isolation study more similar to the current situation did show that younger age and female gender predicted a negative psychological impact of quarantine (Taylor et al., 2008) while in another study, a history of psychiatric illness predicted anxiety and anger 4-6 months after quarantine (Jeong et al., 2016).

Elements of effective insomnia treatment

The European Academy for Cognitive-Behavioral Treatment of Insomnia (The European CBT-I Academy) was founded to improve accessibility to the most effective treatment for insomnia, cognitive behavioral therapy (Baglioni et al., 2020, Morin, 2016, Morin et al., 2009, Riemann et al., 2017). Classically aimed at treating long term sleep problems called chronic insomnia, recent evidence shows that cognitive behavioral therapy can also serve to treat sudden onset (acute) insomnia due to rapid stress-causing situation changes (Boullin et al., 2016, Randall et al., 2019). Many elements of this treatment can be applied to the current situation and may be adapted to treat and prevent sleep problems that result from confinement, increased levels of stress and changes in daytime and nighttime activities and routines. Before presenting those adaptations, we will briefly summarize the key elements of this effective insomnia treatment.

Stimulus control is aimed at shifting the negative associations of the bed and bedroom with not sleeping towards a positive association with good quality sleep. It implies, amongst other things, not using the bed for anything else than sleep or sexual activities (e.g. no television, eating, working) and getting up at the same time every day irrespective of time spent asleep. *Sleep hygiene* refers to ensuring bright light exposure during the day but not during the night in order to enhance sleep inducing melatonin production, not drinking caffeinated coffee or tea in the evening, reducing alcohol intake, not exercising immediately prior to bedtime, avoiding clock-watching during the night and ensuring an optimal room and body temperature to fall asleep. *Relaxation interventions* refer to any technique applied to reduce stress and arousal, which is individual-dependent but can include muscle relaxation and meditation. *Cognitive reappraisal* focuses on challenging and replacing dysfunctional ideas about sleep problems and its causes. Cognitive control and 'worry time' involve reserving a fixed time slot during the day that is

dedicated to resolving worries, stressful thoughts and to making plans, in order to avoid these type of thoughts interfering with nighttime sleep. Through *paradoxical intention*, individuals are asked to try to stay awake instead of trying to fall asleep, thus overcoming sleep effort and enabling the natural sleep drive to lead to faster sleep onset. *Sleep restriction* aims at increasing sleep pressure and sleep quality, and involves restricting the time spent in bed based on the individual's average current nightly sleep duration. This sleep window is then gradually expanded if more time in bed is actually spent asleep. For more details, see (Bastien et al., 2004, Morin et al., 2006, Baglioni et al., 2020, Espie and Kypreos, 2011).

For those considering potential pharmacological treatment for insomnia arising during home confinement, general insomnia treatment guidelines should be followed by treating physicians. The current European guideline for the diagnosis and treatment of insomnia (Riemann et al., 2017) recommends benzodiazepines (BZ) and hypnotic benzodiazepine receptor agonists (Z-drugs; HBRA) for short-term use as a second line treatment if CBT-I treatment is ineffective or unavailable. As an alternative, sedating antidepressants (AD) are discussed. AD might be beneficial if BZ/HBRA are deemed inappropriate, mainly due to potential adverse effects, or if a comorbid mental disorder (e.g. anxiety disorder, major depressive disorder) can be targeted in conjunction with the sleep disturbances (Frasse et al., 2018). The consensus on the restrained use of hypnotic medication in the treatment of insomnia is principally due to the chronic nature of the disorder and the lack of evidence for the long-term efficacy of pharmacotherapy. However, in severe cases of acute insomnia due to external stressors (home confinement) short-term pharmacotherapy might be effective and could be prescribed.

