Teensleep
Durham university
Dr Lyn Robinson

EVALUATION OF THE TEENSLEEP PROGRAMME: A PILOT STUDY

EVALUATION SUMMARY	
Age range	Secondary Year 10
Number of pupils	Approx.1900
Number of schools	12

Evaluation of the Oxford Teensleep sleep education programme.

A Pilot Study

PROTOCOL

Chief evaluator: Dr Lyn Robinson

Protocol version: 2

Protocol date: 26/10/2016

Funder: Education Endowment Foundation

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INTERVENTION

Table 1: Description of the intervention using The Template for Intervention Description Replication (TIDieR) framework

TIDieR* FRAMEWORK	DESCRIPTION
Name of intervention	Oxford Teensleep, Sleep Education Programme
Why? Rationale	In adolescence biological rhythms change in such a way that it is difficult for adolescents to go to sleep and get up early. Therefore, a teenager waking up at 7am to start school at 9am is akin to asking a 55-year-old to get up at 5am: this leads to a significant amount of sleep deprivation. This sleep deprivation interacts with biological rhythms, creating a period of low energy and tiredness which lasts into mid-morning. The biological predisposition for delayed sleep in adolescence is exacerbated by a more relaxed societal attitude to bedtimes, 24/7 access to social media and abnormal light exposure from a range of electrical devices. Many adolescents now have devices in their bedrooms (tablets, phones) that emit a low-level light in the blue wavelength which has been shown to have a direct, alerting effect on the biological clock which may interfere with the process of going to sleep. Studies have shown that using technology, such as e-readers, in the hour prior to sleep can delay the expression of the 'sleep hormone' melatonin. Pupils are also dealing with the stress of exams and are unaware of the importance of sleep and the effects of sleep deprivation. There is growing evidence that teenagers' academic attainment is hampered by a lack of sleep (see Dewald *et al*. 2010). Poor sleep, frequent and early awakenings, and late bedtimes have been found to negatively affect learning capacity and school performance among adolescents (Curcio, Ferrara and Gennaro 2006; Fallone, Owens and Deane, 2002; Wolfson and Carskadon 2003), with one of the most common consequences being daytime sleepiness (Moore and Meltzer 2008). Empirical evidence demonstrates an association between a lack of sleep and the consolidation of cognitive performance, which is required for executive functioning including abstract reasoning, goal directed behaviour and creative processing Curcio, Fearra and Gennaro 2006; Walker *et al*. 2002). Therefore, any intervention that increases teenagers' awareness of the importance of sleep which has the potential to positively alter sleep, would be of great benefit to the adolescent population.
Who? Recipients	The intervention has been developed for 14-16 year olds (Year 10 and Year 11).
What? Materials used	Teachers receive lesson plans, via a half-day of training and a sleep education resource booklet to guide the structure and delivery of each lesson alongside PowerPoint slides. Students receive a handbook which includes information and activities to be completed during each lesson. The aim of the

	student handbook is to encourage students to self-reflect on their behaviours.
What? Procedures, activities and/or processes	The intervention provides teachers with 10 lesson plans, each focusing on a different topic and are designed to be interactive: 1. What is sleep? 2. Why is sleep important? 3. The body clock and sleep drive 4. Sleep scheduling 5. Lifestyle and sleep 6. Light and sleep 7. Creating a sleep haven 8. Thoughts and emotions at bedtime 9. Managing the racing mind 10. The sleep friendly routine The lessons are designed to be discursive and self-reflective: introducing the scientific theory, followed by discussion of the impact of this on an individual, and ending with a focus on the students and their own sleep. The material focuses on the importance of sleep for learning and memory but it also discusses emotion, health, creativity and sports performance. Although there are "do and do nots" in the sections on sleep hygiene, lessons always return back to the theory and get students to focus on what impact poor sleep hygiene (e.g. using your phone in bed) might have on their sleep and how that would make them feel in terms of the theory (e.g. broken sleep resulting in reduced reaction times and poorer sports performance).
Who? Providers/implementers	Researchers from the Sleep and Circadian Neuroscience Institute, University of Oxford will provide each school with a three hour training session. At least two teachers from each school delivering the lessons will either attend the developer-led training session. Teachers who complete the developer-led training will provide cascade training to other staff members who will deliver the programme, without facilitation from the developer, using the materials provided and the developer-led training slides.
How? Mode of delivery	The intervention will be delivered to students by developer-led or cascade trained teachers, in school, during Form time or PSHE lessons.
Where? Location of delivery	State secondary schools in England
When and how much? Duration and dosage	The programme consists of five hours of lessons that can be delivered as ten half-hour lessons or five hour-long lessons during Form time or PSHE lessons.
Tailoring and adaptation	Schools can choose to decide upon the delivery schedule of the programme and whether to teach them during Form or PSHE time.
How well (planned?): strategies to maximize effectiveness	Comprehensive developer-led training and detailed lesson plans. Parents will be provided with a short pamphlet to encourage their child's engagement with the programme and support any behaviour change the students might choose to implement.

RESEARCH QUESTIONS

The pilot is designed to answer the following questions under EEF's three pilot success criteria

EVIDENCE OF PROMISE

a) Is there evidence to support the theory of change?
b) Is there evidence of improvements in sleep behaviour and quality?

Figure 1 details the Theory of Change model, this has informed the evaluation team of how the different aspects of the intervention are expected to lead to changes in outcomes (causal assumptions).

Figure 1: Teensleep Education Package Theory of Change

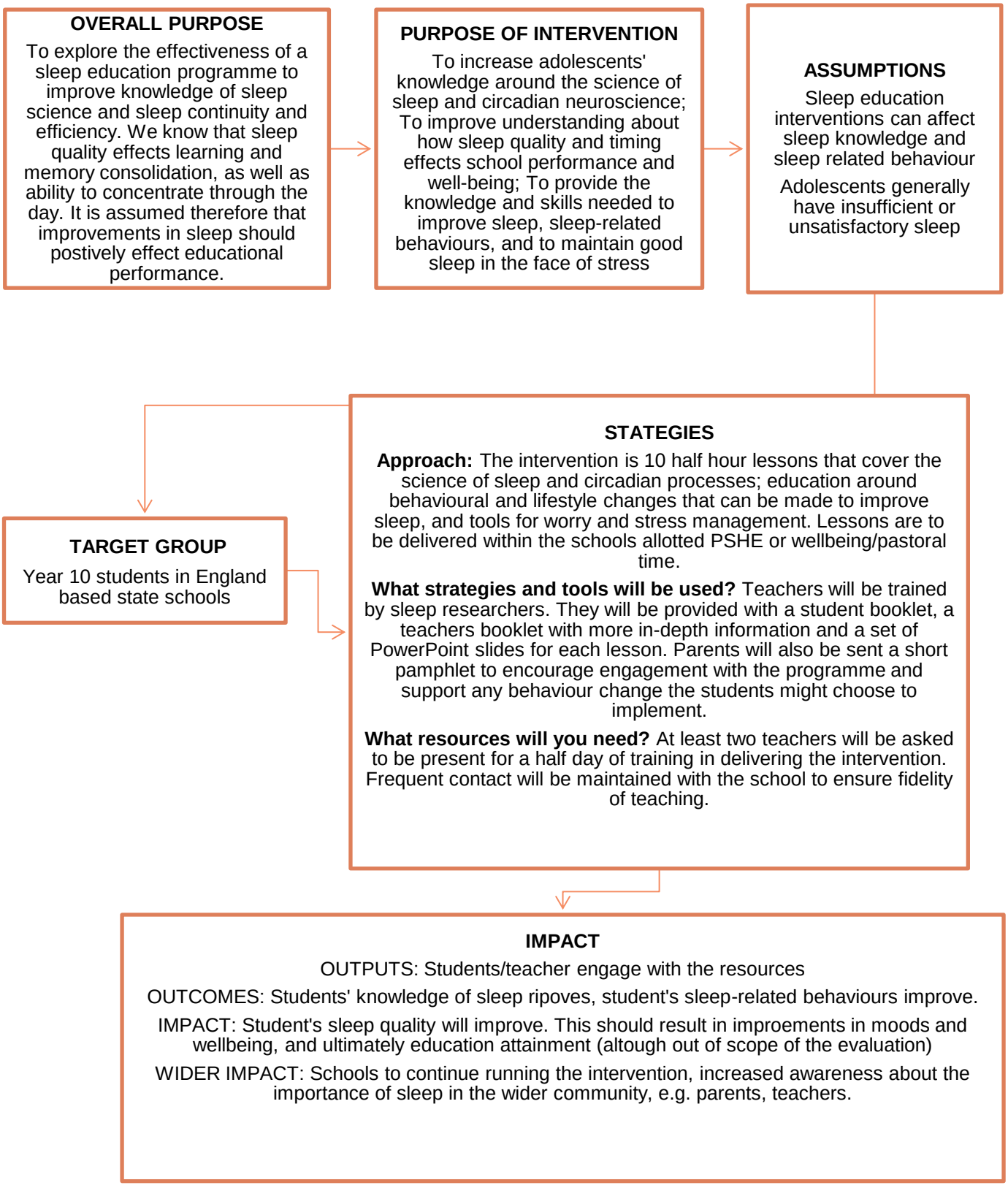
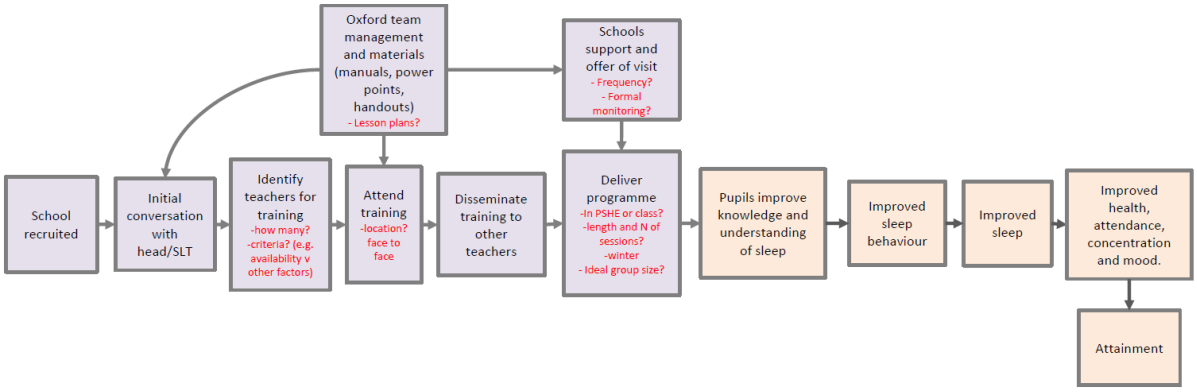


Figure 2 details the Teensleep education package logic model.

