Figure S1. Flow chart of study participants in the Norwegian Women and Cancer Study (NOWAC)

NOWAC participants

N = 172,526

Not administered 8-paged questionnaire

N = 71,210

Died prior to registration

N = 13

Emigrated prior to registration

N = 3

Prevalent cancer at baseline
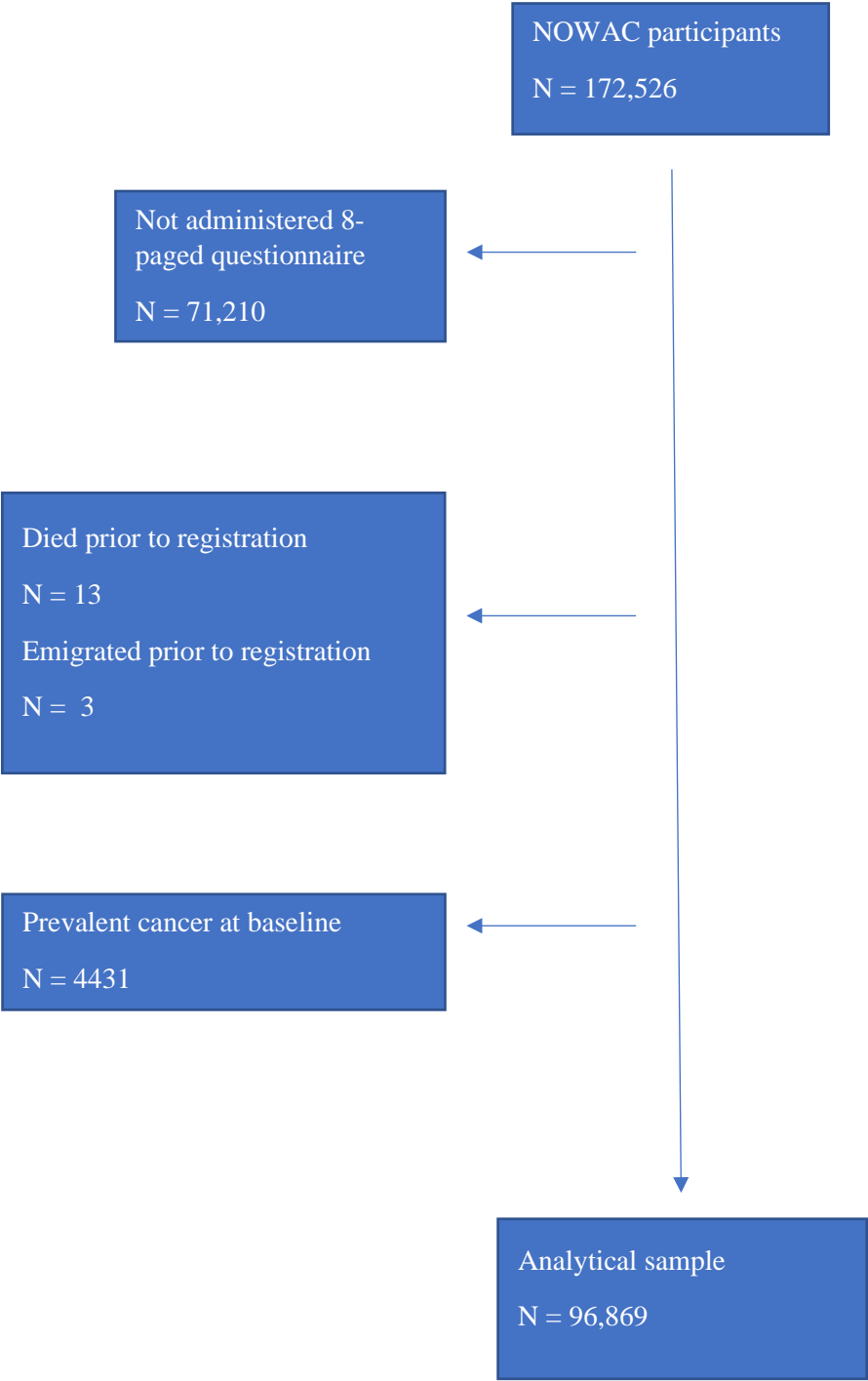
N = 4431

Analytical sample

N = 96,869

Table S1. Associations between the healthy lifestyle index (HLI) score and the incidence of common cancer types in the Norwegian Women and Cancer Study (NOWAC), 1996-2018, complete-case analysis

	HLI score				
	0-5	**6-10**	**11-15**	**16-20**	**Continuous**
	Cases (N) HR (95% CI)	Cases (N) HR (95% CI)	Cases (N) HR (95% CI)	Cases (N) HR (95% CI)	Cases (N) HR (95% CI)
Postmenopausal breast[a,b,c]	39 1.05 (0.77-1.45)	825 1.08 (1.00-1.18)	2014 1.00 (ref)	519 0.82 (0.75-0.91)	3397 0.97 (0.96-0.98)
Colorectal[a]	18 1.46 (0.91-2.33)	281 1.07 (0.93-1.23)	715 1.00 (ref)	199 0.86 (0.73-1.01)	1213 0.98 (0.96-1.00)
Lung[a]	33 3.30 (2.33-4.70)	349 1.67 (1.46-1.92)	557 1.00 (ref)	67 0.38 (0.29-0.49)	1006 0.85 (0.83-0.87)
Postmenopausal endometrial[a,b]	13 1.67 (0.96-2.90)	228 1.40 (1.19-1.64)	444 1.00 (ref)	122 0.84 (0.69-1.03)	807 0.93 (0.91-0.95)
Postmenopausal ovarian[a,b]	3 0.67 (0.21-2.10)	101 1.11 (0.88-1.40)	241 1.00 (ref)	73 0.91 (0.70-1.19)	425 0.99 (0.96-1.02)
Pancreatic[a]	4 1.72 (0.64-4.65)	102 2.03 (1.57-2.63)	136 1.00 (ref)	42 0.93 (0.65-1.32)	284 0.91 (0.88-0.95)
Kidney[a]	3 1.06 (0.34-3.34)	74 1.26 (0.96-1.67)	156 1.00 (ref)	35 0.72 (0.50-1.03)	268 0.93 (0.90-0.97)

[a]Employed Cox proportional hazard regression models, adjusted for education and height

[b]Additionally adjusted for age at menarche, use of oral contraceptives, parity, breastfeeding, and use of hormone replacement therapy.

[c]Additionally adjusted for family history of breast cancer in a first-degree relative

Abbreviations: HR = hazard ratio, CI = confidence interval

This section displays Akaike's information criteria (AIC) values and plots generated for Cox proportional hazards regression models to estimate the associations between the HLI score, modelled as a nonlinear term, and incidences of common cancer types in the NOWAC cohort (1996-2018) on complete-case analysis data. Restricted cubic splines (RCS) were employed to model the HLI as a nonlinear term, where terms modelled with three, four, and five knots located at the percentiles have been tested. AIC values and plots of linear associations are also included for comparison.

Table S2. AIC values for linear and nonlinear models (3-5 RCS knots) among common cancer types

	Postmenopausal breast	Colorectal	Lung	Postmenopausal endometrial	Postmenopausal ovarian	Pancreatic	Kidney
5 knots	72488.83	25154.07	20430.72	17099.34	8888.43	5759.57	5603.20
4 knots	72486.92	25152.04	20433.95	17100.08	8886.32	5759.52	5602.23
3 knots	72484.97	25150.12	20431.63	17099.16	8885.36	5758.14	5600.22
Linear	72486.99	25149.02	20444.73	17097.21	8884.21	5757.35	5598.73

All of the following plots use the HLI score of 5 as the reference. Hazard ratios (HRs) are present on the vertical axes and HLI scores are present on the horizontal axes. Shaded regions represent 95% confidence intervals.