Possible negative sleep-related consequences of home confinement

The current situation is likely to have negative effects on many factors which influence sleep quality. Most people are experiencing major changes in their routines, living with uncertainty, and with stress, insecurity about their health, and worries about the situation and its duration. Most working parents are having to combine their work with homeschooling, home administration and household errands. All these adjustments in turn may affect how many hours a day they can actually spend on sleep.

Entrepreneurs and those with small businesses or start-ups, as well as those who work in the entertainment and hospitality sectors, in bars, restaurants or other closed enterprises will likely further experience stress and anxiety regarding job continuity and financial security. Further

confinement-related stress may be caused by an inability to engage in rewarding activities, such as visiting friends and family, shopping, attending cultural and sporting events and visiting bars or restaurants. Spending more time with family in a limited space can also induce stress, particularly in situations where there are pre-existing family difficulties. For those required to work from home, there may also be disruption to established daily routines and working schedules, leading to a deterioration of positive associations between the home, relaxation and sleep.

Some citizens in strict confinement will be exposed to less daylight than usual, particularly those living in homes with small windows and without an outside area. Many may exercise less due to cancellation of regular sporting activities, restricted opportunities to leave the house, and having to balance the multiple requirements of work and homeschooling. Eating more than usual is a natural reaction during times of stress (Razzoli et al., 2017), however, combined with less exercise, may lead to body weight increase. In the context of disruption to daily routines kept in schedule by work and school times, the combination of these factors may lead to sleep difficulties as well as other health risks.

Particularly for those who live alone and for older people, the current confinement situation may induce or exacerbate loneliness. In fact, a very recent study reporting on citizens' well-being during the COVID-19 outbreak in China showed that those who scored higher on a measure of social participation and a sense of belonging also reported better sleep quality (Xiao et al., 2020b). A lack of regular social interaction can indeed enhance stress and negatively affect sleep quality, although this relationship is usually intermediated by depression and stress due to loneliness (Wakefield et al., 2020, McHugh and Lawlor, 2013). So for those people that live alone but do not feel lonely, sleep quality might not be affected, and confinement might present fewer stress-inducing changes to their daily routine than for families.

Sleep problems during confinement may be an important issue for everyone, but some individuals are at a higher risk to develop sleep problems than others. Women suffer more frequently of poor sleep and insomnia than men (e.g. (Zhang and Wing, 2006, Riemann et al., 2017). Within the group of women, mothers are those who most commonly report sleep disruption and insomnia, especially during pregnancy and the first years of life of the child/children (Sivertsen et al., 2015, Palagini et al., 2014, Mindell and Jacobson, 2000). In those early years, a mothers' sleep is usually strictly dependent on the child's sleep. Furthermore, data show that sleep problems are highly prevalent in pediatric populations and are linked to behavioral and emotional problems both in children and adolescents (Mindell et al., 2017, Hysing

et al., 2016). Insomnia is increasingly diagnosed in the pediatric population, although specific prevalence estimates depend on the criteria used for assessments, incidence rate variation depending on the developmental stage, and on assessment methods (self-assessment questionnaires, parents' questionnaires, actigraphy). However, estimates of prevalence rates for insomnia in the population under 18 years of age range between 25 and 62%.

The current period of social confinement may be particularly stressful for mothers or other primary caregivers who need to manage childcare as well as managing household affairs and work. While many parents share childcare and household responsibilities, in most families these tasks are still predominantly managed by mothers (Offer and Schneider, 2011, Bittman and Wajcman, 2000, Craig, 2006). Although work may be still possible from home, it may be far from optimal, with work productivity and efficiency negatively affected by the increased interaction between work and home lives, leading to further increases in stress. Healthy sleep may be a key protective factor to cope positively with these challenges, although adequate opportunity to sleep may be affected by increased time pressure of work, childcare and household requirements.