Figure 2: Teensleep Education Package logic model.



Descriptive data on change in the following outcomes will be measured before and after the intervention and will be used to inform a judgement on whether there is evidence of promise:

a) Changes to sleep as reported by actigraphy data and sleep diaries including night-time sleep continuity variables (sleep/wake times) and changes in sleep efficiency (the percentage of time spent in bed asleep over time spent in bed).
b) Changes in night-time sleep length measured using actigraphy at the two time points (pre- and post-).
c) Frequency and duration of napping pre- and post-intervention measured using sleep diary data.
d) Changes to knowledge of sleep, measured using the sleep quiz.
e) Pre-and post- self-report data on students' sleep patterns, sleep hygiene, and daytime sleepiness/alertness collected through students' completed questionnaires.

Analysis of Sleep Data

Table 3 describes the outcome measures to be assessed using variables from the various detailed sleep data collection methods (actigraphy and sleep diaries). The developers will provide the following variables from the actiwatches: time in bed, assumed sleep, actual sleep (time and %), actual awake (time and %), sleep efficiency (%), sleep onset latency, and wake bouts. The evaluation team will look to compare the potential variation between the pre- and post- values and provide a descriptive analysis of each of these variables. If available and provided by the school this analysis will be repeated comparing gender, FSM eligibility, IDACI and KS2 point score, and also looking at school level variations.

Secondary analysis will repeat the above analysis with the sleep diary and survey data, providing descriptive analysis of the potential variation between pre- and post- data, and additionally comparing pupil and school level variations.

Table 2: Description of analysis by outcome measure and data collection method

	Outcome measure	Data collection method	Variable
Primary	Changes in sleep time during time in bed and the number of wake bouts (proxy measure of sleep continuity) between pre- and post- data.	Actigraph data from actiwatches	Sleep efficiency (%) Wake bouts
Secondary	Changes in time between going to bed and falling asleep, wake time in bed, actual sleep time etc. between pre- and post- data.	Actigraph data from actiwatches	Time in bed Assumed sleep Actual sleep time Actual sleep (%) Actual wake time Actual wake (%) Sleep latency
	Changes in sleep time during time in bed between pre- and post- data.	Sleep diary data	Self-reported sleep efficiency (%)
	Changes in scores between pre- and post- data.	Sleep knowledge quiz	Total score and individual question scores
	Changes in scores between pre- and post- data.	Surveys/questionnaires	Sleep related sub-scale domains (excluding health and well-being)
	Changes and variation between different groups overall and between pre- and post- data.	School and pupil level demographic data	Above variables
	Changes in the frequency and duration of napping between pre- and post- data.	Sleep diary data	Self-reported

FEASIBILITY

a) To what extent are the participating schools engaged with and delivering the intervention?
b) What are the different stakeholder viewpoints towards, and acceptability of, the intervention?

    i. Teachers who attended the training, using follow-up surveys and interviews.

ii. Other teachers within the school, ascertained during case study visits.

iii. Parents (through completed returned consent forms).

iv. Pupils through focus groups in case study schools.

c) How is the intervention disseminated within the schools to other staff?
d) How effective is the level of support and training?

i. What are the barriers to successful delivery of the intervention?

Readiness for Trial

a) Is fidelity to the intervention being maintained?

i. Are nominated staff accessing the available training and utilising the relevant materials?

ii. Are the different aspects of the intervention being completed?

b) What is the efficacy and acceptability to pupils of the data collection tools? Is fidelity to the data collection tools being maintained by pupils?
c) What is the cost of the programme and is it affordable to schools?

METHODS

Recruitment

Participants (Schools)

The developers have recruited 10 schools located in England to participate in the pilot study. One school has an above average proportion of students who are in receipt of Free School Meals (FSM; currently England's average 28.5%, 2014-15 figures); the overall sample's FSM rate ranges from 1.4%-28.6%, with a 13.5% average. The total number of students within each school range between 141 and 1,283 and the sample includes a variety of Academy, Community and Free Schools, as well as a University Technical College. The majority of the schools are mixed gender and based in an urban location, with exceptions in both instances, and none of the schools have a specified religious ethos. Participating schools were only eligible to take part in the study if they agreed to all of the study requirements outlined in the developer's Memorandum of Understanding which described their commitment to the delivery of the programme (MoU) (Appendix 1) and their continued participation is dependent on agreement to the amended and/or additional MoU which outlines the process evaluation (see Appendix 2).

Participants (Students)

All students who are in Year 10 at the start of the academic school year 2016-17 will receive the intervention as delivered by their teachers, and will complete a sleep quiz and sleep survey pre- and post- intervention. Parents and students will be informed about the pilot study via parents and student information sheets (see Appendix 3 and 4). Opt-out parental consent (see Appendix 3) will be required for schools to share students' pre- and post-intervention sleep quiz results and for students to participate in completing a sleep survey (described below). Opt-in parental consent (see Appendix 4) is required for elements of the evaluation where student sleep data are required (described below). Students will be excluded from the detailed sleep data collection if they have a current sleep disorder (e.g., insomnia, sleep walking), psychological disorder (e.g., ADHD, anxiety, depression),

physiological disorder which may interfere with sleep (e.g., asthma, diabetes, epilepsy, metabolic disorders), heart-rhythm abnormalities, or who take medications that may impact on sleep (e.g., antihistamines, antidepressants, corticosteroids – such as the brown inhaler). We also cannot include individuals who have suffered a concussion where they were unconscious for more than five minutes, or those who have been to a country which is three or more time zones away from the UK (e.g., USA or Asia) within the last six months.

DATA COLLECTION METHODS

SLEEP QUIZ

A sleep quiz will be used to measure changes in pupil's knowledge of sleep as a result of being a recipient of the Teensleep programme. This has been devised by University of Oxford, the purpose of this quiz is to gauge improvement in sleep knowledge (see Appendix 5). Pupils will be requested to complete this pre- (September 2016) and post- intervention (December 2016). The quiz is to be delivered as a surprise, pupils will therefore not be asked to revise for it. If parents do not want their child's data to be shared with the research team as part of the pilot study, they can indicate this on the opt-out consent form that they will receive.

SLEEP SURVEY

A sleep survey will be used to measure changes to students self-reported sleep patterns, sleep hygiene and sleepiness/alertness. Providing parental consent has been obtained, students will complete a survey pre- (September 2016) and post- (December 2016) intervention. This survey, created by the developers, requests students to document sleep quality, circadian preference, daytime sleepiness/alertness, sleep hygiene, and information on health related quality of life. Teachers will be asked to distribute the paper questionnaires to students for completion in school, under exam conditions, which will take approximately 30-40 minutes. Within each school, students who complete the sleep survey at either time-point will be entered into a prize draw to win one of two £25 Amazon gift vouchers. This will be organised and provided by the development team.

DETAILED SLEEP DATA COLLECTION

Actigraphy data will be collected from a random sub-sample of students to measure changes to pupil's sleep.

RECRUITMENT AND ELIGIBILITY

Detailed sleep data will be collected from a sub-group of 15 to 20 students within each school. All Year 10 pupils in the 10 participating school will be requested to return a signed parental consent form should they wish to participate in the sleep data collection. The development team will arrange to visit each school to collect all student consent forms, check for completeness, and then number from one to n. The development team will then call the evaluation team (principally, the project administrator) for a randomised selection of students (plus five numbered reserves). The selected students will be asked to participate in a sleep screening interview and the other students who were not selected will be thanked and returned to their class.

The sleep screening interview (developed and delivered by the development team) will be used to ascertain and exclude any students from the sample who have long-term sleep disorders. Within the interview, students are asked to report sleep disturbances (lasting more than six months), sleep problems, sleep/wake disorders, health, psychological problems,

family history of insomnia and general demographics. Any student that does not meet eligibility criteria will be replaced by a student from the reserves list who will then also undergo eligibility screening. In the case of more than five exclusions, the development team will ring the evaluation team to receive additional randomised students. This interview is conducted by a member of the development team and will take place in the school and last approximately 10 minutes per pupil.

Actigraphy

Following eligibility screening, the development team will train the students to wear actiwatches and complete a sleep diary across a 14-day period pre- (September 2016) and post- (December 2016) intervention. The sleep diary contains full instructions for using the actiwatches and how to complete the sleep diary. The actiwatches to be used are MotionWatch 8 (MW8) devices by CamNtech (formally Cambridge Neurotechnology, Papworth Everidge, Cambridge). They are telemetric devices designed to be worn on the non-dominant wrist. They provide a continuous measure of the motor component of activity measured through a tri-axial accelerometer. Data are downloaded from the MW8 device using a direct USB connect to a chosen computer station with the MotionWare Software. This records the intensity, amount, and duration of movement in three directions.

For the Actigraphy, students will be asked to press the marker button on their device when they are in bed, have switched the lights off, and are attempting to sleep. As Actigraphy uses movement to determine sleep onset/offset, this method is the most accurate way to determine sleep intention as distinct from lying in bed, awake, engaging in other activities. Students will also be instructed to press the same marker when they wake from sleep in the morning and have no intention of returning to sleep.