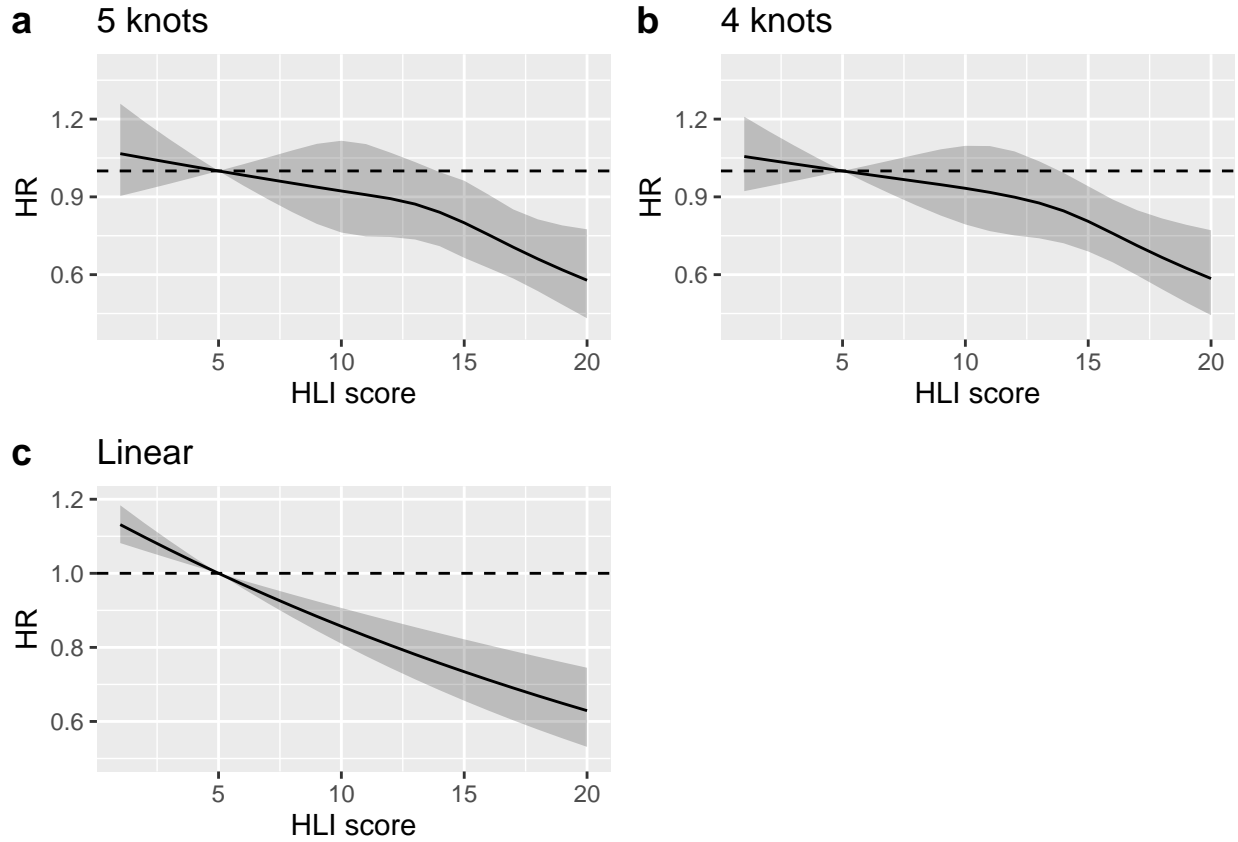Figure S2. Postmenopausal breast cancer

a 5 knots

b 4 knots
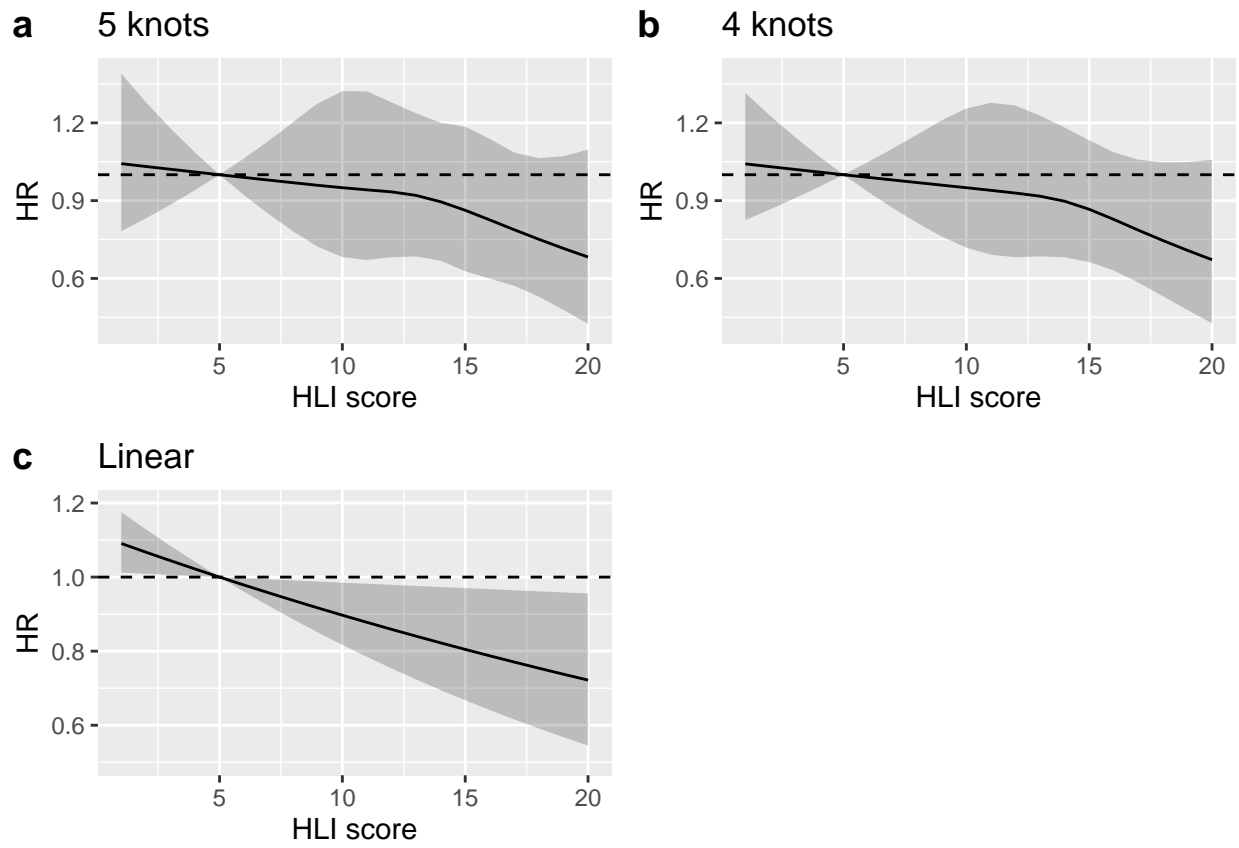
c Linear

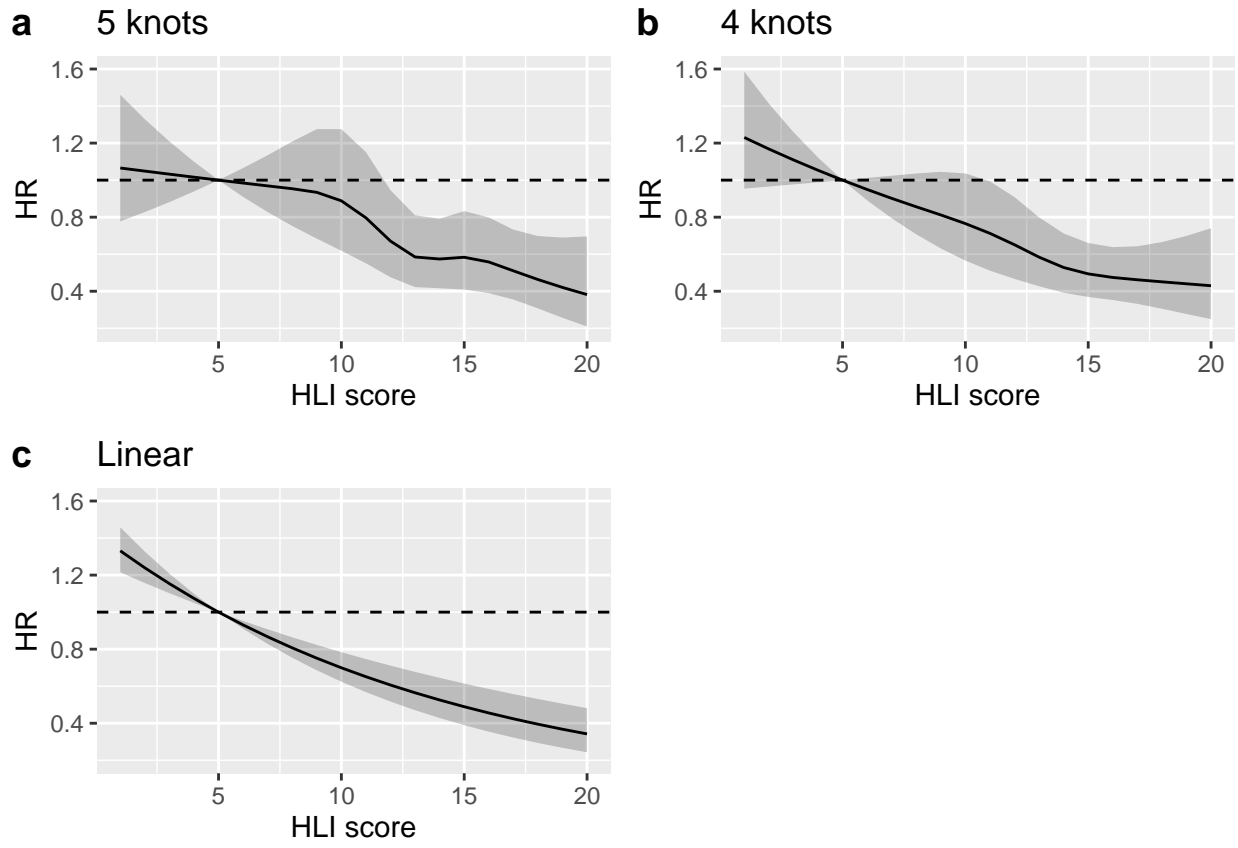Figure S3. Colorectal cancer

a 5 knots

b 4 knots

