

Constructs of Sleep Disturbance and Mental Well-being in Older UK

Adolescents

Dr Margaret Husted^{1,2} and Laura Naylor²

¹ Department of Psychology, University of Winchester, Winchester, Hampshire, United Kingdom ; ² School of Psychology, University of Surrey, Guildford, Surrey, United Kingdom.

Correspondence: Dr Margaret Husted, Department of Psychology, University of Winchester, Sparkford Road, Winchester, Hampshire, SO22 4NR, United Kingdom

Tel +44 (0) 1962 287478

Email margaret.husted@winchester.ac.uk

Abstract

Poor sleep quality can have far reaching physical and mental health consequences (Alvaro, Roberts & Harris, 2014; Ribeiro et al., 2012). This study explores sleep quality in older adolescents; specifically, whether insomnia constructs have unique patterns of association to depression, anxiety and stress. Data from 16-19-year old's (n=198) recruited from further education colleges were obtained. Sleep quality was assessed using the diagnostic criteria for insomnia (DSM-5), Insomnia Severity Index and self-report. The Depression Anxiety Stress Scale (DASS-21) was used to measure mental health state. A large proportion (42-52%) reported sleep difficulties lasting four weeks or more, with 17% short-sleepers (<7hrs.). Regression analysis indicated 12.1%-17.8% of variance in mental health was explained by sleep quality. Specifically, "non-restorative sleep" and "daily impact" consistently predicted depression, anxiety and stress levels. Interestingly, "maintaining sleep" and "early wakings", were associated with anxiety and stress respectively. Results indicate for a potentially large group of adolescents; sleep quality is poor. The cumulative effect of poor sleep appears particularly detrimental. Results provide preliminary indications that sleep behaviours could provide a means for early identification of mental health concerns. Findings can inform tailored interventions aimed at improving sleep quality in adolescents thereby having clear benefits in relation to both short, and longer term, health outcomes.

The National Sleep Foundation suggests that adolescents need 8-10 hours of normal sleep each night, reducing to 7–9 hours by their mid-20's (Hirshkowitz, et al., 2015). The biological and social changes that occur during adolescence have an impact on sleep patterns, which are characterized by a shift towards delayed sleep and waking times (Johnson, Roth, Schultz, Breslau, 2006). These changes increase daytime sleepiness and fatigue (Roane & Taylor, 2005; Roberts, Roberts & Chen, 2002; Shochat, Cohen-Zion, Tzischinsky, 2014) as although adolescents need more sleep, social demands, including early school-start times, academic obligations and extra-curricular activities conflict with adolescents' preferred sleep-wake. Furthermore, as adolescents become more independent, parental control over their sleep schedules decreases (Carskadon, 2002). The combination of alterations to the sleep/wake cycle and circadian rhythm as well as the social, emotional, and developmental changes of adolescence contribute towards an increased risk of developing insomnia (Carskadon, 2002; Johnson et al., 2006; Laberge et al., 2001).

Insomnia

Insomnia is characterized by poor quality, inadequate, or unrefreshing sleep. In relation to insomnia symptoms, there are three main constructs: sleep onset difficulty, sleep maintenance problems (frequent night waking and/or problems returning to sleep), and early morning waking (Pressman & Orr, 1997; Saddichha, 2010). Individuals may experience one, or a combination, of symptoms. Insomnia has been shown to be a comorbid symptom of many mental health conditions in adults (Alvaro, Roberts & Harris, 2014; Roane & Taylor, 2008). Despite much research showing the relationships

between insomnia and mental health, none has investigated the relationships between individual constructs of insomnia and mental health symptomatology in adolescents.

Insomnia and Mental Health in Adolescents

Although the effects of poor sleep can interact with multiple cognitive and emotional components, the adolescent phase (13-18 years) is a period of susceptibility to several mental health issues, which may be exacerbated by sleep disturbances (Brand & Kirov, 2011; Roberts, Roberts & Duong, 2008). The maturational changes in sleep, combined with developmental and psychosocial factors make adolescents extremely vulnerable in terms of both sleep and mental health problems (Alvaro, Roberts & Harris, 2014; Roane & Taylor, 2008). In brief, healthy sleep patterns during adolescence plays a crucial role in functional ability and well-being, not only at this developmental stage, but also during adulthood therefore, poor-quality sleep is a significant issue.

