

Age-Dependent Changes in Health Status in the Childhood Cancer Survivor Cohort

Hudson, et al

Table 1a. Baseline characteristics of survivors by questionnaire completion status

		Total N	Baseline (N=9711) %	2003 Questionnaire (N=6875) %	2007 Questionnaire (N=5982) %	Baseline vs. 2003* p-value	Baseline vs. 2007* p-value	2003 vs. 2007* p-value
Sex	Male	5176	53.3	51.2	50.6	0.0145	0.002	0.5047
	Female	4535	46.7	48.8	49.4			
Race/ethnicity	White	8543	87.1	89.7	90.5	<.0001	<.0001	0.5750
	Black	432	4.5	3.3	2.9			
	Hispanic	507	5.2	4.2	4.1			
	Other	284	2.9	2.5	2.2			
	Not reported	35	0.4	0.1	0.4			
High school graduate	Yes	8185	84.3	86.6	87.9	0.0008	<.0001	0.1101
	No	1002	10.3	8.5	7.5			
	Not reported	524	5.4	4.9	4.6			
Annual household income	< \$20,000	1919	19.8	18.2	17.4	<.0001	<.0001	0.1926
	≥ \$20,000	6589	67.9	71.4	73.0			
	Not reported	1203	12.4	10.4	9.6			
Health insurance	Yes/Canadian	8076	83.2	84.7	85.4	0.0249	0.0005	0.5099
	No	1472	15.2	13.8	13.2			
	Not reported	163	1.7	1.5	1.4			
Body Mass Index, kg/m ²	Underweight	627	6.5	6.1	5.9	0.9919	0.8383	0.9407
	Normal	5336	55.2	55.4	56.0			
	Overweight	2525	26.0	26.3	26.2			
	Obese	1203	12.4	12.3	11.9			

		Total N	Baseline (N=9711) %	2003 Questionnaire (N=6875) %	2007 Questionnaire (N=5982) %	Baseline vs. 2003* p-value	Baseline vs. 2007* p-value	2003 vs. 2007* p-value																																																																																																									
Heavy/binge drinker	Yes	982	10.2	10.5	10.7	0.645	0.541	0.917																																																																																																									
	No	8694	89.9	89.5	89.3				Smoking status	Never	6771	70.1	72.3	73.0	0.013	<.0001	0.404	Former	1078	11.2	10.9	11.0	Current	1813	18.8	16.9	16.0	Meets CDC physical activity guidelines [†]	Yes	5855	63.3	64.6	65.5	0.405	0.131	0.624	No	3395	36.7	35.4	34.5	Grade 3-4 chronic conditions	One	2247	23.1	23.9	24.3	0.382	0.148	0.535	Two or more	710	7.3	7.5	7.8	Age group at questionnaire	Age 18-24	4020	41.4	41.0	40.3	0.530	0.098	0.892	Age 25-29	2578	26.6	27.0	27.6	Age 30-34	1896	19.5	19.2	19.4	Age 35-39	897	9.2	9.6	9.6	Age 40-44	295	3.0	2.9	2.7	Age 45+	25	0.3	0.3	0.3	Age at diagnosis, years	Mean (standard deviation)	9.4 (5.6)	9.4 (5.6)	9.5 (5.6)	9.6 (5.6)	0.036	0.001	0.150	Range	(0, 20)	(0, 20)	(0, 20)	(0, 20)	Time from cancer diagnosis, years	Mean (standard deviation)	16.8 (4.6)	16.8 (4.6)	16.8 (4.6)	16.8 (4.6)	0.483	0.712	0.753	Range
Smoking status	Never	6771	70.1	72.3	73.0	0.013	<.0001	0.404																																																																																																									
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	Range	(6, 31)	(6, 31)	(6, 31)	(6, 31)																																																																																																												

		Total N	Baseline (N=9711) %	2003 Questionnaire (N=6875) %	2007 Questionnaire (N=5982) %	Baseline vs. 2003* p-value	Baseline vs. 2007* p-value	2003 vs. 2007* p-value
Diagnosis	Leukemia	2918	30.1	30.4	30.8	0.905	0.860	0.994
	Central nervous system malignancy	1223	12.6	12.5	12.0			
	Hodgkin lymphoma	1682	17.3	17.0	17.1			
	Non-Hodgkin lymphoma	885	9.1	8.9	9.1			
	Wilms tumor	656	6.8	6.6	6.7			
	Neuroblastoma	408	4.2	4.0	4.0			
	Soft tissue sarcoma	916	9.4	9.9	9.7			
	Bone malignancy	1023	10.5	10.8	10.7			
Select chemotherapy exposures	Anthracycline agents	3180	37.8	37.8	38.1	0.843	0.827	0.983
	Alkylating agents	4406	52.4	51.8	51.7	0.771	0.777	0.996
Brain radiation, maximum dose, Gray	None	5679	67.1	66.7	66.9	0.802	0.860	0.999
	3.0-23.9	772	9.1	9.1	9.3			
	24.0-29.9	1066	12.6	13.0	13.1			
	30.0+	947	11.2	11.2	10.8			
Chest radiation, maximum dose, Gray	None	6038	71.3	71.7	71.9	0.691	0.406	0.864
	62.0-23.9	635	7.5	7.3	7.5			
	24.0-37.9	968	11.4	11.5	11.2			
	38.0+	823	9.7	9.5	9.5			

		Total N	Baseline (N=9711) %	2003 Questionnaire (N=6875) %	2007 Questionnaire (N=5982) %	Baseline vs. 2003* p-value	Baseline vs. 2007* p-value	2003 vs. 2007* p-value
Abdominal radiation, maximum dose, Gray	None	6266	74.0	74.1	74.4	0.698	0.627	0.904
	14.0-23.9	598	7.1	7.0	7.1			
	24.0-34.9	709	8.4	8.8	8.6			
	35.0+	891	10.5	10.1	9.9			
Pelvic radiation, maximum dose, Gray	None	6722	79.4	79.6	80.2	0.657	0.636	0.879
	6.1-23.9	461	5.5	5.3	5.2			
	24-34.9	555	6.6	7.0	6.5			
	35.0+	726	8.6	8.2	8.1			
Surgery	Craniotomy	963	9.9	10.5	10.1	0.085	0.304	0.593
	Thoracotomy	413	4.3	4.5	4.4	0.467	0.392	0.840
	Nephrectomy	551	5.7	5.9	6.0	0.901	0.672	0.819
	Cystectomy	62	0.6	0.7	0.7	0.297	0.450	0.868
	Upper extremity amputation	44	0.5	0.5	0.4	0.795	0.931	0.795
	Lower extremity amputation	451	4.6	5.1	4.9	0.380	0.552	0.825

* 488 survivors who died between baseline and 2003, 708 survivors who died between baseline and 2007, and 220 survivors who died between 2003 and 2007 are not included in the calculation of the p-values from Chi-squared test categorical and Wilcoxon two-sample test for continuous variables.

† The equivalent of at least 150 minutes of moderate physical activity per week.

CDC=Centers for Disease Control and Prevention

1b. Baseline characteristics of siblings by questionnaire completion status

		Total N	Baseline (N=3206) %	2003 Questionnaire (N=2351) %	2007 Questionnaire (N=1947) %	Baseline vs. 2003* p-value	Baseline vs. 2007* p-value	2003 vs. 2007* p-value
Sex	Male	1519	47.4	45.9	45.4	0.136	0.180	0.716
	Female	1687	52.6	54.1	54.7			
Race/ethnicity	White	2830	88.3	89.5	90.3	0.571	0.155	0.882
	Black	81	2.5	2.0	2.0			
	Hispanic	108	3.4	2.8	2.4			
	Other	79	2.5	2.4	2.2			
	Not reported	108	3.4	3.3	3.2			
High school graduate	Yes	2876	89.7	91.4	92.2	0.092	0.011	0.579
	No	199	6.2	4.9	4.5			
	Not reported	131	4.1	3.7	3.2			
Annual household income	< \$20,000	367	11.5	9.7	9.7	0.003	0.005	0.996
	≥ \$20,000	2522	78.7	82.5	82.5			
	Not reported	317	10.0	7.8	7.8			
Health insurance	Yes/Canadian	2823	88.1	89.9	90.9	0.119	0.007	0.526
	No	347	10.8	9.3	8.4			
	Not reported	36	1.1	0.9	0.7			
Body Mass Index, kg/m ²	Underweight	144	3.6	2.9	3.0	0.571	0.606	0.923
	Normal	1693	52.8	54.0	54.0			
	Overweight	905	28.2	27.8	28.4			
	Obese	494	15.4	15.3	14.6			
Heavy/binge drinker	Yes	419	13.1	13.3	13.8	0.871	0.490	0.620
	No	2781	86.9	86.7	86.2			

		Total N	Baseline (N=3206) %	2003 Questionnaire (N=2351) %	2007 Questionnaire (N=1947) %	Baseline vs. 2003* p-value	Baseline vs. 2007* p-value	2003 vs. 2007* p-value
Smoking status	Never	1864	54.5	60.3	61.0	0.276	0.060	0.689
	Former	538	16.9	16.9	17.4			
	Current	786	24.7	22.8	21.6			
Meets CDC physical activity guidelines [†]	Yes	2104	66.5	67.8	67.1	0.333	0.734	0.581
	No	1060	33.5	32.2	33.0			
Grade 3-4 chronic conditions	One	251	7.8	8.0	8.5	0.735	0.668	0.473
	Two or more	40	13	1.4	1.2			
Age group at questionnaire	Age 18-24	959	29.9	28.8	27.4	0.967	0.532	0.904
	Age 25-29	734	22.9	23.2	23.9			
	Age 30-34	689	21.5	22.1	21.9			
	Age 35-39	481	15.0	15.2	15.6			
	Age 40-44	254	7.9	8.0	8.3			
	Age 45+	89	2.8	2.7	2.9			

* 11 siblings who died between baseline and 2003, 16 siblings who died between baseline and 2007, and 5 siblings who died between 2003 and 2007 are not included in the calculation of the p-values from Chi-squared test categorical and Wilcoxon two-sample test for continuous variables.