Children's sleep should also be a priority for families in this period. Sleep is an important factor regulating behavior and emotions (Simon et al., 2015, Walker and van der Helm, 2009). Data show that children's sleep care can be managed effectively, if engaged by both parents (e.g. Titosky et al, 2015). Though it seems logical to meet children's demands to stay with them during the night in stressful situations, co-sleeping has been shown to have a negative effect on the sleep quality and as stress levels of children and parents (Teti et al., 2016, Cortesi et al., 2008). This complicated period of isolation is likely to be particularly challenging for children and adolescents and may impact negatively on their ability to successfully regulate both their behavior and emotions, skills which can be protective for mental health directly, or indirectly through the promotion or inhibition of positive health behaviours.

Possible positive sleep-related consequences of home confinement

Despite the many negative consequences of home confinement, there may be several positive effects that can ameliorate sleep quality. These may however only relate to particular situations where individuals are still allowed to go outside and are not under increased pressure from work or family requirements.

In times of common stress, it is normal for individuals to feel more need to communicate with each other; social interaction diminishes stress partly through release of the neuropeptide

oxytocin (DeVries et al., 2003). Social support further improves sleep quality (Kent de Grey et al., 2018) as also recently shown in medical staff treating patients with COVID-19 (Xiao et al., 2020a). This may mean that there is in fact more social communication than usual, corroborated by reports of 40-50% increases in usage of social media such as WhatsApp and Facebook (<https://www.kantar.com>: Covid-19 Barometer). However, interaction through social media is not of a similar quality as face-to-face social interaction, and screen exposure may hamper sleep quality when used close to bedtime. The increase of frequency and time spent on social interaction however may diminish feelings of loneliness in those who were lonely even before the COVID-19 outbreak, such as elderly people living alone. The closure of companies or more limited working hours as well as the lack of commuting time for many businesses may also mean that family members of the same household get to spend much more time together than usual and may also instigate contact between distant family members more frequently.

This same time gain created by loss of commuting time, fewer working hours and less time spent in shops may, for some, mean they organize other outside activities, are more exposed to daylight and get more exercise than normal, which both benefit sleep quality. And without strict onset hours for school and businesses, the current home confinement may, for some, be a good opportunity to develop sleep and work schedules more closely aligned to their endogenous day- and night rhythm, in particular for strong evening types and adolescents (Basner et al., 2007, Wheaton et al., 2016). Work satisfaction may also be enhanced, for some, by the lack of unwarranted meetings. This may in fact make work more efficient and less stressful, which can further benefit nighttime sleep (Akerstedt et al., 2002). However, as stated before, these benefits may not be enough to counteract the negative effects of the increased work and family requirements, as well as overwhelming levels of stress and anxiety about the well-being of oneself and others, and the negative effects of confinement for family social relations.

Recommendations of the CBT-I Academy taskforce to deal with sleep problems during home confinement

The theoretical basis for below recommendations is given in previous paragraphs.

- Try to keep a regular nighttime and wake up time schedule: always get up at more or less the same time, bring some structure to the day, in particular for children.
- Schedule brief (e.g. 15 minute) times during the day to stress and reflect upon the situation: write thoughts down, talk about stress, etc. Try to restrict your thinking about these things specific times to reduce the chance that this stress interferes with nighttime sleep.
- If possible, use your bed only for sleep and sex, and for no other activity; this is best achieved by only going to bed when you normally feel sleepy.
- Use the current opportunity to follow your natural sleep rhythm closer (in particular for evening types and adolescents).
- Use this opportunity to allow your sleep period to fit more with your natural circadian preference (e.g. for an earlier or later sleep-wake timing than is typically allowed, in particular for adolescents, older adults and evening types – see explanations above).
- Use social media to share feelings of stress and anxiety with family and friends, but also to share distracting positive information, e.g. with humorous content, possibly unrelated to the virus outbreak. However do not take devices and tablets into the bedroom; switch them off before going to bed to reduce sleep disruption due to light exposure, notifications and the need to respond to requests and posts.
- Find helpful distractions, keep busy with those activities you are familiar with and enjoy doing.
- Limit the amount of time you are exposed to news about the COVID-19.
- If more time is available and means allow it: make your home and in particular your bedroom a more comfortable, quiet, dark and cool environment.
- Exercise regularly, preferably in daylight.
- Try to get natural daylight during the day, particularly in the morning, and if not possible, have your home brightly lit in the daytime by opening curtains and blinds, or having lights on; try to have dim light during the evening, with it even darker at night.
- Choose familiar and relaxing activities before bedtime: e.g. reading a book, yoga, etc.
- If you are less active during the day than normal, also eat less at set times, and at the latest two hours before desired sleep onset, to prevent sleep disruption.