c Linear

Figure S4. Lung cancer

a Lung cancer
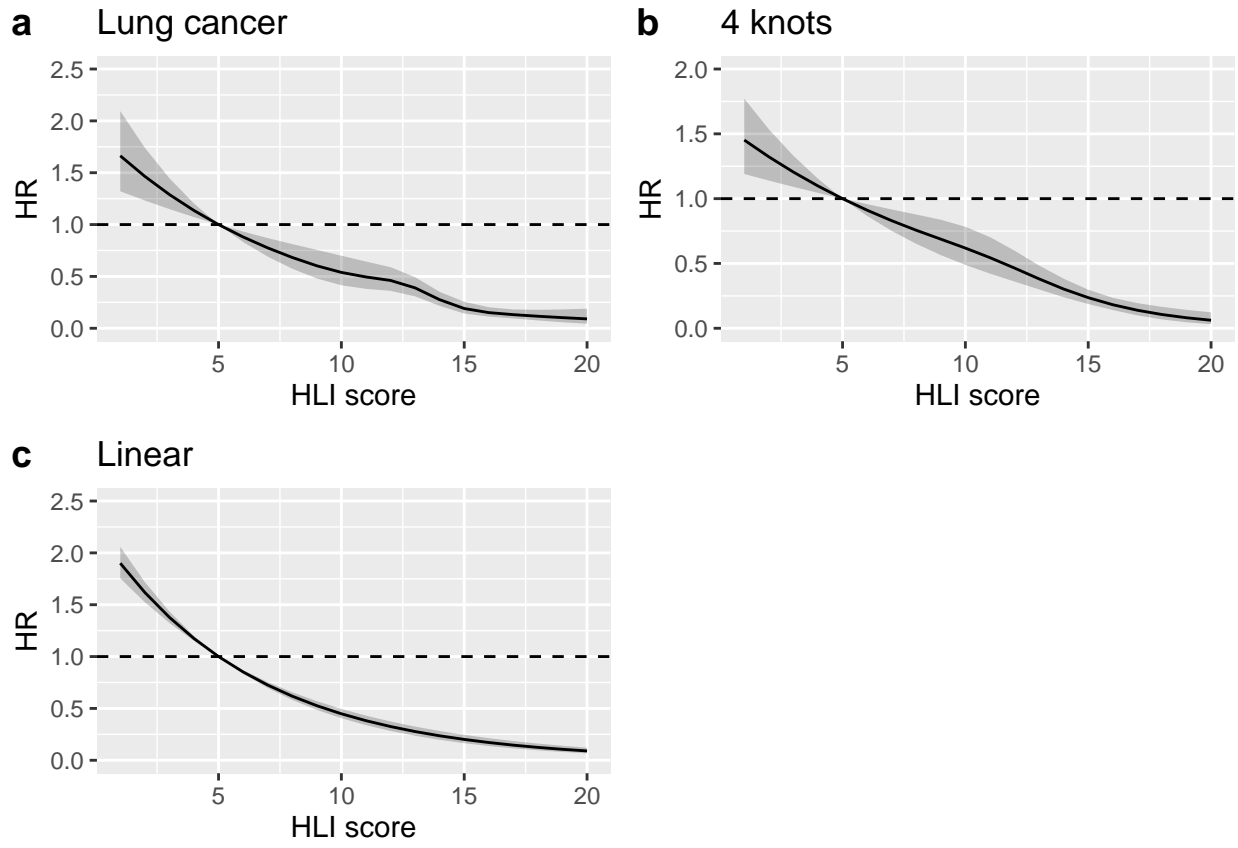
b 4 knots

c Linear

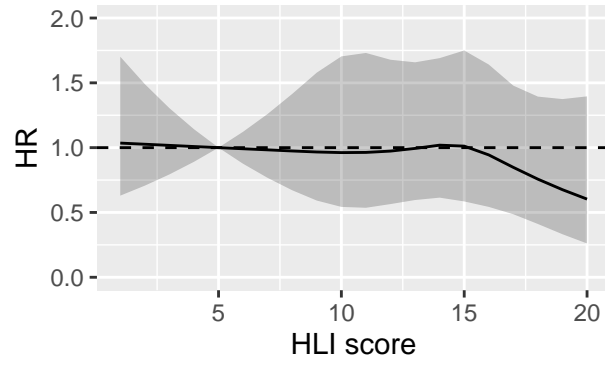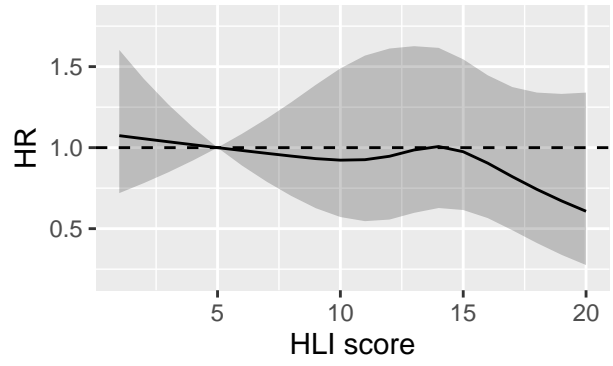Figure S5. Postmenopausal endometrial cancer