At the end of the 14-day baseline period, students are to return the actiwatches back to the school where a courier will be arranged to deliver the devices back to the developers to download and code the data before sending to the evaluation team for QA and analysis.

As analytic focus is on change in sleep from baseline as a result of the sleep education programme, students who withdraw from the cohort of 20 will not be replaced at this point. For post-intervention sleep data collection, actiwatches, sleep diaries and instructions will be sent to each school in labelled pupil packs prior to the beginning of the 14-day sleep monitoring period by the developers. Researchers from the delivery team will not visit the site but will Skype with the students prior to the first recording night to ensure all students have their packs and understand the actiwatch instructions. At the end of the 14-day sleep monitoring period, the development team will arrange for a courier to deliver the devices back to the study team for analysis. Returning actiwatches will be couriered from each school to the development team using a dedicated driver. The internal memory of the actiwatch does not allow for overwriting of data so any potential delay in return will not result in loss of data. All actiwatches will have new batteries installed prior to being used at each testing point to mitigate against battery depletion memory loss.

Participant data will be excluded from analysis if there is less than seven days of continuous actigraphy. In these instances, the participant in question will not be invited to participate in the follow-up if the baseline data is incomplete. Further, in the case of follow-up actigraphy being less than seven days, the baseline data of that participant will be removed from the analysis of change for evaluation purposes. Missing data will be recorded thoroughly and presented in the final report.

Ten percent of all returned data collection via the sleep data collection tools (sleep quiz, sleep survey, actigraphy and sleep diary) will undergo a QA process by the evaluation team to check consistency and inter-rater reliability. The developers will keep detailed recruitment and attrition records for all sleep related data collection methods and pass these to the evaluation team for reporting.

All pupils who return a full set of actigraphy data will be entered into a prize draw to win a £25 Amazon voucher at each time point (two vouchers per school,). All students, from all schools, who provide a complete set of actigraphy data at both time-points will be entered into a prize draw to win a 32GB iPad Pro (9.7”). This prize draw will be organised and provided by the development team, UoO.

Sleep Diaries

At the same time as wearing the actiwatches, students will also be requested to complete a sleep diary to document subjective self-reported sleep duration and quality. The sleep diaries (example in Appendix 6) have been created by the developers for the purpose of this pilot study and are based on the Consensus Sleep Diary (Carney et al., 2012). Each page represents a day and students are instructed to start completing just before going to sleep about the day past and finish when they wake each morning about the previous night’s sleep. The diary consists of sleep quantity and quality questions, pre-sleep behaviours, and nap frequency and timing. Students will be instructed that the sleep diary is to be filled out as a best guess for their sleep. From focus group feedback in the feasibility study, adolescents were concerned about entering “wrong” answers on the diary so training will include clarification as to the differences between subjective and objective sleep measures. It was found in the feasibility study that the students struggled with filling out questions about the day before (e.g. caffeine use after 6pm) in the morning when they woke.

Student Attendance

Student attendance data will be collected from schools by the evaluation team at the end of the intervention.

Monitoring attendance and Engagement at staff training

To monitor engagement/fidelity at the develop-led training sessions, staff attendance data will be collected by the developers and passed onto the evaluation team. The evaluation team will develop an online based survey to be completed by teachers to gauge the effectiveness of support and training following the half-day developer-led training session.

To understand replicability of and to monitor engagement at the cascade training sessions, staff attendance data will be collected via telephone/email by the evaluation team directly from the staff member who led the training. Here, the staff member will be requested to provide names and roles of teachers who have received cascade training and requested to describe the structure, content and duration of the cascade training. Three non-case study schools will be selected at random and a teacher from each will be requested to participate in a telephone interview to gather more in-depth feedback on the cascade-training provided within their school.

Monitoring Programme Fidelity

Schools will be asked to provide a delivery schedule for the sleep education programme, including the date and time each lesson is to be taught and which teacher within each school

will be delivering it. Schools will also be requested to provide information on what aspects of the curriculum have been replaced so that the Teensleep programme could be delivered. Completing the delivery schedule will help the evaluation team monitor the fidelity of the intervention. The evaluation team's research administrator will contact the schools weekly, via telephone or email, to clarify if lessons have been taught as set out in the delivery schedule provided by the school prior to starting the intervention.

School Case Studies

To investigate the feasibility of implementing the intervention the evaluation team will conduct a multiple case study design with longitudinal aspects with schools (*n*=3) who have the highest FSM rate. One school setting will be selected to participate in the longitudinal case study. Here we will closely follow the processes involved in implementing the Teensleep programme and how changes in practice occur over the course of the intervention through visits to observe the developer-led training session, the cascade training session (if appropriate) and two lessons of the package being delivered. The evaluation team will aim to observe one session that is being delivered by a teacher who attended the developer-led training and another session being delivered by a teacher who attended the cascade training only (providing teaching schedules allow).

Two additional settings will be involved in a cross-sectional case study, with two visits to each of the settings to elicit observation data and perceptions of stakeholders at two pre-identified lessons. An observation checklist will be developed to allow comparisons to be made between settings at specific time-points.

All case study visits will include semi-structured interviews with lead contact involved in delivering the Teenseep package, to discuss implementation, acceptability and perceived efficacy. These interviews will provide a wider perspective of the intervention within each setting and will explore how the intervention is used and adapted in different school environments, including barriers that may have been faced.

For participating in the required aspects of the evaluation all schools (*n*=12) will receive a £200 Amazon gift voucher. The three schools who participate in the case studies will receive an additional £400 Amazon gift voucher.

Where possible, all case study visits will include semi-structured interviews with some of the teachers involved in delivering the Teenseep package, to discuss implementation, acceptability and perceived efficacy. These interviews will provide a wider perspective of the intervention. Interviews will also ascertain what aspects of the curriculum have not been taught in replacement of the Teensleep programme. Data on intervention costs will be collected from the developers as well as from all participating schools at other data collection points (at interviews during case study visits) as part of the process evaluation, and will be used to conduct a cost evaluation in line with recent guidance from the EFF.

Feedback Survey of Teaching Staff

All teachers delivering the intervention will be requested to complete an online survey developed by the evaluation team at the end of the intervention to capture resource usefulness and acceptability, intervention delivery and perceived impact of the sleep education package.

STUDENT FOCUS GROUPS

Two focus groups, containing five-eight pupils, within each of the three case study schools will be conducted with pupils who received the intervention but did not participate in the actigraph or sleep diary data collection and those who did. This will allow the evaluation team to ascertain the acceptability of the intervention and the associated data collection methods (sleep survey, sleep screening interview,). We anticipate focus groups will last approximately 30-40 minutes, and will take place during school time. Parental consent will be gained.

INTERVIEW WITH DEVELOPERS

An interview with the developers will be conducted at the end of the programme to discuss further development of/changes to the programme, perceived impact, implementation fidelity including actual barriers, future plans, including information on costs to be included in the cost evaluation in line with recent guidance from the EFF.

ETHICS AND REGISTRATION

The developers have obtained favourable ethical approval from the University of Oxford Central University Research Ethics Committee.

The evaluation team have obtained ethics clearance for the process evaluation from Durham University's School of Education Ethics Committee.

School consent to participate in the delivery of the intervention has been sought by the developers. Schools will be requested to complete a further MoU for their participation in the evaluation. Their continued participation in the intervention is dependent upon their consent to participate in the evaluation. Parental opt-out consent is required for the transferring of sleep quiz data to the research team and completion/data transfer of the sleep survey. Parental opt-in consent will be sought for students wishing to participate in the collection of detailed sleep data, and process evaluation focus groups.

Opt-in consent will be sought from relevant school staff for observations, interviews and surveys as part of the process evaluation.

PERSONELL

THE DELIVERY TEAM

The delivery team will be responsible for the conduct of the research including school recruitment and on-going relationship with schools, informing parents and pupils, intervention development, including writing detailed description of intervention to allow others, if necessary, to be able to replicate the intervention in other areas, intervention training and delivery, and data collection. The delivery team from Oxford University are: Professor Russell Foster, Professor Colin Espie, Dr Chris Harvey, Dr Gaby Illingworth, Dr Rachel Sharman.

THE EVALUATION TEAM

This is a collaborative evaluation between researchers at Durham University's Centre for Evaluation and Monitoring (CEM) and Durham University's Sleep Lab.

Dr Lyn Robinson: Lyn is a Research Associate at CEM and an Associate of Durham University's Sleep Lab. Lyn's research interests focus on how behaviours and practices impact on childhood education and health with a specific focus on disadvantaged children. Lyn is the

Principal Investigator on the evaluation, will oversee all trial management responsibilities, develop the process evaluation tools, conduct some of the process evaluation observations, be the first point of contact for the development team and will oversee and contribute to the writing of the preliminary and final reports.

Professor Helen Ball: Helen is Director of the Sleep Lab at Durham University. Helen is one of the world's leading experts examining the ecology of child sleep. This encompasses attitudes and practices regarding sleep, and the behavioural and physiological monitoring of children (and their parents) during sleep, and the discordance between cultural sleep preferences and biological sleep needs. Helen will be co-investigator on the evaluation and will provide ongoing project advice on data collection methods, evaluation, development of the cleaning, coding and analysis protocols for all sleep data, training and supervision of TBA Research Assistant, and will contribute towards the writing of the preliminary and final report.

Dr Helen Wareham: Helen is a Research Data Analyst at CEM. She primarily works on the Sutton Trust Evaluation Framework as the lead for data management and analysis. Helen will contribute to the design and conduct of this evaluation and will undertake data management requirements and assist with data analysis.

Dr Laura da Costa: Laura is a Research Assistant at CEM. Laura will work closely with the Sleep Lab at Durham to undertake QA, analysis and reporting of the quantitative sleep data. Laura will also analyse and report the qualitative data obtained throughout the process evaluation. Laura will conduct focus groups in early 2017 to gather student feedback on the Teensleep programme, and will contribute towards writing the final report.