The major risk period of early onset depression and anxiety is within an individual's teenage years (Brand & Kirov, 2011; Lewinsohn, Clarke, Seeley & Rohde, 1994). Early onset depression is more severe, more chronic, and associated with greater suicidality and psychosocial impairment in later life, than normal onset depression (Wesselhoeft, Sørensen, Heiervang & Bilenberg, 2013; Zisook et al., 2004). Therefore, improving methods for the early identification of early onset mental health issues is worthwhile, even when symptoms are below clinical thresholds (Cukrowicz, Smith, Hohmeister & Joiner, 2009). Sub-clinical depression in adolescents is associated with suicidality and psychopathology (Balázs et al., 2013). Although subclinical depression does not inevitably lead to major depressive disorder, there is an 8.0% risk of its

development within two years (Wesselhoeft et al., 2013). Surprisingly, no early identification/intervention programs for mental well-being in adolescents incorporate sleep disturbance, despite its identification as a risk factor (Roane & Taylor, 2008).

Early Identification and Intervention

While research has shown as between insomnia and/or sleep disturbance and depression in adults in clinical and non-clinical populations (Baglioni et al., 2011; Soehner, Kaplan & Harvey, 2014), it is not well studied in adolescent populations, especially within the specific subgroup of older adolescents. This is despite research suggesting older adolescents are at increased risk of sleep disturbance and depressive symptoms than younger adolescents (Horowitz & Garber, 2006). In adolescents, research more often focuses on the influence of chronotype on insomnia–depression correlations than on testing sleep disturbance as part of a risk factor profile (Alvaro, Roberts & Harris, 2014; Short, Gradisar, Lack & Wright, 2013) (the chronotype being the behavioural manifestation of a person’s underlying circadian rhythm which is then seen through their typical sleep pattern within a 24-hr period). However, a large-scale national study in the US showed that in cases where insomnia was comorbid with depression, insomnia preceded depression in 69% of patients (Johnson et al., 2006). The longitudinal analysis showed that those with prior insomnia were 3.8 times more likely to go on to develop depression. Further, separate longitudinal research indicated that insomnia, either with or without comorbid depression, was highly stable over time (Buysse et al., 2008). Past research therefore not only confirms the persistent nature of insomnia, but also the significant increased risk of depression among individuals with insomnia, thus emphasizing the need for early identification and intervention. This is particularly

important considering sleep behaviour has been shown to be a better predictor of suicidal ideation and behaviour in young adults than depression and hopelessness (Ribeiro et al., 2012). Overall, meta-analysis supports the interpretation that insomnia can act as a precursor to depression (Lovato & Gradisar, 2014) and that insomnia in adolescence is predictive of depression in adults independent of any prior presence of depression in adolescence (Baglioni et al., 2011).

Health Measurement in Adolescents

The lack of research on insomnia and mental health in non-clinical populations of older adolescents however raises a concern over whether existing clinical measures are appropriate for this population. Clinical self-report measures target problems above a certain threshold of severity and are only effective for those who are health literate enough to recognise the connection between the clinical definitions of symptoms and their experience. Clearly, young people in non-clinical populations who have mental health symptoms may exist within this health literacy gap (Gulliver, Griffiths & Christensen, 2010). Research suggests that this gap in mental health literacy may be responsible for delayed help-seeking (Gulliver, Griffiths & Christensen, 2010; Thompson, Hunt & Issakidis, 2004). We argue that allowing non-clinical populations to report their sleep quality experiences, in terms of the timing of their sleep/waking, as well as the frequency and duration of the issue, effectively circumvents issues with mental health literacy as it provides a much more simple, transparent means for both reporting, and identifying, subtle differences in sleep quality. Understanding qualitative, subtle differences in sleep quality (rather than measures that only identify clinically significant

issues) is beneficial as it will enable much earlier intervention (the benefits of which have been highlighted above) but also provide a greater understanding of the sleep constructs themselves and their interactions with aspects of health and functioning. Focusing on sleep quality and mental well-being as non-pathological constructs may reduce any associated stigma, facilitating help-seeking behaviour (Clement et al., 2014). Although clearly not able to address all aspects of health literacy, this approach would complement what is already known and further would not detract from individuals who do access support through traditional clinical channels.

