



The association between self-reported online screen time and self-reported sleep outcomes in adolescents living in Ireland

Caroline Walsh, Dr Carla Perrotta
University College of Dublin

11th Annual
Research
Conference
2019

Background

- Sleep is essential for healthy adolescent development (Gruber et al., 2014)
- Adolescents recommended 8-10 hours sleep/night (Hirshkowitz et al., 2015, Paruthi et al, 2016)
- 7 hours or less is deemed as insufficient level of sleep for adolescents (Hirshkowitz et al., 2015, Paruthi et al, 2016)
- No exact screen time guidelines currently exist (RCPCH, 2019, AAP 2016)
- Higher screen time has been related to poorer self-reported sleep outcomes (Carter et al, 2016, Hysing et al. 2015, Gamble et al., 2014, Mak et al, 2014, Mazzer et al, 2018)

Aim & Objective

Aim

- To examine the association between screen time and sleep outcomes in adolescents living in Ireland

Objectives

- To describe self-reported sleep outcomes
- To describe self-reported screen time usage
- To examine the association between self-reported screen time and self-reported sleep outcomes adjusting for the potential confounders

International sleep durations:

Average hours sleep per night:

- **Australia 8.06 hours/night** (Chaput and Janssen, 2016)
- **Sweden 7.5 hours/night** (Mazzer et al, 2018)
- **Hong Kong 7.28 hours/night** (Cheung et al, 2016)
- **Japan 6.3 hours/night** (Ohida et al, 2004)
- **Korea 5.4 hours/night** (Yang et al, 2005)

Sleep measurement:

- Overnight polysomnography (PSG) (Bartel et al, 2019)
- Validated measures Pittsburgh Sleep Quality Index (Buysse et al., 1989)
- Self-reported questionnaires (Lang et al, 2015, Combs et al, 2017)

Screen time measurement:

- No validated subjective measures
- Self-reported questionnaires

Literature Review: Factors Affecting Sleep Outcomes



Improved Sleep Outcomes:

Physical activity (Bartel et al., 2014, Foti et al., 2011, ACSM 2018)



Poorer Sleep Outcomes:

Biological changes (Crowley., 2018,
Carskadon 1993)

Mental health (Zhang et al., 2016, Lovato et al.,
2014)

Screen time (Cain & Gradisar., 2010, Bartel et
al., 2014, Hale & Guan, 2014, Carter et al., 2016)



Methodology

- A secondary analysis of ***'Growing Up in Ireland: Wave 3'*** (n=6,216)
- Screen time, sleep and general health variables
- Analysis were conducted using SPSS software
- Descriptive, comparative and inferential statistics

Example of Sleep and Screen time variables

To measure sleep, participants were asked:

12. On a normal week-night, how long do you usually sleep? Do not include time you spend awake in bed.

_____ Hours _____ Minutes

13. Do you have any difficulty with sleep?

Yes, a lot of difficulty Yes, some difficulty No

To measure screen time, participants were asked:

15. How much time do you spend on each of the following activities on a typical day (where it is your main activity at the time)? For each, please answer separately for weekdays and weekend days.

	none	less than hour	1 to 2 hours	2 to 3 hours	More than 3 hours
Online (Weekday)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Online (weekend)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Table 1: Descriptive data on participants (N=6,216)

	n	%
Gender		
Male	3,024	48.6
Female	3,192	51.4
Family SES		
High	3,148	50.6
Low	2,325	37.4
BMI		
Healthy	4,553	73.3
Overweight/obese	1,490	24.4
No. days of 20mins hard exercise in past 14 days		
<5 day/14 days	3,724	59.9
> 5 day/14 days	2,486	40.1
Poor General Health	265	4.3
Chronic physical/ mental health condition	830	13.4

Sleep variables

- Average sleep duration was **7.8 hours** per night (SD \pm 1.14)
- **9%** reported **sleeping \leq 7 hours** per night
- **30%** reported **sleep difficulties**

Screen time variables

- **32%** reported online screen time usage of **>3 hours** on weekdays and **38%** on weekends
- **82%** report regularly messaging friends on media devices before bed
- **83%** report regularly surfing the internet before bed

Univariate Analysis

- Being female, having 'poor' general health, having a chronic physical/mental health condition, less than 7 hours sleep and >3 hours/day online screen time were sig associated with having **sleep difficulties** ($p < 0.001$)
- Being female, having a lower family SES, having a chronic physical/mental health condition, being overweight/obese, and > 3 hours/day online screen time were sig associated with **sleeping less than 7 hours per night** ($p < 0.001$)

Logistic Regression Results

Table 2: Logistic regression final model for the effect of weekday online screen time on sleep difficulties

	Adjusted OR ⁺	95% CI	P Value ⁺
Weekday online screen time^a	1.30	(1.12-1.50)	< 0.001
General health^c	2.59	(1.92- 3.49)	< 0.001
Chronic physical/mental health condition^e	2.18	(1.82-2.60)	< 0.001
Hard exercise^d	.78	(0.68- 0.89)	< 0.001