[†] The equivalent of at least 150 minutes of moderate physical activity per week

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Table 2. Percentage of survivors and siblings who reported moderate to extreme adverse health status by 5-year age groups (Overall)

Characteristic	Age 18-24				Age 25-29				Age 30-34				Age 35-39				Age 40-44				Age 45+			
	Survivors (N=4105)		Siblings (N=1008)		Survivors (N=4231)		Siblings (N=1295)		Survivors (N=5448)		Siblings (N=1633)		Survivors (N=4385)		Siblings (N=1493)		Survivors (N=2728)		Siblings (N=1130)		Survivors (N=1671)		Siblings (N=945)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
General Health	384	9.5	46	4.8	511	12.2	37	4.2	700	13.0	60	5.2	615	14.2	72	7.0	424	15.8	49	6.6	305	18.5	56	8.3
Mental Health	631	17.4	117	12.6	716	18.4	146	11.4	888	17.6	160	10.0	730	17.6	153	10.3	435	16.8	111	10.0	279	17.3	102	10.9
Functional Health	494	12.5	24	2.5	617	15.0	28	3.2	895	16.9	43	3.8	807	18.8	46	4.5	532	19.8	35	4.7	339	20.7	41	6.1
Activity Limitation	420	10.6	46	4.8	480	11.6	46	5.2	643	12.0	61	5.3	652	15.0	63	6.1	486	18.0	57	7.7	402	24.2	70	10.4
Pain	336	8.7	n/a	n/a	357	9.3	n/a	n/a	477	9.6	n/a	n/a	363	8.9	n/a	n/a	236	9.2	n/a	n/a	140	8.7	n/a	n/a
Anxiety	482	12.5	n/a	n/a	484	12.7	n/a	n/a	642	12.9	n/a	n/a	523	12.7	n/a	n/a	349	13.5	n/a	n/a	214	13.3	n/a	n/a
Any Domain (4)*	1267	30.9	193	19.1	1401	33.2	210	16.3	1845	34.0	251	15.5	1571	35.9	257	17.2	1010	37.1	182	16.2	696	41.9	184	19.5
Any Domain (6)†	1556	37.9	n/a	n/a	1639	38.8	n/a	n/a	2192	40.3	n/a	n/a	1822	41.6	n/a	n/a	1157	42.6	n/a	n/a	782	47.0	n/a	n/a
Health Status Score‡																								
None	2837	69.1	815	80.9	2825	66.8	1082	83.7	3588	66.0	1373	84.5	2806	64.1	1233	82.8	1709	62.9	942	83.8	967	58.1	759	80.5
One domain	808	19.7	159	15.8	798	18.9	175	13.5	1047	19.3	202	12.4	817	18.7	207	13.9	491	18.1	135	12.0	336	20.2	129	13.7
Two domains	297	7.2	29	2.9	354	8.4	26	2.0	428	7.9	28	1.7	408	9.3	32	2.1	261	9.6	27	2.4	167	10.0	32	3.4
Three domains	121	2.9	4	0.4	178	4.2	6	0.5	257	4.7	18	1.1	213	4.9	9	0.6	168	6.2	17	1.5	117	7.0	16	1.7
Four domains	41	1.0	1	0.1	71	1.7	3	0.2	113	2.1	3	0.2	133	3.0	9	0.6	90	3.3	3	0.3	76	4.6	7	0.7

* Any domain (4) includes general, mental, functional and activity limitation

† Any domain (6) includes all domains

‡ Health status score includes general, mental, functional and activity limitation

n/a = Not applicable

Table 3. Percentage of survivors and siblings who reported moderate to extreme adverse health status by 5-year age groups (Male)

Characteristic	Age 18-24				Age 25-29				Age 30-34				Age 35-39				Age 40-44				Age 45+			
	Survivors (N=4105)		Siblings (N=1008)		Survivors (N=4231)		Siblings (N=1295)		Survivors (N=5448)		Siblings (N=1633)		Survivors (N=4385)		Siblings (N=1493)		Survivors (N=2728)		Siblings (N=1130)		Survivors (N=1671)		Siblings (N=945)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
General Health	175	8.2	15	3.2	238	10.7	17	4.2	341	12.4	25	4.4	304	13.5	34	7.6	202	14.6	20	5.7	151	18.3	24	8.5
Mental Health	302	16.0	45	10.2	359	17.6	63	10.6	428	16.8	70	9.1	350	16.5	75	11.4	212	16.0	54	10.2	135	16.9	44	11.4
Functional Health	225	10.8	10	2.1	286	13.1	12	2.9	390	14.4	19	3.3	376	16.9	19	4.2	228	16.5	19	5.4	156	19.0	15	5.3
Activity Limitation	179	8.6	17	3.6	192	8.8	13	3.2	236	8.6	26	4.5	262	11.7	18	4.0	192	13.8	19	5.4	150	18.1	23	8.1
Pain	172	8.4	n/a	n/a	162	8.1	n/a	n/a	225	8.9	n/a	n/a	180	8.6	n/a	n/a	105	8.0	n/a	n/a	60	7.5	n/a	n/a
Anxiety	210	10.4	n/a	n/a	209	10.4	n/a	n/a	255	10.1	n/a	n/a	217	10.3	n/a	n/a	137	10.3	n/a	n/a	90	11.3	n/a	n/a
Any Domain (4)*	598	27.6	76	15.4	677	30.2	86	14.3	845	30.4	111	14.2	741	32.7	116	17.5	467	33.4	84	15.6	319	38.3	73	18.8
Any Domain (6)†	744	34.3	n/a	n/a	787	35.1	n/a	n/a	999	35.9	n/a	n/a	851	37.5	n/a	n/a	526	37.7	n/a	n/a	358	43.0	n/a	n/a
Health Status Score‡																								
None	1570	72.4	417	84.6	1567	69.8	517	85.7	1935	69.6	670	85.8	1528	67.3	546	82.5	930	66.6	456	84.4	514	61.7	316	81.2
One domain	402	18.5	65	13.2	417	18.6	72	11.9	496	17.8	91	11.7	403	17.8	97	14.7	240	17.2	65	12.0	161	19.3	50	12.9
Two domains	127	5.9	11	2.2	150	6.7	10	1.7	194	7.0	12	1.5	176	7.8	12	1.8	119	8.5	12	2.2	76	9.1	15	3.9
Three domains	51	2.4	0	0.0	82	3.7	3	0.5	109	3.9	7	0.9	111	4.9	3	0.5	76	5.4	5	0.9	49	5.9	6	1.5
Four domains	18	0.8	0	0.0	28	1.2	1	0.2	46	1.7	1	0.1	51	2.2	4	0.6	32	2.3	2	0.4	33	4.0	2	0.5

* Any domain (4) includes general, mental, functional and activity limitation

† Any domain (6) includes all domains

‡ Health status score includes general, mental, functional and activity limitation

n/a = Not applicable

Table 4. Percentage of survivors and siblings who reported moderate to extreme adverse health status by 5-year age groups (Female)

Characteristic	Age 18-24				Age 25-29				Age 30-34				Age 35-39				Age 40-44				Age 45+			
	Survivors (N=4105)		Siblings (N=1008)		Survivors (N=4231)		Siblings (N=1295)		Survivors (N=5448)		Siblings (N=1633)		Survivors (N=4385)		Siblings (N=1493)		Survivors (N=2728)		Siblings (N=1130)		Survivors (N=1671)		Siblings (N=945)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
General Health	209	10.9	31	6.4	273	13.8	20	4.2	359	13.6	35	6.1	311	14.9	38	6.6	222	17.0	29	7.4	154	18.8	32	8.2
Mental Health	329	18.9	72	14.9	357	19.3	83	12.1	460	18.6	90	10.7	380	18.8	78	9.5	223	17.7	57	9.8	144	17.7	58	10.5
Functional Health	269	14.4	14	2.9	331	17.1	16	3.3	505	19.5	24	4.2	431	20.9	27	4.7	304	23.3	16	4.1	183	22.3	26	6.6
Activity Limitation	241	12.9	29	5.9	288	14.9	33	6.9	407	15.6	35	6.1	390	18.7	45	7.8	294	22.4	38	9.7	252	30.4	47	12.0
Pain	164	8.9	n/a	n/a	195	10.7	n/a	n/a	252	10.4	n/a	n/a	183	9.2	n/a	n/a	131	10.5	n/a	n/a	80	9.9	n/a	n/a
Anxiety	272	14.9	n/a	n/a	275	15.2	n/a	n/a	387	15.8	n/a	n/a	306	15.2	n/a	n/a	212	16.9	n/a	n/a	124	15.3	n/a	n/a
Any Domain (4)*	669	34.6	117	22.7	724	36.5	124	18.0	1000	37.7	140	16.6	830	39.4	141	17.0	543	41.1	98	16.8	377	45.4	111	20.0
Any Domain (6)†	812	41.9	n/a	n/a	852	43.0	n/a	n/a	1193	45.0	n/a	n/a	971	46.1	n/a	n/a	631	47.7	n/a	n/a	424	51.1	n/a	n/a
Health Status Score‡																								
None	1267	65.4	398	77.3	1258	63.5	565	82.0	1653	62.3	703	83.4	1278	60.6	687	83.0	779	58.9	486	83.2	453	54.6	443	80.0
One domain	406	21.0	94	18.3	381	19.2	103	14.9	551	20.8	111	13.2	414	19.6	110	13.3	251	19.0	70	12.0	175	21.1	79	14.3
Two domains	170	8.8	18	3.5	204	10.3	16	2.3	234	8.8	16	1.9	232	11.0	20	2.4	142	10.7	15	2.6	91	11.0	17	3.1
Three domains	70	3.6	4	0.8	96	4.8	3	0.4	148	5.6	11	1.3	102	4.8	6	0.7	92	7.0	12	2.1	68	8.2	10	1.8
Four domains	23	1.2	1	0.2	43	2.2	2	0.3	67	2.5	2	0.2	82	3.9	5	0.6	58	4.4	1	0.2	43	5.2	5	0.9

* Any domain (4) includes general, mental, functional and activity limitation

† Any domain (6) includes all domains

‡ Health status score includes general, mental, functional and activity limitation

n/a = Not applicable

Table 5. Frequency and percentage for adverse health outcomes by chronic condition status

Variables	Total	Poor General Health	Poor Mental Health	Functional Impairments	Activity Limitations	Cancer Related Pain	Cancer Related Anxiety	Any Adverse Health Status Domain
	(N=22,568)	(N=2,939)	(N=3,679)	(N=3,684)	(N=3,083)	(N=1,909)	(N=2,694)	(N=9,148)
	N	%	%	%	%	%	%	%
Any chronic condition grade 3-4*								
Any	8,245	20.4	22.9	28.4	24.6	14.0	16.6	54.6
< grade 3	14,323	9.0	14.5	10.0	7.8	6.3	10.7	32.4
Number of chronic conditions grade 3-4*								
One	5,792	16.6	20.1	23.3	19.6	13.1	14.7	49.4
Two or more	2,453	29.4	29.7	40.5	36.3	16.2	21.0	66.9
< grade 3	14,323	9.0	14.5	10.0	7.8	6.3	10.7	32.4
Second Malignancy								
Grade 3-4*	1,137	23.6	21.6	27.0	25.6	11.8	22.0	55.6
< grade 3	21,431	12.6	17.4	16.2	13.3	9.0	12.4	39.7
Vision/Hearing/Speech								
Grade 3-4*	1,887	23.0	25.5	36.9	22.8	12.9	15.5	57.2
< grade 3	20,681	12.3	16.9	14.9	13.1	8.8	12.6	39.0
Endocrine								
Grade 3-4*	2,125	19.6	23.7	21.7	19.6	11.2	18.1	50.5
< grade 3	20,443	12.5	17.0	16.2	13.3	8.9	12.3	39.5
Respiratory								
Grade 3-4*	246	45.3	42.4	45.8	49.0	24.0	30.1	74.4
< grade 3	22,322	12.8	17.3	16.4	13.6	9.0	12.7	40.2
Cardiac								
Grade 3-4*	1,382	34.7	30.0	40.8	40.0	15.9	19.0	68.3
< grade 3	21,186	11.8	16.8	15.2	12.2	8.7	12.5	38.7
Gastrointestinal								
Grade 3-4*	749	19.0	22.0	20.8	19.2	11.3	18.9	47.5
< grade 3	21,819	13.0	17.5	16.6	13.8	9.1	12.7	40.3
Renal								
Grade 3-4*	176	28.2	30.1	36.8	31.0	13.9	16.4	61.9
< grade 3	22,392	13.0	17.5	16.6	13.8	9.1	12.8	40.4
Musculoskeletal								
Grade 3-4*	1,732	15.3	18.5	25.8	31.8	21.1	14.5	56.9
< grade 3	20,836	13.0	17.5	16.0	12.4	8.1	12.7	39.2
Neurological								
Grade 3-4*	1,275	31.2	34.8	55.2	43.1	20.1	20.7	74.8
< grade 3	21,293	12.1	16.6	14.4	12.2	8.5	12.4	38.5
Other Hematologic†								
Grade 3-4*	816	26.8	28.1	35.7	31.2	16.0	18.2	61.3
< grade 3	21,752	12.7	17.2	16.0	13.3	8.9	12.7	39.8

