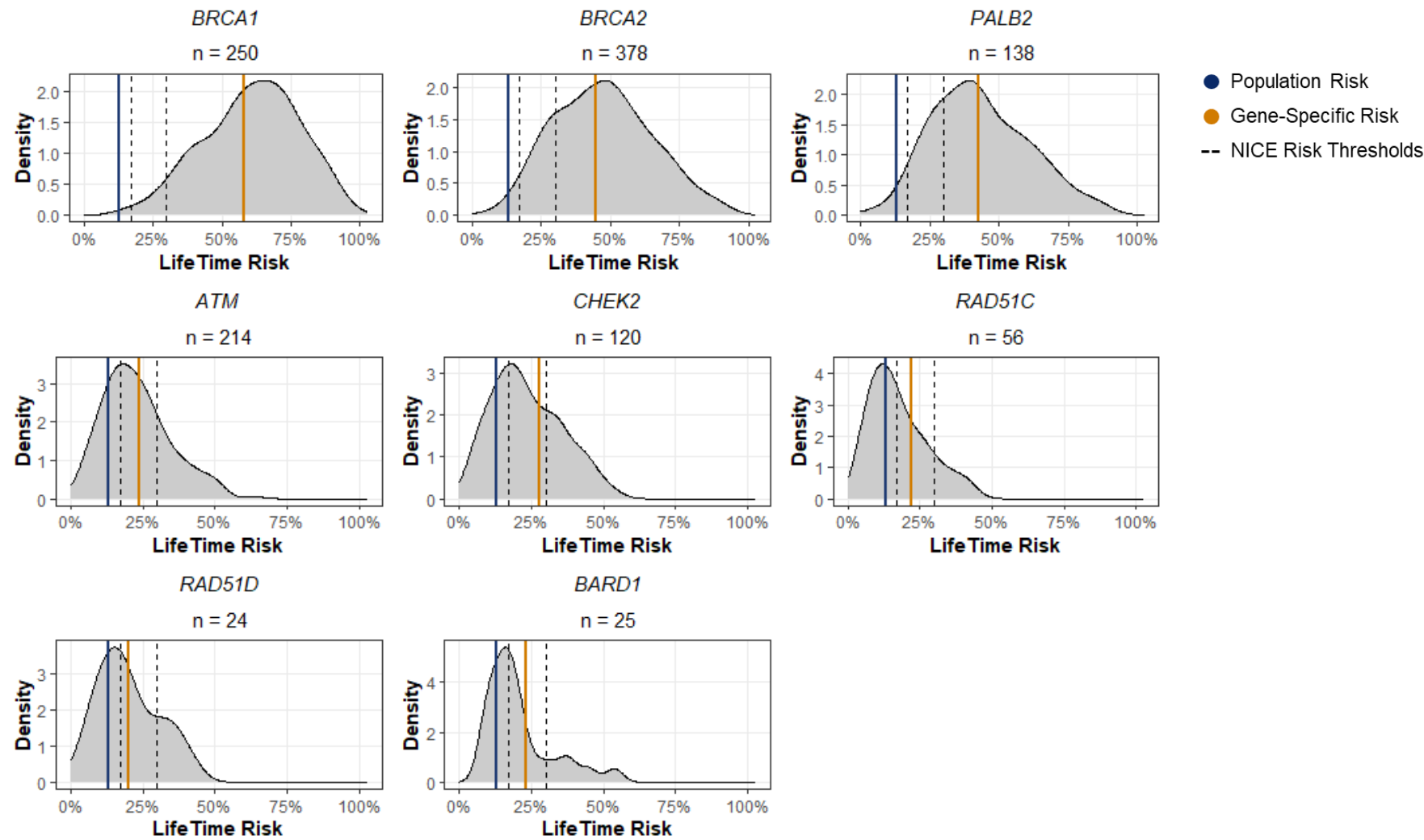
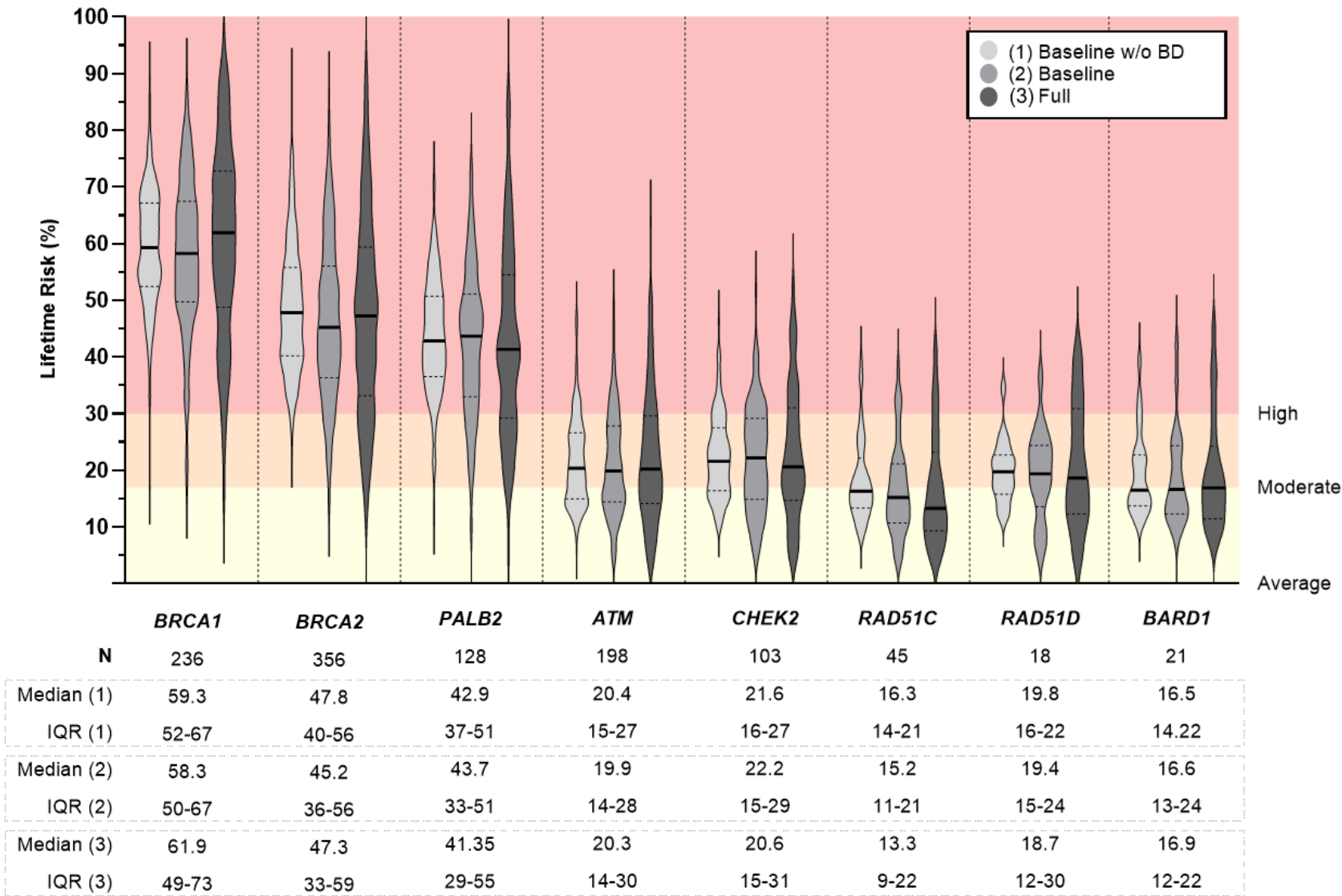


