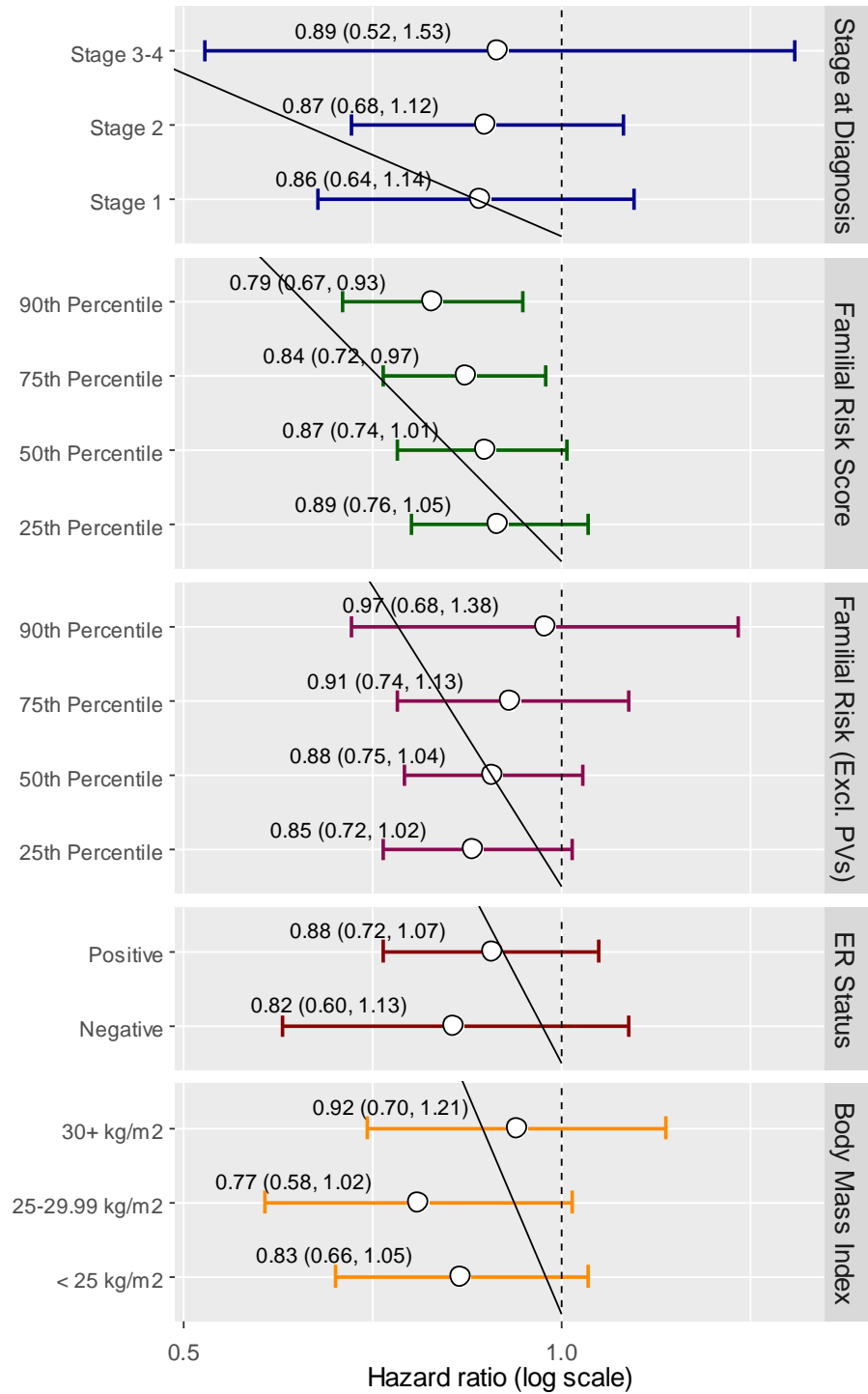# SUPPLEMENTARY MATERIALS

Supplementary Table 1. Characteristics of women with and without *BRCA1* and *BRCA2* pathogenic variants in the Prospective Family Study Cohort (n=4,610)