* Chronic conditions according to the Common Terminology Criteria for Adverse Events Version 4.0

† Includes blood clots and aplastic anemia

Table 6. Percentages for adverse health status outcomes by host and treatment related factors among survivors

	Total (N=22,568)	Poor General Health (N=2,939)	Adverse Mental Health (N=3679)	Functional Impairments (3,684)	Activity Limitations (N=3,083)	Cancer Related Pain (N=1,909)	Cancer Related Anxiety (N=2,694)	Adverse Outcome in Any Domain (N=9,148)
Variables	N	%	%	%	%	%	%	%
Sex								
Male	11,720	12.2	16.6	14.6	10.6	8.4	10.4	36.4
Female	10,848	14.2	18.6	19.1	17.6	9.9	15.5	45.0
Race/ethnicity								
White	20,033	12.6	17.4	16.3	13.8	8.9	12.9	40.0
Non-white	2,535	18.0	19.1	20.4	15.2	10.7	12.8	44.5
Age at interview								
18-24 years	4,105	9.5	17.4	12.5	10.6	8.7	12.5	37.9
25-29 years	4,231	12.2	18.4	15.0	11.6	9.3	12.7	38.7
30-34 years	5,448	13.0	17.7	16.9	12.0	9.6	12.9	40.2
35-39 years	4,385	14.2	17.6	18.8	15.0	8.9	12.7	41.6
40-44 years	2,728	15.8	16.8	19.8	18.0	9.2	13.5	42.4
45+ years	1,671	18.5	17.3	20.7	24.2	8.7	13.3	46.8
Age at diagnosis								
0-4 years	5,729	11.5	16.7	16.4	12.0	7.8	12.0	37.6
5-9 years	5,543	12.9	17.9	16.4	11.8	8.1	12.5	39.3
10-14 years	6,135	13.7	18.5	16.9	14.6	10.0	13.7	42.3
15-20 years	5,161	14.7	17.3	17.4	17.5	10.6	13.3	43.0
Income < \$20,000/year								
Yes	3,207	25.0	30.6	32.6	24.1	8.7	18.3	58.3
No	16,868	10.2	15.3	12.7	11.4	16.3	12.1	36.6

	Total (N=22,568)	Poor General Health (N=2,939)	Adverse Mental Health (N=3679)	Functional Impairments (3,684)	Activity Limitations (N=3,083)	Cancer Related Pain (N=1,909)	Cancer Related Anxiety (N=2,694)	Adverse Outcome in Any Domain (N=9,148)
Variables	N	%	%	%	%	%	%	%
High School graduate								
Yes	19,735	11.9	16.8	15.1	12.8	8.7	12.5	38.7
No	1,419	27.2	30.4	35.2	23.3	16.3	16.0	59.8
Body mass index								
< 18.5 kg/m ²	1,055	19.1	21.7	23.0	22.2	13.3	17.5	51.8
18.5-24.9 kg/m ²	10,842	10.7	16.3	15.3	12.4	8.6	13.1	38.4
25.0-29.9 kg/m ²	6,557	12.1	17.3	15.2	12.1	8.7	11.4	38.1
30+ kg/m ²	4,114	19.9	20.6	21.4	18.6	10.2	13.4	47.1
Smoking status								
Never	15,075	10.9	15.0	15.9	13.1	7.8	11.8	38.0
Former	2,363	14.5	20.5	18.1	13.7	12.4	14.2	43.3
Current	3,634	20.5	27.6	19.5	15.9	13.3	15.8	49.2
Meets CDC physical activity guidelines*								
Yes	15,555	9.9	15.9	13.7	10.5	8.1	12.2	37.1
No	6,462	20.7	21.7	24.0	22.2	11.7	14.5	49.9
Anthracyclines								
Yes	7,633	12.7	18.2	15.7	14.7	10.8	14.0	41.2
No	12,457	12.9	17.6	17.2	13.3	7.5	12.3	40.0
Alkylating agents								
Yes	10,479	13.8	18.7	16.4	14.4	9.7	14.2	41.5
No	9,611	11.8	16.9	16.9	13.2	7.7	11.6	39.4

	Total (N=22,568)	Poor General Health (N=2,939)	Adverse Mental Health (N=3679)	Functional Impairments (3,684)	Activity Limitations (N=3,083)	Cancer Related Pain (N=1,909)	Cancer Related Anxiety (N=2,694)	Adverse Outcome in Any Domain (N=9,148)
Variables	N	%	%	%	%	%	%	%
Cranial radiation								
None	13,570	12.3	17.2	14.5	14.2	9.3	13.4	39.3
3.0-23.9 Gray	1,862	10.1	18.8	13.3	9.5	6.6	12.3	37.0
24.0-29.9 Gray	2,603	12.9	18.0	14.9	10.5	8.5	11.6	38.7
30.0+ Gray	2,244	19.6	20.1	35.3	19.3	8.4	12.5	53.2
Chest radiation								
None	14,520	11.9	17.6	16.7	13.2	9.2	12.4	39.6
6.2-23.9 Gray	1,507	13.6	17.6	13.3	13.1	8.3	14.1	40.5
24.0-37.9 Gray	2,306	16.9	18.1	18.0	15.4	7.7	14.5	44.0
38.0+ Gray	1,946	15.3	18.7	17.7	17.6	8.2	15.0	43.0
Abdominal radiation								
None	15,038	12.4	17.7	16.8	13.8	9.2	12.7	40.3
1.4-23.9 Gray	1,428	12.2	16.9	13.2	12.0	7.0	12.6	36.3
24.0-34.9 Gray	1,740	14.5	17.7	16.7	12.2	7.1	12.9	40.7
35.0+ Gray	2,073	16.5	18.9	18.6	17.3	9.5	15.6	44.6
Craniotomy								
Yes	2,286	17.1	19.9	32.3	18.7	7.1	11.4	50.3
No	20,282	12.7	17.4	15.0	13.4	9.4	13.0	39.4
Thoracotomy								
Yes	984	14.7	17.4	16.8	19.3	12.5	16.5	47.3
No	21,584	13.1	17.6	16.8	13.7	9.0	12.7	40.2

	Total (N=22,568)	Poor General Health (N=2,939)	Adverse Mental Health (N=3679)	Functional Impairments (3,684)	Activity Limitations (N=3,083)	Cancer Related Pain (N=1,909)	Cancer Related Anxiety (N=2,694)	Adverse Outcome in Any Domain (N=9,148)
Variables	N	%	%	%	%	%	%	%
Nephrectomy								
Yes	1,311	10.5	15.3	10.9	10.5	7.3	10.7	34.2
No	21,257	13.3	17.8	17.1	14.2	9.2	13.0	40.9
Cystectomy								
Yes	152	24.7	21.2	29.1	29.3	17.6	16.3	46.7
No	22,416	13.1	17.6	16.7	13.8	9.1	12.9	40.5
Lower extremity amputation								
Yes	1,093	13.9	17.9	24.2	30.1	20.0	14.6	57.4
No	21,475	13.1	17.6	16.4	13.1	8.6	12.8	39.7
Upper extremity amputation								
Yes	104	11.7	20.0	24.2	18.6	21.4	16.2	46.2
No	22,464	13.2	17.6	16.7	13.9	9.1	12.9	40.5

kg/m²=kilograms per meters squared

* The equivalent of at least 150 minutes of moderate physical activity per week.

CDC=Centers for Disease Control and Prevention

Table 7. Percentage of survivors and siblings with one or more poor health status outcome, by five-year age groups

Diagnosis	One or more Domains*						Two or more Domains*					
	18-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45+ years	18-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45+ years
Siblings	19.1	16.2	15.4	17.2	16.1	19.5	3.4	2.7	3.0	3.3	4.2	5.8
Survivors	30.9	33.1	33.9	35.8	37.0	41.7	11.2	14.3	14.6	17.2	19.0	21.5
Leukemia	28.1	30.8	32.3	32.0	32.8	31.8	8.9	12.7	13.1	13.4	16.6	11.4
CNS malignancy	48.0	46.0	48.0	49.5	47.1	45.3	21.6	24.4	24.0	29.1	31.2	25.5
Hodgkin lymphoma	26.0	28.8	31.7	32.5	36.3	43.8	7.3	10.7	13.1	14.9	18.5	23.8
Non-Hodgkin lymphoma	24.3	31.8	26.2	36.7	27.1	32.9	6.9	13.0	9.9	17.9	12.0	14.6
Wilms tumor	24.8	28.3	25.8	32.2	19.6	18.2	8.6	10.8	11.1	14.9	8.9	18.2
Neuroblastoma	28.8	28.8	26.4	28.6	20.8	33.3	9.7	11.3	10.9	14.3	8.3	0.0
Soft tissue sarcoma	30.1	30.9	31.1	30.7	35.0	34.6	12.3	13.7	13.0	12.4	16.0	16.1
Bone malignancy	40.4	39.9	42.0	42.8	47.7	52.6	18.8	16.5	19.7	22.6	23.4	29.4
Diagnosis	Three or more Domains*						Four or more Domains*					
	18-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45+ years	18-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45+ years
Siblings	0.5	0.7	1.3	1.2	1.8	2.4	0.1	0.2	0.2	0.6	0.3	0.7
Survivors	3.9	5.9	6.8	7.9	9.5	11.5	1.0	1.7	2.1	3.0	3.3	4.5
Leukemia	3.5	5.0	5.5	5.6	7.7	8.5	0.7	1.4	1.8	2.4	3.1	3.0
CNS malignancy	7.1	10.8	12.8	14.1	16.6	11.7	1.4	2.6	2.8	4.8	5.8	3.6
Hodgkin lymphoma	3.1	4.7	5.7	7.0	9.6	13.2	1.9	1.9	2.5	2.8	3.6	6.1
Non-Hodgkin lymphoma	2.2	4.4	4.0	7.4	5.4	6.3	0.3	1.4	1.3	3.3	1.3	1.9
Wilms tumor	2.9	3.9	5.4	6.7	1.8	9.1	0.4	0.8	2.1	2.9	0.0	0.0
Neuroblastoma	2.8	5.4	4.2	6.3	8.3	0.0	1.6	0.9	1.3	2.7	0.0	0.0
Soft tissue sarcoma	4.7	5.0	7.4	6.7	10.2	10.7	1.9	1.8	1.5	2.0	4.1	4.4
Bone malignancy	5.8	8.1	8.9	10.5	9.9	13.5	1.3	2.7	3.1	3.9	2.7	4.2

