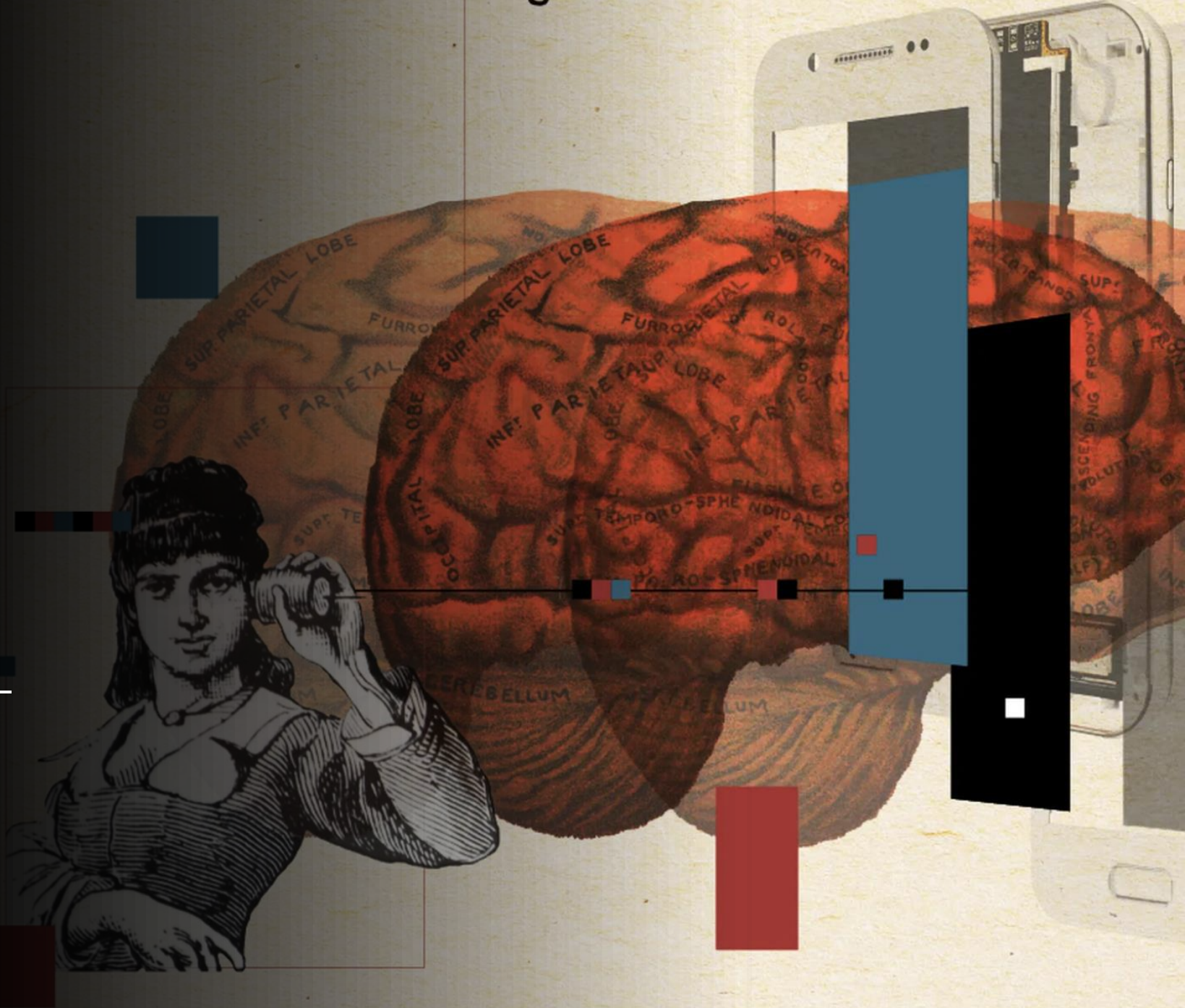# The relationship between problematic smartphone use, sleep and anxiety in secondary school students

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Introduction

Longstanding concern about
- Possible harmful effects of smartphones on mental health of teenagers
- Possible addictive potential of smartphones

Gulf between popular discourse and scientific literature on the first
e.g. Orban and Przybylski 2019 – large epi dataset which found no association between screentime and poor mental health

Parallel preoccupation in popular press/vernacular with smartphone 'addiction'