Recommendations for particularly women and children in family contexts:

- Mind the gender gap! Be careful that women in families with small children do not get overloaded with family and/or working activities. This includes bedtime routines, child nighttime and/or early morning care, planning of daytime activities.
- Keep regular sleep times for your child or children (and for yourself); select the best time for them and keep them in a pattern
- Make the last 30 minutes before bedtime a regular routine that includes calming activities. Choose activities that not only the child enjoys, but that you do too. A parent happy to be with him/her is what a child enjoys most. Keep the order and duration of activities similar each night.
- While using computer, smartphones and watching TV more than usual may be inevitable in confinement, avoid technological devices after dinner or too close to bedtime.
- Do not allow your children to use smartphones, tablets, or TV in bed.
- If your household space allows it, try to avoid children using their bed for activities other than sleeping (e.g. eating, playing, homework), or make a clear distinction between daytime bed use and nighttime bed use (e.g. by changing a cover, sleep pillows versus wake pillows).
- If you can go out, it is best to go out in the morning, and have your breakfast in a place with bright light, if possible a garden or balcony.
- If you can't go out, still take care of your child's physical activity. A large amount of creative online programs for sports at home with children has been set up in many countries. These may be very helpful.
- Keep the child's room comfortable (temperature around 19°C, and dim light at night)
- Reassure children that keeping to schedules and routine helps them to sleep well and deal with their emotions
- In case of anxious awakenings, reassure children during the night.
- Do not sleep in the same bed as the child. Instead, (repetitive) reassurance is more effective.

Recommendations particularly for healthcare staff and those with an increased work burden affecting sleep opportunity:

- Plan brief times with trusted colleagues or family members to express stress and other emotions and concerns about the work situation during the day
- In your limited free time, find tasks that are distracting, keep busy with those activities you are familiar with
- Limit as much as possible the amount of time you are exposed to news about the COVID-19 outbreak which is not directly related to your personal work situation
- In your free time, try to exercise regularly, but not right before desired bed- or naptime
- Try to get natural daylight during the day, and if not possible, use bright lights at work, but not in the room where you sleep. Try to have dim light where you sleep.
- Choose familiar relaxing activities before bed- or naptime: reading a book, yoga, etc.
- Eat light meals, at set times if possible, and not right before desired sleep onset, to prevent sleep disruption due to digestion
- If you experience symptoms related to lack of sleep or fatigue, including dangerous work-related mistakes, inability to concentrate or to make decisions, extreme irritability or strong emotional reactions, inform colleagues and superiors and take a nap. Even a short nap can help to partially reduce those symptoms.
- When coming out of a long shift, do not drive home in your car to avoid accidents. If possible, walk home or bike, if not, take a taxi or bus home.

Recommendations concerning sleep medication

- Try to avoid using prescription sleeping pills if you can, their effectiveness is questionable and they can have some side-effects if taken long-term
- The scientific evidence of over-the-counter sleep medication is debated
- Most authorities recommend CBT-I as the first choice treatment for insomnia: techniques based on CBT-I have the best evidence base
- If CBT - I has been proven ineffective or is unavailable/ unfeasible, short-term administration of benzodiazepines or hypnotic benzodiazepine receptor agonists might be effective.
- Sedating antidepressants might be beneficial for short-term treatment of insomnia, mainly if you have a comorbid mental disorder (e.g. anxiety disorder, major depressive disorder) .

