

Validation of life's simple 7 and life's essential 8 in a european cohort: the role of sleep in cardiovascular risk estimation

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Background: Tools like the Life's Simple 7 (LS7), and the newly developed Life's Essential 8 (LE8) including sleep, can help estimate a person's 10-year CVD risk. Nevertheless, recent studies in an American population showed minimal differences in CVD prediction between LS7 and LS8, suggesting that sleep evaluation does not add more information to the standard LS7 risk estimation.

Purpose: we aimed to validate the LS7 and LE8 metrics for cardiovascular health (CVH) in a European cohort, with a particular focus on the role of subjective and objective sleep assessment in cardiovascular risk estimation.

Methods: Data from the UK Biobank were used for computing LS7, a modified LS7 including sleep, and LE8. Sleep duration was evaluated both subjectively through questionnaires and objectively through wrist-worn accelerometer in a subset of 103,688 UK Biobank participants. The main cardiovascular outcomes were fatal and non-fatal CVD events. Multivariable-adjusted logistic and Cox proportional hazards models were used to evaluate associations of the different metrics with CVD prevalence and incidence.

Results: The final cohort of 23,473 participants (mean age: 56 ± 8 years, 54% females) included 3,302 prevalent CVD events and 2,788 incident events (mean follow-up: 7.5 years). The CVH metrics were categorised into terciles (Table 1). Across all CVH metrics, participants in the highest tercile (ideal), compared to the lowest (poor), demonstrated up to a 66% reduction in odds of prevalent CVD, with the lowest odds observed for metrics based on LS7 Score. However, none of the LS7-based scores in the highest tercile was significantly associated with CVD incidence (Table 2), while significant associations were observed for the middle tercile (intermediate). In contrast, participants in the highest tercile of LE8-based CVH metrics showed significantly reduced incident CVD risks by 23% (no sleep), 33% (subjective), and 35% (objective) (Table 3).

Conclusion: Participants in the highest tercile of LS7-based CVH metrics demonstrated significantly lower odds of prevalent CVD, but showed limited predictive value for incident CVD. LE8-based CVH metrics, particularly those incorporating sleep duration, were consistently associated with a significant reduction in prevalent and incident CVD risk.

Risk Factors and Prevention, Cardiovascular Risk Assessment, Scores

Table 1: Number of participants in each score category for CVH metrics

Type	LS7	LS7 (subjective sleep)	LS7 (objective sleep)	LE8 (no sleep)	LE8 (subjective sleep)	LE8 (objective sleep)
Poor	2,994	1,926	3,590	2,298	1,074	1,164
Intermediate	19,994	21,187	19,593	20,080	21,857	21,669
Ideal	485	360	290	1,095	542	640

Table 2: Association of LS7 Score and alternative LS7 modifications that include subjective or objective sleep

LS7 Score	CVD prevalence OR (95% CI)	CVD incidence HR (95% CI)	CVD prevalence OR (95% CI) subjective sleep	CVD incidence HR (95% CI) subjective sleep	CVD prevalence OR (95% CI) objective sleep	CVD incidence HR (95% CI) objective sleep
Poor	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate	0.67 (0.60 - 0.76)	0.89 (0.81 - 0.97)	0.65 (0.56 - 0.74)	0.89 (0.80 - 1.0)	0.69 (0.62 - 0.77)	0.86 (0.79 - 0.94)
Ideal	0.40 (0.27 - 0.60)	0.87 (0.68 - 1.11)	0.34 (0.21 - 0.55)	0.86 (0.65 - 1.15)	0.41 (0.25 - 0.69)	0.76 (0.55 - 1.05)

Table 3: Association of LE8 Score (including subjective or objective sleep) and an alternative LE8 Score that does not include sleep

LE8 Score	CVD prevalence OR (95% CI) no sleep	CVD incidence HR (95% CI) no sleep	CVD prevalence OR (95% CI) subjective sleep	CVD incidence HR (95% CI) subjective sleep	CVD prevalence OR (95% CI) objective sleep	CVD incidence HR (95% CI) objective sleep
Poor	1.00	1.00	1.00	1.00	1.00	1.00
Intermediate	0.78 (0.69 - 0.89)	0.85 (0.77 - 0.94)	0.76 (0.63 - 0.91)	0.79 (0.69 - 0.91)	0.76 (0.64 - 0.90)	0.77 (0.67 - 0.88)
Ideal	0.66 (0.51 - 0.86)	0.77 (0.64 - 0.94)	0.63 (0.43 - 0.91)	0.67 (0.51 - 0.89)	0.69 (0.48 - 0.96)	0.65 (0.50 - 0.85)