

Table S1. Participant characteristics according to the frequency/severity of hot flushes (N=18,555)

	N	Frequency or severity of hot flushes				p-value
		Never n (%)	Rarely/Mild n (%)	Sometimes/Moderate n (%)	Often/Severe n (%)	
Birth year						<0.0001
1940-1949	10585 (57.0)	5569 (52.6)	1751 (16.5)	2204 (20.8)	1061 (10.0)	
1950-1959	7970 (43.0)	4306 (54.0)	1025 (12.9)	1763 (22.1)	876 (11.0)	
Race/ethnicity/region						<0.0001
Caucasian- Australian	8762 (47.2)	4550 (51.9)	1447 (16.5)	1892 (21.6)	873 (10.0)	
Caucasian- European	6059 (32.7)	2704 (44.6)	626 (10.3)	1852 (30.6)	877 (14.5)	
Caucasian- American	1694 (9.1)	1256 (74.1)	304 (18.0)	68 (4.0)	66 (3.9)	
Asian	787 (4.2)	560 (71.2)	127 (16.1)	70 (8.9)	30 (3.8)	
African American/Black	861 (4.6)	560 (65.0)	194 (22.5)	48 (5.6)	59 (6.9)	
Other	392 (2.1)	245 (62.5)	78 (19.9)	37 (9.4)	32 (8.2)	
Education level						<0.0001
≤10 years	8213 (44.3)	3683 (44.8)	1122 (13.7)	2263 (27.6)	1145 (13.9)	
11-12 years	3011 (16.2)	1659 (55.1)	502 (16.7)	600 (19.9)	250 (8.3)	
>12 years	7331 (39.5)	4533 (61.8)	1152 (15.7)	1104 (15.1)	542 (7.4)	
Smoking status						<0.0001
Never smoker	9809 (52.9)	5606 (57.2)	1435 (19.7)	1931 (19.7)	837 (8.5)	
Past smoker	5410 (29.2)	2815 (52.0)	844 (22.0)	1189 (22.0)	562 (10.4)	
Current smoker	3336 (18.0)	1454 (43.6)	497 (25.4)	847 (25.4)	538 (16.1)	
Body mass index						<0.0001
Normal weight (<25 kg/m ²)	9174 (49.4)	5282 (57.6)	1292 (14.1)	1802 (19.6)	798 (8.7)	
Overweight (25-29.9 kg/m ²)	5411 (29.2)	2705 (50.0)	815 (15.1)	1248 (23.1)	643 (11.9)	
Obese (≥30 kg/m ²)	3970 (21.4)	1888 (47.6)	669 (16.9)	917 (23.1)	496 (12.5)	
Menopausal status						<0.0001
Unknown due to surgery	3221 (17.4)	1314 (40.8)	488 (15.2)	886 (27.5)	533 (16.6)	
Unknown due to hormone use	2233 (12.0)	1003 (44.9)	337 (15.1)	602 (27.0)	291 (13.0)	
Premenopause	6400 (34.5)	4661 (72.8)	844 (13.2)	747 (11.7)	148 (2.3)	
Perimenopause	5177 (27.9)	2433 (47.0)	902 (17.4)	1224 (23.6)	618 (11.9)	
Postmenopause	1524 (8.2)	464 (30.5)	205 (13.5)	508 (33.3)	347 (22.8)	
Menopausal hormone therapy						<0.0001
Current	2609 (14.1)	925 (35.5)	424 (16.3)	778 (29.8)	482 (18.5)	
Non-current	15946 (85.9)	8950 (56.1)	2352 (14.8)	3189 (20.0)	1455 (9.1)	
Type 2 diabetes status						0.0026
Yes	588 (3.2)	298 (50.7)	98 (16.7)	107 (18.2)	85 (14.5)	
No	17945 (96.8)	9567 (53.3)	2675 (14.9)	3856 (21.5)	1847 (10.3)	

Table S2. Study-specific association between age at menarche and risk of hot flushes and night sweats