There are currently no screening programs in the UK for adolescent mental well-being and sleep quality, and treatments for insomnia, depression, and anxiety are only available following clinical diagnosis. We wanted to investigate the extent to which there is an unmet need here to understand how useful screening efforts in this area could be. Acknowledging that this research is based within a UK adolescent population and context, the aim of this research is to provide evidence to support further investigation with findings transferable to alternative contexts.

Due to the social, cognitive, and biological factors influencing sleep and mental health during adolescence, we expected to find issues with both sleep quality and mental well-being. We predicted that as sleep quality worsened, this would be associated with an increase in symptoms of depression, anxiety and stress. We also anticipated relationships between non-restorative sleep and mental well-being, which have been shown previously in adults (Zhang, Lam, Xin-Li, Li & Winga, 2012) and adolescents (Park, Yoo & Seong Hwan Kim, 2012). No other specific predictions were made in relation to the individual

constructs of sleep disturbance due to the lack of prior research examining sleep in this manner.

Method

Participants

We assessed a non-clinical cross-section of older adolescents. Of the 225 individuals approached to participate we recruited 198 students (25% male) from four further education colleges in south east UK as part of an outreach programme. Participants were in the older adolescent age range (16–19) with a mean age of 18 years ($\pm .9$). Economic census data suggested that the mean SES for the local area was middle to high (ONS, 2011). No exclusion criteria were applied.

Procedure

Ethical approval was granted from the University Ethics Department and carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki). Before attending the data collection session, participants were given an information sheet about the study via their college institutions and offered the opportunity to participate during a university outreach event. According to the BPS Code of Human Research Ethics (2014), individuals over the age of 16 are considered competent to consent to participate in research therefore, at the beginning of the data collection session the formal consent process was undertaken with participants given a second information sheet to review prior to consent being taken. Participants responded to measures via an online questionnaire hosted on a secure site. On completion of the online questionnaire, participants were debriefed and given the opportunity to enter a £25 voucher prize draw.

Statistical analyses were conducted using SPSS Statistics (Version 21, Chicago: SPSS Inc.).

Measures

Sleep

Sleep was assessed using a series of measures. Participants responded to the criteria for insomnia as set out in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, (DSM-5) as previously operationalised in past research (Johnson et al., 2006). This quantifies insomnia constructs of sleep onset difficulty, night waking, early morning waking, and non-restorative sleep. An example of this in relation to sleep onset difficulty is; if participants reported difficulty in sleep onset, this was further defined by sleep onset latency (less than 10 min, 10–30 min, or more than 30 min), frequency of sleep onset difficulties (1-2 times a week, 3-4 times a week, 5 or more times a week) and duration of sleep onset difficulty (1–2 weeks, 2–4 weeks, or more than 4 weeks). Similar questions targeting the extent, frequency, and duration of sleep difficulties were asked for each construct. Each construct was measured using the four items, except for early morning waking, which was measured using three items, as by definition, it can only happen once per night. Total scores were created for each construct with the range of scores as follows: Sleep Onset (1-11); Sleep Maintenance (1-10); Early Waking (1-8); Non-Restorative Sleep (1-10).

DSM-5 also highlights the chronic daily impact of sleep disturbance which is not sufficiently captured in the method adopted by Johnson et al. (2006). Sleep disturbance may cause individuals different levels of distress or impairment in social, occupational, or other areas of functioning (Bastien, Vallières & Morin, 2001). To account for the daily

impact of sleep disturbance a single item from the Insomnia Severity Index (ISI) was used (Chung, Kan & Yeung, 2011). The item asks, “To what extent do you consider your sleep to interfere with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory etc.) currently?”. Participants respond on a 5-point Likert scale ranging from 0-Not at all interfering to 4-Very much interfering.

The global sleep quality variable is the sum of a participant’s total scores across all constructs, including daily impact. Higher scores indicate worsening sleep quality. Past research indicates that sleep habits self-reported on scales with quantified constructs are strongly correlated with objective measures, such as wrist actigraphy (Monk et al., 2003). Therefore, self-reports from participants are assumed to be an accurate indication of sleep quality.

Finally, descriptive data on sleep quantity was obtained with participants asked to provide their normal sleep onset and waking times for weekday nights and weekend nights separately. This was then used to calculate participants’ mean sleep time.

