



Daylight exposure, depression and sleep in adolescents:

Preliminary results from a study of high school students in Stockholm showing that daylight exposure and disturbed sleep are associated with depression

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Background

The 2016 Public Health in Sweden Report (2016) states that during the last 12 years, hospital care for depression and anxiety among young people has increased. The causes of poor mental health are multidimensional, and the present study examines to what degree light deprivation is an important factor and whether increases in light levels may reduce mental health problems. Light exposure may show positive or negative health outcomes by the direct effect on the arousal neurosystem, the sleep-wake cycle and midbrain structures involved in mood regulation. We investigated whether daylight exposure and disturbed sleep are associated with depressive symptoms. The overall aim of the wider study is to describe the possible beneficial effects of light exposure strategies for outcome in mental health and recovery in adolescence (15-18 yrs) also considering season and treatment with bright light therapy.

Methods

The study sample consisted of 465 high school students (range 15-18 years; 58% boys) living in Stockholm that answered a questionnaire in winter on demographic characteristics, SLOSH, the Munich Chronotype Questionnaire (MCTQ) and depressive symptoms estimated by the six items of the clinician-administrated Hamilton Depression Scale (HAM-D6), sleep disturbances (Karolinska Sleep Questionnaire, KSQ) and night-time technology. Demographic characteristics and circadian rhythmic variables for school and free days and self-reported levels of stress, night-time technology, physical activity were predictors and the presence of at least mild depression symptoms was the outcome using univariate and multivariate regression analyses.

Results

19,6% of the sample had depression scores above 22 which is above the cut-off for symptoms of clinical depression. Females were more frequently present among the depressed ($\chi^2 = 61.02, p < .001$). Students reported that they were exposed to daylight less than 1 h during a typical school-day in winter (November-January) (Figure 1). Our study also showed that groups that get less than 1 hour of daylight also to a greater extent perceive themselves not being rested. Those exposed to the most daylight, more than 2 hours, sleep better (Figure 2). In a stepwise regression model predictors of depression were stress (more), sleep disturbances (more), daylight exposure in school-days (less), sex (female), and physical exercise (more) (Table 1 and Figure 3). The results show that for every extra 1/2 h of daylight exposure given, the likelihood of being severely depressed is reduced by 41%.