Mrs Kirsty Younger: Is a Research Associate at CEM. Kirsty will contribute towards the development and conduct of the process evaluation.

Mrs Dawn Mee: Is an experienced research administrator at CEM and has worked on EEF funded projects such as the Literacy Octopus Trial. Dawn will provide support to the evaluation team, will maintain contact between key stakeholders and be the first point of contact for participating schools.

Dr Susan Stothard: Sue is a psychologist with over 20 years of experience researching development in children. Sue will be co-investigator on the evaluation and will advise the team and contribute to the process evaluation.

Dr John Little: John is a senior statistician at CEM, Durham University. John will provide statistical advice for the analysis of all data collected as part of the evaluation.

RISKS

Risks	Assessment		Mitigation
	Likelihood	Impact	
School setting recruitment not EEF target schools	Low/Medium	High	The developers have been primarily responsible for recruitment, with the evaluation team offering supporting guidance.
Possibility of attrition for those schools that agree to participate	Low/Medium	Medium	Schools will sign up to MoU informing them of all aspects of the trial. Schools will be in contact with the evaluation team throughout the trial.

Low completion rates of pupil surveys	Medium	High	A prize draw incentive will be offered to students who return completed surveys.
Lack of data from actigraphs	High	Medium	An incentive, detailed above, may encourage participation of students.
Loss or non-return of actigraphs	Medium	High	Results from the development phase of this research demonstrates 100% return rate of actigraphs.
Researcher loss (illness etc)	Medium	Medium	Each institution has a large department with numerous researchers. Senior staff can stand in if necessary.
Transfer of all research data	Low	High	A data sharing agreement will be put in place between Durham and Oxford to ensure secure transfer of all data. A timetable of data transfer dates has been drafted below and to ensure the pilot runs to schedule. Delays in receiving data will result in negatively impact on the timetable (below), delivery of the readiness to trial report and possible increases to budget.
Management of the pilot & the evaluation/test data	Low	Medium/High	Clear protocols in place for communication between the teams so that all teams are informed about any communication with schools. Regular and frequent communication between teams on milestones.

TIMELINE

Date	Activity
March 2016	Project developmental phase
April 2016	Project set-up meetings
April-June 2016	School recruitment
EarlySeptember 2016	Delivery of teacher training by UoO/observations of training by ET/completion of surveys/interviews regarding training (developed by ET)
September 2016	Confirmation from schools of delivery date of the programme within their own timetables
Early September 2016 (date TBC)	Parental consent
Early September 2016 (date TBC)	Return of parental consent by UoO to ET to inform randomisation
Early September 2016 (date TBC)	Randomisation of pupils to participate in actigraphy/sleep diaries data collection
Early September 2016 (date TBC)	Return of randomised list to UoO by ET

September 2016	Baseline sleep survey and sleep quiz (pupils)
September 2016	Baseline surveys returned from schools to UoO
By mid-October 2016	Baseline sleep data collection (sub-sample of students completing sleep diaries and actigraphy data)
October- November 2016	Delivery of sleep education package by teachers in schools
October-November 2016	Case studies (1,2 and 3)
October 2016	Data entry of baseline surveys/sleep diaries/extracting, cleaning, scoring of data from actigraphs
By 30th November 2016	Return of all variables needed for the evaluation and entered baseline data (surveys, sleep diaries, actigraphy) from UoO to ET
December 2016	QA process on baseline data from surveys, sleep diaries and actigraphy.
December 2016	Post-intervention survey (staff)
December 2016	Post-intervention sleep survey and sleep quiz (pupils)
December 2016	Post-intervention surveys returned from schools to UoO
By 13th December 2016	Post-intervention sleep data collection (sub-sample of students completing sleep diaries and actigraphy data)
January- February 2017	Student focus groups
January-March 2017	Data entry of post surveys/sleep diaries/extracting, cleaning, scoring of data from actigraphs
January 2017	Interview with UoO
By 31st March 2017	Return of all variables needed for the evaluation and entered post data (surveys, sleep diaries, actigraphy) from UoO to ET
April 2017	QA process on post data from surveys, sleep diaries and actigraphy.
April-June 2017	Data analysis on pre/post data in relation to specified outcome measures
By 30th June 2017	End of evaluation, readiness to trial meeting with EEF and report*

*Further information from EEF required to determine exact timeline for this.

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APPENDIX 1

School Agreement to participate in the Teensleep Pilot Study

Please sign two copies, retaining one and returning the second copy to Claire Beauchamp at the Sleep and Circadian Neuroscience Institute, Nuffield Department of Clinical Neurosciences, University of Oxford, Oxford Molecular Pathology Institute, Sir William Dunn School of Pathology, South Parks Road, Oxford, OX1 3RE.

School Name:

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Aims of the Evaluation

The aim of this pilot project is to evaluate the impact of the Teensleep education programme, the largest study ever to assess the effects of sleep education on academic, health and sleep outcomes. The results of the research will contribute to our understanding of whether sleep can be improved via education, and the effect this has on health and wellbeing. Ultimately we hope that the evaluation will equip school staff with knowledge to better support young people in improving their sleep habits and ultimately with achieving GCSEs.

Rationale

Sleep is of great importance for our health and wellbeing. It replenishes and prepares us to function at our best during the daytime, and without adequate sleep we are more vulnerable to physical and mental illnesses. Of course, such long-term effects are of concern, but also important are the next day effects of poor sleep, which include fatigue, problems with concentration and learning, irritability and other interpersonal difficulties. Scientists have taken great interest in what sleep is and how it works. We now know that there are two processes that work in harmony to control our sleep-wake pattern. The first of these is sleep-wake homeostasis. This system tells us that the need for sleep is accumulating as we progress throughout the day, and helps us to maintain sleep throughout the night to make sure that the sleep we get compensates for hours of wakefulness. If this system existed alone then we would all start the day feeling fresh and progressively get drowsier as the day went on. This is not the case: we have peaks and troughs in our tiredness/alertness throughout the day. The second process, our circadian biology or biological clock, drives this pattern.

Changes in circadian biology during adolescence have a profound effect on the adolescent sleep-wake cycle. From the age of about ten our circadian rhythms begin to delay, and continue to delay until around 21 years old. This means that as we go through adolescence and into early adulthood we are naturally more inclined to go to bed later and get up later. The biological underpinnings of this are well mapped out. The circadian rhythm is driven by the suprachiasmatic nucleus (SCN), a part of our brains, which receives light signals from the optic nerve. In the morning, when it begins to get light, the SCN tells us it is time to be awake. The SCN then signals the onset of various processes, such as increasing body temperature and the production of certain hormones, such as cortisol, which, amongst other functions, increases blood sugar, to provide an increase in energy levels. Other hormones, such as melatonin, are suppressed. Melatonin is crucial in the onset of sleep and sleep maintenance.

Melatonin levels typically remain low during the day and high during the night, increasing as we approach sleep.

In adolescence it has been shown that melatonin levels naturally rise later, making it difficult to go to sleep early, and difficult to get up early. Therefore, asking an adolescent to get up at 7am to start school at 9am is akin to asking a 55-year-old to get up at 5am; this leads to a significant amount of sleep deprivation. Adolescents generally have a natural circadian dip between 3-7am. The interaction between the circadian rhythm and sleep deprivation elongates this dip, extending it until around 10am. This means that adolescents are typically starting school at a time when they are feeling the effects of sleep deprivation and when their natural rhythms are not optimised for alertness, engagement, and therefore learning. Compounding this, it is well established that sleep has a pivotal role to play in learning and memory consolidation.

Not only do adolescents have a natural biological predisposition to staying up later, but also the devices they use to communicate and for entertainment may also impact sleep. TV screens, tablets and phones emit light at a level that may interfere with sleep onset, compounding the effects of the naturally occurring circadian delay. Pupils are also dealing with the stress of exams and the pressure to perform well. We will therefore be looking at the effect of sleep education on sleep quality and academic outcomes. This will be the largest study to look at whether sleep education can be utilised to minimise some of the effects of the delay in the adolescent biological clock and sleep deprivation resulting from poor sleep habits and behaviours.

The Pilot Study

The pilot study will be conducted to evaluate the content, delivery and efficacy of a sleep education programme. Changes in sleep behaviour and practices will be evaluated to determine the ability of the sleep education programme to improve adolescent sleep. This will be used to refine the programme in preparation for a main trial, which will assess whether sleep education improves academic performance at GCSE, and sleep quality. The content will include guidance on good bedtime routines, the science behind sleep related behaviours, stress-management techniques and how to maintain good sleep during periods of stress.

Teachers (at least two) within your school will be trained in delivering the programme which consists of five hours of content designed as tenx30 minute topics which can be delivered flexibly (e.g., fivex60 minute lessons). The training will take place in your school and last three hours by the research team at the University of Oxford. We would then like teachers who have undergone the training to cascade this to other teachers in the school who will also be delivering the programme. You will be provided with a handbook, lesson plans and PowerPoint slides to assist you in delivering each of the lessons. We will also provide you with a handbook to give to each student to use during the lessons to facilitate learning and assist with required activities. These materials should be used also in the cascade training. Teachers who are delivering the cascade training will be provided with the slides that the researchers used in the initial training sessions. Any questions or uncertainty that arises during the cascade training should be fed back to the research team, who will respond to queries and provide extra input where needed. The programme must be provided to Year 10 students between September and the end of November 2016.