Mental Well-being

Mental well-being was assessed using the Depression Anxiety Stress Scale (DASS-21) (Lovibond & Lovibond, 1995). The DASS-21 was designed as a continuous measure of symptomatology therefore, it represents symptoms occurring within a subclinical range better than standard clinical measures (Henry & Crawford, 2005). Importantly, the measure does not contain items that use sleep as indicators thus ensures responses are based on mental well-being rather than comorbid sleep symptoms. Sample items include “I found it difficult to relax” “I couldn’t seem to experience any positive

feeling at all” and “I found myself getting agitated”. Participants indicate the extent the statement has applied to them over the previous week responding on a 4-point Likert scale ranging from 0 “Never” to 3 “Almost Always”. The DASS-21 has been shown to have good reliability (Cronbach’s alpha = 0.88, 95% CI = .87–.89) and construct validity in a non-clinical sample of adults (Henry & Crawford, 2005). Confirmatory factor analysis in a non-clinical adolescent sample showed that the data fit the same model (Szabo, 2010). Higher scores on the DASS-21 indicate higher levels of depression, anxiety, and stress.

Results

Initial descriptive analysis showed that participants reported sleeping for an average of 7 hr. 50 min during the week and 8 hr. 42 min at weekends, with a range of 3.0–8.5 hours in both instances. A sub-group slept for < 7 hr. during the week (17%) and at the weekend (7%). Overall, 47% of participants reported sleep onset difficulties with 42% experiencing problems for more than 4 weeks. Further, 21% reported sleep maintenance problems, 48% early morning waking, and 64% non-restorative sleep (with 52% reporting non-restorative sleep for more than 4 weeks).

To examine whether sleep quality was associated with self-reported levels of depression, anxiety, and stress, a correlation analysis was conducted (see Table 1). Results showed that poor sleep quality was negatively associated with the number of hours slept and as sleep quality worsened, it was associated with higher levels of depression, anxiety, and stress. There were significant positive associations between all three mental well-being elements.

Table. 1

Pearson Correlational Analysis of Study Variables

	Weekday	Weekend	Sleep Quality.	Depression	Anxiety	Stress
Weekday	-					
Weekend	.419**	-				
Sleep Quality	-.257*	-.146*	-			
Depression	-.124	-.087	.291**	-		
Anxiety	-.068	-.025	.337**	.550**	-	
Stress	-.082	-.101	.388**	.637**	.643**	-

** = $P < .001$, * = $p < .05$

Note. Weekday/Weekend = average no. of reported hours slept, Sleep Quality = based on responses to insomnia constructs and ISI (higher score = poorer sleep quality).

Having established the relationship between poor quality sleep and mental well-being, the analysis focused on examining whether the individual constructs of insomnia could provide indications of underlying mental health issues. A series of linear regression analyses were run to explore the strength of the relationships between insomnia constructs and levels of depression, anxiety, and stress (see table 2).

Depression, Anxiety, and Stress

Sleep constructs explained 12.1% of the variance (R^2) in depression $F(5, 189) = 5.20$, $p < .001$; 14.9% of the variance (R^2) in anxiety $F(5, 189) = 6.62$, $p < .001$ and 17.8% of the variance (R^2) in stress $F(5, 191) = 8.25$, $p < .001$. Daily impact and non-restorative sleep were significant factors across models with sleep maintenance and early morning waking unique factors in explaining anxiety and stress respectively.

Table. 2

Regression table of insomnia constructs as predictors of variance in adolescent depression, Anxiety & Stress levels

	Depression	Anxiety	Stress
Constant	(5.49)	(7.15)	(10.25)
Sleep Onset	.01 [.07] (.12)	.04 [.06] (.65)	.09 [.05] (1.69)
Sleep Maintenance	.17 [.12] (1.45)	.23* [.10] (2.12)	.10 [.06] (1.13)
Early Waking	.14 [.11] (1.30)	.03 [.09] (.37)	.18* [.08] (2.21)
Non-restorative Sleep	.19* [.07] (2.80)	.19** [.06] (3.01)	.12* [.05] (2.28)
Daily Impact	.53** [.19] (2.80)	.43** [.16] (2.67)	.45** [.14] (3.21)

**p <.01 *p<.05. B S.E in square brackets; t-statistic in parentheses.

Note. The sleep constructs used reflect participants' report of delayed onset of sleep, difficulties maintaining sleep, early waking from sleep, experiencing non-restorative sleep and the daily impact of sleep.