Supplementary Figure 1. Density distributions of estimated lifetime breast cancer risk according to pathogenic variant carrier status. Solid vertical lines indicate the population risk (13%) and the gene-specific risk. Dashed vertical lines indicate the NICE risk thresholds (17% and 30%).



Supplementary Figure 2. Lifetime breast cancer risk distribution across gene carriers according to risk estimates derived from baseline assessment without BD, baseline (including BD), and full assessment (including BD and PRS). BD: Breast Density, w/o: without



Supplementary Table 1. Contribution of PRS, high breast density (BI-RADS categories C or D), and first-degree family history between women in the lowest and highest 15% of lifetime breast cancer risk estimates by gene. LTR: Lifetime Risk, BD: Breast Density.

	z-score (mean per each group)			BD (% with C or D)			Family history (1st grade, yes)		
	Low LTR	High LTR	p-value	Low LTR	High LTR	p-value	Low LTR	High LTR	p-value
<i>BRCA1</i>	-0.6	1.6	<0.001	14%	89%	<0.001	38%	76%	0.001
<i>BRCA2</i>	-0.8	1.3	<0.001	4%	87%	<0.001	34%	70%	0.001
<i>PALB2</i>	-1.2	1.4	<0.001	20%	100%	<0.001	40%	81%	0.01
<i>ATM</i>	-0.7	1.5	<0.001	13%	93%	<0.001	22%	76%	<0.001
<i>CHEK2</i>	-0.8	1.4	<0.001	13%	93%	<0.001	33%	83%	0.006
<i>RAD51C</i>	-0.6	1.1	0.002	0%	71%	0.007	25%	78%	0.06
<i>RAD51D</i>	-0.4	1.4	0.008	0%	100%	0.25	33%	25%	1
<i>BARD1</i>	-0.1	1.6	0.05	0%	67%	0.4	0%	75%	0.14

Supplementary Table 2. Number of women changing lifetime risk category after incorporation of PRS into the baseline assessment model.