Age at menarche	n	Hot flushes n (%)				Hot flushes Model 1: RRR (95% CI) ^a			Hot flushes Model 2: RRR (95% CI) ^b		
		Never	Rarely /Mild	Sometimes /Moderate	Often /Severe	Rarely /Mild	Sometimes /Moderate	Often /Severe	Rarely /Mild	Sometimes /Moderate	Often /Severe
Frequency											
ALSWH	10523	5436 (51.7)	1687 (16.0)	2334 (22.2)	1066 (10.1)						
≤11 years	1976	938 (47.5)	342 (17.3)	459 (23.2)	237 (12.0)	1.20 (1.02-1.40)	1.14 (0.99-1.31)	1.50 (1.24-1.82)	1.11 (0.95-1.31)	1.01 (0.87-1.16)	1.32 (1.08-1.60)
12 years	2274	1196 (52.6)	355 (15.6)	475 (20.9)	248 (10.9)	0.97 (0.84-1.14)	0.93 (0.81-1.07)	1.25 (1.04-1.50)	0.94 (0.81-1.10)	0.88 (0.76-1.01)	1.17 (0.97-1.41)
13 years	2944	1554 (52.8)	457 (15.5)	646 (21.9)	287 (9.8)	0.97 (0.84-1.12)	0.97 (0.86-1.10)	1.11 (0.93-1.33)	0.95 (0.83-1.10)	0.95 (0.83-1.07)	1.08 (0.90-1.29)
≥14 years	3329	1748 (52.5)	533 (16.0)	754 (22.7)	294 (8.8)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						1.03 (0.99-1.06)	1.02 (0.99-1.05)	1.10 (1.05-1.15)	1.01 (0.98-1.05)	1.00 (0.96-1.03)	1.07 (1.02-1.12)
SWAN	3079	2257 (73.3)	586 (19.0)	99 (3.2)	137 (4.4)						
≤11 years	737	517 (70.2)	155 (21.0)	30 (4.1)	35 (4.8)	1.25 (0.96-1.63)	1.87 (1.00-3.48)	1.31 (0.78-2.19)	1.16 (0.89-1.52)	1.64 (0.87-3.08)	1.15 (0.68-1.94)
12 years	810	599 (74.0)	142 (17.5)	28 (3.5)	41 (5.1)	1.02 (0.78-1.34)	1.57 (0.84-2.94)	1.40 (0.85-2.30)	0.99 (0.76-1.30)	1.47 (0.78-2.77)	1.31 (0.79-2.17)
13 years	832	612 (73.6)	162 (19.5)	25 (3.0)	33 (4.0)	1.16 (0.89-1.50)	1.38 (0.72-2.62)	1.11 (0.66-1.88)	1.13 (0.87-1.47)	1.31 (0.69-2.50)	1.06 (0.63-1.79)
≥14 years	700	529 (75.6)	127 (18.1)	16 (2.3)	28 (4.0)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						1.05 (0.99-1.11)	1.15 (1.01-1.30)	1.09 (0.98-1.21)	1.03 (0.98-1.09)	1.12 (0.98-1.27)	1.06 (0.96-1.18)
Severity											
NSHD	1041	649 (62.3)	63 (6.1)	266 (25.6)	63 (6.1)						
≤11 years	177	93 (52.5)	13 (7.3)	60 (33.9)	11 (6.2)	2.16 (0.89-5.26)	1.66 (1.06-2.61)	2.06 (0.80-5.30)	2.29 (0.93-5.66)	1.56 (0.99-2.48)	1.98 (0.76-5.16)
12 years	296	192 (64.9)	14 (4.7)	69 (23.3)	21 (7.1)	1.13 (0.47-2.68)	0.93 (0.61-1.41)	1.90 (0.82-4.42)	1.17 (0.49-2.78)	0.89 (0.59-1.36)	1.85 (0.79-4.33)