To help us evaluate the impact of the programme, we will also be surveying all Year 10 pupils involved through questionnaires at the beginning and end of the pilot study. This survey will assess sleep, sleepiness, circadian preference, general wellbeing and sleep hygiene. The questions asked in the survey are non-invasive, and it will be made clear to all pupils taking the survey that they can miss out any question that they are uncomfortable answering. We will provide the school with the surveys for teachers to distribute during class time for pupils to complete. The survey will take approximately 40 minutes to complete, and should be completed under exam conditions. Once complete, the University of Oxford team will arrange for a courier to collect the surveys. Following completion of this survey, if the researchers think that it would be good for the pupil to talk to their parents/carers or a doctor about their health or wellbeing following this conversation, they will inform the relevant teacher at the school. Pupils will also be asked to complete a sleep knowledge quiz at the beginning and end of the sleep education programme. This will allow us to evaluate if it is an improvement in sleep knowledge that drives any change in their sleep patterns/quality. Again, we will provide the school with the sleep knowledge quiz to distribute to pupils to complete during class time. We anticipate the sleep knowledge quiz will take pupils no longer than ten minutes to complete. Once complete, the University of Oxford team will arrange for a courier to collect the surveys. The survey data are gathered anonymously so, researchers cannot trace back data to an individual pupil. To allow us to do this, pupils will be asked to put their examination number on all surveys as their unique code therefore students will need to be supplied with this number if they do not know it. If information about survey responses needs to be sent back to schools then this number along with the nature of the concern will be returned to schools for them to then identify the pupil.

Schools will be required to inform all parents of pupils about the research by giving out information sheets and consent forms provided by us. Schools will need to collect Opt-Out consent forms from parents/carers of pupils who do not wish their child to take part in the sleep survey or sleep knowledge quiz. As well as the information sheets, we will also ask schools to distribute a pamphlet to parents which explains the importance of sleep and gives some information on what we are teaching the pupils.

We would also like to monitor sleep patterns and activity levels during the day, over a two week period before and after the programme is delivered, in a sub-group of 15 pupils using wrist worn devices. These are completely non-invasive devices that students wear like a watch. These devices will be used to allow us to investigate whether sleep length and quality improves as a result of the programme. During this time, these 15 pupils will also be asked to fill in a sleep diary. This will assess the individual's perception of their sleep, and also provide the researchers with information regarding sleep habits, for example caffeine consumption after 6pm. Pupils will be asked to volunteer for these aspects of the research. We will require the school to distribute and collect information sheets and consent forms to parents of pupils wishing to take part in the sleep monitoring aspect of the pilot study. Fifteen pupils will be selected at random from all the pupils who return a consent form to this sleep monitoring activity. The University of Oxford team will then arrange a time with you to visit your school to carry out screening interviews with 15 consenting pupils, these will take up to 15 minutes per pupil, and will happen in the afternoon after the teacher training session. Pupils therefore will be asked to be taken out of class for these interviews. The screening interviews ask pupils about their general health (physical and psychological) as these factors may influence sleep. Unfortunately, we cannot include individuals who have a current sleep disorder (e.g., insomnia, sleep walking), psychological disorder (e.g., ADHD, anxiety, depression), physiological disorder which may interfere with sleep (e.g., asthma, diabetes, epilepsy,

metabolic disorders), heart-rhythm abnormalities, or who take medications that may impact on sleep (e.g., antihistamines, antidepressants, corticosteroids – such as the brown inhaler). We also cannot include individuals who have suffered a concussion where they were unconscious for more than five minutes, or those who have been to a country which is three or more time zones away from the UK (e.g., USA or Asia) within the last six months. If the researchers think that it would be good for the pupil to talk to their parents/carers or a doctor about their health or wellbeing following this conversation, they will inform the relevant teacher at the school.
Once the two week monitoring period is over, we will require the school to collect in the devices and sleep diaries from participating pupils, after which the research team will arrange a courier to collect them. Asking pupils to complete the surveys, and for a sub-sample to wear the devices, will allow us to assess the feasibility of these methods in the school environment and track any improvements caused by the sleep education programme.

A prize draw is being offered to all students who complete a full 14 days of sleep monitoring on the wrist worn device (£25 Amazon voucher per school both before and after the Teensleep lessons). Students who complete both 14 day periods will also be entered into a larger prize draw across all schools for a chance to win an iPad. A prize draw is also being offered for all completed surveys at each round of data collection (2 x £25 Amazon Voucher per school both before and after the Teensleep lessons). The Oxford researchers will provide the exam candidate numbers of the students who achieve this to the evaluation team so they can conduct each of the prize draws.

Who has reviewed this project?

This project has been reviewed by, and received ethics clearance through, the University of Oxford Central University Research Ethics Committee and through Durham University's School of Education Ethics Committee.

Data protection

All pupil data collected during the research project will be stored securely, treated confidentially, shared between the research teams at the University of Oxford and Durham University and used only for research purposes. Everyone who has access to the project's data has a duty of confidentiality and is responsible for handling study data in accordance with applicable Data Protection law(s) and has undergone relevant data protection training. All research staff who enter the schools as part of this pilot study will have DBS clearance.

Who is running the project and who do I contact for further information?

The Teensleep education programme has been designed and will be delivered by researchers at the University of Oxford and is being evaluated by an evaluation team based at Durham University.

For further information on the Teensleep programme please contact the project coordinator, Adam Jowett: adam.jowett@ndcn.ox.ac.yk; 01865 618 666.

For further information on the evaluation of the Teensleep programme, please contact Dr Lyn Robinson (Lead Researcher, CEM Durham University) on 0191 334 4197 or by email teensleepevaluation@cem.dur.ac.uk.

Responsibilities

The UNIVERSITY OF OXFORD TEAM will:

- Provide a half-day course in delivering the education intervention, making sure teachers understand the science behind the lessons and how to use the materials properly
- Provide on-going support to the school in terms of facilitating survey collection and supporting cascade training

The SCHOOL will (please tick):

- ☐ Ensure the shared understanding and support of all school staff for the project and personnel involved
- ☐ Release relevant staff so that they can attend a half-day training session
- ☐ Provide cascade training to teachers delivering the programme who did not attend the half day training session
- ☐ Deliver the sleep education programme to Year 10 students
- ☐ Inform all parents/carers about the study and collect Opt-In/Out consent forms
- ☐ Be a point of contact for parents/carers seeking more information on the project
- ☐ Facilitate the completion of the surveys and sleep quiz by all pupils before and after the programme and return to the Oxford team when requested
- ☐ Support the completion of sleep diaries and the wearing of wrist devices in the sub group of selected pupils
- ☐ Agree to participate in the evaluation of the Teensleep education programme, being led by Durham University (please read the 'Teensleep pilot study evaluation, information for schools' sheet). Please note, your participation in the Teensleep education programme is dependent upon your participation in the evaluation.

We commit to the Evaluation of Teensleep as detailed above:

Head teacher name: _____

Signature: _____

Other relevant school staff names:

_____

Date: _____

APPENDIX 2

Evaluation of the Teensleep Education Programme

Information for Schools

The Teensleep education programme has been designed and will be delivered by researchers at the University of Oxford. The pilot study has been funded by the Education Endowment Foundation (EEF) and the Wellcome Trust who have selected researchers at the Centre for Evaluation and Monitoring at Durham University to evaluate how effective the Teensleep programme is. You have received this information sheet as you have identified that your school would like to take part in the Teensleep education programme pilot study, details of which can be found on the enclosed/attached 'School agreement to participate in the Teensleep pilot study; 4 Aug 16 v8' document. To take part in the pilot study, your school must also agree to take part in the evaluation of the Teensleep programme.

What does the evaluation involve?

All schools who sign-up to participate in the Teensleep pilot study will need to:

1. Identify a staff member to be the key point of contact for the evaluation team.

2. Provide information on all Year 10 pupils including school attendance data, their eligibility to receive Free School Meals, gender and Key Stage 2 point score, providing parental consent has been obtained.

3. Provide a delivery schedule of when all Teensleep lessons will be taught (including the lesson content, date/time of delivery and the name of the teacher delivering the session) and supply completion data to Dawn Mee, the evaluation team's research administrator, who will contact you via telephone or email weekly to see if the Teensleep programme has been delivered as originally planned alongside the pupil attendance data at each lesson.

4. Complete an online or on paper survey following training (and return to the evaluation team) which it will take no longer than 15 minutes (applicable to all staff members who completed the training).

5. Complete an online survey after all of the Teensleep lessons have been taught. All staff members who taught the programme will be emailed the link to this survey. It will take no longer than 15 minutes to complete.

6. Identify the staff member who led cascade training (if applicable) to participate in a short telephone interview lasting no longer than 30 minutes. This staff member will be requested to complete a separate consent form. This interview will take place at a time convenient to the staff member.

7. Identify all staff members who attended the cascade training so that the research team can randomly select one teacher to participate in a short telephone interview lasting no longer than 30 minutes to discuss their experience of the cascade training. This staff member will be requested to complete a separate consent form. This interview will take place at a time convenient to the staff member.

For completing these elements of the evaluation, your school will receive a £200 Amazon voucher.

Your school may also be selected to facilitate a visit from a member of the research team to:

1. Observe the training session led by the University of Oxford, and the cascade-led training session led by staff in your school.
2. Observe two Teensleep lessons being delivered within your school at two different time points.
3. Conduct a focus group with two groups of 5-8 students (one group who did not take part in the sleep monitoring aspect of the pilot study, and one group who did). These focus groups will last between 30-45 minutes, and are to take place within school time during January-February 2017. The research team will arrange with you the most convenient time for these to take place. Beforehand, we will provide you with information sheets and consent forms to distribute to parents of students wishing to take part in the focus group.

For participating in these additional observation visits and helping the research team facilitate the student focus group your school will receive an additional £400 Amazon voucher.

How will data collected from schools be used in this project?

Data collected as part of this project will be used only for research purposes and will be collected to evaluate the Teensleep programme, its impact on pupils, and how the programme is implemented. We will handle all research data confidentially and in line with the Data Protection Act. During the project, data will be shared between the universities involved (University of Oxford) but will only be accessed by the specific staff working on the project. Any researcher who visits your school will have DBS clearance.

Who has reviewed this evaluation?

This evaluation has been reviewed and approved by Durham University's School of Education Ethics Committee.

Who is running the evaluation and who do I contact for further information?