^a Weekday time online; online screen time of greater than 3 hours per day

^c GenHealth; 'poor health' categories created by combining 'fair and poor'

^d Hard Exercise participate in 20 minutes of hard exercise in 5 of the past 14 days

^e Chronic physical/mental condition;; self-reported chronic physical or mental health disease or condition

⁺ P Values and Adjusted Odds Ratios are calculated from multivariate logistic regression

* Bonferroni Correction p value = .05/7= .00714

Logistic Regression Results

Table 3: Logistic Regression final model for the effect of weekday online screen time on sleep duration (≤ 7 hours)

	Adjusted OR⁺	95% CI	P Value⁺
Weekday online screen time^a	1.80	(1.47-2.22)	< 0.001
General health^s	3.12	(2.21-4.42)	< 0.001
Chronic physical/mental health condition^e	1.63	(1.26-2.11)	< 0.001
Hard exercise^d	.65	((0.52-0.81)	< 0.001

- ^a Weekday time online; online screen time of greater than 3 hours per day
- ^b BMI Category: BMI of greater than 25kg/m²^p
- ^c GenHealth; 'poor health' categories created by combining 'fair and poor'
- ^d Hard Exercise participate in 20 minutes of hard exercise in 5 of the past 14 days
- ^e Chronic physical/mental condition; self-reported chronic physical or mental health disease or condition
- ⁺ P Values and Adjusted Odds Ratios are calculated from multivariate logistic regression
- * Bonferroni Correction p value = .05/7= .00714

Discussion

- Large % spend > 3 hours weekday/weekend on online screen devices
- *Online screen time was associated with sleep difficulties and insufficient sleep durations
- 3 potential mechanisms for poorer sleep outcomes (Cain and Gradisar, 2010)
 - 1) Blue Light
 - 2) Cognitive arousal
 - 3) Sleep displacement
- Physical activity was identified as a protective factor for sleep duration and sleep difficulties

Discussion

Strengths

- Large, nationally representative sample size
- Two stage randomisation
- High quality data collection

Limitations

- Cross sectional design
- Specific to online screen time
- Self-reported measurement of sleep/screen time
- Struggle of research to keep up to date with technological advances

Implications

- Identified patterns in Irish adolescent
 - 1) Sleep behaviours
 - 2) Online screen time usage
- These findings have implications for researchers, public health practitioners and parents
- This may help guide and support educational campaigns in relation to healthy screen time usage and improving sleep behaviours in adolescents.

Conclusion

- Almost 1 in 10 Irish adolescents are not getting sufficient levels of sleep each night
- One third of Irish adolescent report sleep difficulties
- Large % of Irish adolescents spend > 3 hours online screen time on weekdays and weekends
- There is an association with higher online screen time (>3 hours/day) and poorer sleep quality and sleep duration in Irish adolescents
- Further longitudinal and experimental research with objective measurements is needed in this area

Thank you

Questions?

References

- AMERICAN ACADEMY OF PAEDIATRICS. 2016. *Updated Screen Time Recommendations* [Online]. Available: <https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/American-Academy-of-Pediatrics-Announces-New-Recommendations-for-Childrens-Media-Use.aspx> [Accessed 25/03/2019 2019].
- AMERICAN COLLEGE OF SPORTS MEDICINE. 2018. *ACSM Physical Activity Guidelines 2nd Edition* [Online]. Available: https://health.gov/paguidelines/second-edition/pdf/Physical_Activity_Guidelines_2nd_edition_Presentation.pdf [Accessed 5/04/2019].
- BARTEL, K., SCHEEREN, R. & GRADISAR, M. 2019. Altering Adolescents' Pre-Bedtime Phone Use to Achieve Better Sleep Health. *Health Communication*, 34, 456-462.
- BARTEL, K. A., GRADISAR, M. & WILLIAMSON, P. 2014. Protective and risk factors for adolescent sleep: A meta-analytic review. *Sleep Medicine Reviews*, 21, 72-85.
- CAIN, N. & GRADISAR, M. 2010. Electronic media use and sleep in school-aged children and adolescents: A review. *Sleep Med*, 11, 735-42.
- CARSKADON, M. A., VIEIRA, C. & ACEBO, C. 1993. Association between puberty and delayed phase preference. *Sleep*, 16, 258-62.
- CARTER, B., REES, P., HALE, L., BHATTACHARJEE, D. & PARADKAR, M. S. 2016. Association Between Portable Screen-Based Media Device Access or Use and Sleep Outcomes: A Systematic Review and Meta-analysis. *JAMA Pediatrics*, 170, 1202-1208.
- CROWLEY, S. J., WOLFSON, A. R., TAROKH, L. & CARSKADON, M. A. 2018. An update on adolescent sleep: New evidence informing the perfect storm model. *Journal of Adolescence*, 67, 55-65.
- FOTI, K. E. M. P. H., EATON, D. K. P., LOWRY, R. M. D. M. S. & MCKNIGHT-ELY, L. R. P. 2011. Sufficient Sleep, Physical Activity, and Sedentary Behaviors. *American Journal of Preventive Medicine*, 41, 596-602.
- GAMBLE, A. L., D'ROZARIO, A. L., BARTLETT, D. J., WILLIAMS, S., BIN, Y. S., GRUNSTEIN, R. R. & MARSHALL, N. S. 2014. Adolescent Sleep Patterns and Night-Time Technology Use: Results of the Australian Broadcasting Corporation's Big Sleep Survey. *PLoS One*, 9, e111700.
- GRADISAR, M., GARDNER, G. & DOHNT, H. 2010. Recent worldwide sleep patterns and problems during adolescence: A review and meta-analysis of age, region, and sleep. *Sleep Medicine*, 12, 110-118.
- HALE, L. & GUAN, S. 2014. Screen time and sleep among school-aged children and adolescents: A systematic literature review. *Sleep Medicine Reviews*, 21, 50-58.
- HIRSHKOWITZ, M., WHITON, K., ALBERT, S. M., ALESSI, C., BRUNI, O., DONCARLOS, L., HAZEN, N., HERMAN, J., KATZ, E. S., KHEIRANDISH-GOZAL, L., NEUBAUER, D. N., O'DONNELL, A. E., OHAYON, M., PEEVER, J., RAWDING, R., SACHDEVA, R. C., SETTERS, B., VITIELLO, M. V., WARE, J. C. & ADAMS HILLARD, P. J. 2015. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health*, 1, 40-43.