13 years	358	225 (62.9)	27 (7.5)	83 (23.2)	23 (6.4)	1.85 (0.85-4.06)	0.95 (0.64-1.42)	1.78 (0.77-4.08)	1.88 (0.86-4.13)	0.92 (0.62-1.38)	1.74 (0.75-4.00)
≥14 years	210	139 (66.2)	9 (4.3)	54 (25.7)	8 (3.8)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						1.07 (0.86-1.33)	1.14 (1.01-1.29)	1.16 (0.93-1.46)	1.09 (0.87-1.36)	1.12 (0.99-1.27)	1.15 (0.91-1.45)
NCDS	3261	1139 (34.9)	278 (8.5)	1202 (36.9)	642 (19.7)						
≤11 years	532	185 (34.6)	55 (10.3)	195 (36.7)	98 (18.4)	1.28 (0.86-1.89)	1.08 (0.83-1.39)	1.06 (0.78-1.45)	1.24 (0.83-1.85)	1.04 (0.80-1.34)	0.98 (0.71-1.34)
12 years	808	276 (34.2)	67 (8.3)	297 (36.8)	168 (20.8)	1.03 (0.71-1.49)	1.09 (0.87-1.36)	1.22 (0.93-1.60)	1.01 (0.69-1.46)	1.06 (0.85-1.34)	1.16 (0.88-1.53)
13 years	1080	371 (34.4)	83 (7.7)	404 (37.4)	222 (20.6)	0.95 (0.67-1.35)	1.10 (0.89-1.36)	1.19 (0.92-1.54)	0.94 (0.66-1.33)	1.08 (0.88-1.34)	1.16 (0.90-1.50)
≥14 years	841	308 (36.6)	73 (8.7)	306 (36.4)	154 (18.3)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						1.06 (0.95-1.18)	1.02 (0.95-1.09)	1.04 (0.96-1.13)	1.05 (0.94-1.17)	1.01 (0.94-1.08)	1.02 (0.94-1.11)
HOW	462	266 (57.6)	130 (28.1)	49 (10.6)	17 (3.7)						
≤11 years	91	57 (62.6)	17 (18.7)	12 (13.2)	5 (5.5)	N/A	N/A	N/A	N/A	N/A	N/A
12 years	74	34 (46.0)	34 (46.0)	5 (6.8)	1 (1.4)						
13 years	128	74 (57.8)	38 (29.7)	12 (9.4)	4 (3.1)						
≥14 years	169	101 (59.8)	41 (24.3)	20 (11.8)	7 (4.1)						
Per 1-year decrease											
SMWHS	189	128 (67.7)	32 (16.9)	17 (9.0)	12 (6.3)						
≤11 years	32	21 (65.6)	5 (15.6)	3 (9.4)	3 (9.4)	N/A	N/A	N/A	N/A	N/A	N/A
12 years	60	40 (66.7)	9 (15.0)	5 (8.3)	6 (10.0)						
13 years	60	45 (75.0)	8 (13.3)	6 (10.0)	1 (1.7)						
≥14 years	37	22 (59.5)	10 (27.0)	3 (8.1)	2 (5.4)						
Per 1-year decrease											
Night sweats											
Age at menarche	n	Night sweats n (%)				Night sweats Model 1: RRR (95% CI) ^a			Night sweats Model 2: RRR (95% CI) ^b		
		Never	Rarely /Mild	Sometimes /Moderate	Often /Severe	Rarely /Mild	Sometimes /Moderate	Often /Severe	Rarely /Mild	Sometimes /Moderate	Often /Severe