Discussion

The aims of this research were to explore the sleep quality and mental well-being of older adolescents in the UK and to determine the extent to which specific constructs of sleep disturbance were related to aspects of their mental well-being. First, we expected to find issues with sleep quality in this age group due to the social, cognitive, and biological impact of adolescence on sleep. While most participants in this study report achieving around the recommended minimum 8 hours sleep (Hirshkowitz et al.,2015), many reported poor sleep quality according to our global measure. A sub-group of participants (17%) reported regularly sleeping less than 7 hours per night - which is known to

increase the risk of detrimental health effects (Park et al., 2012; Shochat et al., 2014). Of all insomnia constructs we tested, the biggest problem was with non-restorative sleep (64%), followed by early morning waking (48%), sleep onset difficulty (47%), and sleep maintenance (21%) - with 52% reporting problems lasting at least 4 weeks, thereby indicating chronic sleep problems.

It could be argued that higher levels of short sleeping in this population would be expected based on past research (National Sleep Foundation, 2006) whereby the problem of short sleeping in the US was shown to increase from 16% at around 11 years of age to 75% by the age of 18. However, there is little research looking at the incidence of sleep disturbance in older adolescents in the UK and differences in sleep patterns, as a result of social, cultural and behavioural factors, are a possible explanation for the findings. Results did show only a moderate, positive correlation between weekday and weekend sleep length, but this is arguably unsurprising as only the weekday wake times are subject to external demands, e.g. school start times, consistently across all participants. Therefore greater variability in sleep behaviour would be expected for individuals' weekend sleep pattern. But, further research in a larger sample would be helpful in establishing whether these findings are representative of the wider UK adolescent population.

Second, we expected to find a negative association between sleep quality and levels of depression, anxiety, and stress, and this was confirmed. Our study has shown that the relationships found in clinical and non-clinical adult populations between sleep disturbance and mental well-being (Baglioni et al., 2011; Soehner et al., 2014), is also present in a non-clinical population of older adolescents. This is important because it suggests that this relationship exists in youth, even if symptoms are at a subclinical level.

Further research aimed at early intervention and improving sleep quality and mental well-being in this population would in turn reduce the development of clinical syndromes.

Examination of the individual components of poor sleep showed that non-restorative sleep and daily impact were consistently indicated as significant factors in relation to symptoms of depression, anxiety, and stress ($p \leq .02$). We could find no previous research on these relationships in older adolescents. However, a longitudinal relationship between non-restorative sleep and poor mental health has been shown in adults (Zhang et al., 2012), and a cross-sectional relationship between non-restorative sleep and suicidal ideation found in adolescents (Park et al., 2012) which supports our findings.

Depression, anxiety, and stress were all related to daily impact (severity) of sleep. It makes intuitive sense that an adolescent who experiences negative effects of poor sleep in wide-ranging areas of their lives would also experience poor mental well-being, but the direction and mechanisms of this relationship remains unclear. Further investigation of moderation or mediation effects of the daily impact of sleep disturbance on mental well-being could enhance our understanding of this relationship and support the design of tailored interventions. Further, anxiety was significantly related to issues with sleep maintenance, while stress was significantly related to early morning waking supporting our proposal that sleep behaviours may provide indications of underlying mental well-being concerns.

Taken in combination, study findings add support to the need for interventions to improve sleep quality in older adolescents, both to improve their current well-being and to reduce adult insomnia and mental health concerns. As mentioned in the introduction

there are currently no screening programs in the UK for adolescent mental well-being and sleep quality. Given the current pressures on healthcare systems in terms of both mental and physical healthcare, adopting a pre-emptive approach to intervene at the subclinical stage, especially in young people, would appear to be beneficial and a basic screening programme, perhaps situated within school curriculums (e.g. PHSE), would enable this to occur. If constructs of sleep quality in adolescents can be related to specific patterns of mental well-being this opens the potential for preventative treatments tailored to improve the sleep and mental well-being of older adolescents, which is an aim to reduce their risk of subsequent clinical issues. The results therefore provide preliminary indications that interventions to improve sleep quality that focus on non-restorative sleep and the daily impact of sleep as primary outcome measures may be particularly beneficial. Sleep maintenance difficulty and early waking may both be related to specific underlying mental health concerns and could be effective as the secondary focus for interventions or as measures of improvement following treatment. As it is clear that there is a need for more personalised interventions that are adaptive to populations, a more detailed understanding of the nature of the relationship between sleep and mental well-being can only be beneficial.

