

APPENDIX A.1. Sleep Quality Index Variables

(1) How much sleep do you get (hours): How much sleep do you get (hours)? The range is 1-11 and is truncated at 12 or more. Response of "I don't know" or "refused" were considered missing:

sld010h

(2) How long to fall asleep (min.), 0-50, 60 or more=60: **sld020m**

(3) How often do you snore?, 4-point likert scale: 0=never, 1=Rarely (1-2 nights/week), 2=Occasionally (3-4 nights/week), 3=Frequently (5 or more nights/week): **slq030**

(4) How often do you snort/stop breathing? 4-point likert scale: 0=never, 1=Rarely (1-2 nights/week), 2=Occasionally (3-4 nights/week), 3=Frequently (5 or more nights/week): **slq040**

(5) How often do you have trouble falling asleep? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq080**

(6) How often do you wake up during the night? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq090**

(7) How often do you wake up too early in the morning? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq100**

(8) How often do you feel unrested during the day? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq110**

(9) How often do you feel overly sleepy during the day? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq120**

(10) How often did you not get enough sleep? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq130**

(11) How often do you take pills to help you sleep? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq140**

(12) How often do you have leg jerks while sleeping? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq150**

(13) How often do you have leg cramps while sleeping? 5-point likert scale: 0=Never, 1=Rarely (1 time a month), 2=Sometimes (2-4 times a month), 3=Often (5-15 times a month), 4=Almost always (16-30 times a month) : **slq160**

(14) Do you have difficulty concentrating when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq170**

(15) Do you have difficulty remembering when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq180**

(16) Do you have difficulty eating when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq190**

(17) Do you have difficulty with a hobby when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq200**

(18) Do you have difficulty getting things done when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq210**

(19) Do you have difficulty with finances when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq220**

(20) Do you have difficulty with work when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq230**

(21) Do you have difficulty using the phone when tired? 5-point likert scale: 1=Don't do this activity for other reasons, 2=no difficulty, 3=Yes, a little difficulty, 4=Yes, moderate difficulty, 5=yes, extreme difficulty: **slq240**

APPENDIX A.2 Reduced factor analysis and factor loading plot

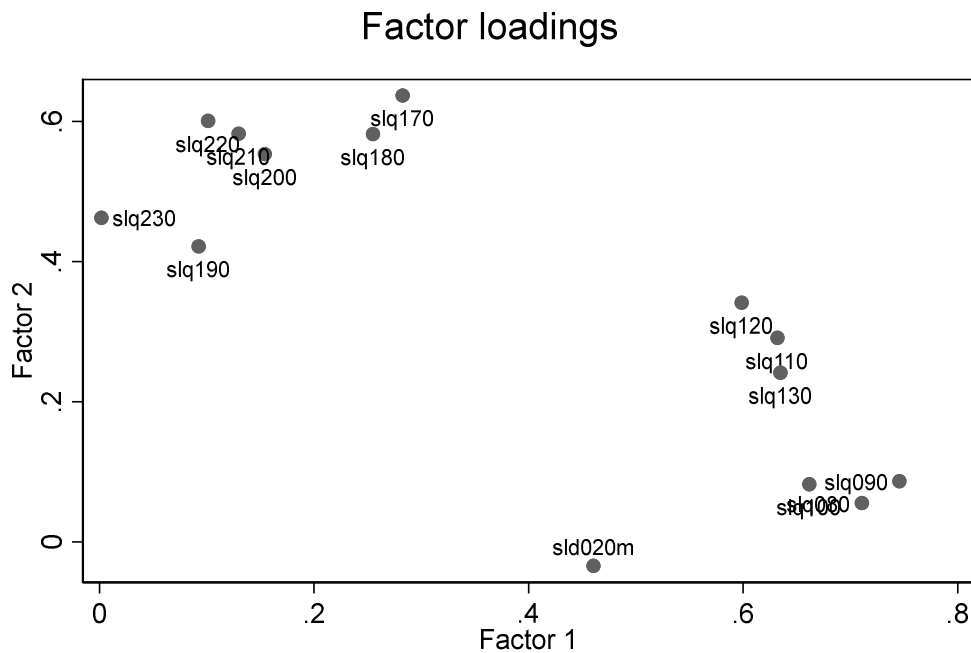
Reduced and rotated factor analysis results with 2-factor extraction:

factor loadings/uniqueness (N=3,941)