Figure S6. Postmenopausal ovarian cancer

a   5 knots

b   4 knots
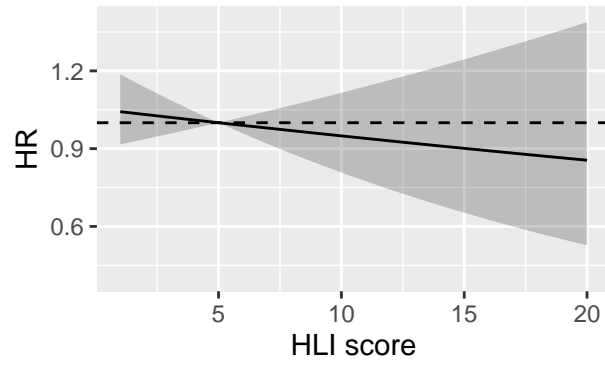
c   Linear

Figure S7. Pancreatic cancer

a 5 knots

b 4 knots

c Linear

Figure S8. Kidney cancer

a 5 knots

b 4 knots

c Linear
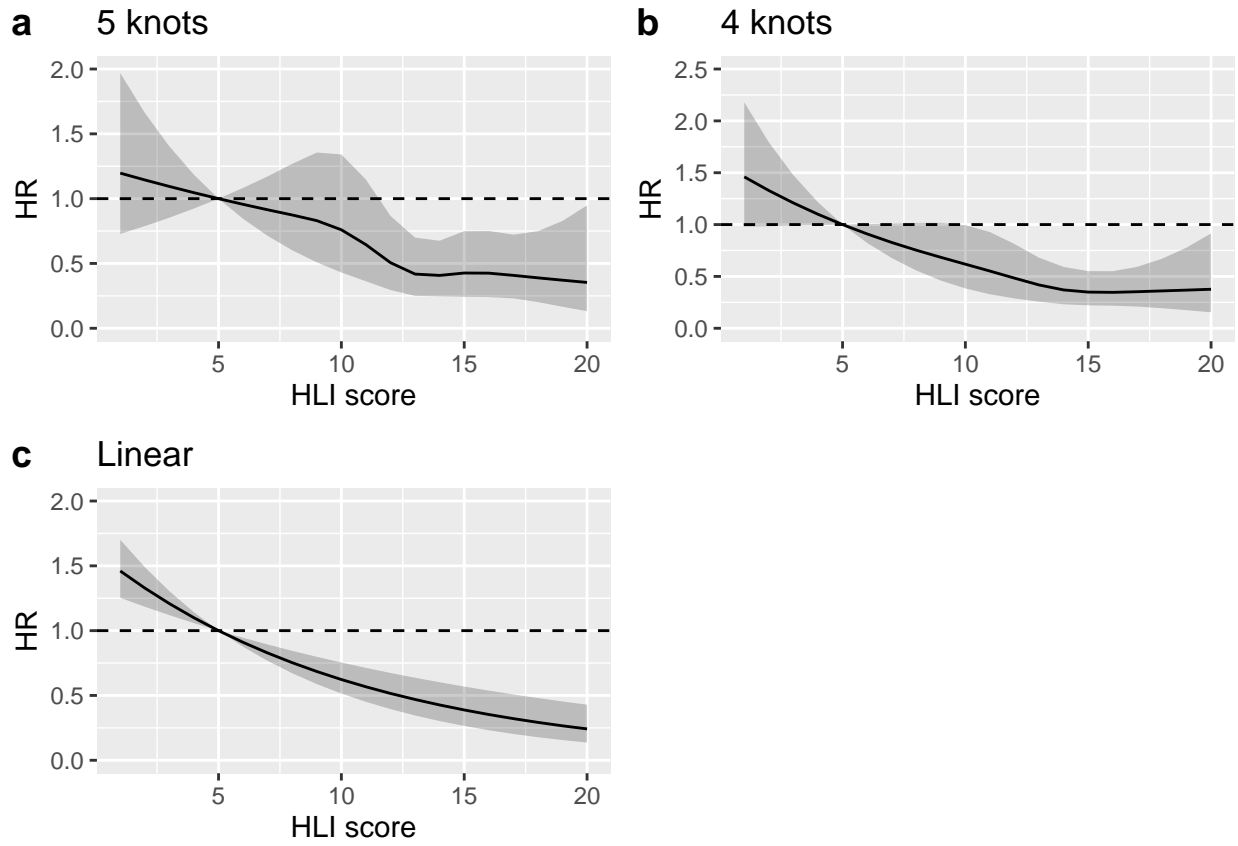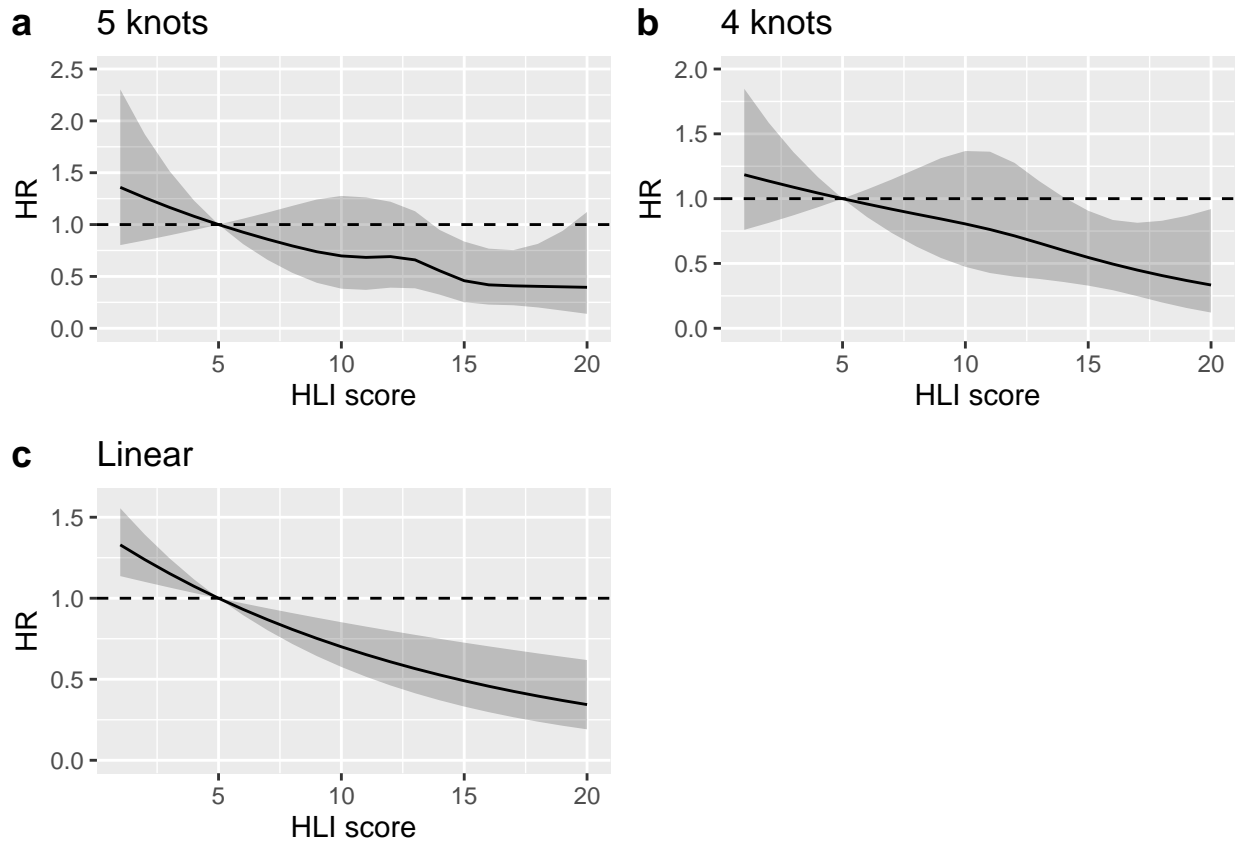

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Table S3. Linear associations between the healthy lifestyle index (HLI) score excluding, in turn, each lifestyle factor, and the incidence of common cancer types in the Norwegian Women and Cancer Study (1996-2018)