- In case of pharmacotherapy, general treatment recommendations regarding dosage, duration and monitoring should be followed.

National websites to consult on sleep advice related to home confinement:

France (French):

<https://blog.reseau-morphee.fr/2020/03/17/gerer-son-sommeil-pendant-la-crise-covid-19/>

Canada (English)

<https://sleeponitcanada.ca/>

Canada (French)

<https://dormezladessuscanada.ca/>

United States of America (English)

<https://www.sleepresearchsociety.org/sleeping-tips-when-staying-indoors-during-isolation-period/>

United Kingdom (English) – for students:

<https://www.sleepsociety.org.uk/sleep-and-student-mental-health/>

References

Akerstedt, T., Kecklund, G. and Axelsson, J. Impaired sleep after bedtime stress and worries. *Biol Psychol*, 2007, 76: 170-3.

- Akerstedt, T., Knutsson, A., Westerholm, P., Theorell, T., Alfredsson, L. and Kecklund, G. Sleep disturbances, work stress and work hours: a cross-sectional study. *J Psychosom Res*, 2002, 53: 741-8.
- Altena, E., Micoulaud-Franchi, J. A., Geoffroy, P. A., Sanz-Arigita, E., Bioulac, S. and Philip, P. The bidirectional relation between emotional reactivity and sleep: From disruption to recovery. *Behav Neurosci*, 2016, 130: 336-50.
- Baglioni, C., Altena, E., Bjorvatn, B. *et al.* The European Academy for Cognitive Behavioural Therapy for Insomnia: An initiative of the European Insomnia Network to promote implementation and dissemination of treatment. *J Sleep Res*, 2020, 29: e12967.
- Basner, M., Fomberstein, K. M., Razavi, F. M. *et al.* American time use survey: sleep time and its relationship to waking activities. *Sleep*, 2007, 30: 1085-95.
- Bastien, C. H., Morin, C. M., Ouellet, M. C., Blais, F. C. and Bouchard, S. Cognitive-behavioral therapy for insomnia: comparison of individual therapy, group therapy, and telephone consultations. *Journal of Consulting & Clinical Psychology*, 2004, 72: 653-9.
- Bittman, M. and Wajcman, J. The rush hour: the character of leisure time and gender equity. *Social Forces*, 2000, 79: 165-89.
- Boullin, P., Ellwood, C. and Ellis, J. G. Group vs. Individual Treatment for Acute Insomnia: A Pilot Study Evaluating a "One-Shot" Treatment Strategy. *Brain Sci*, 2016, 7
- Brooks, S. K., Webster, R. K., Smith, L. E. *et al.* The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*, 2020, 395: 912-20.
- Cortesi, F., Giannotti, F., Sebastiani, T., Vagnoni, C. and Marioni, P. Cosleeping versus solitary sleeping in children with bedtime problems: child emotional problems and parental distress. *Behav Sleep Med*, 2008, 6: 89-105.
- Craig, L. Does father care mean fathers share? A comparison of how mothers and fathers in intact families spend time with children. *Gender & Society*, 2006, 20: 259-81.
- Devries, A. C., Glasper, E. R. and Detillion, C. E. Social modulation of stress responses. *Physiol Behav*, 2003, 79: 399-407.
- Drake, C., Richardson, G., Roehrs, T., Scofield, H. and Roth, T. Vulnerability to stress-related sleep disturbance and hyperarousal. *Sleep*, 2004, 27: 285-91.
- Ellis, J. G., Gehrman, P., Espie, C. A., Riemann, D. and Perlis, M. L. Acute insomnia: current conceptualizations and future directions. *Sleep Med Rev*, 2012, 16: 5-14.
- Espie, C. A. and Kypreos, S. D. Cognitive and behavioral psychological therapies for chronic insomnia. In: T. J. BARKOUKIS, J. K. MATHESON, R. FERBER and K. DOHRAMJI (Eds), *Therapy in Sleep Medicine*. Elsevier Health Sciences, 2011: 161-71.
- Frase, L., Nissen, C., Riemann, D. and Spiegelhalder, K. Making sleep easier: pharmacological interventions for insomnia. *Expert Opin Pharmacother*, 2018, 19: 1465-73.
- Fuller, P. M., Gooley, J. J. and Saper, C. B. Neurobiology of the sleep-wake cycle: sleep architecture, circadian regulation, and regulatory feedback. *J Biol Rhythms*, 2006, 21: 482-93.
- Gehrman, P., Seelig, A. D., Jacobson, I. G. *et al.* Predeployment Sleep Duration and Insomnia Symptoms as Risk Factors for New-Onset Mental Health Disorders Following Military Deployment. *Sleep*, 2013, 36: 1009-18.