	Factor 1	Factor 2	Uniqueness
	Sleepiness and sleep disturbance	Poor sleep-related daytime dysfunction	
sld020m	0.46	-0.03	0.79
slq080	0.71	0.06	0.49
slq090	0.75	0.09	0.44
slq100	0.66	0.08	0.56
slq110	0.63	0.29	0.51
slq120	0.60	0.34	0.53
slq130	0.63	0.24	0.54
slq170	0.28	0.64	0.51
slq180	0.25	0.58	0.60
slq190	0.09	0.42	0.81
slq200	0.15	0.55	0.67
slq210	0.13	0.58	0.64
slq220	0.10	0.60	0.63
slq230	0.01	0.46	0.79

Bolded factor loadings are >0.40 and considered significant. Factors are labelled based on highest loadings on measured items.

Factor loading plot



Rotation: orthogonal varimax
Method: principal factors

APPENDIX A.3. DASH diet scoring system

Nutrient	DASH diet nutrient composition ^a	DASH score target (1)	Intermediate target (0.5)
Saturated fat	6% of energy	6% of energy	11% of energy
Total fat	27% of energy	27% of energy	32% of energy
Protein	18% of energy	18% of energy	16.5% of energy
Cholesterol	150 mg	71.4 mg/1000 kcal	107.1 mg/1000 kcal
Fiber	31 g	14.8 g/1000 kcal	9.5 g/1000 kcal
Magnesium	500 mg	238 mg/1000 kcal	158 mg/1000 kcal
Calcium	1240 mg	590 mg/1000 kcal	402 mg/1000 kcal
Potassium	4700 mg	2238 mg/1000 kcal	1534 mg/1000 kcal
Sodium ^b	2400 mg	1143 mg/1000 kcal	1286 mg/1000 kcal

Abbreviation: DASH, Dietary Approaches to Stop Hypertension trial.

^a Based on a 2100-kcal diet.

^b Sodium target based on the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommendations.

Source:[1]

1. Mellen PB, Gao SK, Vitolins MZ, Goff DC, Jr. Deteriorating dietary habits among adults with hypertension: DASH dietary accordance, NHANES 1988-1994 and 1999-2004. *Archives of internal medicine* 2008;168:308-14.

Appendix A.4. Allostatic Load Score

	1	0.5	0
SBP	≥150 mmHg	120 to <150 mmHg	<120 mmHg
DBP	≥90 mmHg	80 to <90 mmHg	<80 mmHg
BMI	≥30 kg/m ²	25 to <30 kg/m ²	<25 kg/m ²
HbA1c	≥6.5%	5.7% to <6.5%	<5.7%
Total cholesterol	≥240 mg/dL	200 to <240 mg/dL	<200 mg/dL
HDL cholesterol	<40 mg/dL	40 to <60 mg/dL	≥60 mg/dL
Total/HDL cholesterol ratio	≥6	5 to <6	<5
CRP	≥3 mg/L	1 to <3 mg/L	<1 mg/L
Albumin	<3.0 μg/mL	3.0 to <3.8 μg/mL	≥3.8 μg/mL
Creatinine clearance	<30 mL/min/1.73 m ²	30 to <60 mL/min/1.73 m ²	≥60 mL/min/1.73 m ²

Sources:[2]

1. Mellen, P.B.; Gao, S.K.; Vitolins, M.Z.; Goff, D.C., Jr. Deteriorating dietary habits among adults with hypertension: DASH dietary accordance, NHANES 1988-1994 and 1999-2004. *Archives of internal medicine* **2008**, *168*, 308-314, doi:10.1001/archinternmed.2007.119.
2. Rodriguez, E.J.; Livaudais-Toman, J.; Gregorich, S.E.; Jackson, J.S.; Napoles, A.M.; Perez-Stable, E.J. Relationships between allostatic load, unhealthy behaviors, and depressive disorder in U.S. adults, 2005-2012 NHANES. *Preventive medicine* **2018**, *110*, 9-15, doi:10.1016/j.ypmed.2018.02.002.