Frequency											
ALSWH	10523	6451 (61.3)	1523 (14.5)	1746 (16.6)	803 (7.6)						
≤11 years	1976	1135 (57.4)	300 (15.2)	349 (17.7)	192 (9.7)	1.16 (0.99-1.36)	1.13 (0.97-1.31)	1.64 (1.33-2.01)	1.13 (0.96-1.34)	1.05 (0.90-1.22)	1.49 (1.21-1.84)
12 years	2274	1406 (61.8)	309 (13.6)	383 (16.8)	176 (7.7)	0.97 (0.83-1.14)	1.01 (0.87-1.17)	1.23 (1.00-1.52)	0.96 (0.82-1.13)	0.98 (0.84-1.13)	1.18 (0.95-1.46)
13 years	2944	1834 (62.3)	411 (15.0)	448 (15.2)	221 (7.5)	1.06 (0.92-1.23)	0.90 (0.79-1.04)	1.18 (0.97-1.44)	1.06 (0.91-1.22)	0.89 (0.77-1.02)	1.15 (0.95-1.41)
≥14 years	3329	2076 (62.4)	473 (14.2)	566 (17.0)	214 (6.4)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						1.03 (0.99-1.07)	1.02 (0.99-1.05)	1.12 (1.07-1.18)	1.02 (0.99-1.06)	1.00 (0.97-1.04)	1.10 (1.04-1.15)
SWAN	3079	2173 (70.6)	708 (23.0)	84 (2.7)	114 (3.7)						
≤11 years	737	524 (71.1)	162 (22.0)	18 (2.4)	33 (4.5)	0.86 (0.67-1.10)	1.35 (0.64-2.83)	1.42 (0.81-2.50)	0.84 (0.65-1.08)	1.26 (0.59-2.66)	1.33 (0.75-2.37)
12 years	810	565 (69.8)	188 (23.2)	24 (3.0)	33 (4.1)	0.97 (0.77-1.24)	1.75 (0.86-3.55)	1.44 (0.82-2.53)	0.96 (0.76-1.23)	1.69 (0.83-3.44)	1.40 (0.79-2.46)
13 years	832	592 (71.2)	183 (22.0)	30 (3.6)	27 (3.3)	0.92 (0.72-1.17)	2.13 (1.07-4.21)	1.15 (0.64-2.06)	0.91 (0.72-1.16)	2.08 (1.05-4.12)	1.12 (0.62-2.02)
≥14 years	700	492 (70.3)	175 (25.0)	12 (1.7)	21 (3.0)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						1.00 (0.95-1.05)	1.10 (0.96-1.26)	1.09 (0.97-1.22)	0.99 (0.94-1.04)	1.08 (0.95-1.24)	1.07 (0.95-1.20)
Severity											
NSHD	1041	725 (69.6)	41 (3.9)	212 (20.4)	63 (6.1)						
≤11 years	177	119 (67.2)	9 (5.1)	37 (20.9)	12 (6.8)	2.41 (0.79-7.36)	1.37 (0.82-2.30)	1.60 (0.67-3.84)	2.73 (0.88-8.50)	1.42 (0.84-2.39)	1.59 (0.66-3.86)
12 years	296	194 (65.5)	8 (2.7)	74 (25.0)	20 (6.8)	1.31 (0.42-4.09)	1.69 (1.07-2.64)	1.64 (0.75-3.60)	1.41 (0.45-4.42)	1.72 (1.09-2.70)	1.64 (0.74-3.62)
13 years	358	253 (70.7)	19 (5.3)	65 (18.2)	21 (5.9)	2.39 (0.87-6.52)	1.14 (0.72-1.79)	1.32 (0.61-2.88)	2.48 (0.90-6.81)	1.16 (0.73-1.82)	1.33 (0.61-2.91)
≥14 years	210	159 (75.7)	5 (2.4)	36 (17.1)	10 (4.8)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						1.14 (0.87-1.51)	1.13 (0.99-1.29)	1.16 (0.92-1.45)	1.18 (0.89-1.57)	1.14 (0.99-1.30)	1.15 (0.91-1.45)
NCDS	3261	1580 (48.5)	212 (6.5)	1023 (31.4)	446 (13.7)						
≤11 years	532	258 (48.5)	29 (5.5)	175 (32.9)	70 (13.2)	0.83 (0.52-1.32)	1.10 (0.86-1.40)	1.12 (0.79-1.57)	0.86 (0.53-1.38)	1.13 (0.88-1.45)	1.13 (0.80-1.59)
12 years	808	385 (47.7)	58 (7.2)	239 (29.6)	126 (15.6)	1.10 (0.74-1.62)	1.00 (0.80-1.25)	1.35 (1.01-1.82)	1.11 (0.75-1.64)	1.02 (0.81-1.27)	1.36 (1.01-1.83)
13 years	1080	517 (47.9)	67 (6.2)	348 (32.2)	148 (13.7)	0.95 (0.65-1.38)	1.09 (0.88-1.33)	1.17 (0.88-1.56)	0.95 (0.65-1.39)	1.10 (0.89-1.35)	1.18 (0.89-1.56)
≥14 years	841	420 (49.9)	58 (6.9)	261 (31.0)	102 (12.1)	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease						0.95 (0.84-1.08)	1.02 (0.96-1.09)	1.07 (0.98-1.17)	0.96 (0.85-1.09)	1.03 (0.96-1.10)	1.07 (0.98-1.17)
HOW	462	291 (63.0)	118 (25.5)	36 (7.8)	17 (3.7)						
≤11 years	91	61 (67.0)	17 (18.7)	6 (6.6)	7 (7.7)	N/A	N/A	N/A	N/A	N/A	N/A
12 years	74	40 (54.1)	27 (36.5)	6 (8.1)	1 (1.4)						
13 years	128	86 (67.2)	29 (22.7)	9 (7.0)	4 (3.1)						
≥14 years	169	104 (61.5)	45 (26.6)	15 (8.9)	5 (3.0)						
Per 1-year decrease											
SMWHS	189	147 (77.8)	26 (13.8)	5 (2.6)	11 (5.8)						
≤11 years	32	26 (81.3)	3 (9.4)	0 (0.0)	3 (9.4)	N/A	N/A	N/A	N/A	N/A	N/A
12 years	60	43 (71.7)	9 (15.0)	1 (1.7)	7 (11.7)						
13 years	60	49 (81.7)	9 (15.0)	1 (1.7)	1 (1.7)						
≥14 years	37	29 (78.4)	5 (13.5)	3 (8.1)	0 (0.0)						
Per 1-year decrease											