- Gouin, J. P., Wenzel, K., Boucetta, S., O'byrne, J., Salimi, A. and Dang-Vu, T. T. High-frequency heart rate variability during worry predicts stress-related increases in sleep disturbances. *Sleep Med*, 2015, 16: 659-64.
- Huang, Y. and Zhao, N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 epidemic in China: a web-based cross-sectional survey. *medRxiv*, 2020
- Hysing, M., Sivertsen, B., Garthus-Niegel, S. and Eberhard-Gran, M. Pediatric sleep problems and social-emotional problems. A population-based study. *Infant Behav Dev*, 2016, 42: 111-8.
- Jeong, H., Yim, H. W., Song, Y. J. et al. Mental health status of people isolated due to Middle East Respiratory Syndrome. *Epidemiol Health*, 2016, 38: e2016048.
- Kent De Grey, R. G., Uchino, B. N., Trettevik, R., Cronan, S. and Hogan, J. N. Social support and sleep: A meta-analysis. *Health Psychol*, 2018, 37: 787-98.
- Liu, N., Zhang, F., Wei, C. et al. Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: gender differences matter. *Psychiatry Research*, 2020, in press
- Mchugh, J. E. and Lawlor, B. A. Perceived stress mediates the relationship between emotional loneliness and sleep quality over time in older adults. *Br J Health Psychol*, 2013, 18: 546-55.
- Miller, K. E., Brownlow, J. A., Woodward, S. and Gehrman, P. R. Sleep and Dreaming in Posttraumatic Stress Disorder. *Curr Psychiatry Rep*, 2017, 19: 71.
- Mindell, J. A. and Jacobson, B. J. Sleep disturbances during pregnancy. *J Obstet Gynecol Neonatal Nurs*, 2000, 29: 590-7.
- Mindell, J. A., Leichman, E. S., Dumond, C. and Sadeh, A. Sleep and Social-Emotional Development in Infants and Toddlers. *J Clin Child Adolesc Psychol*, 2017, 46: 236-46.
- Morin, C. M. Improving access to cognitive behavioral therapy for insomnia (CBT-I). *Encephale*, 2016
- Morin, C. M., Bootzin, R. R., Buysse, D. J., Edinger, J. D., Espie, C. A. and Lichstein, K. L. Psychological and behavioral treatment of insomnia: update of the recent evidence (1998-2004). *Sleep*, 2006, 29: 1398-414.
- Morin, C. M., Vallieres, A., Guay, B. et al. Cognitive behavioral therapy, singly and combined with medication, for persistent insomnia: a randomized controlled trial. *JAMA*, 2009, 301: 2005-15.
- Offer, S. and Schneider, B. Revisiting the gender gap in time-use patterns: multitasking and well-being among mothers and fathers in dual-earner families. *American Sociological Review*, 2011, 76: 809-33.
- Palagini, L., Gemignani, A., Banti, S., Manconi, M., Mauri, M. and Riemann, D. Chronic sleep loss during pregnancy as a determinant of stress: impact on pregnancy outcome. *Sleep Med*, 2014, 15: 853-9.
- Potter, G. D., Skene, D. J., Arendt, J., Cade, J. E., Grant, P. J. and Hardie, L. J. Circadian Rhythm and Sleep Disruption: Causes, Metabolic Consequences, and Countermeasures. *Endocr Rev*, 2016, 37: 584-608.
- Randall, C., Nowakowski, S. and Ellis, J. G. Managing Acute Insomnia in Prison: Evaluation of a "One-Shot" Cognitive Behavioral Therapy for Insomnia (CBT-I) Intervention. *Behav Sleep Med*, 2019, 17: 827-36.
- Razzoli, M., Pearson, C., Crow, S. and Bartolomucci, A. Stress, overeating, and obesity: Insights from human studies and preclinical models. *Neurosci Biobehav Rev*, 2017, 76: 154-62.
- Riemann, D., Baglioni, C., Bassetti, C. et al. European guideline for the diagnosis and treatment of insomnia. *J Sleep Res*, 2017, 26: 675-700.