Though the bidirectional nature of the relationship between sleep and mental health has been shown (Shochat et al., 2014), research supports the argument that poor sleep quality in adolescents precedes development of clinical levels of depression, anxiety, stress, and insomnia as adults (Baglioni et al., 2011; Lovato & Gradisar, 2014; Roane & Taylor, 2008). However, the cross-sectional nature of this study means firm conclusions over the direction, or developmental timeline, of the relationship between

sleep and mental health cannot be reached. Replication of findings and longitudinal research confirming the stability of the interaction and/or causality is needed. While the proportion of the variance in mental well-being explained by sleep quality remains low, we believe that this is suggestive of the complex, multifactorial nature of mental health issues. As such, we believe that inclusion of sleep quality and its constructs in screening efforts could capture a dimension of risk that is not currently addressed, aiding early identification, and treatment, of sub-clinical levels of depression, anxiety, and stress before they worsen.

Conclusion

This study has indicated that some older adolescents in the UK may experience poor sleep quality of a chronic nature. Poor quality sleep was associated with higher levels of reported depression, anxiety, and stress in this population. Non-restorative sleep and daily impact were significantly related to all symptoms of poor mental well-being, while sleep maintenance and early waking problems were related to symptoms of anxiety and stress respectively. Our findings suggest that older adolescents may have unmet health needs of poor sleep quality that could be improved with tailored interventions specifically targeting non-restorative sleep and daily impact; this in turn would have both short- and long-term health benefits.

References

- Alvaro, P. K., Roberts, R. M., & Harris, J. K. (2014). The independent relationships between insomnia, depression, subtypes of anxiety, and chronotype during adolescence. *Sleep Medicine, 15*(8), 934–941. <http://doi.org/10.1016/j.sleep.2014.03.019>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC.
- Baglioni, C., Battagliese, G., Feige, B., Spiegelhalder, K., Nissen, C., Voderholzer, U., ... Riemann, D. (2011). Insomnia as a predictor of depression: a meta-analytic evaluation of longitudinal epidemiological studies. *Journal of Affective Disorders, 135*(1–3), 10–9. <http://doi.org/10.1016/j.jad.2011.01.011>
- Balázs, J., Miklósi, M., Keresztény, Á., Hoven, C. W., Carli, V., Wasserman, C., ... Wasserman, D. (2013). Adolescent subthreshold-depression and anxiety: psychopathology, functional impairment and increased suicide risk. *Journal of Child Psychology and Psychiatry, 54*(6), 670–677. <http://doi.org/10.1111/jcpp.12016>
- Bastien, C. H., Vallières, A., & Morin, C. M. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine, 2*(4), 297–307. Retrieved November 2017 from <http://www.ncbi.nlm.nih.gov/pubmed/11438246>
- Brand S, Kirov R. (2011) Sleep and its importance in adolescence and in common adolescent somatic and psychiatric conditions. *Int J Gen Med.*,4, 425–442. <http://doi:10.2147/IJGM.S11557>
- British Psychological Society. (2014). *Code of Human Research Ethics*. Retrieved March 2018 from https://www1.bps.org.uk/system/files/Public%20files/inf180_web.pdf
- Buysse, D. J., Angst, J., Gamma, A., Ajdacic, V., Eich, D., & Rössler, W. (2008). Prevalence, course, and comorbidity of insomnia and depression in young adults. *Sleep, 31*(4), 473–80. Retrieved April 2018 from <http://www.ncbi.nlm.nih.gov/pubmed/18457234>
- Carskadon, M. A. (2002). *Adolescent Sleep Patterns: Biological, Social, and Psychological Influences*. Cambridge University Press.
- Chen, P.-Y., Yang, C.-M., & Morin, C. M. (2015). Validating the cross-cultural factor structure and invariance property of the Insomnia Severity Index: evidence based on ordinal EFA and CFA. *Sleep*