TABLE S1. Study sample characteristics by age group, NHANES 2005-2008

	Age 30-59		Age60+		Page
	Mean/%	(SE)	Mean/%	(SE)	
Age (years):					<0.001
<i>Mean ± SEM</i>	44.2	0.3	68.5	0.3	
Sex:					<0.001
Male	50.0	0.0	41.1	0.0	
Female	50.0	0.0	58.9	0.0	
Race/Ethnicity:					<0.001
Mexican American	7.9	0.01	4.1	0.01	
Other Hispanic	3.8	0.01	2.9	0.01	
Non-Hispanic White	73.3	0.02	83.6	0.02	
Non-Hispanic Black	9.4	0.01	7.1	0.01	
Other	5.6	0.01	2.4	0.01	
Education:					<0.001
< Less Than 9th Grade	3.683	0.004	10.693	0.011	
9-11th Grade	10.550	0.012	12.891	0.013	
High School Grad/GED or Equivalent	23.110	0.011	28.489	0.012	
Some College or AA degree	31.252	0.012	23.470	0.015	
College Graduate or above	31.405	0.022	24.457	0.019	
Marital status:					<0.001
Married/Living with partner	74.257	0.016	65.823	0.021	
Other	25.743	0.016	34.177	0.021	
Poverty-income ratio:					<0.001
< 100%	9.201	0.010	7.071	0.008	
100%-<200%	14.476	0.011	24.701	0.014	
≥ 200%	76.323	0.018	68.228	0.018	
Smoking status:					<0.001
Never smoker	54.605	0.013	46.283	0.018	
Ex-smoker	22.371	0.009	41.046	0.018	
Current smoker	23.024	0.014	12.671	0.013	
Alcohol consumption (≥ 12 glasses in past 12 months):					<0.001
Yes	78.695	0.015	67.019	0.019	
No	21.305	0.015	32.980	0.019	
Physical activity:					0.025
Yes	45.773	0.026	38.184	0.032	
No	54.227	0.026	61.816	0.032	
Body mass index (kg/m²):					0.35
<i>Mean ± SEM</i>	28.941	0.229	28.671	0.211	
Self-rated health:				0.013	
Excellent/Very good/Good	87.801	0.009	84.924		

Fair/Poor	12.199	0.009	15.076		
Allostatic load					
<i>Mean ± SEM</i>	2.708	0.041	3.291	0.049	<0.001
DASH diet total score					
<i>Mean ± SEM</i>	2.065	0.040	2.494	0.062	<0.001
DASH diet component 1: Saturated fat					
<i>Mean ± SEM</i>	0.251	0.009	0.271	0.010	0.089
DASH diet component 2: Fat					
<i>Mean ± SEM</i>	0.265	0.008	0.288	0.018	0.051
DASH diet component 3: Protein					
<i>Mean ± SEM</i>	0.346	0.012	0.354	0.017	0.65
DASH diet component 4: Cholesterol					
<i>Mean ± SEM</i>	0.266	0.009	0.275	0.010	0.54
DASH diet component 5: Fiber					
<i>Mean ± SEM</i>	0.143	0.008	0.248	0.013	<0.001
DASH diet component 6: Magnesium					
<i>Mean ± SEM</i>	0.177	0.007	0.259	0.015	<0.001
DASH diet component 7: Calcium					
<i>Mean ± SEM</i>	0.360	0.010	0.431	0.013	<0.001
DASH diet component 8: Potassium					
<i>Mean ± SEM</i>	0.133	0.005	0.239	0.010	<0.001
DASH diet component 9: Sodium					
<i>Mean ± SEM</i>	0.122	0.007	0.127	0.013	0.74
Sleep quality measures					
Factor 1: Sleepiness and sleep disturbance					
<i>Mean ± SEM</i>	0.070	0.024	-0.000	0.030	0.095
Factor 2: Poor sleep-related daytime dysfunction					
<i>Mean ± SEM</i>	0.084	0.018	-0.265	0.031	<0.001

Abbreviations: DASH=Dietary Approaches to Stop Hypertension; nc=not computed; NHANES=National Health and Nutrition Examination Surveys; SEM=Standard Error of the Mean.

N=2,683 among the 30-59y age group, N=1,258 among the 60+ age group.