- Rosenbaum, S., Vancampfort, D., Steel, Z., Newby, J., Ward, P. B. and Stubbs, B. Physical activity in the treatment of Post-traumatic stress disorder: A systematic review and meta-analysis. *Psychiatry Res*, 2015, 230: 130-6.
- Simon, E. B., Oren, N., Sharon, H. *et al.* Losing Neutrality: The Neural Basis of Impaired Emotional Control without Sleep. *J Neurosci*, 2015, 35: 13194-205.
- Sivertsen, B., Hysing, M., Dorheim, S. K. and Eberhard-Gran, M. Trajectories of maternal sleep problems before and after childbirth: a longitudinal population-based study. *BMC Pregnancy Childbirth*, 2015, 15: 129.
- Taylor, M. R., Agho, K. E., Stevens, G. J. and Raphael, B. Factors influencing psychological distress during a disease epidemic: data from Australia's first outbreak of equine influenza. *BMC Public Health*, 2008, 8: 347.
- Teti, D. M., Shimizu, M., Crosby, B. and Kim, B. R. Sleep arrangements, parent-infant sleep during the first year, and family functioning. *Dev Psychol*, 2016, 52: 1169-81.
- Van Rhenen, W., Blonk, R. W., Van Der Klink, J. J., Van Dijk, F. J. and Schaufeli, W. B. The effect of a cognitive and a physical stress-reducing programme on psychological complaints. *Int Arch Occup Environ Health*, 2005, 78: 139-48.
- Wakefield, J. R. H., Bowe, M., Kellezi, B., Butcher, A. and Groeger, J. A. Longitudinal association between family identification, loneliness, depression and sleep quality. *British Journal of Health Psychology*, 2020, 25: 1-16.
- Walker, M. P. and Van Der Helm, E. Overnight therapy? The role of sleep in emotional brain processing. *Psychol Bull*, 2009, 135: 731-48.
- Wheaton, A. G., Chapman, D. P. and Croft, J. B. School Start Times, Sleep, Behavioral, Health, and Academic Outcomes: A Review of the Literature. *J Sch Health*, 2016, 86: 363-81.
- Xiao, H., Zhang, Y., Kong, D., Li, S. and Yang, N. The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit*, 2020a, 26: e923549.
- Xiao, H., Zhang, Y., Kong, D., Li, S. and Yang, N. Social Capital and Sleep Quality in Individuals Who Self-Isolated for 14 Days During the Coronavirus Disease 2019 (COVID-19) Outbreak in January 2020 in China. *Med Sci Monit*, 2020b, 26: e923921.
- Zhang, B. and Wing, Y. K. Sex differences in insomnia: a meta-analysis. *Sleep*, 2006, 29: 85-93.