A research team at the Centre for Evaluation and Monitoring at Durham University, led by Dr Lyn Robinson, is evaluating how effective the Teensleep programme is. If you have any questions, concerns of require further information on the evaluation of the Teensleep programme, please contact Mrs Dawn Mee (research administrator) in the first instance by telephone (0191 334 4367) or by email (TeenSleepEvaluation@cem.dur.ac.uk).

If you have any questions relating directly to the Teensleep education programme, please contact the Postdoctoral Research Assistants, Dr Rachel Sharman or Dr Gaby Illingworth (teensleep@ndcn.ox.ac.uk).

Do we have to take part in the evaluation?

Participation in the Teensleep pilot study is voluntary; you should choose whether you wish your school to take part. However your school cannot implement the Teensleep programme unless you also agree to participate in the evaluation. If you do wish to be involved, we will ask the head teacher to sign a Memorandum of Understanding (attached) showing that they understand and agree to all aspects of taking part in the evaluation of the project.

Will the evaluation be published?

At the end of the Teensleep programme, a report will be made publicly available on the Education Endowment Foundation's website (https://educationendowmentfoundation.org.uk), for anyone who is interested in the findings of the research. Data will also be published in relevant academic journals. Individual data will not be published; therefore, no individual could be identified via these publications.

Evaluation of the Teensleep Education Programme

School Memorandum of Understanding

To be completed by the head teacher. Please tick each box, sign and provide information below:

- ☐ I confirm that I have read and understood the information sheet for the Evaluation of the Teensleep Education Programme and have had the opportunity to ask questions.
- ☐ I understand that by agreeing to take part in the delivery of the Teensleep programme, we also agree to take part in the evaluation and will receive a £200 Amazon voucher for the school.
- ☐ I agree to identify a staff member to be the key point of contact for the evaluation team.
- ☐ I agree to provide the evaluation team with my school's delivery schedule of the Teensleep programme and to provide completion and attendance data of each session.
- ☐ I agree to send the research team the pupil information required as detailed in the information sheet. I understand that the research team will only use any information gathered in this project for research purposes as described.
- ☐ I agree for staff to complete the requested surveys and participate in the telephone interviews (if applicable). I understand that separate consent will be sought from individuals involved in the interviews.
- ☐ I understand that members of the research team may request to visit the school to observe Teensleep lessons, and conduct focus groups with some students. If my school is chosen for this, I understand the school will receive an additional £400 Amazon gift voucher.
- ☐ I understand that all child and staff data will be kept confidential and that no material which would identify the school or individual children or staff will be used in any reports of this evaluation
- ☐ I consent to my school taking part in the evaluation of the Teensleep education programme.

Head Teacher name:_____Head Teacher signature:_____

Date:_____

School Name:_____School postcode:_____

Email address:_____

Identified key staff member:_____Their email address:_____

APPENDIX 3

Teensleep Pilot Study
Information for Pupils and Parents/Carers
The Teensleep Education Programme: Surveys and Sleep Knowledge Quiz

1. Study title

Teensleep: Improving Sleep in Adolescence through Education

2. Background of the study

You may be aware that the pupil's school is taking part in the pilot study of the Teensleep project. The following paragraphs will explain the overall project and the pilot study, and then go on to explain what the pupil is being asked to do and why.

Background to the Teensleep project

Sleep is of great importance for our health and wellbeing. It replenishes and prepares us to function at our best during the daytime. Without good sleep, we are more likely to become unwell. These long-term effects are of concern, but so are the effects of poor sleep the following day. If you do not sleep well or get enough sleep, you are likely to feel tired, have problems with concentration, and probably feel irritable. Scientists have taken great interest in what sleep is and how it works, particularly in adolescence. We know that during the teenage years sleep patterns change. This change is driven by a change in the level of a hormone called melatonin. High levels of melatonin help us to fall asleep, and we find it difficult to sleep if there are low levels of melatonin in our bodies. During teenage years the levels of melatonin we produce begin to change. This change means that teenagers find it very difficult to fall asleep early, and difficult to wake up early. Asking a teenager to get up at 7am to start school at 9am is like asking a 55-year old to get up at 5am: this leads to a significant amount of sleep deprivation.

As well as the changes in biology which occur during the teenage years, there are other factors which contribute towards poor sleep quality such as using devices (like tablets, smartphones, and computer games) to communicate and for entertainment late into the evening. TV screens, tablets and phones emit light at a level that may interfere with how easily you can fall asleep, which may interact with the effects of the biological changes. Teenagers are also dealing with the stress of exams and the pressure to perform well.

In this project we are looking at the effect of sleep education on sleep quality, mood and wellbeing. This information will then hopefully lead to projects assessing the effects of sleep education on educational performance which we would expect to improve if sleep improves.

During the autumn of 2016 the pupil will receive the Teensleep lessons, which have been written by researchers at the University of Oxford, and that their teachers have been trained to deliver. The Teensleep lessons will teach pupils about:

- Good bedtime routines
- The science behind good sleep related behaviours
- How to deal with stress, particularly
- How to maintain good sleep during stressful times

This will be the largest study to look at the effect of sleep education on adolescent sleep, health, wellbeing, and academic performance.

3. What will happen in the pilot study?

The Teensleep pilot study is being carried out to evaluate the content and delivery of a sleep education programme in order to obtain feedback from teachers and students on its accessibility and feasibility. This feedback will be used to refine the programme in preparation for the main trial when we will assess whether sleep education improves sleep quality, general wellbeing and academic performance at GCSE. As part of the evaluation of the sleep education programme, we will find out how much pupils know about sleep through a quiz. This is a short quiz, lasting approximately ten minutes and students will be requested to complete this by their teachers during lesson time.

In order for us to track any improvements in the pupil's health, sleep, and wellbeing that may result from the Teensleep lessons, we also want to conduct a survey with all pupils taking the lessons. If you agree that the pupil can take part in this, we will be asking pupils to complete a short survey twice; once before and once after the sleep education programme is taught. The survey will take about 30–40 minutes to complete. The survey will ask questions about:

- *Sleep quality* – for example 'How long does it take you to fall asleep?'
- *Tiredness* – we will ask pupils to rate how likely it is that they will fall asleep during certain activities, such as doing schoolwork at home in the evening
- *Wellbeing* – for example 'Thinking about the last week, have you been in a good mood?' or 'Thinking about the last week, have you had fun with your friends?'
- *Whether they are more alert in the evening or the morning* – for example 'I go to bed at [insert time]' or 'I wake up with/without the use of an alarm clock'
- *Sleep hygiene* – we will ask pupils about their sleep habits, for example 'I fall asleep while listening to loud music' or 'I go to bed feeling hungry'

Pupils who complete a survey, before and after the Teensleep lessons, will be entered into a prize draw at their school for a chance to win one of two £25 Amazon Vouchers. Following the survey, if the researchers think that it would be good for the pupil to speak to their parent or a doctor about their health or wellbeing following this survey, they will inform the relevant teacher at the school.

In order for us to understand how different individuals respond to the Teensleep programme, we will also request that the pupil's school provides the research team (at Durham University) with information on the pupil's gender, attendance, their eligibility for Free School Meals and Key Stage 2 point score.

More information on the Teensleep Pilot Study and the research team can he found here: www.teensleep.org.uk.

4. Why has the pupil been invited to take part?

You have been contacted about this research because the pupil is in year 10 and their school has agreed to participate in the pilot study.

5. Is the pupil eligible to take part?

All pupils receiving the sleep education programme in Year 10 are eligible to take part.

6. Does the pupil have to take part?

Before you agree that the pupil can take part you should have had a chance to talk with the researchers about the study and fully understand what the pupil is being asked to do. It is also important that you have read this information sheet in full, to ensure you know exactly what the pupil is being asked to do and what their rights are as a participant. If you have any questions about any of this then please contact a member of the research team (details of how to do so are in the 'people' section below). Please remember that **the pupil is free to withdraw at any time without reason and without penalty. Their participation is voluntary. If you are not happy with the pupil taking part you are under no obligation at all to agree.**

7. Are there any potential risks in taking part?

There are no risks or direct benefits to taking part in this aspect of the pilot study; however, the information the pupil provides will tell us more about the accessibility and feasibility of the sleep education programme and will hopefully give us a better understanding of how sleep education may affect sleep and wellbeing in adolescence.

9. What happens to the research data provided?

All of the pupil's data collected during the research project will be stored securely, treated confidentially, shared only between the research teams at the University of Oxford and Durham University and used only for research purposes. Everyone who has access to the project's data has a duty of confidentiality and is responsible for handling study data in accordance with applicable Data Protection law(s) and has undergone relevant data protection training. None of the information we collect will affect the pupil's place at their school. All research staff who enter the school as part of this pilot study will have DBS clearance. Oxford University will store the data gathered for up to five years after the end of the trial, to allow time for it to be properly analysed, published and reviewed. After this period it will be destroyed. The University's data storing policies can be read here:

http://researchdata.ox.ac.uk/university-of-oxford-policy-on-the-management-of-research-data-and-records/ . Again data are stored anonymously and you will never be identified.

10. Will the research be published?

At the end of the Teensleep programme of research, a report will be made publicly available on the Education Endowment Foundation's website (https://educationendowmentfoundation.org.uk), for anyone who is interested in the findings of the research. Data will also be published in relevant academic journals. Individual data will not be published; therefore, no individual could be identified via these publications.

11. Who has reviewed this project?

This project has been reviewed by, and received ethics clearance through, the University of Oxford Central University Research Ethics Committee and through Durham University's School of Education Ethics Committee.

12. Who are the research team?

The Teensleep programme is being delivered to schools by a research team at the University of Oxford.

The Principal Investigators on this research are Professors Russell Foster (Russell.Foster@eye.ox.ac.uk) and Colin Espie (Colin.Espie@ndcn.ox.ac.uk). More information on all the staff involved can be found at www.teensleep.org.uk.