	HR (95% CI)[a]
Postmenopausal breast[c,d,e]	
HLI[b]	0.97 (0.96-0.98)
HLI excluding physical activity level	0.97 (0.95-0.98)
HLI excluding BMI	0.96 (0.95-0.98)
HLI excluding smoking status	0.97 (0.96-0.98)
HLI excluding alcohol consumption	0.97 (0.96-0.98)
HLI excluding diet	0.96 (0.95-0.97)
Colorectal[c]	
HLI[b]	0.98 (0.96-1.00)
HLI excluding physical activity level	0.97 (0.95-0.99)
HLI excluding BMI	0.98 (0.96-1.00)
HLI excluding smoking status	0.99 (0.97-1.01)
HLI excluding alcohol consumption	0.98 (0.97-1.00)
HLI excluding diet	0.98 (0.96-1.00)
Lung[c]	
HLI[b]	0.86 (0.84-0.87)
HLI excluding physical activity level	0.83 (0.82-0.85)
HLI excluding BMI	0.78 (0.76-0.79)
HLI excluding smoking status	1.01 (0.99-1.03)
HLI excluding alcohol consumption	0.86 (0.85-0.83)
HLI excluding diet	0.81 (0.80-0.83)
Postmenopausal endometrial[c,d]	
HLI[b]	0.93 (0.91-0.95)
HLI excluding physical activity level	0.93 (0.91-0.96)
HLI excluding BMI	0.97 (0.95-0.99)
HLI excluding smoking status	0.89 (0.87-0.91)
HLI excluding alcohol consumption	0.92 (0.90-0.94)
HLI excluding diet	0.93 (0.91-0.95)
Postmenopausal ovarian[c,d]	
HLI[b]	0.99 (0.96-1.02)
HLI excluding physical activity level	0.98 (0.94-1.01)
HLI excluding BMI	0.98 (0.95-1.01)
HLI excluding smoking status	1.01 (0.97-1.04)
HLI excluding alcohol consumption	0.99 (0.96-1.02)
HLI excluding diet	1.00 (0.96-1.03)
Pancreatic[c]	
HLI[b]	0.92 (0.89-0.95)
HLI excluding physical activity level	0.90 (0.87-0.94)
HLI excluding BMI	0.91 (0.87-0.94)
HLI excluding smoking status	0.97 (0.93-1.01)
HLI excluding alcohol consumption	0.91 (0.88-0.95)
HLI excluding diet	0.90 (0.86-0.93)

Kidney[c]

HLI[b]	0.94 (0.91-0.97)
HLI excluding physical activity level	0.94 (0.90-0.98)
HLI excluding BMI	0.96 (0.92-1.00)
HLI excluding smoking status	0.94 (0.91-0.98)
HLI excluding alcohol consumption	0.92 (0.89-0.96)
HLI excluding diet	0.93 (0.89-0.97)

[a] HRs correspond to 1-point increase on the HLI score, performed on multiple imputed data

[b] Estimates for HLI (including physical activity level, BMI, smoking status, alcohol consumption, and diet) in the full model also appear in Table 3. of main article

[c] Employed Cox proportional hazard regression models, adjusted for education and height

[d] Additionally adjusted for age at menarche, use of oral contraceptives, parity, breastfeeding, and use of hormone replacement therapy.

[e] Additionally adjusted for family history of breast cancer in a first-degree relative

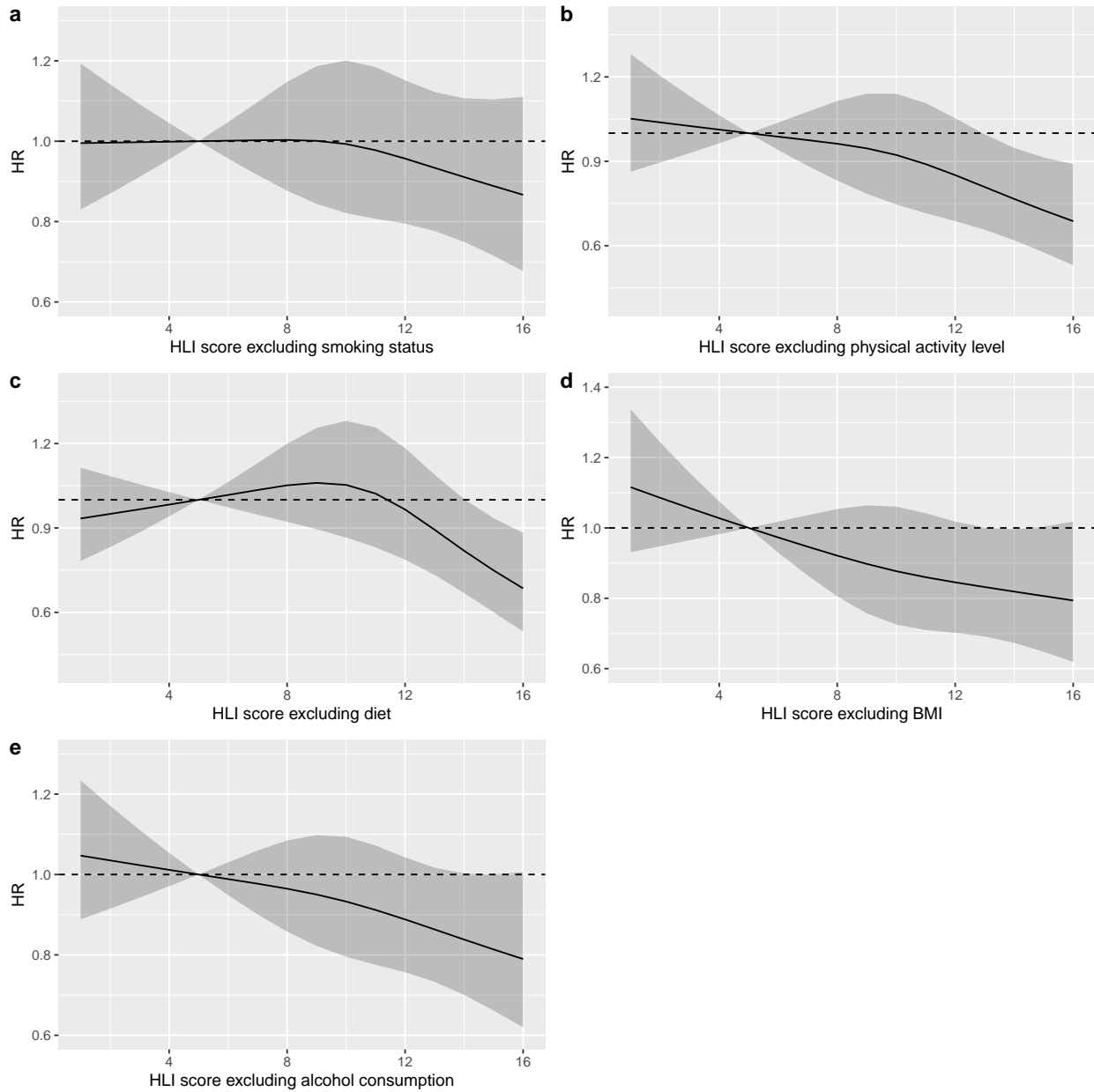Abbreviations: HR = hazard ratio, CI = confidence interval, BMI = body mass index

This section displays results from sensitivity analyses conducted on associations with the HLI modelled as a nonlinear term using restricted cubic splines (RCS) with three knots in the NOWAC cohort (1996-2018) on complete-cases analysis data. Single lifestyle factors were excluded from the HLI score, creating five reduced models. Thus, five estimated associations were obtained for each cancer outcome. Here, we visualise these results in plots.

