

## **Online Appendix**

A Generational Shift:  
Race and the Declining Lifetime Risk of Imprisonment

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## Online Appendix

**Table A1.** Age Distributions from Official NPS Reports and NCRP Estimates, by Race and Gender, 2012, United States

Age	All		Men		White Men		Hispanic Men		Black Men	
	NPS	NCRP	NPS	NCRP	NPS	NCRP	NPS	NCRP	NPS	NCRP
18-19	4%	4%	4%	4%	2%	3%	4%	5%	5%	5%
20-24	18%	19%	18%	20%	15%	17%	19%	21%	20%	22%
25-29	19%	19%	19%	19%	18%	19%	21%	20%	18%	18%
30-34	17%	17%	17%	17%	16%	17%	18%	17%	16%	15%
35-39	12%	12%	12%	12%	13%	12%	13%	12%	11%	10%
40-44	11%	10%	11%	10%	12%	11%	10%	9%	10%	9%
45-49	9%	9%	9%	9%	10%	9%	7%	7%	9%	9%
50-44	6%	6%	6%	6%	7%	7%	4%	4%	6%	6%
55+	4%	4%	4%	5%	6%	5%	3%	3%	4%	4%

*Note:* NPS column is the age distribution of admitted prisoners in 2012 reported in the Prisoners Series from the National Prisoner Statistics. NCRP column is the authors' calculation based on the age distribution of 604,230 individual admissions recorded in 2012 in the National Corrections Reporting Program.

**Table A2.** Robustness Checks, Risk of Incarceration by Age 38, United States

		A.	B.	C.	D.	E.	F.
		Baseline Estimate	2004 Survey Used for 2005-2015	2004 Survey Used for 1999-2019	2016 Survey Used for 2005-2015	2016 Survey Used for 1999-2019	NCRP Estimates Used for 2010-2019
All	Real Cohort 1999-2019	6.5%	6.3%	6.3%	6.9%	7.5%	6.5%
	Synthetic Cohort 1999	5.8%	-	5.9%	-	7.0%	-
	Synthetic Cohort 2019	4.7%	-	4.1%	-	-	4.5%
Men	Real Cohort 1999-2019	11.3%	11.0%	11.0%	12.0%	13.2%	11.3%
	Synthetic Cohort 1999	10.1%	-	10.3%	-	12.2%	-
	Synthetic Cohort 2019	7.9%	-	6.8%	-	-	7.4%
White Men	Real Cohort 1999-2019	5.9%	5.6%	5.5%	6.4%	7.0%	5.9%
	Synthetic Cohort 1999	4.6%	-	4.7%	-	5.9%	-
	Synthetic Cohort 2019	3.8%	-	3.1%	-	-	3.7%
Hispanic Men	Real Cohort 1999-2019	12.8%	12.5%	12.4%	13.6%	15.1%	12.9%
	Synthetic Cohort 1999	12.7%	-	12.5%	-	15.1%	-
	Synthetic Cohort 2019	10.1%	-	8.6%	-	-	9.6%
Black Men	Real Cohort 1999-2019	33.7%	33.8%	34.0%	34.7%	37.7%	33.0%
	Synthetic Cohort 1999	35.8%	-	36.9%	-	39.9%	-
	Synthetic Cohort 2019	18.3%	-	17.2%	-	-	16.6%