Lifetime Risk, n (%)	TOTAL (BRCA)	BRCA1	BRCA2	TOTAL (Non- BRCA)	PALB2	ATM	CHEK2	RAD51C	RAD51D	BARD1
N total	628	250	378	577	138	214	120	56	24	25
Average to Average	2 (0)	1 (0)	1 (0)	129 (22)	2 (1)	56 (26)	27 (23)	26 (46)	9 (38)	9 (36)
Moderate To Moderate	25 (4)	3 (1)	22 (6)	114 (20)	13 (9)	52 (24)	30 (25)	9 (16)	5 (21)	5 (20)
High To High	530 (84)	237 (95)	293 (78)	157 (27)	96 (70)	28 (13)	23 (19)	6 (11)	1 (4)	3 (12)
Average to Moderate	3 (0)	0 (0)	3 (1)	48 (8)	1 (1)	25 (12)	11 (9)	7 (13)	2 (8)	2 (8)
Average to High	1 (0)	0 (0)	1 (0)	2 (0)	0 (0)	2 (1)	0 (0)	0 (0)	0 (0)	0 (0)
Moderate to High	12 (2)	2 (1)	10 (3)	49 (8)	5 (4)	21 (10)	14 (12)	2 (4)	5 (21)	2 (8)
Moderate to Average	6 (1)	1 (0)	5 (1)	39 (7)	1 (1)	17 (8)	11 (9)	5 (9)	2 (8)	3 (12)
High to Average	0 (0)	0 (0)	3 (1)	2 (0)	1 (1)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)
High to Moderate	46 (7)	6 (2)	40 (11)	37 (6)	19 (14)	13 (6)	3 (3)	1 (2)	0 (0)	1 (4)
Change	71 (12)	9 (4)	62 (17)	177 (31)	27 (20)	78 (36)	40 (33)	15 (27)	9 (37)	8 (32)
Increase	16 (3)	2 (1)	14 (4)	99 (17)	6 (5)	48 (22)	25 (21)	9 (16)	7 (29)	4 (16)
Decrease	55 (9)	7 (3)	48 (13)	78 (14)	21 (15)	30 (14)	15 (12)	6 (11)	2 (8)	4 (16)

Supplementary Table 3. Number of women changing 10-year risk category after incorporation of PRS into the baseline assessment model.

10-Year Risk; n (%)	TOTAL (BRCA)	BRCA1	BRCA2	TOTAL (Non- BRCA)	PALB2	ATM	CHEK2	RAD51C	RAD51D	BARD1
N total	628	250	378	577	138	214	120	56	24	25
Average to Average	1 (0)	0 (0)	1 (0)	77 (13)	2 (1)	33 (15)	18 (15)	16 (29)	6 (25)	2 (8)
Moderate To Moderate	49 (8)	6 (2)	43 (11)	214 (37)	20 (14)	107 (50)	49 (41)	17 (30)	8 (33)	13 (52)
High To High	510 (81)	232 (93)	278 (74)	131 (23)	80 (58)	18 (8)	23 (19)	5 (9)	2 (8)	3 (12)
Average to Moderate	0 (0)	0 (0)	0 (0)	20 (3)	0 (0)	7 (3)	6 (5)	5 (9)	1 (4)	1 (4)
Average to High	1 (0)	0 (0)	1 (0)	1 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Moderate to High	11 (2)	5 (2)	6 (2)	46 (8)	9 (7)	21 (10)	7 (6)	3 (5)	3 (13)	3 (12)
Moderate to Average	8 (1)	1 (0)	7 (2)	51 (9)	3 (2)	22 (10)	11 (9)	9 (16)	4 (17)	2 (8)
High to Average	0 (0)	0 (0)	0 (0)	1 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
High to Moderate	48 (8)	6 (2)	42 (11)	36 (6)	23 (17)	5 (2)	6 (5)	1 (2)	0 (0)	1 (4)
Change	68 (11)	12 (5)	56 (15)	155 (27)	36 (26)	56 (26)	30 (25)	18 (32)	8 (34)	7 (28)
Increase	12 (2)	5 (2)	7 (2)	67 (12)	9 (6)	29 (13)	13 (11)	8 (14)	4 (17)	4 (16)
Decrease	56 (9)	7 (3)	49 (13)	88 (15)	27 (20)	27 (13)	17 (14)	10 (18)	4 (17)	3 (12)