Data are presented as n (%) or relative risk ratio (RRR) and 95% confidence intervals (95% CI) using multinomial logistic regression models with a generalised logit link.

N/A indicated that the HOW and SMWHS studies did not have sufficient data to perform regression models.

^a Model 1 was adjusted for birth year and race/ethnicity/region.

^b Model 2 was additionally adjusted for body mass index.

Table S3. Association between age at menarche and risk of hot flushes and night sweats adjusted for other factors

Hot flushes		Hot flushes Model 3: RRR (95% CI) ^a				Hot flushes Model 4: RRR (95% CI) ^b			
Age at menarche	n	Never	Rarely /Mild	Sometimes /Moderate	Often /Severe	Never	Rarely /Mild	Sometimes /Moderate	Often /Severe
Frequency (ALSWH + SWAN)									
	13602								
≤11 years	2713	Ref	1.18 (1.14-1.22)	1.13 (1.06-1.21)	1.42 (1.40-1.43)	Ref	1.10 (1.06-1.14)	1.01 (0.94-1.08)	1.25 (1.25-1.26)
12 years	3084	Ref	0.98 (0.96-1.00)	0.95 (0.88-1.01)	1.25 (1.18-1.33)	Ref	0.95 (0.93-0.97)	0.89 (0.83-0.96)	1.18 (1.10-1.26)
13 years	3776	Ref	1.04 (0.93-1.15)	1.03 (0.97-1.09)	1.17 (1.12-1.23)	Ref	1.02 (0.92-1.13)	1.00 (0.94-1.06)	1.14 (1.10-1.18)
≥14 years	4029	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.03 (1.02-1.04)	1.02 (1.01-1.04)	1.09 (1.08-1.09)	Ref	1.01 (1.00-1.03)	1.00 (0.98-1.02)	1.06 (1.05-1.07)
Severity (NSHD + NCDS + HOW + SMWHS)									
	4953								
≤11 years	832	Ref	1.16 (0.86-1.55)	1.14 (0.90-1.44)	1.04 (0.81-1.34)	Ref	1.15 (0.88-1.51)	1.10 (0.87-1.38)	0.97 (0.75-1.26)
12 years	1238	Ref	1.13 (0.80-1.60)	1.04 (0.91-1.19)	1.22 (1.17-1.26)	Ref	1.13 (0.78-1.64)	1.02 (0.88-1.18)	1.17 (1.12-1.22)
13 years	1626	Ref	1.06 (0.84-1.35)	1.09 (0.99-1.19)	1.24 (1.16-1.34)	Ref	1.06 (0.82-1.37)	1.07 (0.97-1.18)	1.21 (1.13-1.31)
≥14 years	1257	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.03 (1.00-1.07)	1.03 (0.98-1.08)	1.02 (0.98-1.06)	Ref	1.03 (1.00-1.06)	1.02 (0.97-1.08)	1.00 (0.96-1.05)
Night sweats		Night sweats Model 3: RRR (95% CI) ^a				Night sweats Model 4: RRR (95% CI) ^b			
Age at menarche	n	Never	Rarely /Mild	Sometimes /Moderate	Often /Severe	Never	Rarely /Mild	Sometimes /Moderate	Often /Severe
Frequency (ALSWH + SWAN)									
	13602								
≤11 years	2713	Ref	1.04 (0.88-1.23)	1.06 (1.02-1.11)	1.50 (1.42-1.58)	Ref	1.02 (0.86-1.20)	1.00 (0.96-1.04)	1.40 (1.34-1.46)
12 years	3084	Ref	0.97 (0.96-0.99)	1.02 (0.97-1.08)	1.23 (1.16-1.32)	Ref	0.97 (0.95-0.98)	0.99 (0.94-1.05)	1.19 (1.11-1.29)
13 years	3776	Ref	1.04 (0.98-1.11)	0.95 (0.87-1.05)	1.22 (1.19-1.24)	Ref	1.03 (0.97-1.10)	0.94 (0.85-1.03)	1.20 (1.17-1.22)
≥14 years	4029	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.01 (0.99-1.04)	1.02 (1.01-1.02)	1.10 (1.09-1.11)	Ref	1.01 (0.99-1.03)	1.00 (0.99-1.01)	1.08 (1.07-1.09)
Severity (NSHD + NCDS + HOW + SMWHS)									
	4953								
≤11 years	832	Ref	0.84 (0.65-1.09)	1.06 (0.99-1.14)	1.18 (0.90-1.55)	Ref	0.86 (0.66-1.13)	1.10 (1.03-1.17)	1.19 (0.92-1.54)
12 years	1238	Ref	1.21 (0.99-1.48)	1.10 (0.90-1.34)	1.45 (1.29-1.64)	Ref	1.23 (1.02-1.48)	1.11 (0.92-1.34)	1.44 (1.29-1.61)
13 years	1626	Ref	0.99 (0.81-1.22)	1.08 (1.03-1.13)	1.24 (1.23-1.26)	Ref	1.00 (0.81-1.23)	1.08 (1.02-1.15)	1.23 (1.20-1.27)
≥14 years	1257	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	0.98 (0.94-1.02)	1.02 (0.99-1.06)	1.08 (1.01-1.15)	Ref	0.99 (0.94-1.03)	1.03 (1.00-1.07)	1.08 (1.02-1.15)

Data are presented as n (%) or relative risk ratio (RRR) and 95% confidence intervals (95% CI) using generalised linear mix models with multinomial distribution and generalised logit link. The Glimmix procedure in SAS was used to incorporate study as a random effect into the analyses.

^a Model 3 was adjusted for birth year, race/ethnicity/region, education level, smoking status, menopausal status, use of menopausal hormone therapy, and diabetes status.

^b Model 4 was adjusted for covariates in model 3 plus body mass index.

Table S4. Association between age at menarche and risk of hot flushes and night sweats stratified by menopausal status