*Note:* We have conducted five robustness checks to demonstrate that the lifetime risk estimates are unaffected by the choice to linearly interpolate between survey years or any differences between the 2004 SCIFCF and the 2016 SPI. These surveys are only used to estimate one parameter,  $f_x$ , the estimated proportion of admissions that were first-time admissions at age  $x$ . All other parameters in the models remain the same as in the baseline analysis. Cells with dashes represent estimates that are entirely unaffected by the robustness check scenario. Across these five robustness checks, our estimates are consistent and the statistical and substantive conclusions remain unchanged. In every alternative scenario, the estimated declines in black male incarceration risk would be *larger* than those estimated in the baseline analysis. First, rather than linearly interpolating the estimates, we assume the 2004 survey estimates held for all years from 2005-2015. As shown in column B of Appendix Table 2, the estimated real cohort risk of incarceration for the 1999 cohort is only slightly affected. The synthetic cohort estimates for the 1999 and 2019 cohorts remain unchanged. Second, we make a stronger assumption and assume that the 2004 survey estimates applied for the entire observation period from 1999-2019. These results are shown in Column C. This strong assumption only slightly affects our estimates for the risk for the real 1999 cohort, the synthetic 1999 cohort, and the synthetic 2019 cohort. Notably, under this scenario the estimated risk for black men is slightly higher in 1999 and slightly lower in 2019. Substantively, this means if we use the 2004 survey estimates for the entire period, we would have observed larger declines in black male incarceration risk. Third, we instead assume that the 2016 survey estimates are more reliable and held from 2005-2015. Under this alternative scenario, shown in column D, the estimates for the real cohort estimate for the 1999 cohort are again only slightly affected. The estimates for the synthetic 1999 and 2019 cohorts are unaffected by this alternative scenario. Fourth, in column E, we make a stronger assumption about the 2016 survey and assume it held for the entire period from 1999-2019. As in the previous scenarios, this alternative scenario results in slightly higher estimates of the lifetime risk of incarceration for the earlier cohorts. Thus, under this scenario, the declines in black male incarceration would have been even larger. Fifth and lastly, aside from multiple robustness checks on the interpolation strategy, we also use an entirely different dataset to estimate the percentage of admissions that are first-time admissions. The restricted-access version of the NCRP data includes a variable on whether the individual has previously been incarcerated for a felony offense. Although the NCRP covers our entire observation period, the BJS cautions that the prior incarceration variable should only be used from 2010 onward. As a final check, in Column F, we estimate the lifetime risk of incarceration using the NCRP to estimate the proportion of first-time prison admissions. Again, the estimated risk of incarceration remains relatively unchanged and the substantive conclusions are the same. Once again, the decline in incarceration for black men would be larger if we used the NCRP data.

**Table A3. State-Level Changes in Incarceration and Racial Disparities from Peak Year of Black Male Incarceration to 2019, United States**

State	Peak Year	Black Male Inc. Rate in Peak Year	White Male Inc. Rate in Peak Year	B:W Disparity in Peak Year	Black Male Inc. Rate in 2019	White Male Inc. Rate in 2019	B:W Disparity in 2019	% Change in Black Male Rate	% Change in White Male Rate	% Change in B:W Disparity
AK	1997	6661	1039	6.4	3342	855	3.9	-50%	-18%	-39%
AL	2002	4617	803	5.7	3112	908	3.4	-33%	13%	-40%
AR	2014	4688	1021	4.6	4291	1010	4.2	-8%	-1%	-7%
AZ	1994	7024	1301	5.4	4265	868	4.9	-39%	-33%	-9%
CA	1998	6150	687	8.9	3572	382	9.3	-42%	-44%	4%
CO	2003	5740	636	9.0	3092	497	6.2	-46%	-22%	-31%
CT	1999	8376	462	18.1	3730	348	10.7	-55%	-25%	-41%
DE	1999	8723	1082	8.1	4263	707	6.0	-51%	-35%	-25%
FL	1995	5591	634	8.8	3597	715	5.0	-36%	13%	-43%
GA	2004	3874	744	5.2	2679	798	3.4	-31%	7%	-36%
HI	2004	2061	907	2.3	1166	686	1.7	-43%	-24%	-25%
IA	1998	8520	480	17.7	4553	516	8.8	-47%	7%	-50%
ID	2012	4238	1029	4.1	3649	1071	3.4	-14%	4%	-17%
IL	1999	4788	323	14.8	3164	355	8.9	-34%	10%	-40%
IN	2008	5360	725	7.4	3664	720	5.1	-32%	-1%	-31%
KS	1997	5745	532	10.8	3724	602	6.2	-35%	13%	-43%
KY	1997	5636	645	8.7	3299	1025	3.2	-41%	59%	-63%
LA	2005	5830	999	5.8	3937	892	4.4	-32%	-11%	-24%
MA	1996	3260	268	12.2	1159	166	7.0	-64%	-38%	-43%
MD	1996	3727	374	10.0	1971	328	6.0	-47%	-12%	-40%
ME	2004	2644	344	7.7	2471	321	7.7	-7%	-7%	0%
MI	2002	5829	696	8.4	3893	536	7.3	-33%	-23%	-13%
MN	1996	3976	158	25.2	2549	241	10.6	-36%	52%	-58%
MO	2002	5839	886	6.6	3411	756	4.5	-42%	-15%	-31%