References

- HUANG, Y.-S., WANG, C.-H. & GUILLEMINAULT, C. 2010. An epidemiologic study of sleep problems among adolescents in North Taiwan. *Sleep Medicine*, 11, 1035-1042.
- HYSING, M., PALLESEN, S., STORMARK, K. M., JAKOBSEN, R., LUNDERVOLD, A. J. & SIVERTSEN, B. 2015. Sleep and use of electronic devices in adolescence: results from a large population-based study. *BMJ Open*, 5, e006748.
- LANG, C., KALAK, N., BRAND, S., HOLSBOER-TRACHSLER, E., PÜHSE, U. & GERBER, M. 2015. The relationship between physical activity and sleep from mid adolescence to early adulthood. A systematic review of methodological approaches and meta-analysis. *Sleep Medicine Reviews*, 28, 28-41.
- LEMOLA, S., PERKINSON-GLOOR, N., BRAND, S., DEWALD-KAUFMANN, J. F. & GROB, A. 2015. Adolescents' Electronic Media Use at Night, Sleep Disturbance, and Depressive Symptoms in the Smartphone Age. *Journal of Youth and Adolescence*, 44, 405-418.
- 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, 521-529.
- MAK, Y. W., WU, C. S., HUI, D. W., LAM, S. P., TSE, H. Y., YU, W. Y. & WONG, H. T. 2014. Association between screen viewing duration and sleep duration, sleep quality, and excessive daytime sleepiness among adolescents in Hong Kong. *Int J Environ Res Public Health*, 11, 11201-19.
- MATRICCIANI, L., OLDS, T. & PETKOV, J. 2011. In search of lost sleep: Secular trends in the sleep time of school-aged children and adolescents. *Sleep Medicine Reviews*, 16, 203-211.
- MAZZER, K., BAUDUCCO, S., LINTON, S. J., BOERSMA, K., ÖREBRO, U. & INSTITUTIONEN FÖR JURIDIK, P. O. S. A. 2018. Longitudinal associations between time spent using technology and sleep duration among adolescents. *Journal of Adolescence*, 66, 112-119.
- NATIONAL SLEEP FOUNDATION. 2014. *Sleep In America Poll 2014 'Sleep in the Modern Family'* [Online]. Available: <https://www.sleepfoundation.org/sites/default/files/inline-files/2014-NSF-Sleep-in-America-poll-summary-of-findings---FINAL-Updated-3-26-14-.pdf> [Accessed 3/04/2019].
- PARUTHI, S., BROOKS, L. J., D'AMBROSIO, C., HALL, W. A., KOTAGAL, S., LLOYD, R. M., MALOW, B. A., MASKI, K., NICHOLS, C., QUAN, S. F., ROSEN, C. L., TROESTER, M. M. & WISE, M. S. 2016. Recommended amount of sleep for pediatric populations: A consensus statement of the American Academy of Sleep Medicine. *Journal of Clinical Sleep Medicine*, 12, 785-786.
- ROYAL COLLEGE OF PAEDIATRIC AND CHILD HEALTH. 2019. *The Health Impact of Screen Time: A Guide for Clinicians and Parents* [Online]. Available: https://www.rcpch.ac.uk/sites/default/files/2018-12/rcpch_screen_time_guide_-_final.pdf [Accessed 25/03/2019].
- ZHANG, J. M. D. P., PAKSARIAN, D. M. P. H. P., LAMERS, F. P., HICKIE, I. B. M. D., HE, J. M. S. & MERIKANGAS, K. R. P. 2016. Sleep Patterns and Mental Health Correlates in US Adolescents. *Journal of Pediatrics*, 182, 137-143.