Age at menarche	Frequency of hot flushes Model 1: RRR (95% CI) ^a					Severity of hot flushes Model 1: RRR (95% CI) ^a				
	n	Never	Rarely	Sometimes	Often	n	Never	Mild	Moderate	Severe
Hysterectomy/oophorectomy	2378					843				
≤11 years	532	Ref	1.18 (0.85-1.64)	1.04 (0.78-1.38)	1.56 (1.10-2.20)	170	Ref	0.65 (0.43-0.97)	1.14 (0.68-1.90)	0.81 (0.44-1.50)
12 years	538	Ref	1.17 (0.85-1.62)	0.94 (0.71-1.25)	1.37 (0.97-1.94)	228	Ref	0.88 (0.61-1.26)	0.79 (0.56-1.11)	1.09 (0.83-1.43)
13 years	618	Ref	0.92 (0.67-1.26)	0.96 (0.74-1.25)	1.11 (0.79-1.56)	257	Ref	0.99 (0.69-1.40)	1.08 (0.49-2.40)	1.26 (1.04-1.53)
≥14 years	690	Ref	Ref	Ref	Ref	188	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.03 (0.96-1.11)	1.01 (0.95-1.08)	1.13 (1.05-1.22)		Ref	0.91 (0.86-0.96)	1.02 (0.89-1.17)	0.97 (0.83-1.12)
Postmenopause	524					1000				
≤11 years	89	Ref	1.57 (0.71-3.46)	1.12 (0.55-2.30)	2.22 (1.03-4.78)	178	Ref	1.18 (0.82-1.71)	0.95 (0.75-1.20)	0.87 (0.70-1.09)
12 years	115	Ref	0.83 (0.38-1.82)	1.33 (0.71-2.47)	1.81 (0.89-3.68)	236	Ref	1.51 (0.57-4.02)	1.32 (1.01-1.71)	1.13 (0.85-1.49)
13 years	143	Ref	0.76 (0.37-1.57)	1.01 (0.56-1.80)	1.77 (0.92-3.38)	317	Ref	1.12 (0.71-1.77)	1.01 (0.90-1.14)	0.98 (0.82-1.17)
≥14 years	177	Ref	Ref	Ref	Ref	269	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	0.98 (0.82-1.17)	1.05 (0.91-1.22)	1.19 (1.01-1.40)		Ref	1.04 (0.94-1.15)	1.01 (0.91-1.11)	0.98 (0.92-1.03)
Pre/perimenopause	9127					2450				
≤11 years	1807	Ref	1.20 (1.18-1.22)	1.21 (1.11-1.32)	1.30 (1.27-1.33)	386	Ref	1.40 (1.01-1.93)	1.31 (1.10-1.55)	1.58 (1.42-1.76)
12 years	2094	Ref	0.92 (0.82-1.02)	0.94 (0.83-1.08)	1.19 (1.05-1.34)	586	Ref	1.05 (0.89-1.25)	0.96 (0.79-1.18)	1.44 (1.12-1.86)
13 years	2587	Ref	1.03 (0.93-1.14)	1.01 (0.94-1.08)	0.98 (0.91-1.06)	861	Ref	1.04 (0.78-1.38)	1.07 (0.98-1.16)	1.52 (1.29-1.80)
≥14 years	2639	Ref	Ref	Ref	Ref	617	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.04 (1.02-1.05)	1.04 (1.01-1.07)	1.07 (1.05-1.09)		Ref	1.09 (1.02-1.17)	1.06 (1.04-1.09)	1.15 (1.09-1.20)
	Frequency of night sweats Model 1: RRR (95% CI) ^a					Severity of night sweats Model 1: RRR (95% CI) ^a				
	n	Never	Rarely	Sometimes	Often	n	Never	Mild	Moderate	Severe
Hysterectomy/oophorectomy	2378					843				
≤11 years	532	Ref	1.25 (0.90-1.74)	1.28 (0.95-1.71)	1.70 (1.16-2.50)	170	Ref	0.76 (0.71-0.81)	1.57 (0.99-2.49)	1.20 (0.62-2.31)
12 years	538	Ref	1.05 (0.76-1.46)	1.07 (0.80-1.43)	1.26 (0.85-1.87)	228	Ref	0.99 (0.62-1.58)	1.46 (0.86-2.49)	1.47 (0.96-2.23)
13 years	618	Ref	1.03 (0.75-1.42)	0.87 (0.65-1.16)	1.32 (0.91-1.92)	257	Ref	0.50 (0.27-0.95)	1.56 (1.25-1.94)	1.43 (1.08-1.89)
≥14 years	690	Ref	Ref	Ref	Ref	188	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.08 (1.00-1.16)	1.07 (1.01-1.15)	1.14 (1.05-1.24)		Ref	0.98 (0.94-1.03)	1.11 (0.98-1.25)	1.05 (0.90-1.23)
Postmenopause	524					1000				
≤11 years	89	Ref	1.72 (0.84-3.56)	1.15 (0.58-2.29)	2.70 (1.26-5.79)	178	Ref	0.84 (0.34-2.08)	0.91 (0.78-1.06)	1.00 (0.81-1.23)
12 years	115	Ref	1.30 (0.65-2.58)	1.58 (0.87-2.85)	1.98 (0.94-4.18)	236	Ref	1.25 (0.78-2.02)	0.92 (0.71-1.20)	1.22 (0.80-1.87)
13 years	143	Ref	0.94 (0.49-1.78)	0.94 (0.54-1.65)	1.12 (0.54-2.32)	317	Ref	0.77 (0.53-1.10)	0.89 (0.71-1.11)	1.05 (0.87-1.27)
≥14 years	177	Ref	Ref	Ref	Ref	269	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.15 (0.98-1.35)	1.08 (0.94-1.24)	1.29 (1.08-1.54)		Ref	0.96 (0.79-1.16)	0.99 (0.93-1.04)	1.00 (0.95-1.06)
Pre/perimenopause	9127					2450				
≤11 years	1807	Ref	0.97 (0.83-1.13)	1.07 (1.04-1.09)	1.45 (1.39-1.53)	386	Ref	0.89 (0.42-1.87)	1.07 (0.97-1.17)	1.21 (0.84-1.72)
12 years	2094	Ref	0.96 (0.94-0.99)	1.00 (0.88-1.13)	1.17 (1.00-1.38)	586	Ref	1.20 (0.97-1.50)	1.11 (0.89-1.39)	1.52 (0.98-2.34)
13 years	2587	Ref	1.03 (0.90-1.17)	1.02 (0.88-1.18)	1.07 (1.03-1.11)	861	Ref	1.25 (0.89-1.76)	1.00 (0.95-1.05)	1.19 (1.01-1.41)
≥14 years	2639	Ref	Ref	Ref	Ref	617	Ref	Ref	Ref	Ref
Per 1-year decrease		Ref	1.00 (0.99-1.01)	1.01 (0.99-1.04)	1.09 (1.09-1.09)		Ref	0.97 (0.84-1.12)	1.03 (0.98-1.08)	1.12 (0.98-1.28)