* Includes poor general health, adverse mental health, functional impairments and activity limitations

CNS=Central Nervous system

Figure 1 Bone Cancer

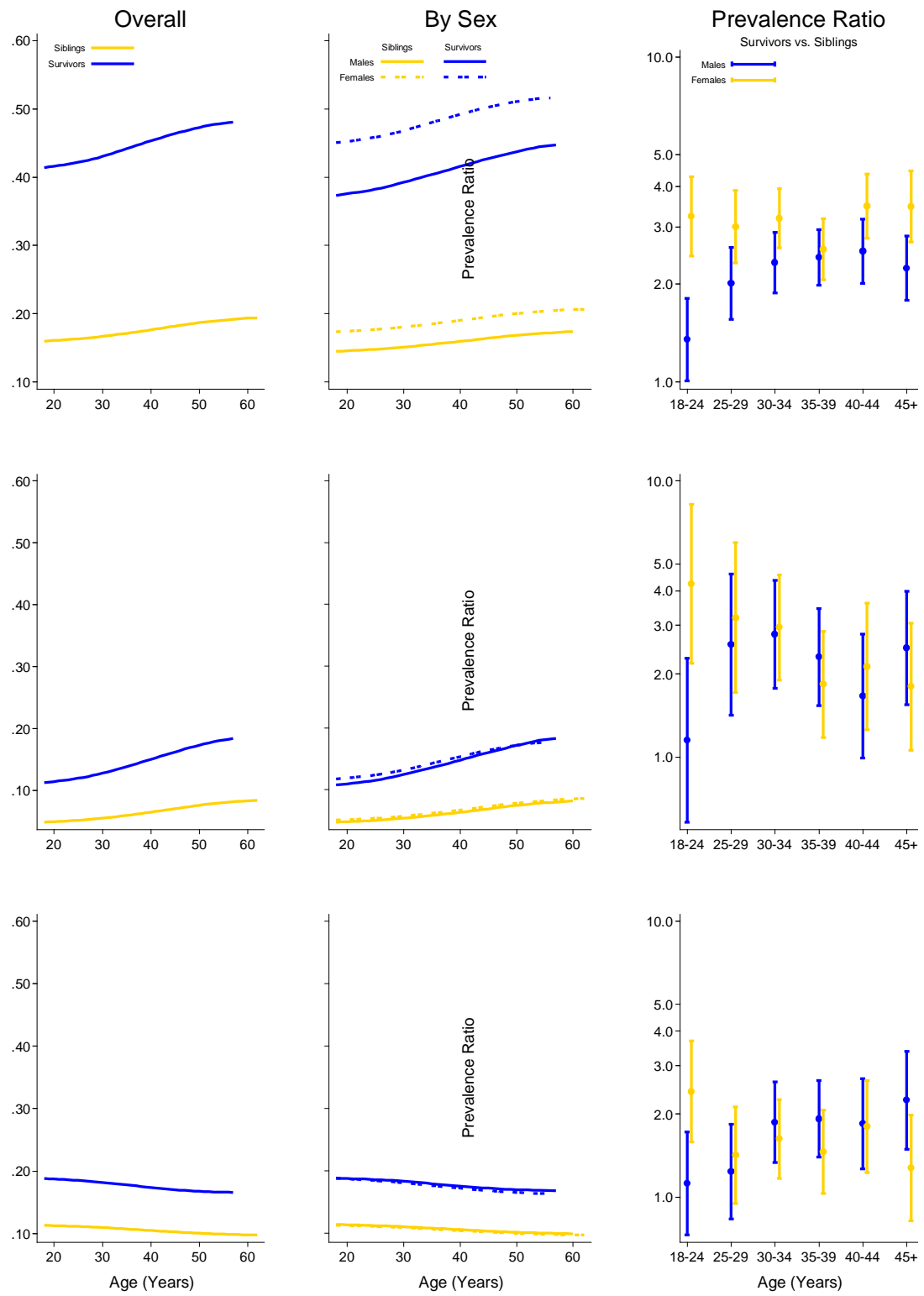


Figure 1 Bone Cancer