TECHNOLOGY

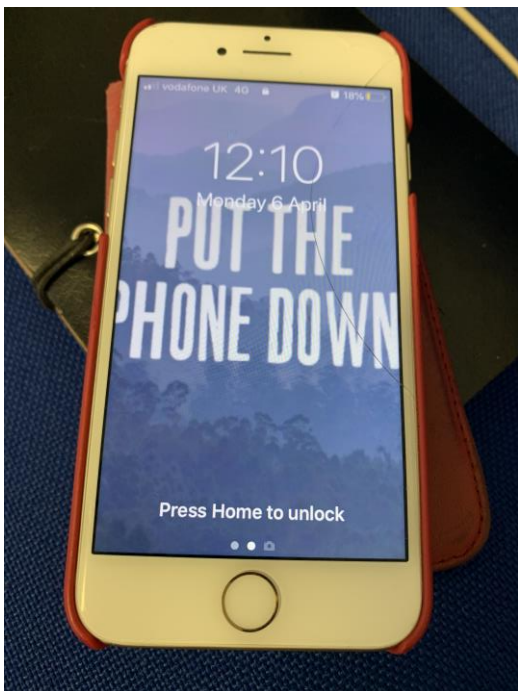## HAVE SMARTPHONES DESTROYED A GENERATION?

More comfortable online than out partying, post-Millennials are safer, physically, than adolescents have ever been. But they're on the brink of a mental-health crisis.

By Jean M. Twenge

SEPTEMBER 2017 ISSUE   SHARE ∨

Is it problematic use, rather than use per se or duration of use, that is the relevant exposure?

Introduction

Sohn et al 2019 BMC Psychiatry

- Systematic review and meta-analysis
- N = 4000 children and young people
- Prevalence 23.3% (14-31%)
- Association with depression, stress/anxiety and sleep
- Use of a variety of tools to capture – which mapped to a variable degree onto constructs recognized in behavioural addictions
- Limitations – mainly Far East, mainly cross-sectional, mainly self-report

Aims (pragmatic, resource-limited)

To investigate the prevalence of problematic smartphone use using the SAS-SV in a large English sample

To examine the relationship between self-reported problematic smartphone use and depression and anxiety, adjusted for daily duration of use

To examine the extent to which this relationship was mediated via poor sleep

Methods

Study population

Secondary school students aged 16-18 in England

Opportunistic recruitment between January and March 2020 – target 600

Semi-structured questionnaire which considered benefits and harms of smartphone use, including:

- Use and type of use
- Duration of use (screentime)
- Benefits of use
- Impact on functioning
- Smartphone Addiction Scale-Short Version
- Generalised Anxiety Disorder Assessment -7
- Patient Health Questionnaire-9
- Insomnia Severity Index

Smartphone Addiction Scale –Short Version

Missing planned work due to smartphone use

Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use

Feeling pain in the wrists or at the back of the neck while using a smartphone

Won't be able to stand not having a smartphone

Feeling impatient and fretful when I am not holding my smartphone

Having my smartphone in my mind even when I am not using it

I will never give up using my smartphone even when my daily life is already greatly affected by it.

Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook

Using my smartphone longer than I had intended

The people around me tell me that I use my smartphone too much.

Likert scale – strong disagree to strongly agree

Methods – Multilevel logistic mixed-effects model

Random Intercept:
School

Fixed effects:
- Age
- Sex
- Ethnicity
- Daily screentime
- SAS-SV score

Primary Outcome:
Moderate anxiety
(GAD-7 >9)

Secondary Outcome:
Low mood
(PHQ-9 > 9)

Mediation analysis

Mediator regressed on PSU and outcomes
Outcomes regressed on PSU, covariates and mediator
Direct, indirect and total effect bootstrapped with 500
replications to generate effect sizes and 95% CIs

Sleep quality
(ISI >14)