Data are presented as n (%) or relative risk ratio (RRR) and 95% confidence intervals (95% CI) using generalised linear mix models with multinomial distribution and generalised logit link. The Glimmix procedure in SAS was used to incorporate study as a random effect into the analyses. Frequency data were collected from ALSWH and SWAN, while severity data were collected from NSHD, NCDS, HOW, and SMWHS. SWAN data were not included in the analyses for hysterectomy/oophorectomy and postmenopause as all women were pre- or perimenopausal at baseline. ^a Model 1 was adjusted for birth year and race/ethnicity/region.

Table S5. Association between age at menarche and risk of hot flushes and night sweats only among women with VMS, using rarely or mild symptoms as the reference

Age at menarche	n	Hot flushes Model 1: RRR (95% CI) ^a				n	Night sweats Model 1: RRR (95% CI) ^a			
		Never	Rarely /Mild	Sometimes /Moderate	Often /Severe		Never	Rarely /Mild	Sometimes /Moderate	Often /Severe
Frequency (ALSWH + SWAN)	5909				4978					
≤11 years	1258	N/A	Ref	0.97 (0.93-1.02)	1.25 (1.20-1.29)	1054	N/A	Ref	1.00 (0.94-1.07)	1.48 (1.39-1.59)
12 years	1289	N/A	Ref	0.98 (0.91-1.06)	1.30 (1.25-1.35)	1113	N/A	Ref	1.08 (0.99-1.17)	1.32 (1.24-1.41)
13 years	1610	N/A	Ref	1.00 (1.00-1.00)	1.11 (1.06-1.17)	1350	N/A	Ref	0.91 (0.76-1.08)	1.14 (1.05-1.24)
≥14 years	1752	N/A	Ref	Ref	Ref	1461	N/A	Ref	Ref	Ref
Per 1-year decrease		N/A	Ref	1.00 (0.99-1.01)	1.07 (1.06-1.07)		N/A	Ref	1.00 (0.98-1.02)	1.09 (1.08-1.10)
Severity (NSHD + NCDS + HOW + SMWHS)	2771				2210					
≤11 years	477	N/A	Ref	1.01 (0.74-1.36)	1.00 (0.73-1.37)	368	N/A	Ref	1.22 (0.98-1.51)	1.43 (1.12-1.82)
12 years	696	N/A	Ref	1.00 (0.87-1.16)	1.19 (1.02-1.40)	576	N/A	Ref	0.95 (0.79-1.14)	1.27 (1.09-1.49)
13 years	911	N/A	Ref	1.02 (0.80-1.31)	1.15 (0.99-1.34)	721	N/A	Ref	0.98 (0.74-1.30)	1.12 (0.91-1.38)
≥14 years	687	N/A	Ref	Ref	Ref	545	N/A	Ref	Ref	Ref
Per 1-year decrease		N/A	Ref	1.02 (0.94-1.10)	1.03 (0.97-1.09)		N/A	Ref	1.05 (1.02-1.08)	1.12 (1.09-1.15)

Data are presented as relative risk ratio (RRR) and 95% confidence intervals (95% CI) using generalised linear mix models with multinomial distribution and generalised logit link. The Glimmix procedure in SAS was used to incorporate study as a random effect into the analyses. N/A indicated that women with no symptoms were excluded from the analyses.

^a Model 1 was adjusted for birth year and race/ethnicity/region.