A research team from the Centre for Evaluation and Monitoring (CEM) at Durham University, led by Dr Lyn Robinson (Email: Lyn.Robinson@cem.dur.ac.uk, Tel: 0191 334 4197), has been asked to see how effective the Teensleep programme is by the Education Endowment Foundation, an organisation that funds research into education, and the Wellcome Trust, an organisation that funds research to improve health.

13. Whom do I contact if I have a question or concern about the study or I wish to complain?

If you have a concern about the Teensleep education programme, please contact the Postdoctoral Research Assistants, Dr Rachel Sharman or Dr Gaby Illingworth (teensleep@ndcn.ox.ac.uk) who will do their best to answer your query. The researchers at the University of Oxford should acknowledge your concern within ten working days and give you an indication of how they intend to deal with it. If you remain unhappy or wish to make a formal complaint, please contact the chair of the Research Ethics Committee at the University of Oxford who will seek to resolve the matter in a reasonably expeditious manner:

Chair, Medical Sciences Inter-Divisional Research Ethics Committee:
Email: ethics@medsci.ox.ac.uk
Address: Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD

For further information about the evaluation of the Teensleep programme more generally you can contact Mrs Dawn Mee on 0191 334 4367 or by email teensleepevaluation@cem.dur.ac.uk.

14. What should I do next?

If you are happy for the pupil's survey responses and knowledge about sleep to be used in the pilot of the Teensleep project, you do not need to do anything. Thank you for your help with this project.

If you would rather the pupil did not complete surveys or provide information about their sleep knowledge, please complete the attached form and return it to the pupil's school by [INSERT DATE]

Teensleep Pilot Study Evaluation: Opt-Out Form

If you **do not** want information to be provided by the pupil and shared for use in the Teensleep pilot study, please return this form to the pupil's school by [INSERT DATE]

☐ I **do not** want information about the pupil's sleep knowledge to be shared for use in the Teensleep pilot study

☐ I **do not** want the pupil to complete the surveys and for their responses to be shared for use in the Teensleep pilot study

☐ I **do not** want the pupil's school to share the following information on the pupil for use in the Teensleep pilot study: gender, attendance, their eligibility for Free School Meals and Key Stage 2 point score

Parent/Carer Signature _____ Date _____

Child's Name _____

Child's School _____

APPENDIX 4

Teensleep Pilot Study
Information for Pupils and Parents/Carers
Collecting Information about Sleep

1. Study title

Teensleep: Improving Sleep in Adolescence through Education

2. Background of the study

You may be aware that your school is taking part in the pilot study of the Teensleep project. The following paragraphs will explain the overall project and the pilot study, and then go on to explain what you (the pupil) are being asked to do and why.

Background to the Teensleep project

Sleep is of great importance for our health and wellbeing. It replenishes and prepares us to function at our best during the daytime. Without good sleep, we are more likely to become unwell. These long-term effects are of concern, but so are the effects of poor sleep the following day. If you do not sleep well or do not get enough sleep, you are likely to feel tired, have problems with concentration, and probably feel irritable. Scientists have taken great interest in what sleep is and how it works, particularly in adolescence. We know that during the teenage years sleep patterns change. This change is driven by a change in the level of a hormone called melatonin. High levels of melatonin help us to fall asleep, and we find it difficult to sleep if there are low levels of melatonin in our bodies. During teenage years the levels of melatonin we produce begin to change. This change means that teenagers find it very difficult to fall asleep early, and difficult to wake up early. Asking a teenager to get up at 7am to start school at 9am is like asking a 55-year old to get up at 5am; this leads to a significant amount of sleep deprivation.

As well as the changes in biology which occur during the teenage years, there are other factors which contribute towards poor sleep quality such as using devices (like tablets, smartphones, and computer games) to communicate and for entertainment late into the evening. TV screens, tablets and phones emit light at a level that may interfere with how easily you can fall asleep, which may interact with the effects of the biological changes. Teenagers are also dealing with the stress of exams and the pressure to perform well. In this project we are looking at the effect of sleep education on sleep quality, mood and wellbeing. This information will then hopefully lead to projects assessing the effects of sleep education on educational performance which we would expect to improve if sleep improves.

During the autumn of 2016 you will receive the Teensleep lessons, which have been written by researchers at the University of Oxford, and that your teachers have been trained to deliver. The Teensleep lessons will teach pupils about:

- Good bedtime routines
- The science behind good sleep related behaviours
- How to deal with stress, particularly
- How to maintain good sleep during stressful times

This will be the largest study to look at the effect of sleep education on adolescent sleep, health, wellbeing, and academic performance.

3. What will happen in the pilot study?

The school you are attending has agreed to take part in the pilot study of the Teensleep project. The pilot study is being carried out to evaluate the content and delivery of the Teensleep lessons in order to get feedback from teachers and students on its accessibility and use in schools alongside assessing if the lessons can improve sleep. This will be used to refine the programme in preparation for the main trial which will assess the effect of sleep education on sleep, general wellbeing and academic performance at GCSE level.

In order for us to track any improvements to sleep which may result from the Teensleep lessons, we are selecting a small group of pupils at random from each school to look at their sleep in more detail for two weeks before the lessons start and again for two weeks after they finish. If you agree to participate in this part of the research, you will be given a sleep diary and a movement device to wear like a watch around your non-dominant wrist. The device measures how active you are during the day, and will allow us to assess how well you sleep during the night. The sleep data gathered will allow us to assess how sleep changes in response to the intervention, and if changes in sleep affect general wellbeing. **The watch must be worn constantly over the two-week period, except when bathing or swimming.**

As well as the watch, you will also be provided with a sleep diary. We will be asking you to fill this diary out every day, before you go to sleep about the day you have just had and then in the morning shortly after you wake up about the sleep you have just had and how you feel. This diary will allow us to review how much sleep you believe you are getting and how this compares to the data we get from the watch. It will also ask questions about other lifestyle factors that may affect sleep, such as the amount of caffeine you consume after 6pm and your media use in the hour before bed.

A researcher from the University of Oxford will visit you at school to deliver the watch and sleep diary, and explain how to use both during class time.

Students who complete a full 14 days of sleep monitoring on the wrist worn device will be entered into a prize draw at their school for a £25 Amazon voucher. Students who complete both 14 day periods will also be entered into a larger prize draw across all schools for a chance to win an iPad. At the end of the two week period, you will need to return you watch and sleep diary to your teacher.

4. Why have I been invited to take part?

You have been contacted about this research because you are in Year 10 and your school has agreed to participate in the pilot study.

5. Can I take part?

Before you can participate in sleep monitoring, a researcher from the University of Oxford will have a short conversation with you lasting about five minutes and will write down your answers from this in a questionnaire. We will ask about your sleep and also about your general health (physical and psychological) as these factors may influence how you sleep. Unfortunately, we cannot include individuals who have a current sleep disorder (e.g., insomnia, sleep walking),

psychological disorder (e.g., ADHD, anxiety, depression), physiological disorder which may interfere with sleep (e.g., asthma, diabetes, epilepsy, metabolic disorders), heart-rhythm abnormalities, or who take medications that may impact on sleep (e.g., antihistamines, antidepressants, corticosteroids – such as the brown inhaler). We also cannot include individuals who have suffered a concussion where they were unconscious for more than five minutes, or those who have been to a country which is three or more time zones away from the UK (e.g., USA or Asia) within the last six months. If the researchers think that it would be good for you to talk to your parents/carers or a doctor about your health or wellbeing following this conversation, they will speak to a teacher at your school.

Fifteen pupils will be randomly selected to wear the movement watch and complete the sleep diary from all pupils who meet the inclusion criteria and whose parents have returned signed consent forms.

6. Do I have to take part?

Before you agree to take part you should have had a chance to talk with the researchers about the study and fully understand what you are being asked to do. It is also important that you have read this information sheet in full, to ensure you know exactly what you are being asked to do and what your rights are as a participant. If you have any questions about any of this then please contact a member of the research team (details of how to do so are in the 'people' section below). **After agreeing to participate you are free to withdraw at any time without reason and without penalty. Your participation is voluntary. If you are not happy with taking part you are under no obligation at all to agree.**

7. Are there any potential risks in taking part?

There are no risks or direct benefits to taking part in this aspect of the pilot study; however, the information you provide will tell us more about the best ways to use movement devices and sleep diaries with school students and will hopefully give us a better understanding of how sleep education may affect sleep and wellbeing in adolescence.

8. What happens to the research data provided?

All your data collected during the research project will be stored securely, treated confidentially, shared between the research teams only at the University of Oxford and Durham University and used only for research purposes. We will not use your name or the name of the school in any report arising from the research. Everyone who has access to study data has a duty of confidentiality and is responsible for handling study data in accordance with applicable Data Protection law(s) and has undergone relevant data protection training. Oxford University will store the data for up to five years after the end of the trial, to allow time for it to be properly analysed, published and reviewed. After this period it will be destroyed. The University's data storing policies can be read here: http://researchdata.ox.ac.uk/university-of-oxford-policy-on-the-management-of-research-data-and-records/ . None of the information we collect will affect your child's place at their school. All research staff who enter the school as part of this pilot study will have DBS clearance.

9. Will the research be published?

At the end of the Teensleep programme of research, a report will be made publicly available on the Education Endowment Foundation's website (https://educationendowmentfoundation.org.uk), for anyone who is interested in the findings of the research. Data will also be published in relevant academic journals. Individual data will not be published; therefore, no individual could be identified via these publications.

10. Who has reviewed this project?

This project has been reviewed by, and received ethics clearance through, the University of Oxford Central University Research Ethics Committee and through Durham University's School of Education Ethics Committee.

11. People

The Teensleep programme is being delivered to schools by a research team at the University of Oxford.
The Principal Investigators on this research are Professors Russell Foster (Russell.Foster@eye.ox.ac.uk) and Colin Espie (Colin.Espie@ndcn.ox.ac.uk). More information on all the staff involved can be found at www.teensleep.org.uk. Any queries should initially be sent to teensleep@ndcn.ox.ac.uk. Any complaints should be directed to the Principal Investigators. If you wish to change details we hold about you, you should contact one of the principle investigators.