MS	2003	4604	947	4.9	3040	961	3.2	-34%	2%	-35%
MT	1996	4976	568	8.8	3431	810	4.2	-31%	43%	-52%
NC	1997	3655	446	8.2	2099	448	4.7	-43%	0%	-43%
ND	2007	2777	360	7.7	1625	376	4.3	-41%	5%	-44%
NE	1996	4754	371	12.8	4012	453	8.9	-16%	22%	-31%
NH	1995	4323	440	9.8	1202	472	2.5	-72%	7%	-74%
NJ	1998	5411	354	15.3	2604	191	13.6	-52%	-46%	-11%
NM	1999	4184	1202	3.5	2156	446	4.8	-48%	-63%	39%
NV	1990	5975	761	7.9	3289	745	4.4	-45%	-2%	-44%
NY	1996	4122	637	6.5	1968	220	8.9	-52%	-65%	38%
OH	1997	6157	593	10.4	3890	616	6.3	-37%	4%	-39%
OK	1997	7813	1046	7.5	5323	1119	4.8	-32%	7%	-36%
OR	1991	5341	490	10.9	3202	759	4.2	-40%	55%	-61%
PA	2009	5383	468	11.5	3916	468	8.4	-27%	0%	-27%
RI	1996	7858	590	13.3	2804	337	8.3	-64%	-43%	-37%
SC	1998	4039	629	6.4	2233	465	4.8	-45%	-26%	-25%
SD	2005	5505	855	6.4	3036	620	4.9	-45%	-27%	-24%
TN	1999	4014	567	7.1	2597	634	4.1	-35%	12%	-42%
TX	1999	8508	2065	4.1	3809	963	4.0	-55%	-53%	-4%
UT	2000	5909	551	10.7	2427	402	6.0	-59%	-27%	-44%
VA	2003	4325	568	7.6	3071	618	5.0	-29%	9%	-35%
VT	2006	9631	768	12.5	3287	540	6.1	-66%	-30%	-51%
WA	1998	4185	530	7.9	2145	476	4.5	-49%	-10%	-43%
WI	1999	10477	527	19.9	7253	516	14.1	-31%	-2%	-29%
WV	2007	3035	673	4.5	2805	772	3.6	-8%	15%	-19%
WY	2000	5500	694	7.9	3309	816	4.1	-40%	18%	-49%

*Note:* Authors' calculations based on race-gender-state-specific counts of individuals in state prisons and race-gender-state specific estimates of the adult population.

**Table A4.** Tests of Normality of Distributions for State Level Changes in Incarceration Rates from 1999 to 2019, by Race and Gender, United States

<i>Panel A. Shapiro-Francia W Test for Normal Distribution</i>				
Demographic	W	V	z	Prob>z
All	0.953	2.430	1.678	0.047
White Men	0.983	0.887	-0.228	0.590
Black Men	0.939	3.190	2.193	0.014
<i>Panel B. Shapiro-Wilk W Test for Normal Distribution</i>				
Demographic	W	V	z	Prob>z
All	0.956	2.062	1.543	0.061
White Men	0.980	0.927	-0.161	0.564
Black Men	0.940	2.820	2.211	0.014

*Note:* Authors' calculations. The null hypothesis for the Shapiro-Wilk and Shapiro-Francia test is that the data fits a normal distribution. Rejecting the null hypothesis provides strong evidence that the data is not normally distributed.

**Table A5.** Multiple-Decrement Life Table, White Men and Black Men, United States, 1999  
Real Cohort

Year	Age	White Men				Black Men			
		$l_x$	$d_x^I$	$d_x^D$	$r_x^I$	$l_x$	$d_x^I$	$d_x^D$	$r_x^I$
1999	18	100,000	197	111	0.2%	100,000	1,876	193	1.9%
2000	19	99,692	358	118	0.6%	97,931	2,859	201	4.7%
2001	20	99,217	364	119	0.9%	94,870	2,700	204	7.4%
2002	21	98,734	376	130	1.3%	91,967	2,854	214	10.3%
2003	22	98,228	399	133	1.7%	88,899	2,874	212	13.2%
2004	23	97,697	384	128	2.1%	85,814	2,637	191	15.8%
2005	24	97,185	418	130	2.5%	82,987	2,645	209	18.4%
2006	25	96,637	323	143	2.8%	80,132	1,915	203	20.4%
2007	26	96,172	321	133	3.1%	78,014	1,984	192	22.3%
2008	27	95,717	321	132	3.5%	75,838	1,886	187	24.2%
2009	28	95,264	319	128	3.8%	73,766	1,826	181	26.1%
2010	29	94,817	299	133	4.1%	71,758	1,611	164	27.7%
2011	30	94,385	250	138	4.3%	69,983	1,024	167	28.7%
2012	31	93,997	222	143	4.6%	68,793	878	160	29.6%
2013	32	93,632	231	145	4.8%	67,755	825	165	30.4%
2014	33	93,256	236	159	5.0%	66,764	779	166	31.2%
2015	34	92,861	220	182	5.2%	65,820	685	184	31.9%
2016	35	92,459	169	208	5.4%	64,950	500	204	32.4%
2017	36	92,082	165	220	5.6%	64,246	474	213	32.8%
2018	37	91,697	161	221	5.7%	63,560	445	218	33.3%
2019	38	91,315	155	236	5.9%	62,897	424	233	33.7%

*Note:* Authors' calculations from multiple-decrement life tables for real cohort risks of incarceration in state or federal prison.  $l_x$  represents the population remaining alive and never incarcerated at age  $x$ .  $d_x^I$  represents the number of decrements to first-time prison admission in the age interval.  $d_x^D$  represents the number of decrements to death in the age interval.  $r_x^I$  represents the cumulative lifetime risk of incarceration at age  $x$ .