Medicine, 16(5), 598–603. <http://doi.org/10.1016/j.sleep.2014.11.016>

- Chung, K.-F., Kan, K. K.-K., & Yeung, W.-F. (2011). Assessing insomnia in adolescents: comparison of Insomnia Severity Index, Athens Insomnia Scale and Sleep Quality Index. *Sleep Medicine*, 12(5), 463–70. <http://doi.org/10.1016/j.sleep.2010.09.019>
- Clement, S., Schauman, O., Graham, T., & Maggioni, F., Evans-Lacko, S., Bezborodovs, N., Morgan, C., Rüsch, N., Brown, J. S. L., & Thornicroft, G. (2014). What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. *Psychological Medicine*, 45(1), pp. 11–27. <http://doi:10.1017/S0033291714000129>.
- Cukrowicz, K. C., Smith, P. N., Hohmeister, H. C., & Joiner, T. E. (2009). The moderation of an early intervention program for anxiety and depression by specific psychological symptoms. *Journal of Clinical Psychology*, 65(4), 337–351. <http://doi.org/10.1002/jclp.20560>
- Farrer, L., Leach, L., Griffiths, K. M., Christensen, H., & Jorm, A. J. (2008). Age differences in mental health literacy. *BMC Public Health*, 12(5). <http://doi:10.1186/1471-2458-8-125>.
- Gulliver, A., Griffiths, K. M., & Christensen, H. (2010). Perceived barriers and facilitators to mental health help-seeking in young people: A systematic review. *BMC Psychiatry*, 10(13). <http://doi:10.1186/1471-244X-10-113>.
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227–239. <http://doi.org/10.1348/014466505X29657>
- Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., ... Adams Hillard, P. J. (2015). National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health*, 1(1), 40–43. <http://doi.org/10.1016/j.sleh.2014.12.010>
- Horowitz, J. L., & Garber, J. (2006). The prevention of depressive symptoms in children and adolescents: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, 74(3), 401–415. <http://doi.org/10.1037/0022-006X.74.3.401>
- Johnson, E. O., Roth, T., Schultz, L., & Breslau, N. (2006). Epidemiology of DSM-IV insomnia in adolescence: Lifetime prevalence, chronicity, and an emergent gender difference. *Pediatrics*, 117(2), E247–E256. <http://doi.org/10.1542/peds.2004-2629>

- Laberge, L., Petit, D., Simard, C., Vitaro, F., Tremblay, R. e., & Montplaisir, J. (2001). Development of sleep patterns in early adolescence. *Journal of Sleep Research, 10*(1), 59–67.
<http://doi.org/10.1046/j.1365-2869.2001.00242.x>
- Lewinsohn, P. M., Clarke, G. N., Seeley, J. R., & Rohde, P. (1994). Major Depression in Community Adolescents: Age at Onset, Episode Duration, and Time to Recurrence. *Journal of the American Academy of Child & Adolescent Psychiatry, 33*(6), 809–818. <http://doi.org/10.1097/00004583-199407000-00006>
- Lovato, N., & Gradisar, M. (2014). A meta-analysis and model of the relationship between sleep and depression in adolescents: Recommendations for future research and clinical practice. *Sleep Medicine Reviews, 18*(6), 521–529. <http://doi.org/10.1016/j.smrv.2014.03.006>
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 335–43. Retrieved November 2017 from <http://www.ncbi.nlm.nih.gov/pubmed/7726811>
- National Sleep Foundation. 2006 Teens and sleep. Sleep in America Polls. Washington, DC: National Sleep Foundation; 2006. Retrieved November 2017 from <http://www.sleepfoundation.org/article/sleep-america-polls/2006-teens-and-sleep>
- Monk, T. H., Buysse, D. J., Kennedy, K. S., Pods, J. M., DeGrazia, J. M., & Miewald, J. M. (2003). Measuring sleep habits without using a diary: the sleep timing questionnaire. *Sleep, 26*(2), 208–12. Retrieved April 2018 from <http://www.ncbi.nlm.nih.gov/pubmed/12683481>
- Office for National Statistics - 2011 Census. <https://www.ons.gov.uk/help/localstatistics>
- Park, J. H., Yoo, J-H., & Seong Hwan Kim, S.H. (2012). Associations between non-restorative sleep, short sleep duration and suicidality: Findings from a representative sample of Korean adolescents. *Psychiatry and Clinical Neurosciences, 67*(1), pp. 28–34. doi:10.1111/j.1440-1819.2012.02394.x.
- Pressman, M. R., & Orr, W. C. (Eds.). (1997). *Understanding Sleep: The Evaluation and Treatment of Sleep Disorders*. American Psychological Association. <http://doi.org/https://doi.org/10.1037/10233-016>
- Ribeiro, J. D., Pease, J. L., Gutierrez, P. M., Silva, C., Bernert, R. A., Rudd, M. D., & Joiner, T. E. (2012).