Figure 1

Gender differences in daily daylight exposure related to HAM-D6 scores

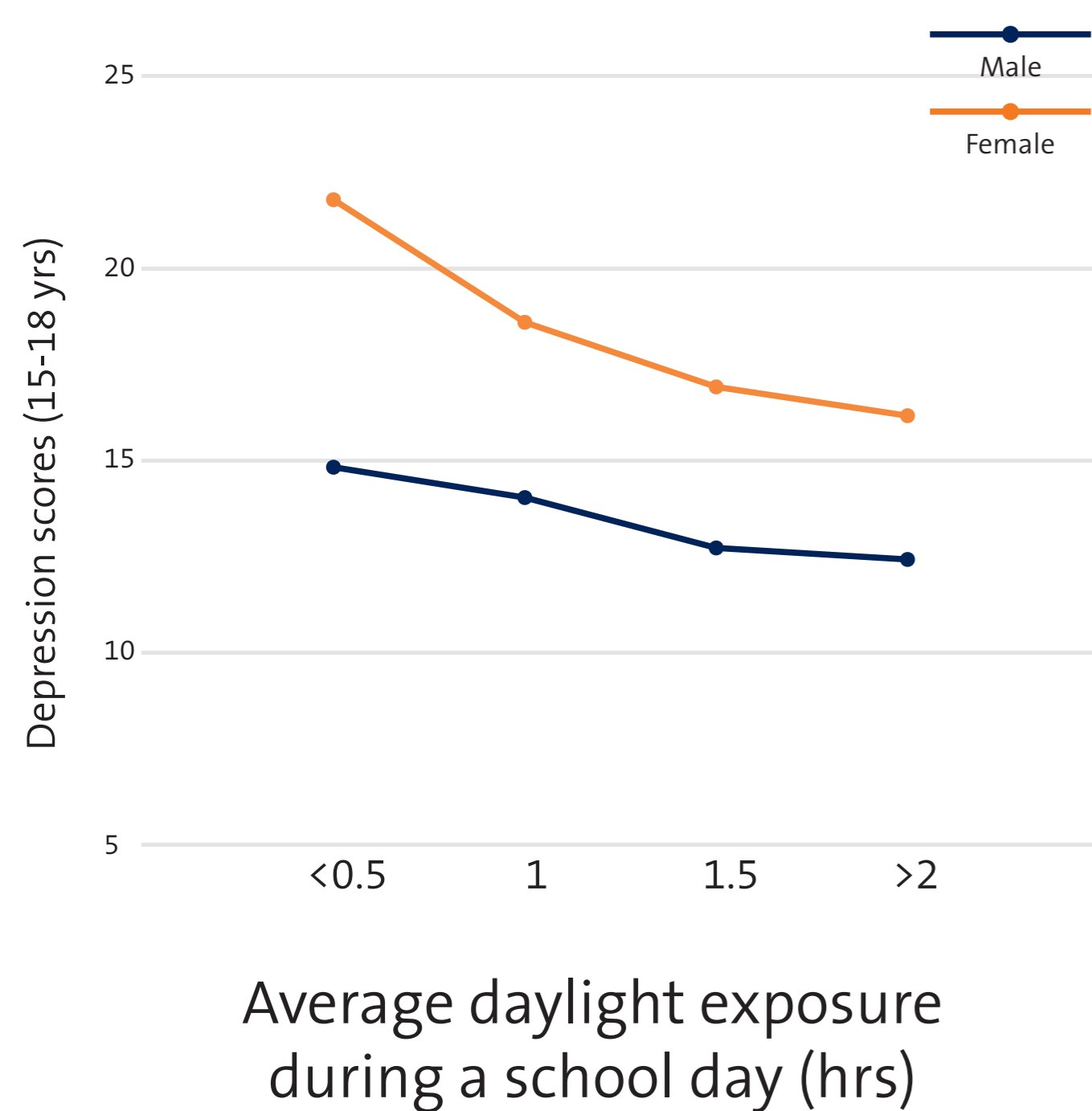


Figure 2

Relation between nonrestorative sleep and daylight

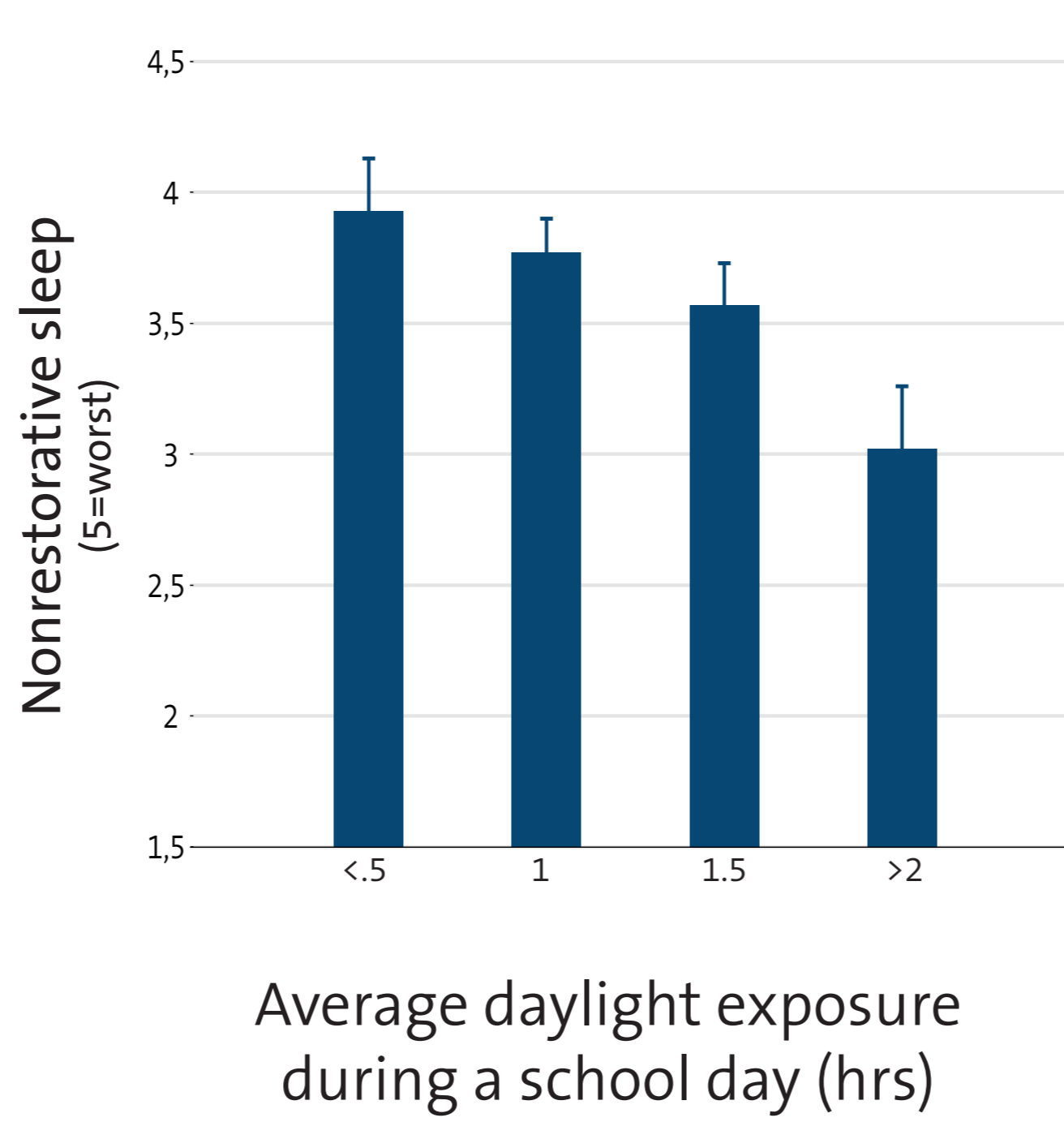


Figure 3

Relation between HAM-D6 scores and sleep disturbances

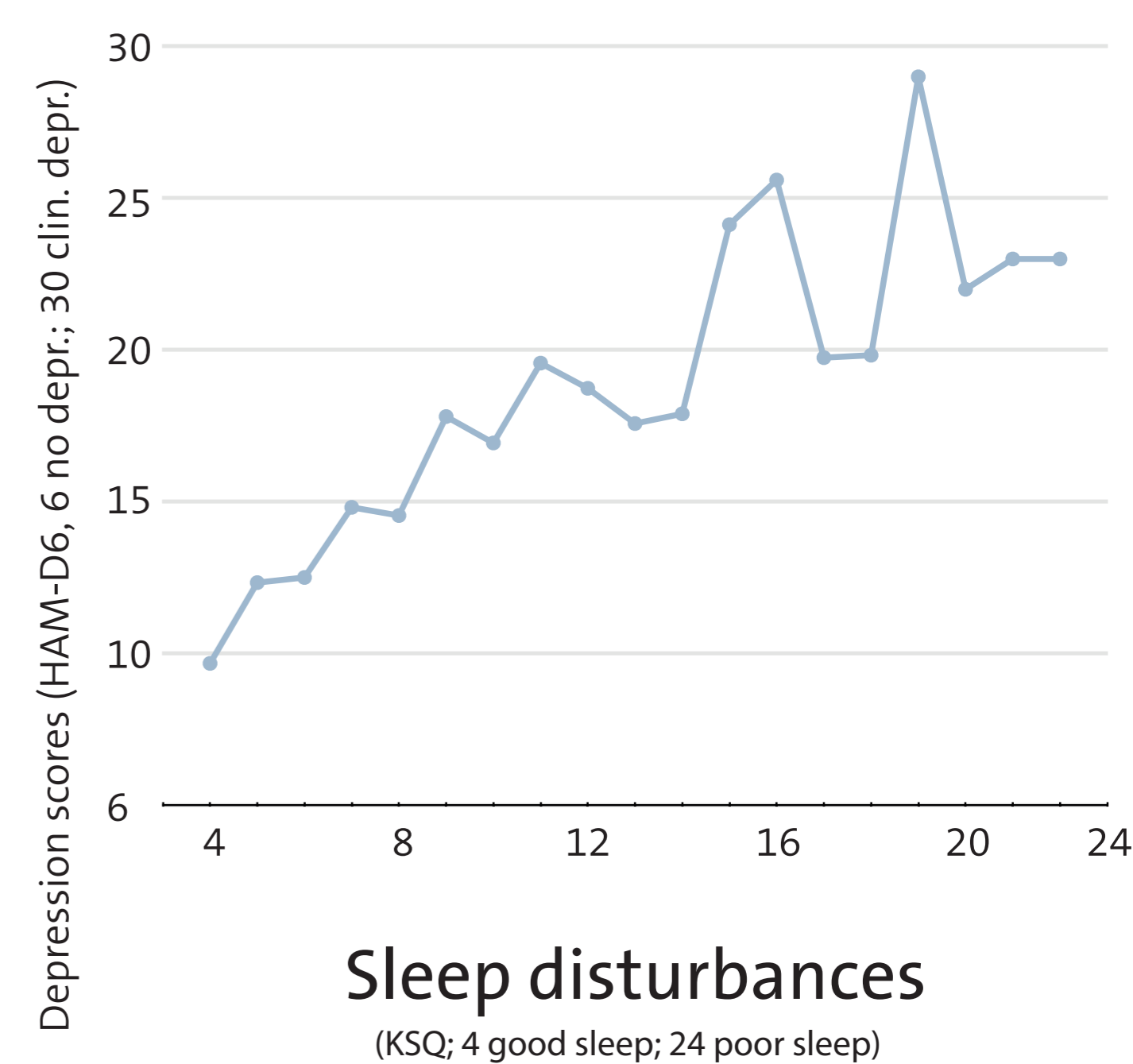


Table 1

Step-wise regression model, prediction of HAM-D6 scores

Variables in the Equation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1a	Sex	,678	,386	3,092	1	,079	1,971	,925	4,198
	Daylightschooldays	-,53	,196	7,346	1	,007*	,588	,401	,863
	Stress	,653	,098	44,478	1	,000*	1,921	1,586	2,328
	Sleepdisturbances	,127	,044	8,361	1	,004*	1,136	1,042	1,238
	Physicalexercise	-,308	,155	3,933	1	,047*	,735	,542	,996
	Constant	-6,878	1,439	22,856	1	,000	,001		

a Variable(s) entered on step 1: sex, daylightschooldays, stress, sleepdisturbances, physicalexercise, tehnologyuse.

Conclusions

Accordingly, our results demonstrated that, both daylight exposure and disturbed sleep was associated with depression. Thus possibly lack of daylight exposure could be linked to mental health problems in adolescence.