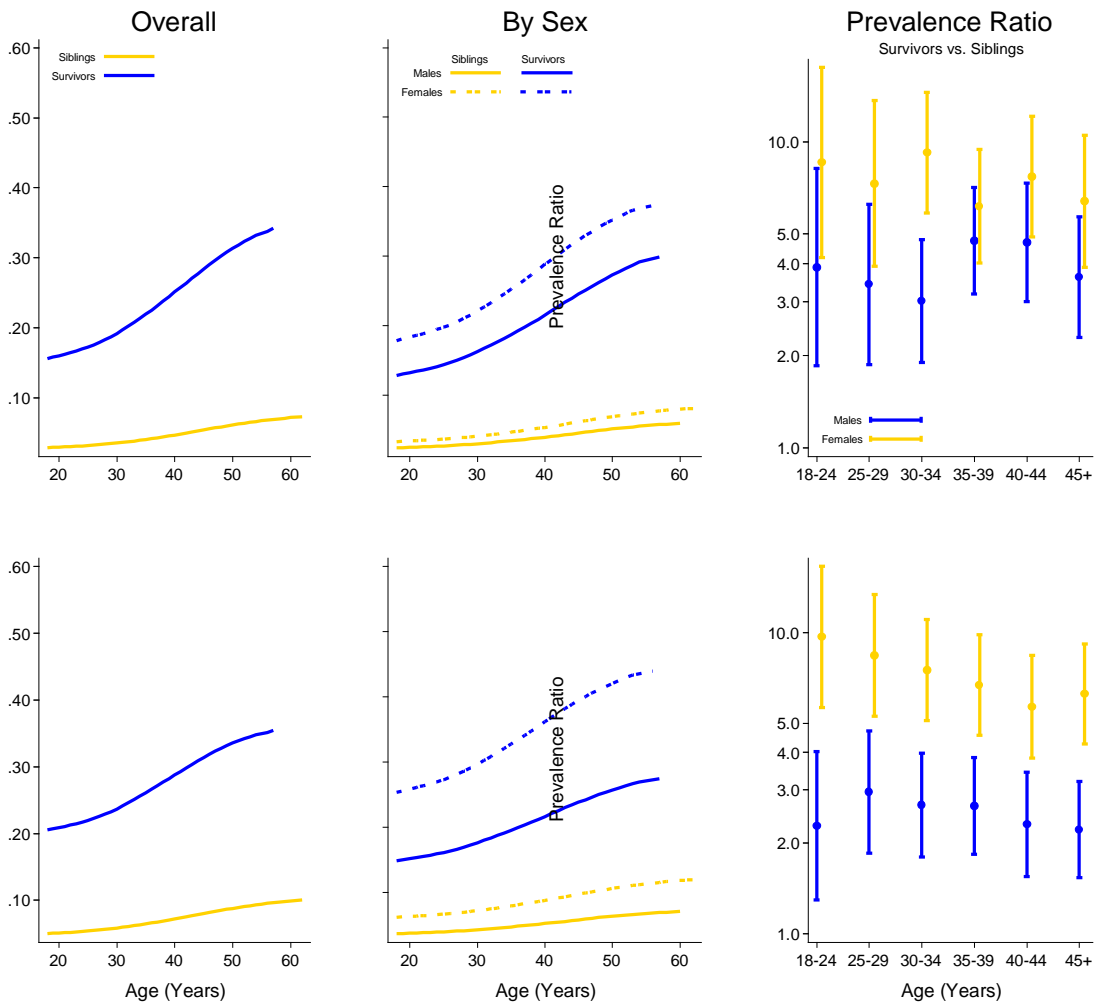


Figure 2 CNS

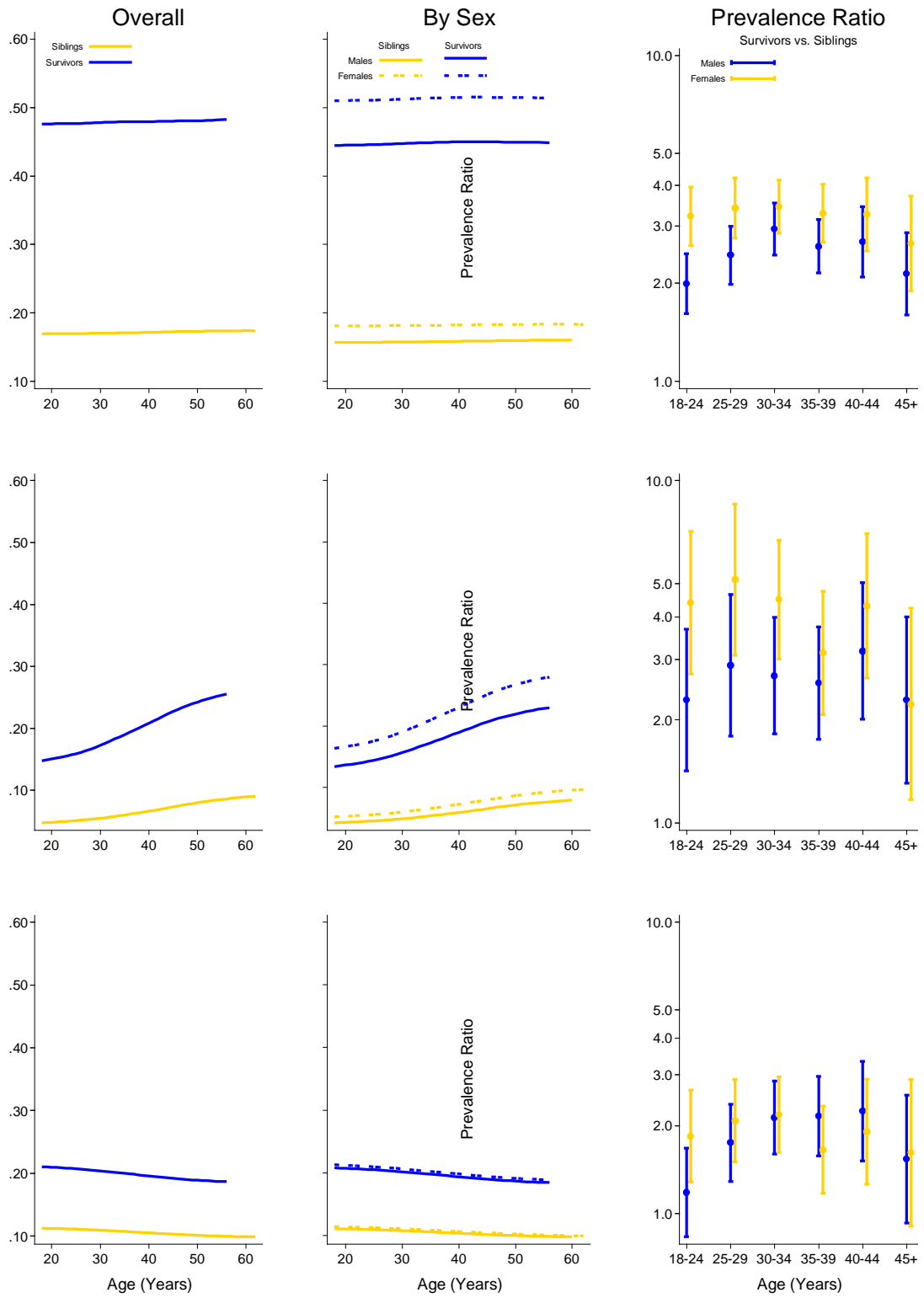


Figure 2 CNS

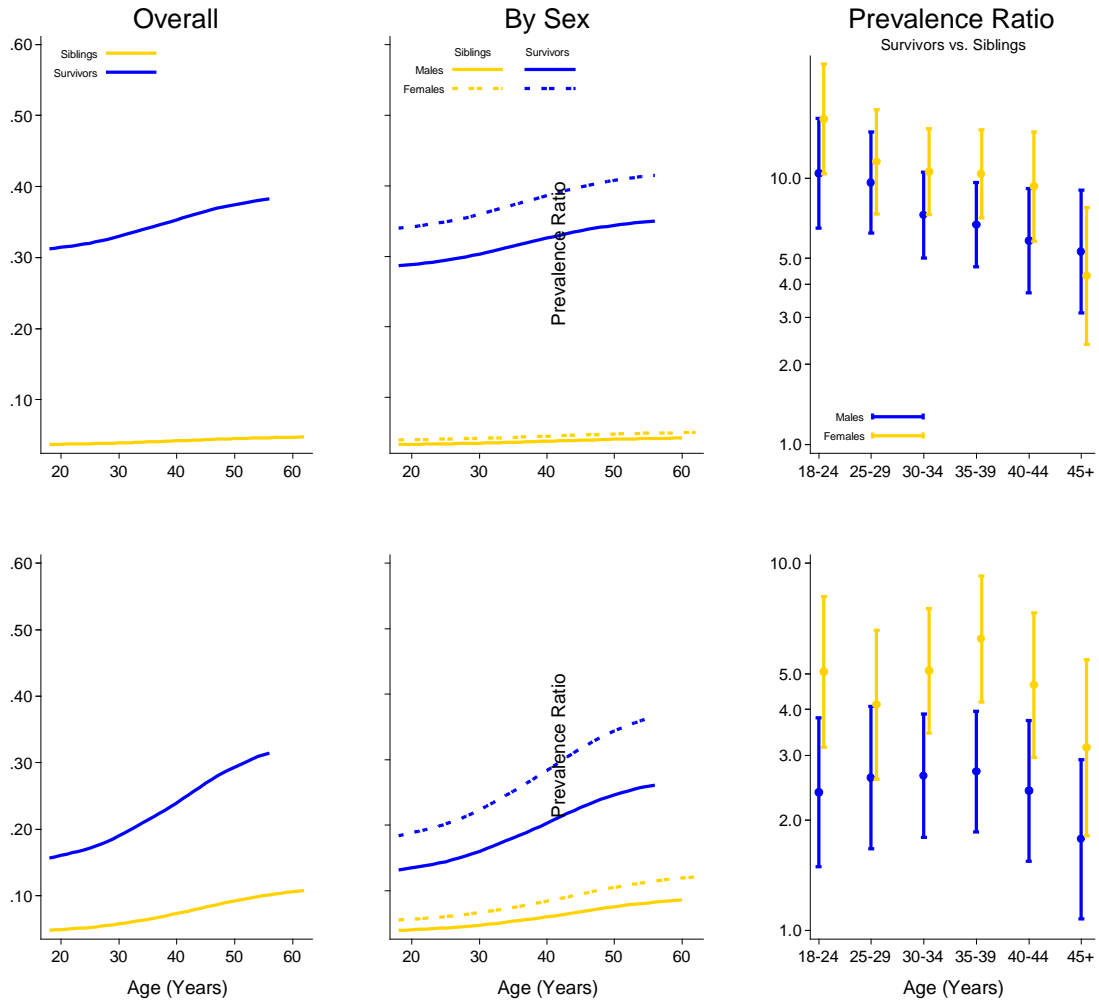


Figure 3 Hodgkin Lymphoma

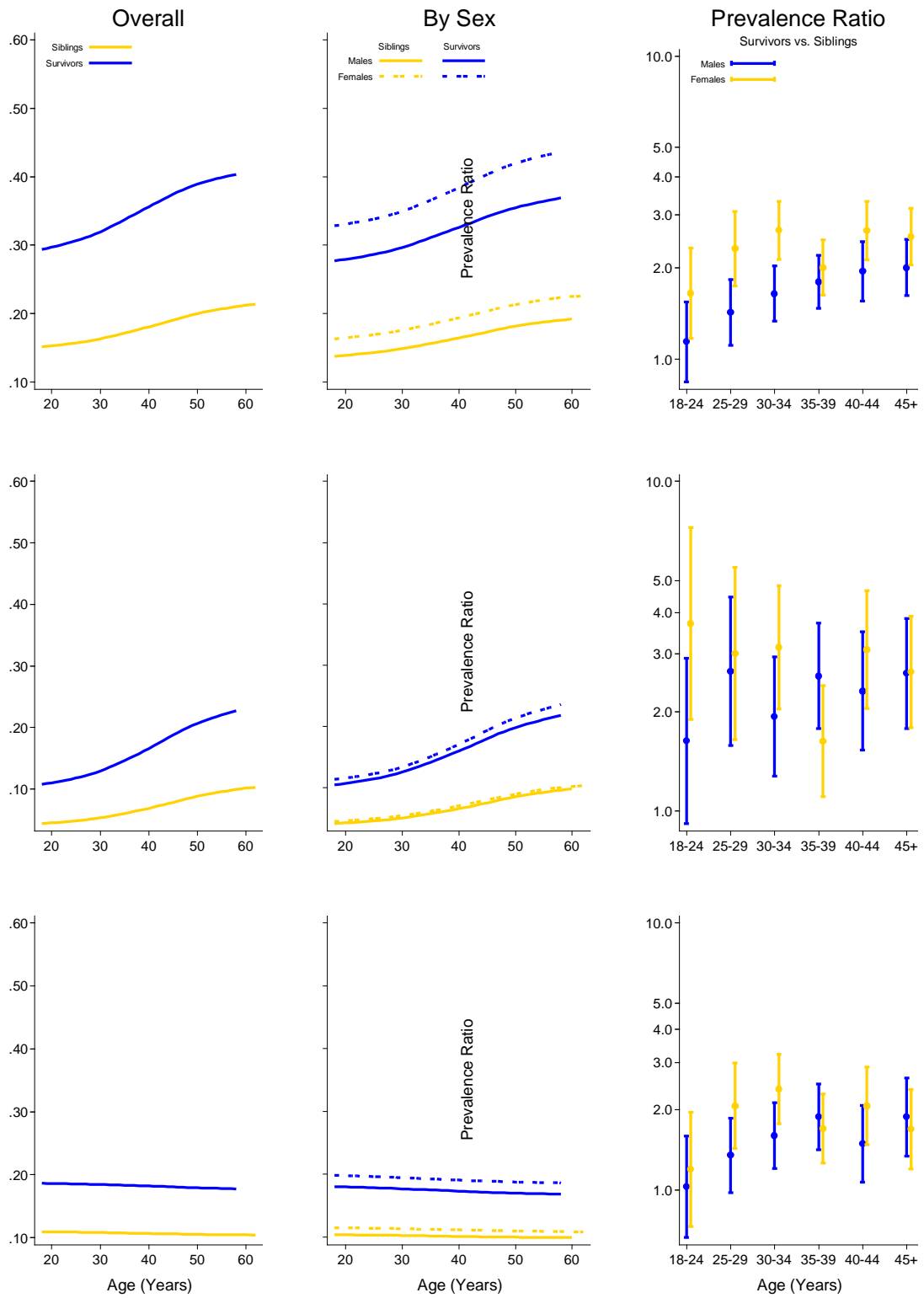