TABLE S2. DASH total score as predictor of sleep quality measures, stratified by age group: multiple linear regression models, NHANES 2005-2008

	Age30-59 N=2,683			Age 60+ N=1,258			
	<i>Factor 1: Sleepiness and sleep disturbance</i>			<i>Factor 1: Sleepiness and sleep disturbance</i>			
	β	(SEE)	P _{wald}	β	(SEE)	P _{wald}	P _{age×DASH}
Model 1	-0.023	0.017	0.19	-0.028	0.017	0.11	0.72
Model 2	-0.010	0.017	0.56	-0.030	0.018	0.11	0.55
Model 3	-0.007	0.018	0.71	-0.028	0.018	0.13	0.56
	<i>Factor 2: Poor sleep-related daytime dysfunction</i>			<i>Factor 2: Poor sleep-related daytime dysfunction</i>			
	β	(SEE)	P _{wald}	β	(SEE)	P _{wald}	P _{age×DASH}
Model 1	-0.023	0.013	0.088	-0.096	0.014	0.51	0.75
Model 2	-0.022	0.013	0.10	-0.005	0.016	0.78	0.78
Model 3	-0.020	0.014	0.18	-0.002	0.016	0.92	0.68

Abbreviations: DASH=Dietary Approaches to Stop Hypertension; NHANES=National Health and Nutrition Examination Surveys ; SEE=Standard Error of the Estimate.

Model 1 (age); Model 2 (age, sex, race/ethnicity, marital status, poverty income ratio and education); Model 3 (Model 2 + smoking, alcohol use, physical activity, self-rated health, BMI and ALI).

TABLE S3. DASH component scores as predictors of sleep quality measures, stratified by age group: multiple linear regression models, NHANES 2005-2008

	Age30-59			Age 60+			P _{age×DASH}
	<i>Factor 1 Sleepiness and sleep disturbance</i>	<i>Factor 1 Sleepiness and sleep disturbance</i>	<i>Factor 1 Sleepiness and sleep disturbance</i>	<i>Factor 1 Sleepiness and sleep disturbance</i>	<i>Factor 1 Sleepiness and sleep disturbance</i>	<i>Factor 1 Sleepiness and sleep disturbance</i>	
	β	(SEE)	P _{wald}	β	(SEE)	P _{wald}	
DASH component 1: Saturated fat							
Model 1	-0.013	0.080	0.13	-0.043	0.012	0.72	0.69
Model 2	-0.057	0.078	0.47	-0.040	0.128	0.76	0.78
Model 3	-0.040	0.079	0.62	-0.073	0.134	0.59	0.96
DASH component 2: Total fat							
Model 1	+0.002	0.059	0.97	-0.012	0.070	0.092	0.085
Model 2	+0.036	0.057	0.53	-0.013	0.067	0.066	0.077
Model 3	+0.044	0.058	0.45	-0.013	0.071	0.068	0.052
DASH component 3: Protein							
Model 1	-0.038	0.041	0.36	-0.010	0.067	0.14	0.50
Model 2	-0.019	0.042	0.65	-0.010	0.067	0.13	0.46
Model 3	-0.023	0.043	0.64	-0.095	0.066	0.16	0.50
DASH component 4: Cholesterol							
Model 1	+0.024	0.046	0.60	+0.018	0.092	0.85	0.89
Model 2	+0.020	0.048	0.69	+0.002	0.086	0.98	0.89
Model 3	+0.018	0.050	0.72	+0.006	0.090	0.95	0.97
DASH component 5: Fiber							
Model 1	-0.205	0.083	0.019	-0.115	0.093	0.226	0.50
Model 2	-0.129	0.086	0.14	-0.110	0.10	0.276	0.69
Model 3	-0.106	0.086	0.23	-0.124	0.11	0.246	0.76

DASH component 6: Magnesium							
Model 1	-0.047	0.080	0.019	-0.101	0.091	0.28	0.69
Model 2	0.007	0.083	0.94	-0.089	0.096	0.36	0.54
Model 3	0.018	0.085	0.83	-0.060	0.096	0.54	0.61