Figure S9. Postmenopausal breast cancer incidence and its association with HLI score excluding single lifestyle factors. Models are adjusted for education, height, age at menarche, ever use of oral contraceptives, parity, breastfeeding, using of hormone replacement therapy, and history of breast cancer n a first-degree relative. The shaded regions represent the 95% confidence intervals and the reference HLI score is set to 5.
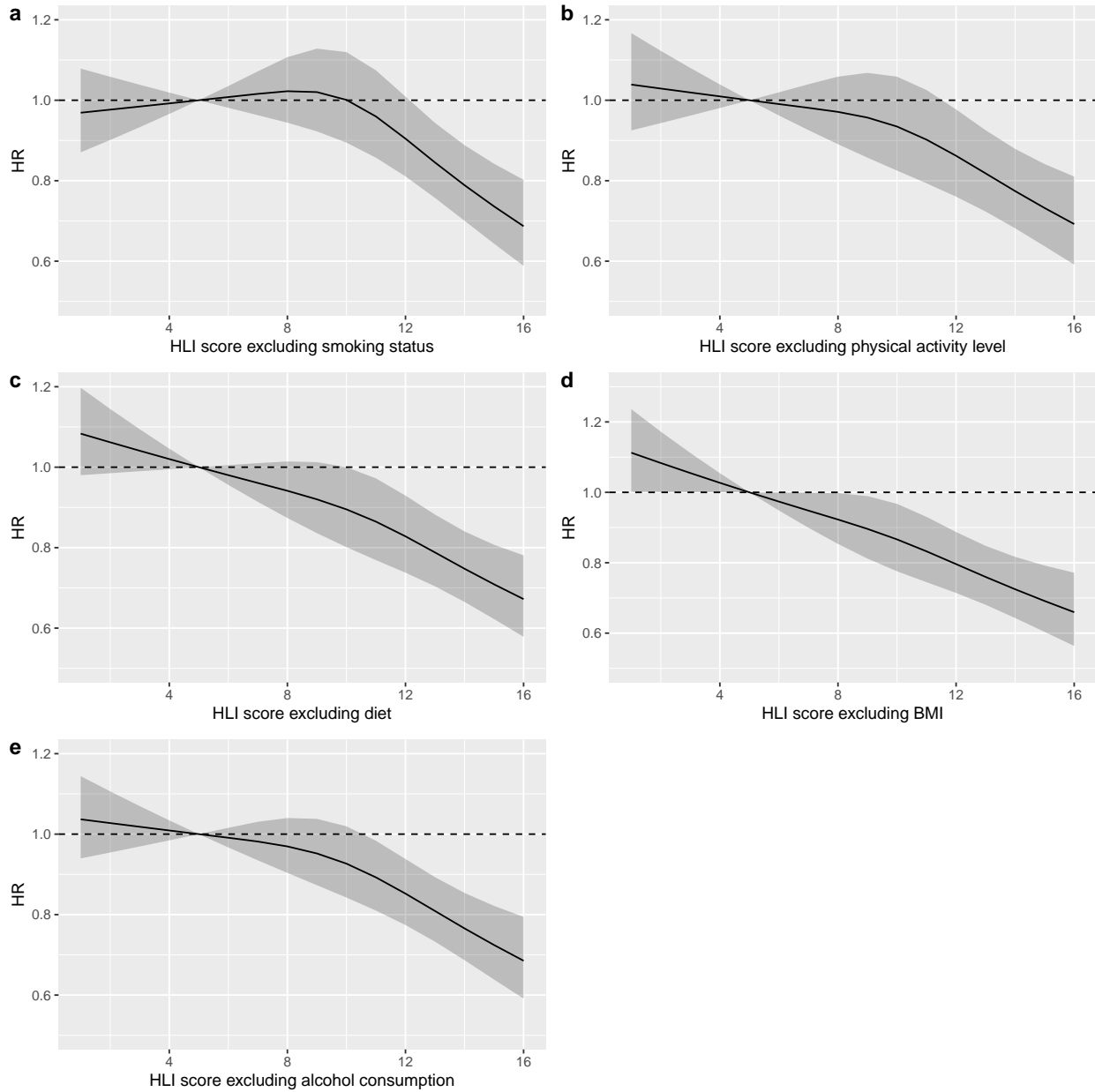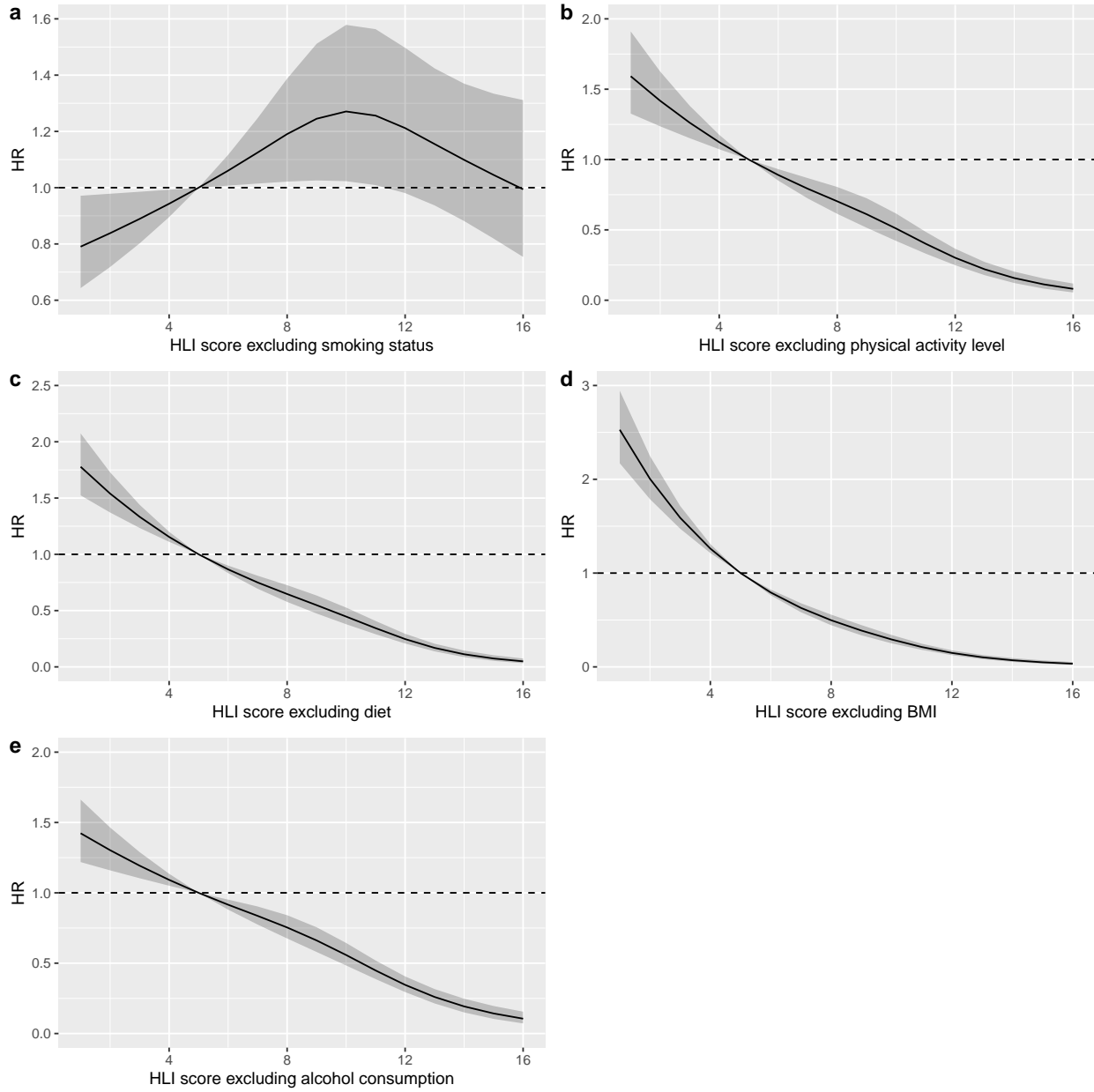

Abbreviations: HR = hazard ration, BMI = body mass index

Figure S10. Colorectal cancer incidence and its association with HLI score excluding single lifestyle factors. Models are adjusted for education and height. The shaded regions represent the 95% confidence intervals and the reference HLI score is set to 5.

