LIGHT EXPOSURE, SLEEP QUALITY, AND SLEEPINESS AS PREDICTORS OF MEMORY DECLINE IN OLDER ADULTS
A COHORT STUDY FROM NORWAY

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INTRODUCTION

- Light influences various physiological and behavioral systems, including sleep-wake rhythm, hormone secretion, cognitive functions, and mood (1).

- Spending more time in outdoor light has been linked to lower odds of depression, reduced sleepiness, and fewer symptoms of insomnia (2). Light exposure has also been reported to predict rates of memory complaints and impact sleep quality and mood (3).

- The current study aims to investigate the longitudinal association between time spent in outdoor light and self-reported age-related memory decline while also examining the impact of sleep quality, sleepiness, and mental health.

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METHOD

- Inhabitants from the municipality of Bergen, Norway were invited in April 2020 to participate in a study surveying the impact of lockdown during the COVID-19 pandemic.

- In total, 29,535 individuals out of 81,170 invited, consented to participate.

- Out of these, 3917 were over 69 years old, and thus invited to fill out an online questionnaire in Sept. 2020 (T1) and Feb. 2021 (T2).

- Both timepoints included the following assessments:
    - The Harvard Light Exposure Assessment Questionnaire (H-LEA)
    - The Pittsburg Sleep Quality Index (PSQI)
    - Epworth Sleepiness Scale (ESS)
    - Short form Geriatric Anxiety Index (GAI)
    - Short form Geriatric Depression Scale (GDS)
    - Memory Complaint in Age Questionnaire (MAC-Q)

- A preliminary regression analysis was performed including MAC-Q (T2) as the dependent variable. Step 1 included age. Step 2 added H-LEA (T1), PSQI (T1) and ESS (T1). Step 3 added GAI (T1) and GDS (T1).

RESULTS

Out of 3917 participants, 2066 (52.7%) were male. 50.3% of the sample were 70 to 74 years old.

Table 1. Demographics and descriptive statistics.

	%	n
Age		
70 - 74	38.2	1497
75 - 79	22.3	872
80 - 84	9.8	384
85+	5.8	226
Gender		
Male	52.7	2066
	Mean (n)	Std. Deviation
Hours in daylight	3.66 (1084)	2.46
MAC-Q	24.6 (2155)	3.97
PSQI	6.01 (1187)	3.39
ESS	5.12 (2077)	3.29
GDS	0.99 (2127)	1.11
GAI	0.63 (2153)	1.28

The preliminary regression analysis was significant at $p < 0.001$, as were each added step. As shown in table 2, age, sleepiness and depression were significant. Time spent in daylight, sleep quality and anxiety were unrelated to memory.

Table 2. Results from regression analysis.

Step		β	t	Sig.	R^2
1	**Age**	**.217**	**4.692**	**<.001**	.047
2	**Age**	**.214**	**4.660**	**<.001**	
	PSQI	**.126**	**2.719**	**.007**	
	ESS	**.111**	**2.411**	**.016**	
	Daylight	-.012	-.260	.795	.080
3	**Age**	**.224**	**4.924**	**<.001**	
	PSQI	.059	1.209	.227	
	ESS	**.095**	**2.077**	**.038**	
	Daylight	.001	.026	.979	
	GAI	.079	1.493	.136	
	GDS	**.129**	**2.412**	**.016**	.107

CONCLUSION

Age, sleepiness and depression were all associated with memory decline. Meanwhile, no association was found between exposure to daytime outdoor light, subjective sleep quality and anxiety and age-related memory decline. Further research is needed to fully understand the interplay between light exposure and memory functions in older adults.

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