DASH component 7: Calcium							
Model 1	-0.055	0.059	0.33	+0.010	0.081	0.90	0.42
Model 2	-0.050	0.063	0.44	+0.010	0.096	0.91	0.53
Model 3	-0.032	0.061	0.61	0.007	0.086	0.94	0.57

DASH component 8: Potassium							
Model 1	-0.225	0.103	0.036	-0.109	0.098	0.27	0.34
Model 2	-0.211	0.103	0.049	-0.121	0.100	0.23	0.41
Model 3	-0.193	0.061	0.605	-0.095	0.102	0.36	0.33

DASH component 9: Sodium							
Model 1	+0.078	0.074	0.30	-0.031	0.088	0.73	0.20
Model 2	+0.092	0.073	0.21	-0.033	0.089	0.71	0.23
Model 3	+0.085	0.077	0.27	-0.001	0.092	1.00	0.37

Factor 2 **Poor sleep-related daytime dysfunction**

Factor 2 **Poor sleep-related daytime dysfunction**

DASH component 1: Saturated fat	β	(SEE)	P_{wald}	β	(SEE)	P_{wald}	$P_{age \times DASH}$
Model 1	-0.105	0.061	0.095	-0.012	0.068	0.87	0.49
Model 2	-0.103	0.066	0.13	-0.000	0.073	1.00	0.51
Model 3	-0.082	0.070	0.25	-0.014	0.075	0.85	0.69

DASH component 2: Total fat							
Model 1	-0.033	0.043	0.45	-0.067	0.053	0.21	0.50
Model 2	-0.026	0.044	0.56	-0.056	0.053	0.30	0.40
Model 3	-0.020	0.046	0.66	-0.053	0.052	0.31	0.47

DASH
component 3:
Protein

Model 1	-0.053	0.057	0.36	-0.043	0.065	0.51	0.76
Model 2	-0.048	0.058	0.41	-0.039	0.064	0.55	0.76
Model 3	-0.062	0.057	0.29	-0.030	0.060	0.62	0.62

DASH
component 4:
Cholesterol

Model 1	-0.052	0.042	0.23	-0.071	0.057	0.23	0.64
Model 2	-0.049	0.042	0.26	-0.063	0.053	0.25	0.67
Model 3	-0.049	0.045	0.29	-0.061	0.056	0.28	0.82

DASH
component 5:
Fiber

Model 1	-0.168	0.068	0.019	+0.128	0.068	0.067	0.013
Model 2	-0.157	0.067	0.025	+0.143	0.076	0.068	0.020
Model 3	-0.136	0.070	0.062	+0.146	0.081	0.082	0.030

DASH
component 6:
Magnesium

Model 1	-0.011	0.075	0.14	-0.0279	0.061	0.65	0.53
Model 2	-0.011	0.075	0.14	-0.0024	0.066	0.97	0.57
Model 3	-0.093	0.076	0.23	+0.001	0.071	0.85	0.57

DASH
component 7:
Calcium

Model 1	-0.022	0.042	0.60	-0.0247	0.066	0.71	0.84
Model 2	-0.002	0.043	0.67	-0.0040	0.067	0.95	0.85
Model 3	0.0001	0.043	0.82	-0.0009	0.066	0.99	0.83

DASH
component 8:
Potassium

Model 1	-0.039	0.102	0.71	-0.025	0.048	0.64	0.84
Model 2	-0.036	0.100	0.73	-0.002	0.053	0.98	0.87
Model 3	-2.475	0.096	0.80	+0.023	0.053	0.67	0.96

DASH
component 9:
Sodium

Model 1	+0.100	0.074	0.18	+0.000	0.068	1.00	0.20
Model 2	+0.087	0.074	0.25	-0.216	0.063	0.97	0.19

Model 3	+0.089	0.072	0.22	1.198	0.060	0.84	0.29
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Abbreviations: DASH=Dietary Approaches to Stop Hypertension; NHANES=National Health and Nutrition Examination Surveys; SEE=Standard Error of the Estimate.

Model 1 (age); Model 2 (age, sex, race/ethnicity, marital status, poverty income ratio and education); Model 3 (Model 2 + smoking, alcohol use, physical activity, self-rated health, BMI and ALI). N=2,683 among the 30-59y age group, N=1,258 among the 60+ age group.