Problematic
Smartphone use

Anxiety (GAD-7>9)
Depression
(PHQ-9>9)
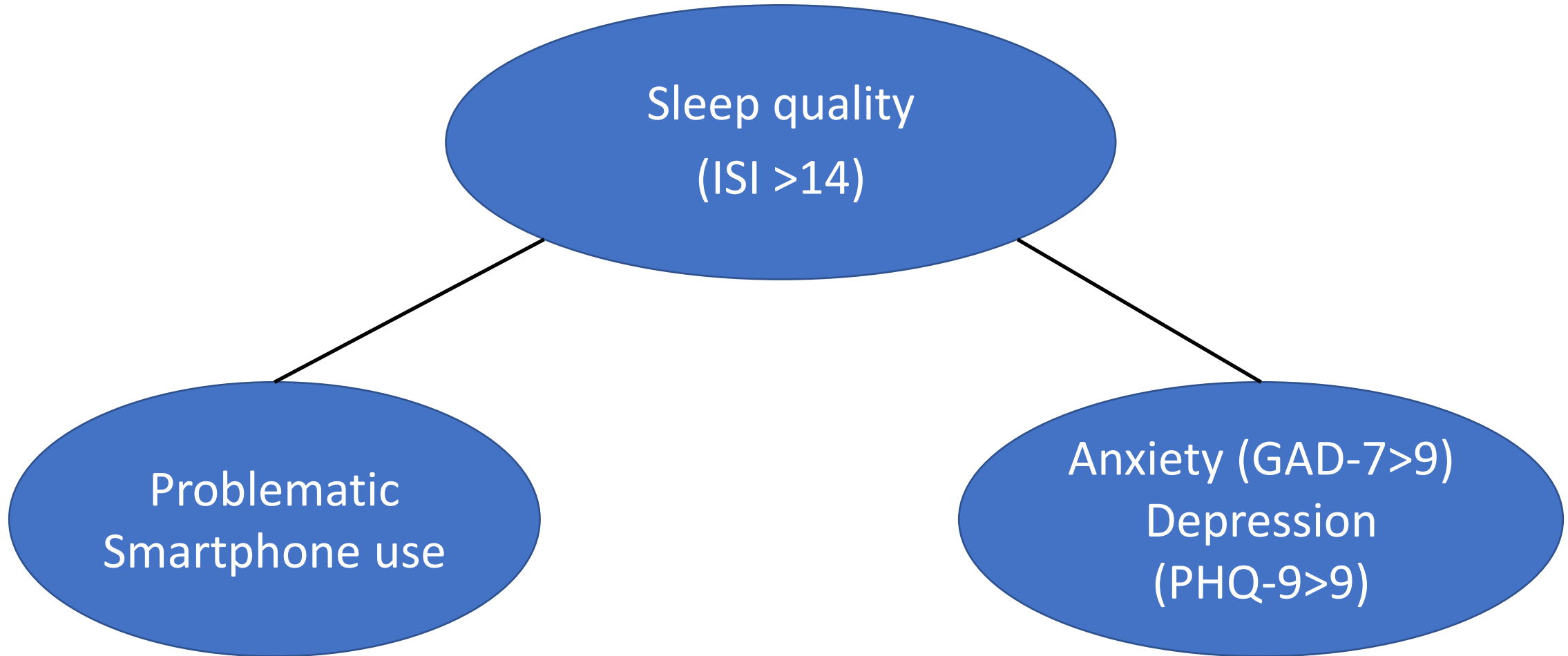
Results:
Similar prevalence of anxiety, depression and PSU as in international samples

- 657 students recruited from 5 schools from 3 regions of the UK with a median IMD of 7

- Median age 17.5 (16-18)

- 77.3% female

- 66.8% White, 14.3% Asian, 7.3% Mixed and 7% Black

- Median daily smartphone use was 4 hours (range 3-6 hours)

- 28.6% reported anxiety (GAD-7 >9 – moderate anxiety)

- 34.4% reported depression (PHQ-9 >9 – moderate depression)

- 18.7% reported Problematic Smartphone Use (SAS-SV >31 M; >33 F)

- 64.1% had tried to reduce their smartphone use

- 12.5% reported that they would value support to cut down

Problematic smartphone use, but *not* daily duration of use, was associated with anxiety and low mood

Factor	Adjusted Odds Ratio (95% CI) for ANXIETY	p
Problematic smartphone use	2.03 (1.28-3.23)	0.003
Female gender	1.99 (1.18 – 3.34)	0.001

Factor	Adjusted Odds Ratio (95% CI) for DEPRESSION	p
Problematic smartphone use	2.96 (1.80-4.89)	<0.0001
Female gender	2.48 (1.44- 4.28)	0.001

Both problematic use and daily duration of use were associated with insomnia

Factor	Adjusted Odds Ratio (95% CI)	p
Problematic smartphone use	1.64 (1.08 – 2.50)	0.002
Daily duration of use	1.15 (1.06-1.24)	0.02

Mediation analysis: Problematic smartphone use contributes to anxiety directly and via insomnia

Significant direct effect of PSU on anxiety:

OR 1.92 (1.20 – 2.91)

Significant indirect effect via the mediator:

OR 1.17 (1.03 – 1.37)

Total effect of the model 2.24 (1.41-3.44)

Conclusions

- Similar proportions of teenagers in an English sample report addictive-type behavior towards their smartphone as seen elsewhere

- Association between problematic smartphone use but not daily duration of use, and both self-reported anxiety and depression in teenagers

- This association is partly mediated by sleep disruption, in the case of anxiety

- Study limited by cross-sectional nature and self-report measures

- Longitudinal data and clinical outcomes and functional outcomes would be helpful

- Apps worth further investigation – smartphones = rapid delivery device?

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'Absorbed by light' Gali May Lucas 2018