A research team from the Centre for Evaluation and Monitoring (CEM) at Durham University, led by Dr Lyn Robinson (Email: Lyn.Robinson@cem.dur.ac.uk, Tel: 0191 334 4197), has been asked to see how effective the Teensleep programme is by the Education Endowment Foundation, an organisation that funds research into education, and the Wellcome Trust, an organisation that funds research to improve health.

12. Whom do I contact if I have a concern about the study or I wish to complain?

If you have a concern about any part of the Teensleep education programme, please contact the Postdoctoral Research Assistants, Dr Rachel Sharman or Dr Gaby Illingworth (teensleep@ndcn.ox.ac.uk) who will do their best to answer your query. The researchers at the University of Oxford should acknowledge your concern within ten working days and give you an indication of how they intend to deal with it. If you remain unhappy or wish to make a formal complaint, please contact the chair of the Research Ethics Committee at the University of Oxford who will seek to resolve the matter in a reasonably expeditious manner:

Chair, **Medical Sciences Inter-Divisional Research Ethics Committee**:
Email: ethics@medsci.ox.ac.uk
Address: Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD

For further information about the evaluation of the Teensleep programme more generally you can contact Mrs Dawn Mee on 0191 334 4367 or by email teensleepevaluation@cem.dur.ac.uk.

13. I'm happy to take part, what do I do next?

Please complete the attached consent form and return it to school by [INSERT DATE].

Teensleep Pilot Study
CONSENT FORM for Pupils and Parents/Carers
Collecting Information about Sleep

Names and roles of researchers:

University of Oxford: Professor Russell Foster – Co-Principal Investigator

Professor Colin Espie – Co-Principal Investigator

Dr Christopher-James Harvey – Research Associate

Mr. Adam Jowett- Project Coordinator

Dr Gaby Illingworth – Postdoctoral Research Assistant

Dr Rachel Sharman – Postdoctoral Research Assistant

University of Durham: Dr Lyn Robinson – Principal Investigator
Professor Helen Ball - Co-principal Investigator
Dr Helen Wareham - Co-principal Investigator
Dr Sue Stothard – Co-principal Investigator
Dr Laura da Costa – Research Assistant
Mrs Kirsty Younger – Research Associate
Mrs Dawn Mee – Research Administrator

	Please initial box	*Yes*	*No*
1. I confirm that I have read and understand the information sheet dated 24th August 2016 for the above study, have had the opportunity to ask questions, and have had satisfactory answers to any questions.		☐	☐
2. I understand that my child's participation is voluntary and they are free to withdraw at any time without giving any reason, without any adverse consequences as a result of this decision.		☐	☐
3. I understand that by giving consent my child will be asked to wear a movement watch and complete a sleep diary for two weeks both before and after the Teensleep lessons, should they meet the criteria and be randomly selected.		☐	☐
4. I understand that information my child provides will be shared with The University of Oxford, and the evaluation team at Durham University. I give permission for these organisations:			
a) to have access to the information provided, and		☐	☐
b) to store anonymised data for further analysis.		☐	☐

5. I understand that I will need to return all the research equipment provided to my child as soon as the study has finished. ☐ ☐

6. I understand how to raise a complaint. ☐ ☐

7. I give permission for my personal details to be kept after the study, so I can be contacted about future research (selecting no here does not affect eligibility to take part in the research). ☐ ☐

8. I agree to my child participating in this study. ☐ ☐

Name of Pupil	Signature	Date
Name of Parent/Carer	Signature	Date
Name of Researcher	Signature	Date

Please return this form to your child's school by [INSERT DATE].

APPENDIX 5

Teensleep Sleep Knowledge Quiz

Dear Student,

We want to know how much you know about sleep.

This quiz contains multiple choice questions about sleep. Please answer the best you can. Remember all your answers will remain anonymous and will not be shared with your teachers, parent(s)/carers, or other members of your class. Answer this quiz on your own, don't discuss how to answer a question with your friends.

Thanks for your time today and for taking part in our project,

The Teensleep team at the University of Oxford

Introduction

Please write the name of your school

Please enter your pupil number. If you are not sure your teacher will be able to tell you

What is your date of birth?

Please write in the format of DD/MM/YY (for example 14/10/01 is 14th October 2001)

__ __ / __ __ /__ __

What is your gender?

Please choose only one of the following:

○ Female ○ Male ○ Other

Please put a tick in **one circle only** to indicate the answer you think is correct for each question.

1. Sleep is a time when

○ The brain shuts down for rest and relaxation but the body remains active

○ The brain and body shut down for rest and relaxation

○ The body shuts down for rest and relaxation but the brain remains active

2. Most teenagers need

○ 7 – 8 hours of sleep a night

○ 9 – 10 hours of sleep a night

○ 11 – 12 hours of sleep a night

3. The 24-hour biological clock runs on a

○ Circadian rhythm

○ Ultradian rhythm

○ Infradian rhythm

4. REM sleep stands for

○ Rapid Eye Movement Sleep

○ Really Early Morning Sleep

○ Resting Event Monitoring Sleep

5. Which of these drinks is a source of caffeine?

○ Fanta

○ Lucozade

○ Lilt

6. Electronic devices are bad for sleep because the light they emit is

○ Yellow

○ White

○ Blue

7. Bright light early in the morning will

○ Make you feel more alert in the morning and fall asleep earlier that night

○ Make you feel more alert in the morning and fall asleep later that night

○ Make you feel alert in the morning and fall asleep at the usual time that night

8. Thinking a lot at bedtime

○ May make your sleep lighter and disturbed

○ Can make your sleep deeper and longer

○ Will have no effect on your sleep at all

9. Which of the following would be a good bedtime routine?

○ Exercising, eating dinner, and using your mobile phone

○ Doing homework, watching TV, and playing video games

○ Cleaning teeth, having a warm bath, and reading a printed book

10. Napping during the day should be avoided, but if needed

○ Can happen at any time and must last no more than 90 minutes

○ Can happen before 3pm and must last less than 20 minutes

○ Can happen before 6pm and must last less than one hour

11. Snacking before bed should be avoided but if needed a sleep promoting snack could be

○ Cereal and milk

○ Chicken and pasta

○ Hot chocolate and a biscuit

12. Having a long lie in is OK on

○ Saturday and Sunday

○ Saturday only

○ Sunday only

13. Deep sleep occurs

○ Mostly in the first half of the sleep period

○ Mostly in the last half of the sleep period

○ Occurs equally throughout the sleep period

14. In REM sleep you have

○ Slow wave sleep

○ Slow rolling eye movements

○ Vivid dreaming

15. At puberty, an adolescent's biological urge to sleep delays by

○ 0 – 1 hours

○ 1 – 3 hours

○ 3 – 5 hours

16. SleeP hYgiene refers to

○ Behaviours and habits that promote good sleep

○ Changing bed sheets to promote good sleep

○ Exercising just before bed to promote good sleep

17. The sleep hormone is called

○ Melatonin

○ Melanin

○ Myosin

18. The drop in alertness at lunchtime is called the

○ Pastpriory ditch

○ Postprandial dip

○ Prepreparatory drop

19. Whether a person is a morning or evening type is influenced by their

○ Clocktype

○ Phototype

○ Chronotype

20. If negative thoughts are stopping sleep we could try

○ To keep thinking about them

○ To forget them

○ To restructure them

APPENDIX 6

Oxford Teensleep | SCNi

TEENSLEEP PROJECT SLEEP DIARY

Instructions:
This diary is designed to provide a record of how you feel and your experience of sleep each day whilst wearing the activity monitoring device.
Each page relates to your mood and sleep experiences for a particular day. Please complete each day soon after you wake up. Take a few minutes to do this, trying to be as accurate as you can. We are interested in how you feel at the time you complete the diary. It is your best estimate of sleep that we are looking for, try not to clock watch at night.

The date you put on the top of each page is the morning you are filling the diary out.

If you have any questions please don't hesitate to contact us.

Pupil Number:_____

Jawbone Username:_____

School Name: _____

Date:_____

Project Coordinator: Adam Jowett
Contact: 01865 618666 adam.jowett@ndcn.ox.ac.uk

Day EXAMPLE

Please complete today's date 14 / OCT / 2015

MEASURING THE PATTERN OF YOUR SLEEP		HOURS : MINUTES
1	What time did you wake up this morning? *24hr clock*	0 7 : 3 0
2	At what time did you get out of bed this morning? *24hr clock*	0 7 : 4 5
3	At what time did you go to bed last night? *24hr clock*	2 3 : 3 0
4	Lights Out: At what time did you put the lights out to go to sleep? *24hr clock*	0 0 : 1 5
5	How long did it take you to fall asleep? (After Lights Out)	0 0 : 0 5
6	How many times did you wake up during the night?	2 TIMES
7	How long were you awake in total during the night?	0 0 : 1 0
8	About how long did you sleep altogether?	0 7 : 0 0
9a	Would you have liked to have slept longer? **YES / NO** (please circle)	
9b	If yes to Question 9a, how much longer?	0 1 : 0 0

MEASURING THE QUALITY OF YOUR SLEEP (PLEASE CIRCLE)					
	not at all		**moderately**		**very**
10	How rested/refreshed do you feel this morning?				
	0	1	2	3	4
11	How alert do you feel this morning?				
	0	1	2	3	4
12	How mentally alert were you in bed last night?				
	0	1	2	3	4
13	How physically tense were you in bed last night?				
	0	1	2	3	4

PRE-SLEEP HABITS	
14a	Did you take any medication yesterday? **YES / NO** (please circle)Y/N
14b	If yes to Question 14a, please list: **Antihistamine for hayfever** **Paracetamol for headache**
15a	Did you drink or eat any items containing caffeine after 6pm? **YES / NO** (please circle)
15b	If yes to Question 15a, please list: **Can of diet coke** **Cup of tea** **Chocolate bar** **Energy drink**