Figure 3 Hodgkin lymphoma

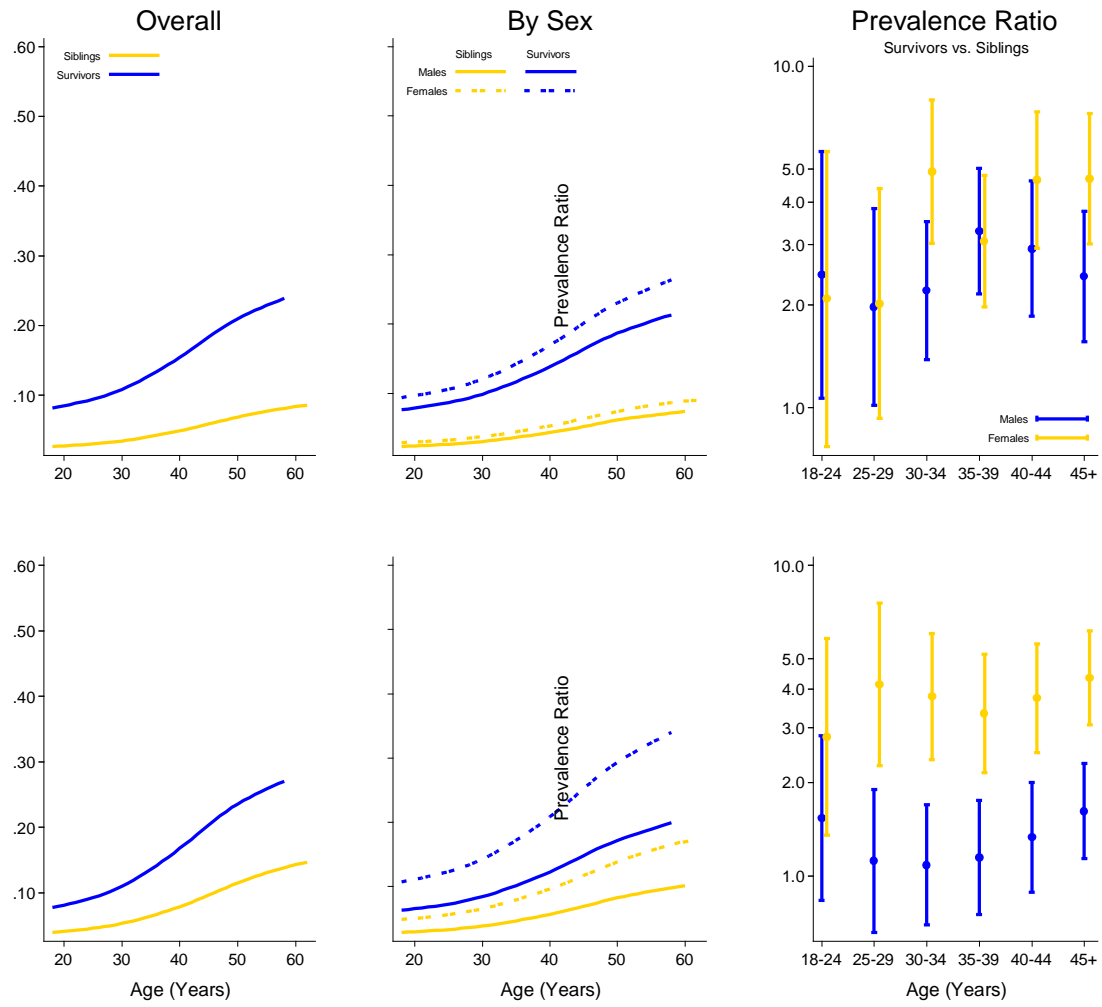


Figure 4 Leukemia

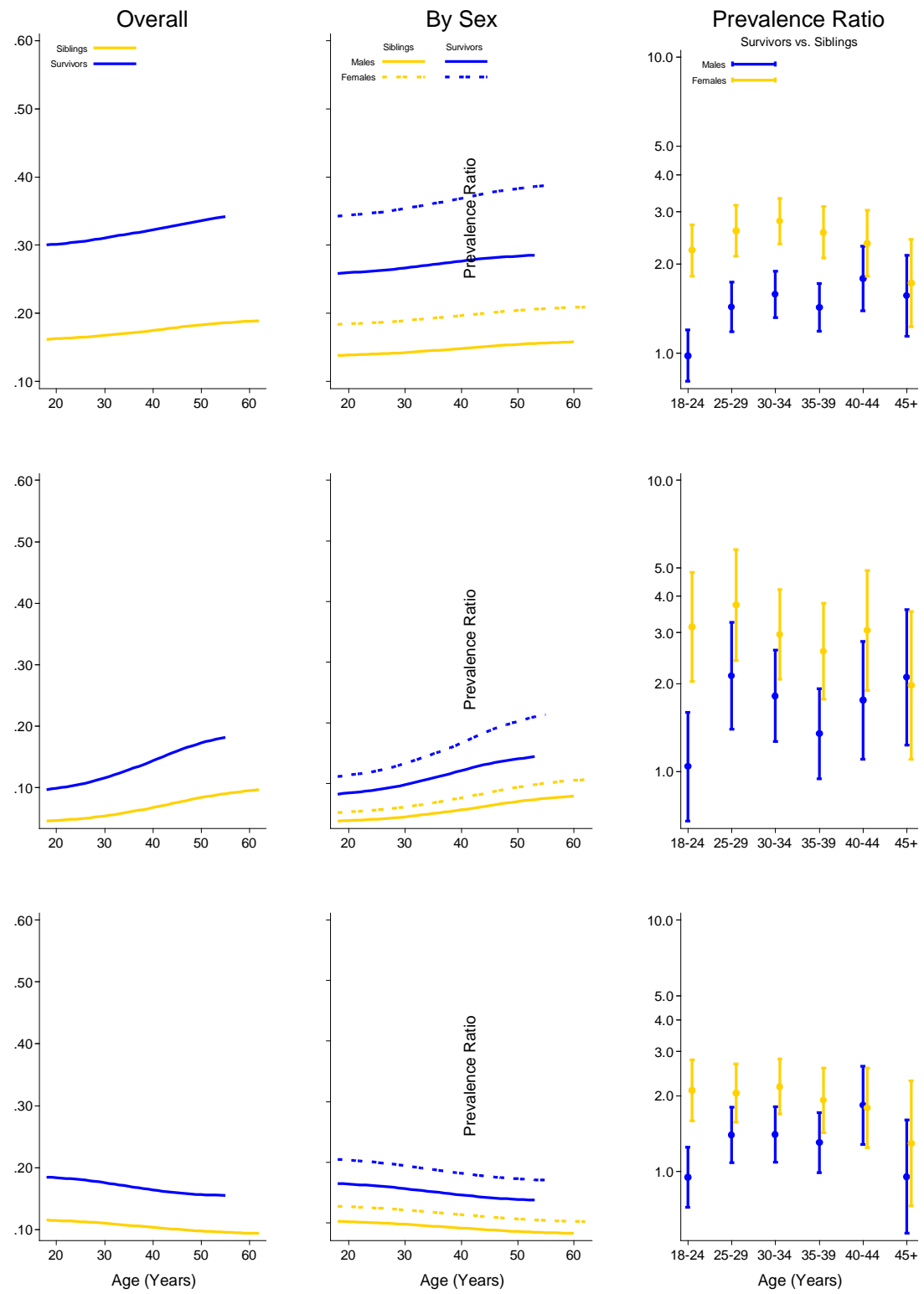


Figure 4 Leukemia

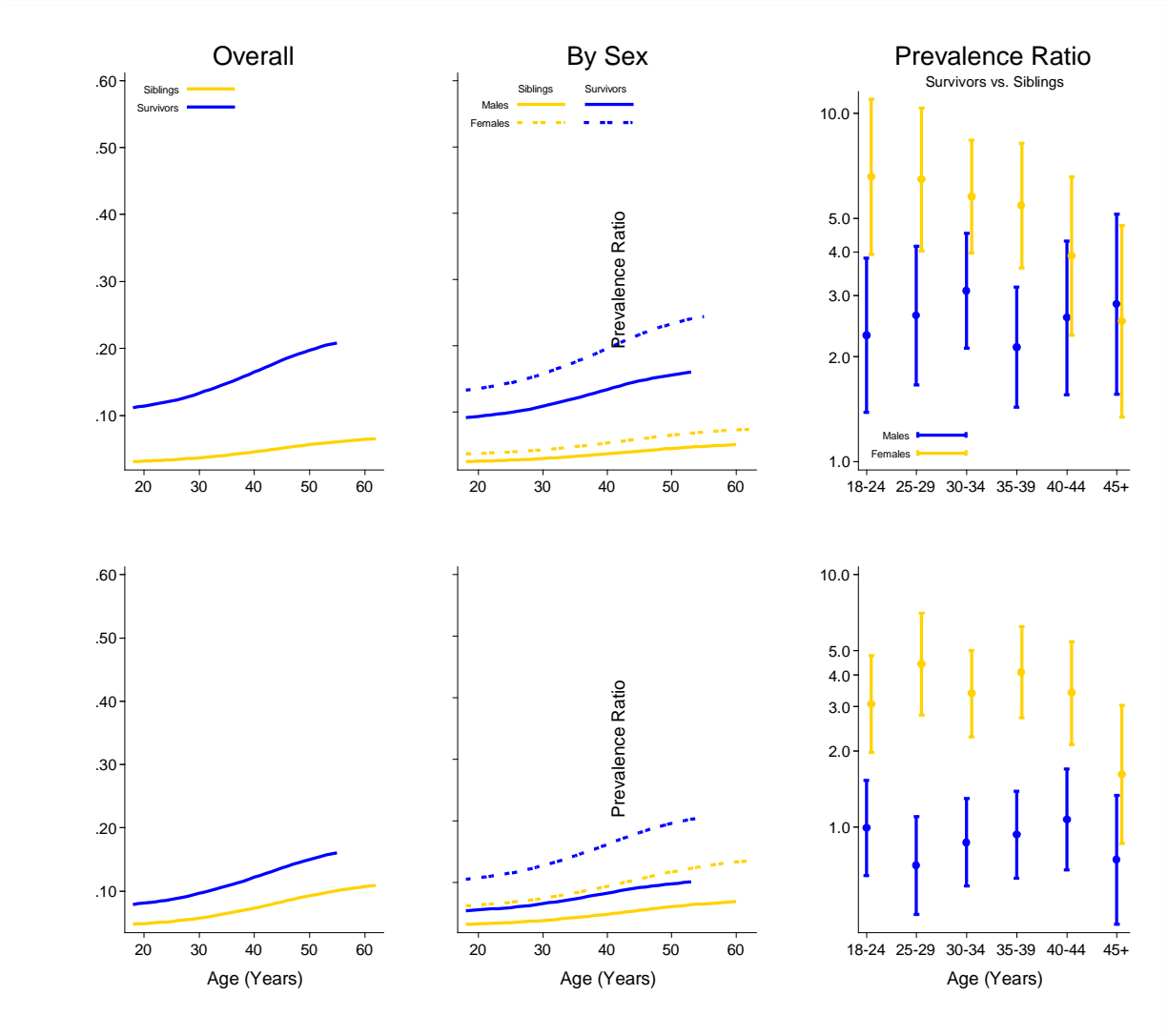