Characteristic	*BRCA1* or *BRCA2* Pathogenic Variants		P^b
	No (n=4,236)[a]	Yes (n=374)	
Age at first invasive BC diagnosis, No. (%)			<0.001
< 40 years	892 (21.1)	164 (43.9)	
40-49 years	1,353 (31.9)	125 (33.4)	
50-59 years	1,387 (32.7)	68 (18.2)	
≥ 60 years	604 (14.3)	17 (4.5)	
Year of birth, No. (%)			<0.001
< 1950	2,033 (48.0)	81 (21.7)	
1950-1959	1,309 (30.9)	115 (30.7)	
1960-1969	761 (18.0)	136 (36.4)	
≥ 1970	133 (3.1)	42 (11.2)	
Race and ethnicity, No. (%)			<0.001
Asian	507 (12.0)	14 (3.7)	
Hispanic	537 (12.7)	36 (9.6)	
Non-Hispanic Black	423 (10.0)	19 (5.1)	
Non-Hispanic White	2,671 (63.1)	294 (78.6)	
Other	98 (2.3)	11 (2.9)	
Educational attainment, No. (%)			0.73
High school graduate/GED or less	1,339 (31.6)	112 (30.0)	
Some college/vocational school	1,589 (37.5)	140 (37.4)	
Bachelor's degree or higher	1,308 (30.9)	122 (32.6)	
Pre-diagnosis body mass index, No. (%)			0.03
<25 kg/m^2	2,141 (50.5)	215 (57.5)	
25 to <30 kg/m^2	1,211 (28.6)	96 (25.7)	
≥30 kg/m^2	884 (20.9)	63 (16.8)	
Cigarette smoking status at baseline, No. (%)			0.92
Never	2,452 (57.9)	214 (57.2)	
Former	1,204 (28.4)	110 (29.4)	
Current	580 (13.7)	50 (13.4)	
Alcohol consumption at baseline, No. (%)			0.12
Never	2,332 (55.1)	188 (50.3)	
Former	570 (13.5)	62 (16.6)	
Current	1,334 (31.5)	124 (33.2)	
Post-menopausal hormone therapy at baseline, No. (%)			
Never	3,001 (70.8)	311 (83.2)	
Former	1,186 (28.0)	53 (14.2)	
Current	49 (1.2)	10 (2.7)	
Estrogen receptor status of first invasive BC, No. (%)			<0.001
Positive	2,605 (61.5)	159 (42.5)	
Negative	995 (23.5)	163 (43.6)	
Missing	636 (15.0)	52 (13.9)	

Tumor stage at diagnosis of first invasive BC, No. (%)			0.11
Stage 1	1,587 (37.5)	137 (36.6)	
Stage 2	1,443 (34.1)	134 (35.8)	
Stage 3-4	252 (5.9)	32 (8.6)	
Missing	954 (22.5)	71 (19.0)	
Vital status, No. (%)			0.35
Alive	3,130 (73.9)	268 (71.7)	
Deceased	1,106 (26.1)	106 (28.3)	

[a] BC = breast cancer; GED = general education degree

Supplementary Figure 1. Multivariable hazard ratios and 95% confidence intervals for the association of recreational physical activity, any versus none, and all-cause mortality after first invasive breast cancer stratified by prognostic factors in the Prospective Family Study Cohort

(n=4,610). Hazard ratios and 95% confidence intervals (given within parentheses and depicted using error bars) are adjusted for age group at diagnosis (<40, 40-49, 50-59, ≥60 years), study center (Australia, Canada, kConFab, New York, Northern California, Philadelphia, Utah), decade of birth year (<1950, 1950-1959, 1960-1969, ≥1970), race/ethnicity (Asian, Hispanic, non-Hispanic Black, non-Hispanic White, other), education (high school graduate or less, some college, Bachelor's degree or higher), cigarette smoking (never, former, current), alcohol consumption (never, former, current), post-menopausal hormone therapy use (never vs. otherwise), body mass index (<25, 25 to <30, ≥30 kg/m^2; except when stratified by body mass index), stage at diagnosis (1, 2, 3-4; except when stratified by stage at diagnosis), chemotherapy for first invasive breast cancer (yes vs. otherwise), radiation treatment for first invasive breast cancer (yes vs. otherwise), and surgery for first invasive breast cancer (mastectomy, lumpectomy, otherwise). Familial risk score was modeled as a continuous variable with hazard ratios predicted at the 25th (9.61% remaining lifetime risk of contralateral breast cancer), 50th (13.68%), 75th (18.18%), and 90th (25.96%) percentiles. We evaluated multiplicative interactions by familial risk in the full sample and excluding women with *BRCA1* and *BRCA2* pathogenic variants (abbreviated in the figure as excl. PVs). Multiplicative interaction *P* values, based on the Wald test statistic for cross-product terms, were as follows: stage at diagnosis $P_{interaction} = 0.99$; familial risk score $P_{interaction} = 0.07$; familial risk score after excluding women with *BRCA1/2* pathogenic variants $P_{interaction} = 0.50$; estrogen receptor (ER) status $P_{interaction} = 0.70$; body mass index $P_{interaction} = 0.68$. All statistical tests were 2-sided.