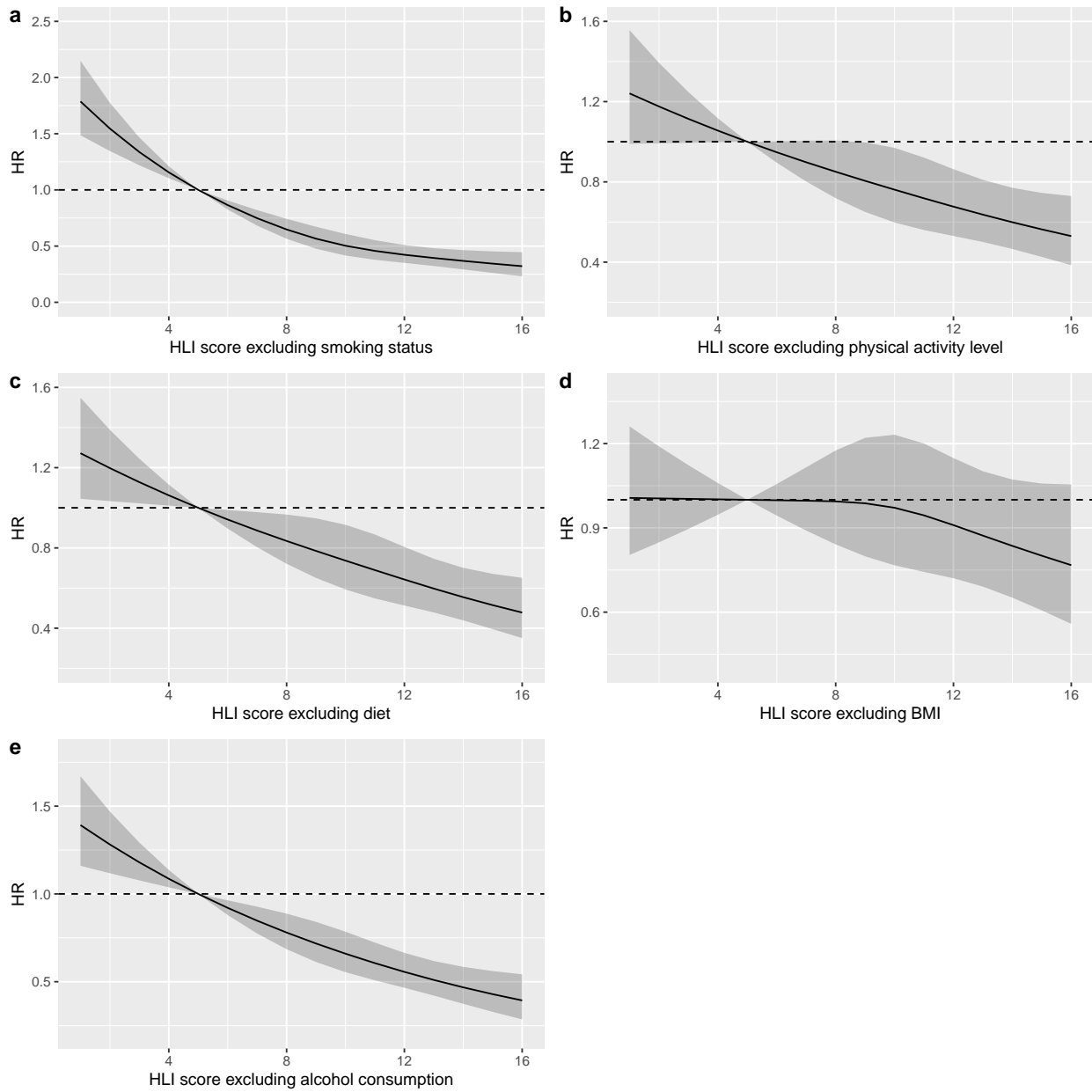Abbreviations: HR = hazard ration, BMI = body mass index

Figure S11. Lung cancer incidence and its association with HLI score excluding single lifestyle factors. Models are adjusted for education and height. The shaded regions represent the 95% confidence intervals and the reference HLI score is set to 5.

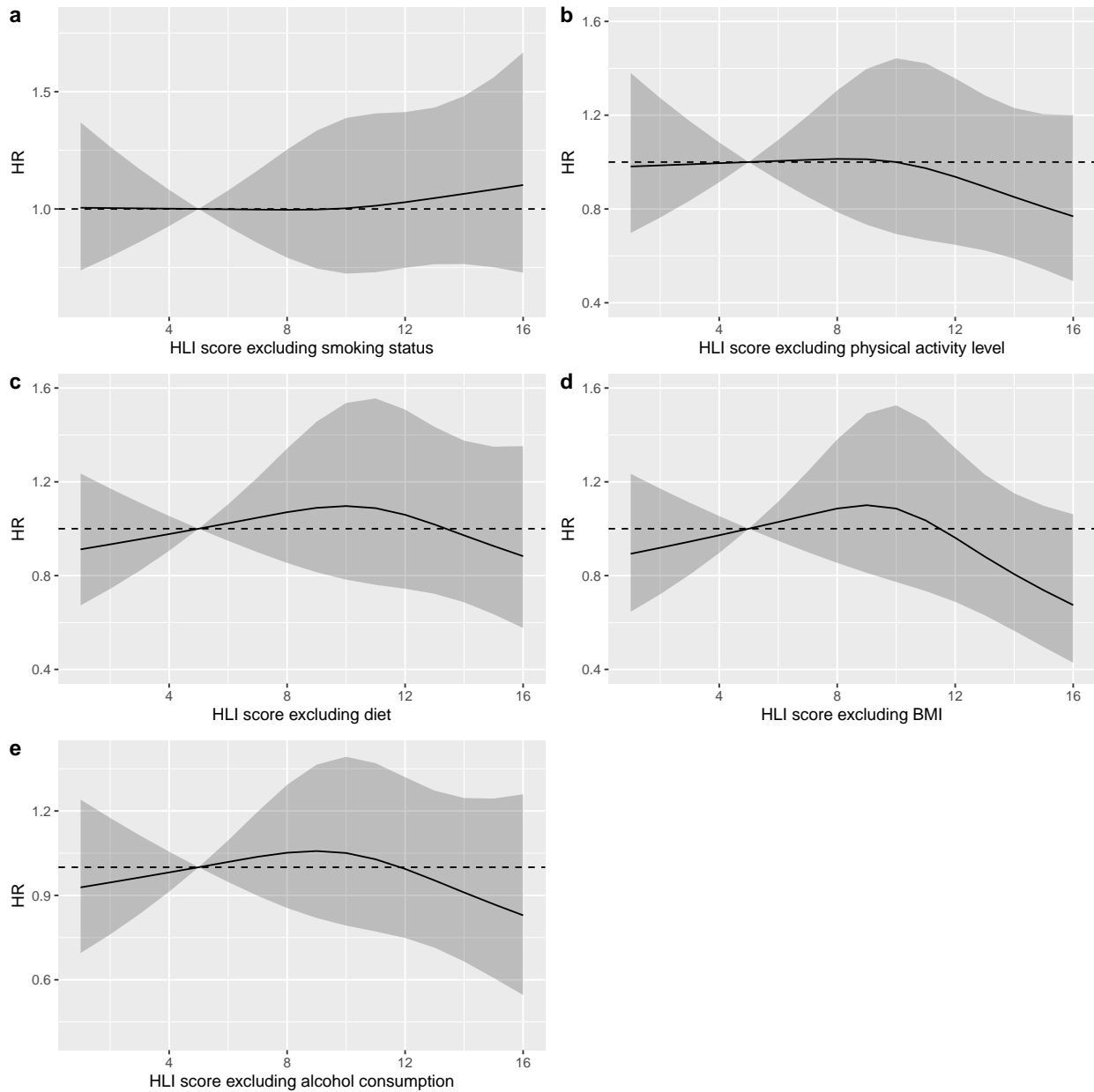Abbreviations: HR = hazard ration, BMI = body mass index