Table S6. Distribution of frequency and severity of hot flushes and night sweats

	Frequency of night sweats				Kendall's Tau-b (95% CI)
	Never	Rarely	Sometimes	Often	
Frequency of hot flushes					
(ALSWH + SWAN) (n=13602)					
Never	6769 (49.8)	650 (4.8)	214 (1.6)	60 (0.4)	0.61 (0.60-0.62)
Rarely	1067 (7.8)	999 (7.3)	160 (1.2)	47 (0.4)	
Sometimes	644 (4.7)	487 (3.6)	1213 (8.9)	89 (0.7)	
Often	144 (1.1)	95 (0.7)	243(1.8)	721 (5.3)	
	Severity of night sweats				
	Never	Mild	Moderate	Severe	
Severity of hot flushes					
(NSHD + NCDS + HOW + SMWHS) (n=4953)					
Never	1877 (37.9)	102 (2.1)	182 (3.7)	21 (0.4)	0.59 (0.57-0.61)
Mild	256 (5.2)	174 (3.5)	66 (1.3)	7 (0.1)	
Moderate	523 (10.6)	109 (2.2)	797 (16.1)	105 (2.1)	
Severe	87 (1.8)	12 (0.2)	231 (4.7)	404 (8.2)	

Data were presented as n (%).

Table S7. Association between age at menarche and risk of hot flushes alone, night sweats alone, and both symptoms

Age at menarche	Hot flushes alone vs no symptoms ^a Model 1: RRR (95% CI) ^d			Night sweats alone vs no symptoms ^b Model 1: RRR (95% CI) ^d			Both symptoms vs no symptoms ^c Model 1: RRR (95% CI) ^d		
	Rarely /Mild	Sometimes /Moderate	Often /Severe	Rarely /Mild	Sometimes /Moderate	Often /Severe	Rarely /Mild	Sometimes /Moderate	Often /Severe
Frequency (ALSWH + SWAN)									
≤11 years	1.22 (1.18-1.26)	1.06 (0.96-1.17)	1.28 (1.23-1.33)	1.06 (0.85-1.33)	0.92 (0.91-0.93)	1.31 (0.82-2.11)	1.23 (1.00-1.51)	1.20 (1.14-1.27)	1.71 (1.48-1.96)
12 years	0.99 (0.98-0.99)	0.94 (0.85-1.03)	1.38 (1.35-1.41)	1.01 (0.98-1.04)	1.12 (0.99-1.26)	1.26 (0.96-1.66)	0.99 (0.97-1.01)	0.95 (0.95-0.96)	1.26 (1.24-1.27)
13 years	1.03 (0.96-1.11)	1.05 (1.03-1.07)	1.13 (1.02-1.26)	1.08 (0.95-1.23)	0.97 (0.77-1.22)	1.17 (1.09-1.24)	1.15 (1.12-1.18)	0.92 (0.88-0.95)	1.17 (1.16-1.18)
≥14 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease	1.04 (1.04-1.04)	1.01 (0.99-1.04)	1.08 (1.07-1.09)	1.02 (0.99-1.05)	0.99 (0.96-1.01)	1.07 (1.02-1.12)	1.05 (1.02-1.08)	1.03 (1.03-1.04)	1.13 (1.11-1.15)
Severity (NSHD + NCDS + HOW + SMWHS)									
≤11 years	1.09 (0.83-1.42)	1.03 (0.85-1.24)	1.11 (0.83-1.49)	0.86 (0.64-1.15)	0.96 (0.58-1.58)	1.87 (0.90-3.89)	0.93 (0.57-1.50)	1.26 (0.98-1.63)	1.28 (0.92-1.78)
12 years	1.06 (0.69-1.63)	0.93 (0.62-1.38)	0.96 (0.69-1.35)	1.09 (0.77-1.54)	1.06 (0.91-1.22)	1.77 (0.68-4.62)	1.04 (0.49-2.23)	1.21 (0.94-1.54)	1.67 (1.50-1.86)
13 years	1.03 (0.79-1.35)	1.04 (0.87-1.25)	1.09 (0.82-1.45)	1.01 (0.83-1.23)	1.02 (0.70-1.49)	1.22 (0.49-3.02)	0.93 (0.61-1.41)	1.16 (1.15-1.16)	1.38 (1.35-1.40)
≥14 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Per 1-year decrease	1.01 (0.99-1.03)	0.99 (0.97-1.01)	1.04 (1.03-1.05)	0.97 (0.92-1.02)	0.99 (0.92-1.07)	1.20 (1.00-1.45)	0.97 (0.90-1.06)	1.08 (0.99-1.17)	1.10 (1.04-1.16)

Data are presented as n (%) or relative risk ratio (RRR) and 95% confidence intervals (95% CI) using generalised linear mix models with multinomial distribution and generalised logit link. The Glimmix procedure in SAS was used to incorporate study as a random effect into the analyses. The risks for the combination of often hot flushes but sometimes/moderate night sweats and the combination of often night sweats but sometimes/moderate hot flushes associated with age at menarche were not presented.

^a 'Hot flushes alone' model was conducted among women who experienced any hot flushes but never or rarely/mild night sweats.

^b 'Night sweats alone' model was conducted among women who experienced any night sweats but never or rarely/mild hot flushes.

^c 'Both symptoms' model was conducted among women who experienced same degree of both symptoms (i.e., reporting both often/severe hot flushes and often/severe night sweats, or both sometimes/moderate hot flushes and sometimes/moderate night sweats).

^d RRRs (95%CI) were adjusted for birth year and race/ethnicity/region.