Figure 5 Neuroblastoma

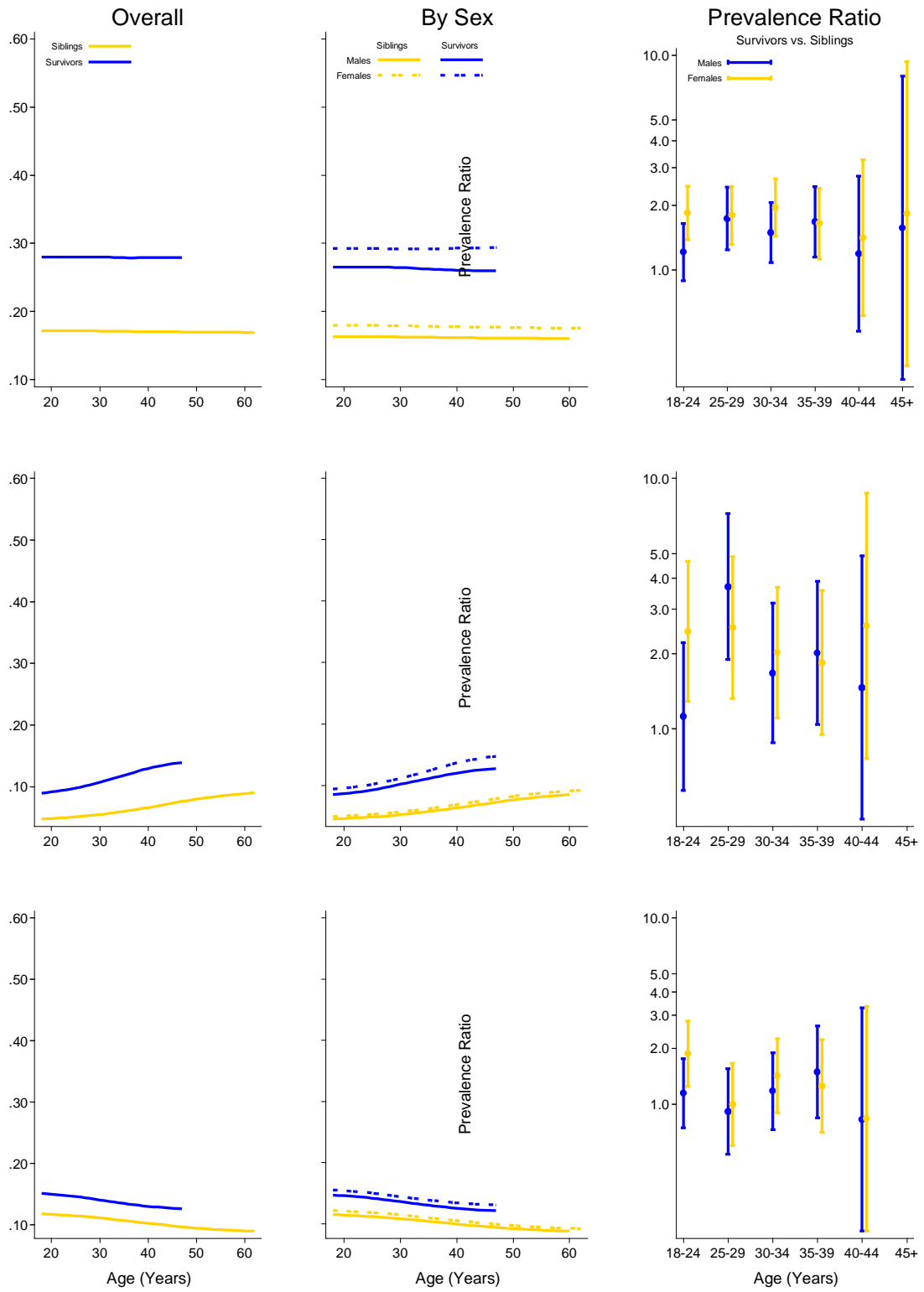


Figure 5 Neuroblastoma

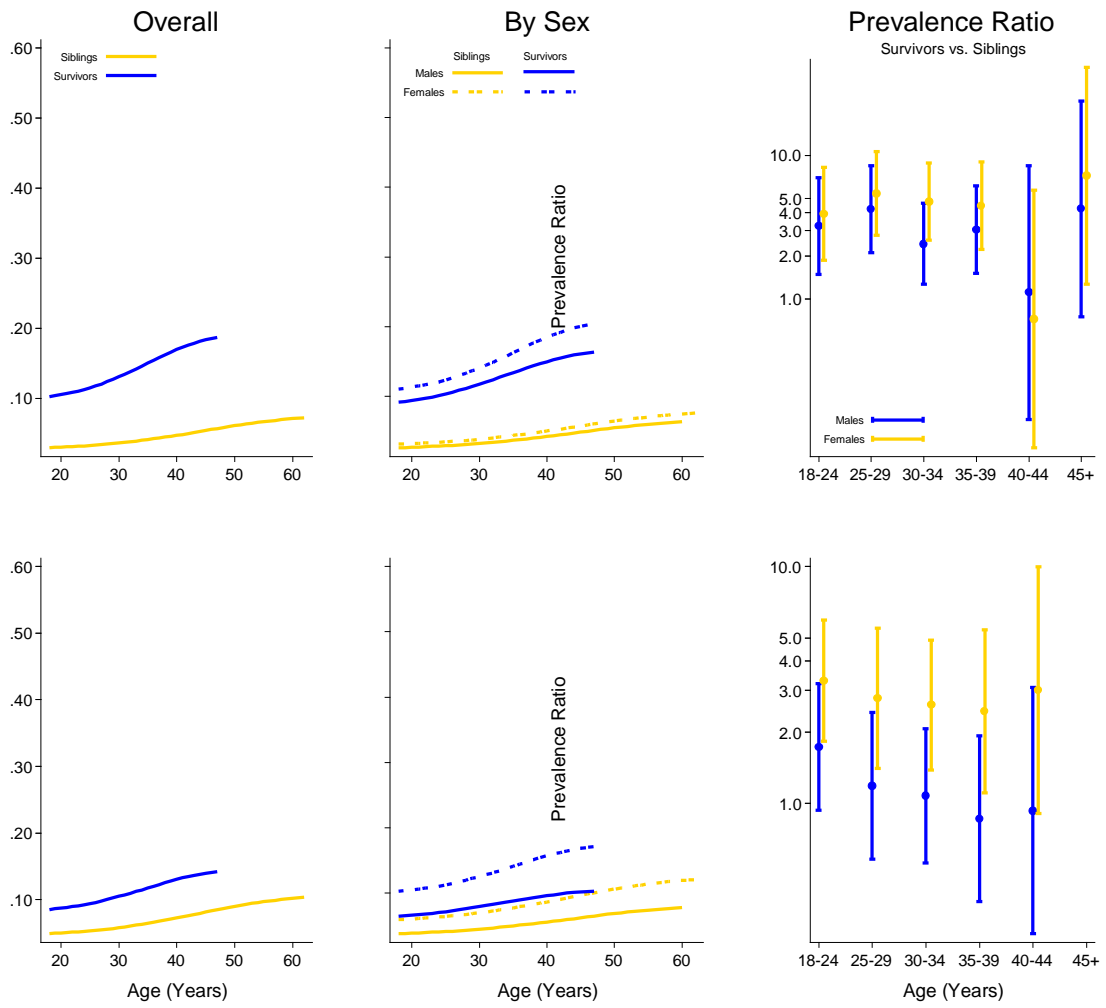


Figure 6 NHL

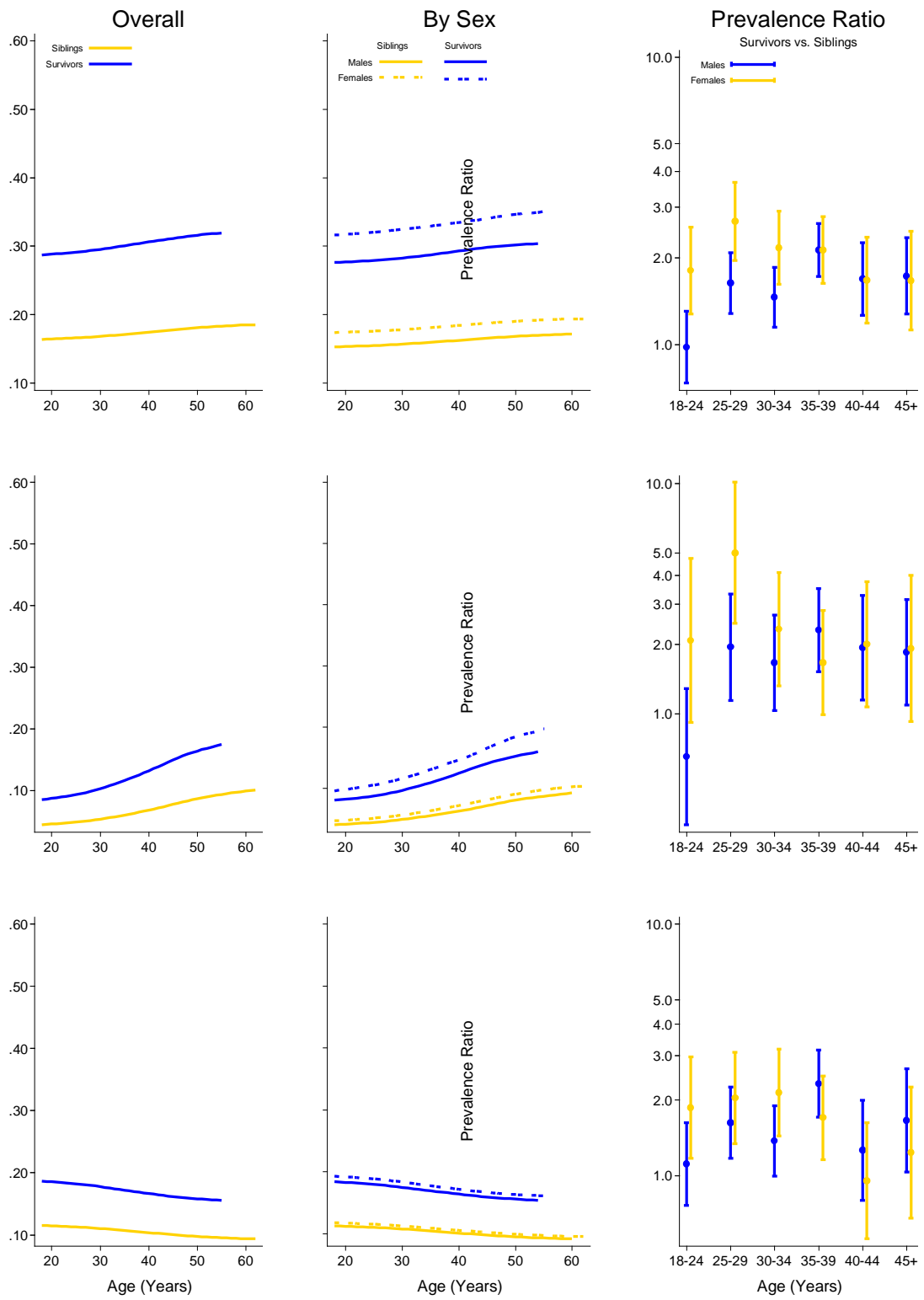


Figure 6 NHL