Figure S12. Postmenopausal endometrial cancer incidence and its association with HLI score excluding single lifestyle factors. Models are adjusted for education, height, age at menarche, ever use of oral contraceptive, parity, breastfeeding, use of hormone replacement therapy. The shaded regions represent the 95% confidence intervals and the reference HLI score is set to 5.
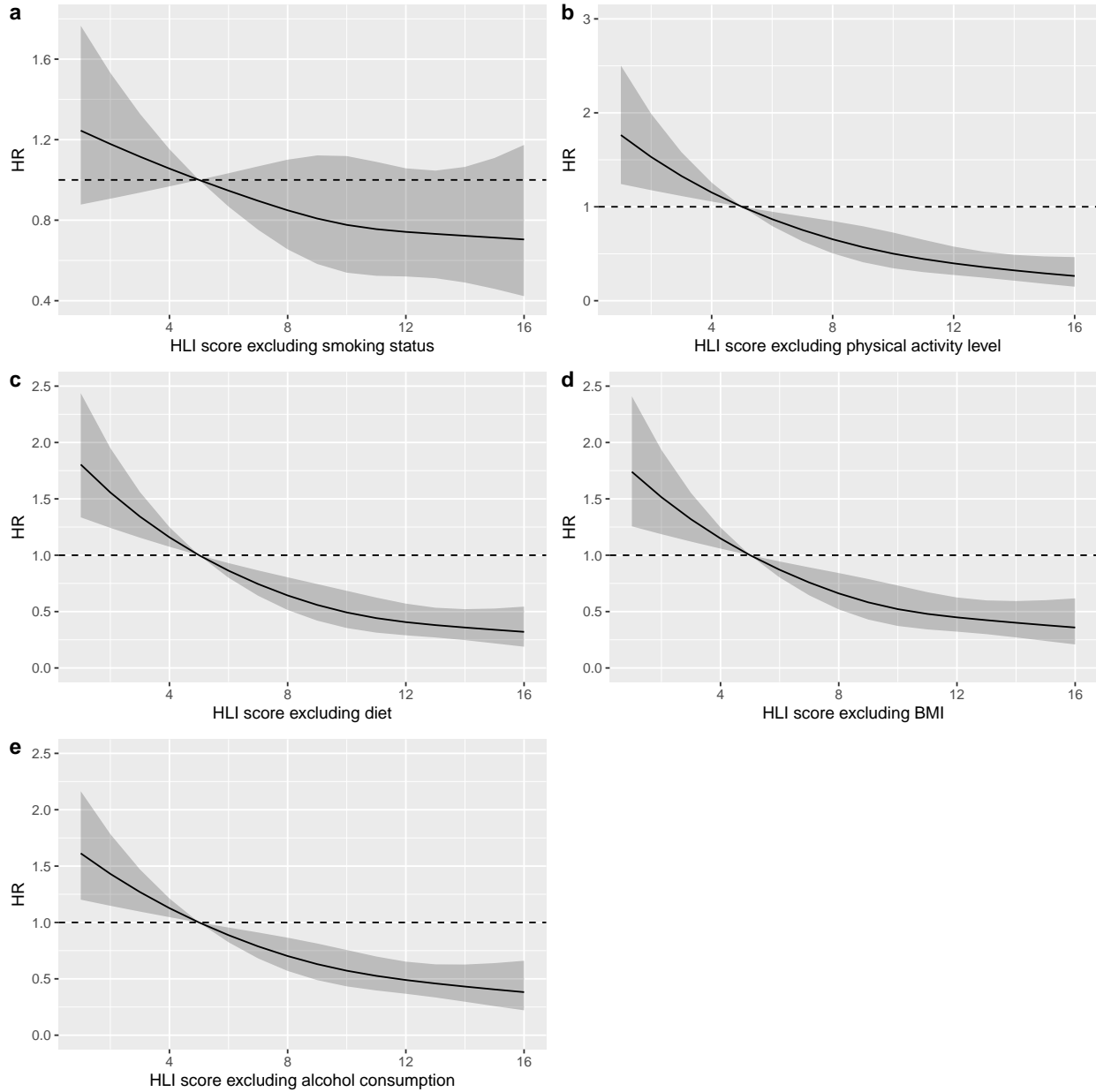

Abbreviations: HR = hazard ration, BMI = body mass index

Figure S13. Postmenopausal ovarian cancer incidence and its association with HLI score excluding single lifestyle factors. Models are adjusted for education, height, age at menarche, ever use of oral contraceptive, parity, breastfeeding, use of hormone replacement therapy. The shaded regions represent the 95% confidence intervals and the reference HLI score is set to 5.
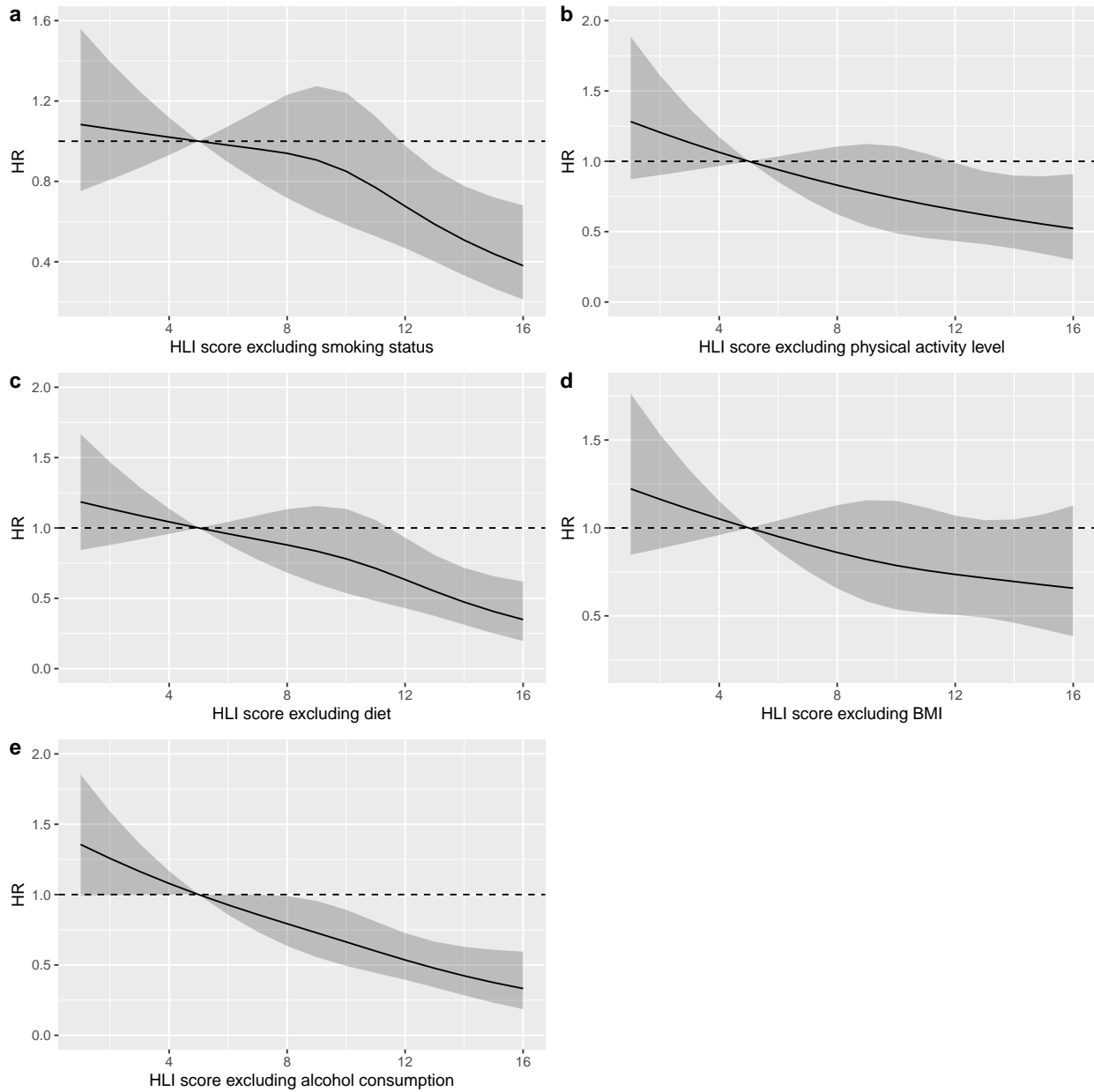

Abbreviations: HR = hazard ration, BMI = body mass index

Figure S14. Pancreatic cancer incidence and its association with HLI score excluding single lifestyle factors. Models are adjusted for education and height. The shaded regions represent the 95% confidence intervals and the reference HLI score is set to 5.

Abbreviations: HR = hazard ration, BMI = body mass index

Figure S15. Kidney cancer incidence and its association with HLI score excluding single lifestyle components. Models are adjusted for education and height. The shaded regions represent the 95% confidence intervals and the reference HLI score is set to 5.

Abbreviations: HR = hazard ration, BMI = body mass index