- Sleep problems outperform depression and hopelessness as cross-sectional and longitudinal predictors of suicidal ideation and behavior in young adults in the military. *Journal of Affective Disorders*, 136(3), 743–50. <http://doi.org/10.1016/j.jad.2011.09.049>
- Roane, B. M., & Taylor, D. J. (2008). Adolescent insomnia as a risk factor for early adult depression and substance abuse. *Sleep*, 31(10), 1351–6. Retrieved March 2018 from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2572740/>
- Roberts, R. E., Roberts, C. R., & Chen, I. G. (2002). Impact of insomnia on future functioning of adolescents. *Journal of Psychosomatic Research*, 53(1), 561–569. [http://doi.org/10.1016/s0022-3999\(02\)00446-4](http://doi.org/10.1016/s0022-3999(02)00446-4)
- Roberts, R. E., Roberts, C. R., & Duong, H. T. (2008). Chronic insomnia and its negative consequences for health and functioning of adolescents: A 12-month prospective study. *Journal of Adolescent Health*, 42(3), 294–302. <http://doi.org/10.1016/j.jadohealth.2007.09.016>
- Saddichha, S. (2010). Diagnosis and treatment of chronic insomnia. *Annals of Indian Academy of Neurology*, 13(2), 94–102. <http://doi.org/10.4103/0972-2327.64628>
- Shochat, T., Cohen-Zion, M., & Tzischinsky, O. (2014). Functional consequences of inadequate sleep in adolescents: a systematic review. *Sleep Medicine Reviews*, 18(1), 75–87. <http://doi.org/10.1016/j.smr.2013.03.005>
- Short, M. A., Gradisar, M., Lack, L. C., & Wright, H. R. (2013). The impact of sleep on adolescent depressed mood, alertness and academic performance. *Journal of Adolescence*, 36(6), 1025–1033. <http://doi.org/10.1016/j.adolescence.2013.08.007>
- Singh, S. P. (2009). Transition of care from child to adult mental health services: the great divide. *Current Opinion in Psychiatry*, 22(4), p. 386–390. <http://doi:10.1097/YCO.0b013e32832c9221>.
- Soehner, A. M., Kaplan, K. A., & Harvey, A. G. (2014). Prevalence and clinical correlates of co-occurring insomnia and hypersomnia symptoms in depression. *Journal of Affective Disorders*, 167, 93–97. <http://doi.org/10.1016/j.jad.2014.05.060>
- Szabó, M. (2010). The short version of the Depression Anxiety Stress Scales (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence*, 33(1), 1–8. <http://doi.org/10.1016/j.adolescence.2009.05.014>

- Thompson, A., Hunt, C., & Issakidis, C. (2004). Why wait? Reasons for delay and prompts to seek help for mental health problems in an Australian clinical sample. *Social Psychiatry and Psychiatric Epidemiology*, *39*(10), pp 810–817. <http://doi:10.1007/s00127-004-0816-7>.
- Wesselhoeft, R., Sørensen, M. J., Heiervang, E. R., & Bilenberg, N. (2013). Subthreshold depression in children and adolescents – a systematic review. *Journal of Affective Disorders*, *151*(1), 7–22. <http://doi.org/10.1016/j.jad.2013.06.010>
- Yu, L., Buysse, D. J., Germain, A., Moul, D. E., Stover, A., Dodds, N. E., Johnston, K. L., & Pilkonis, P. A. (2012). Development of Short Forms from the PROMIS™ Sleep Disturbance and Sleep-Related Impairment Item Banks. *Behavioral Sleep Medicine*, *10*(1), pp. 6–24. [doi:10.1080/15402002.2012.636266](https://doi.org/10.1080/15402002.2012.636266).
- Zhang, J., Lam, S-P., Xin-Li, S., Li, A. M., & Winga, Y-K. (2012). The longitudinal course and impact of non-restorative sleep: A five-year community-based follow-up study. *Sleep Medicine*, *13*(6), pp. 570–576. <http://doi:10.1016/j.sleep.2011.12.012>.
- Zisook, S., John Rush, A., Alcala, A., Alpert, J., Balasubramani, G. K., Fava, M., ... Wisniewski, S. (2004). Factors that differentiate early vs. later onset of major depression disorder. *Psychiatry Research*, *129*(2), 127–140. <http://doi.org/10.1016/j.psychres.2004.07.004>