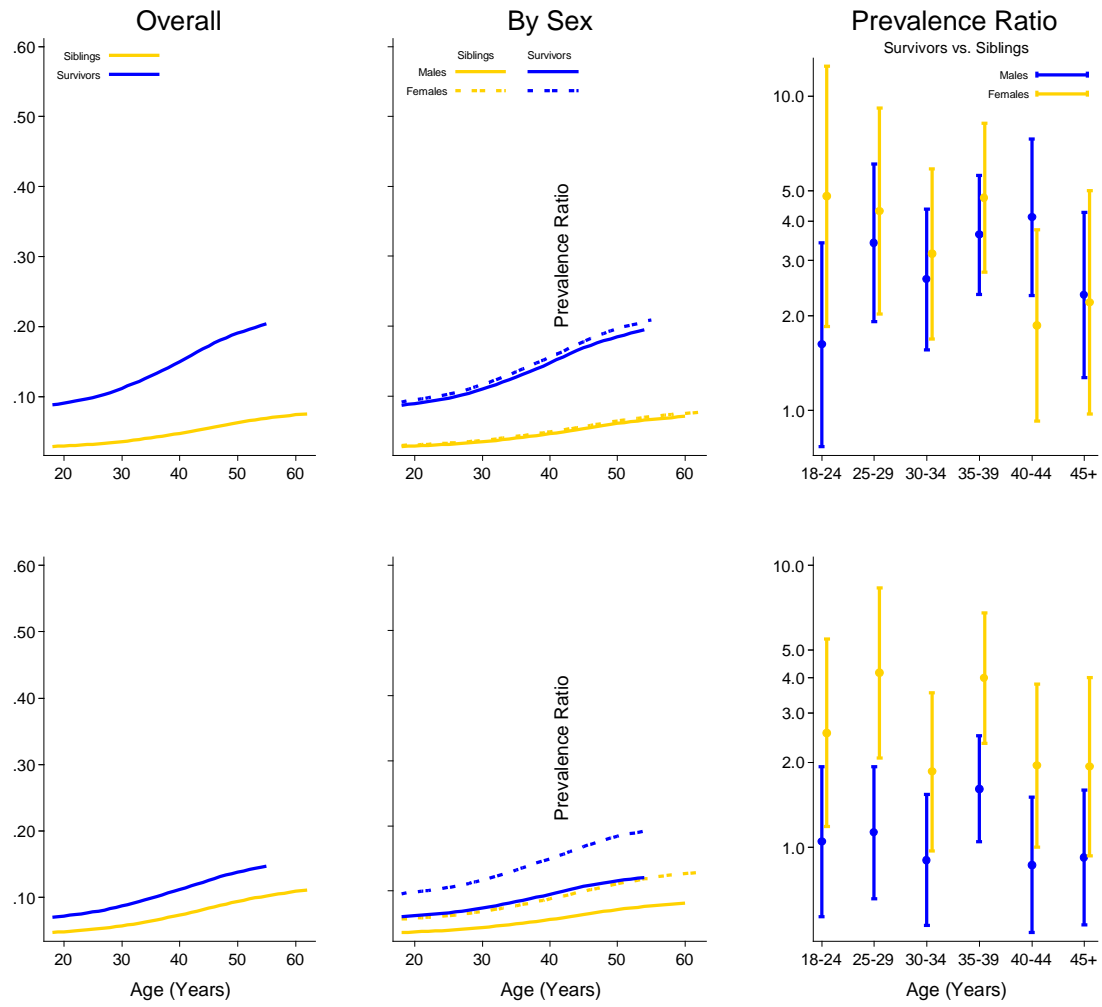


Figure 7 STS

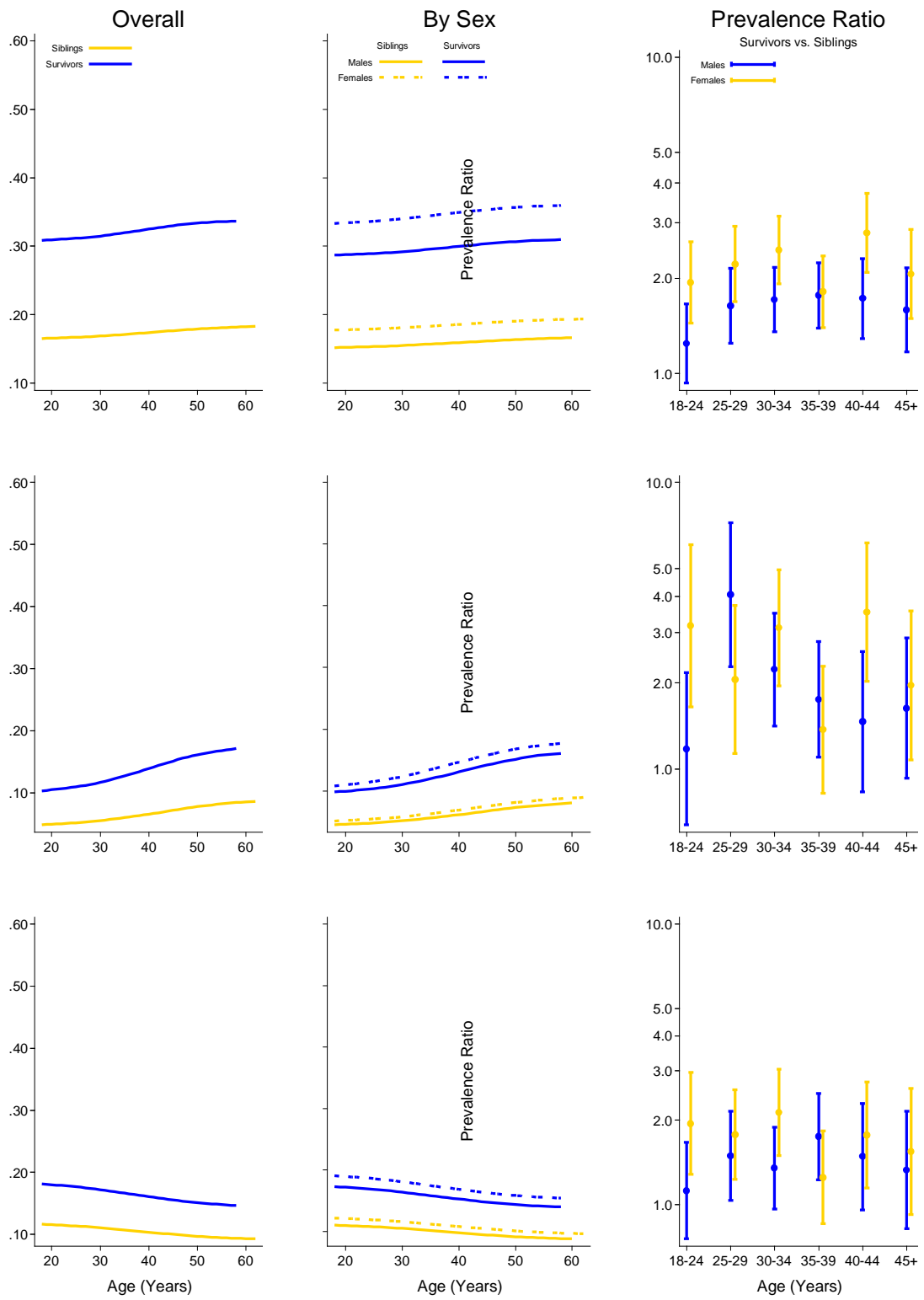


Figure 7 STS

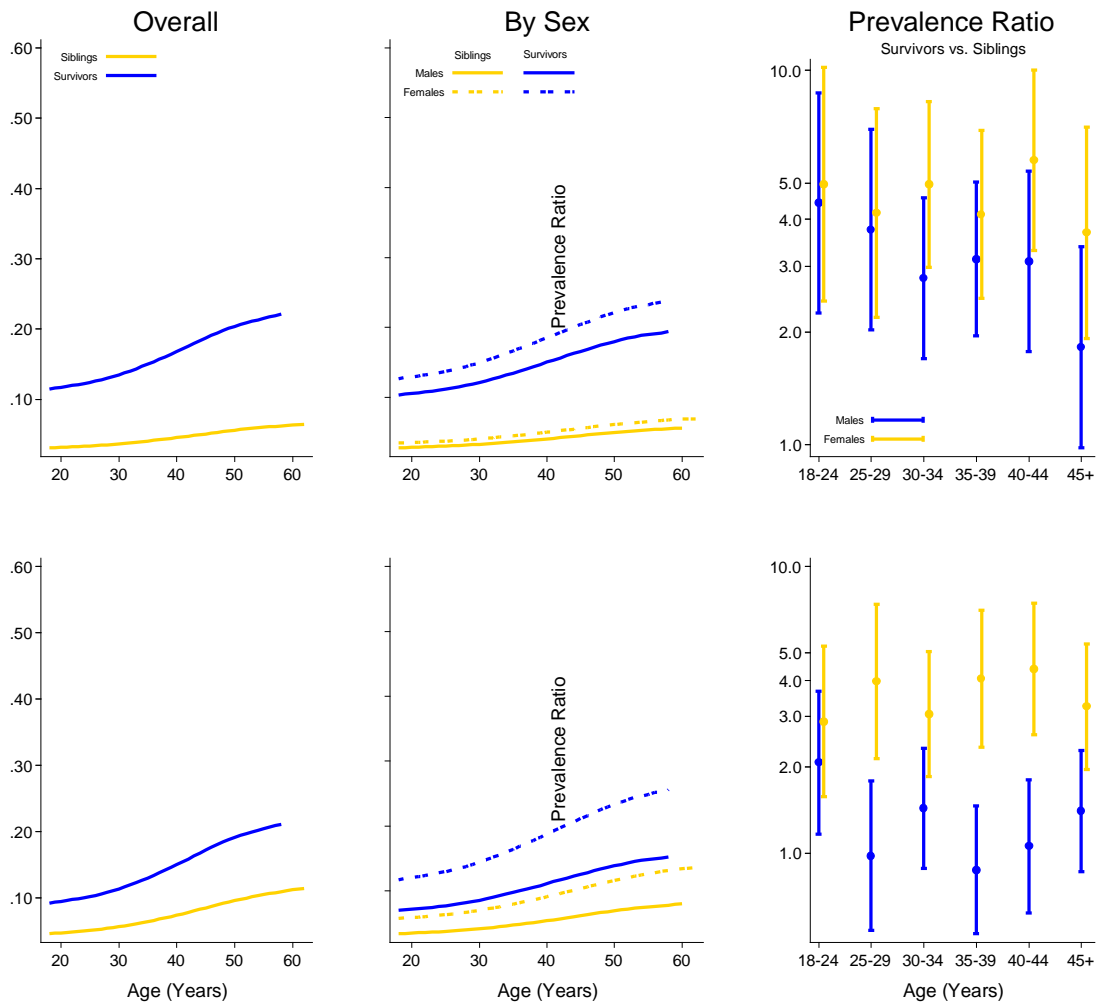


Figure 8 Wilms

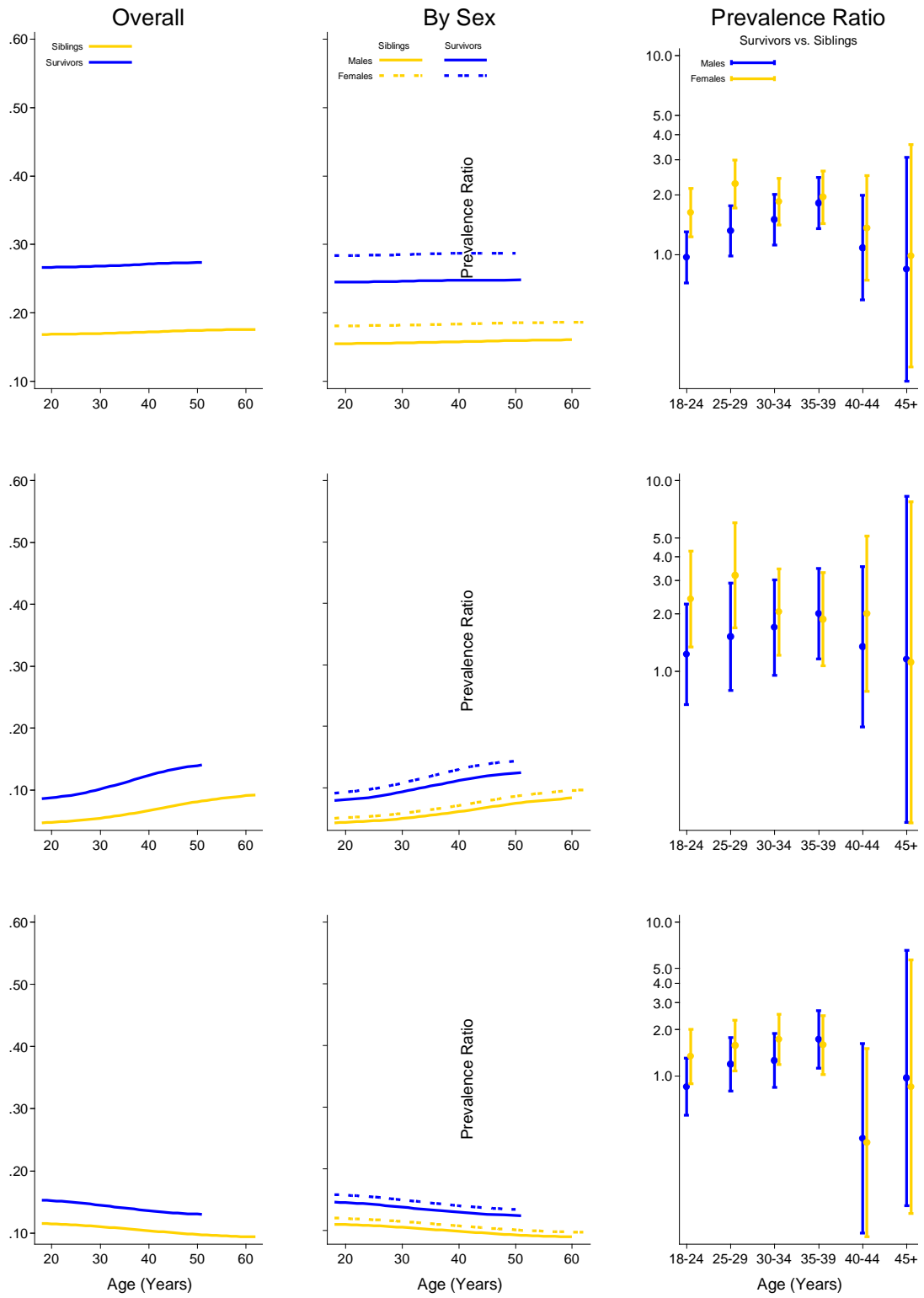


Figure 8 Wilms