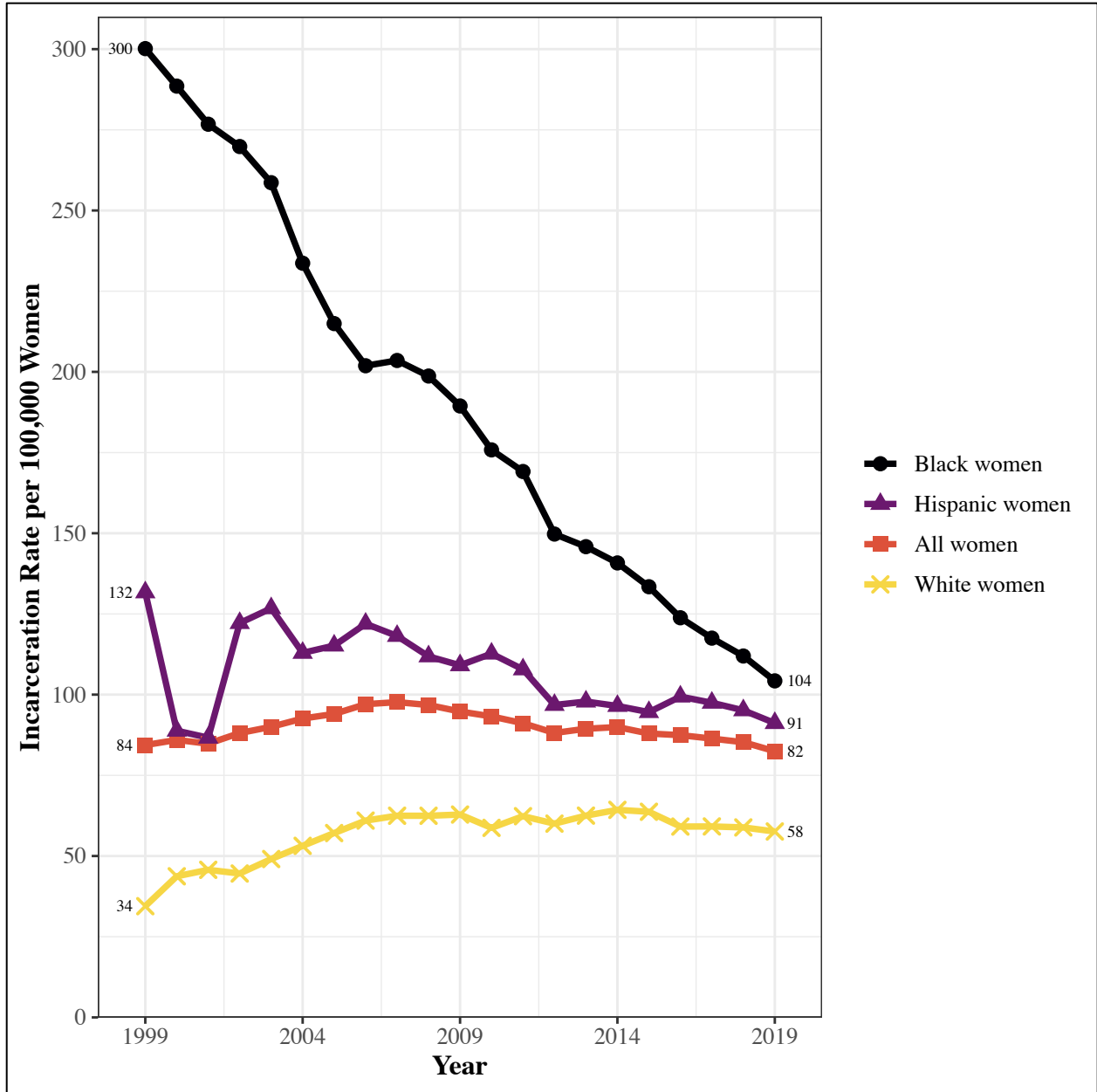
**Table A6. Real and Projected Risk of Incarceration by Age, United States, by Year**

		Cohort																					
		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
		Birth Year																					
Age		1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	
All	20	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	
	25	3.2	3.2	3.1	3.1	3.1	3.1	3.0	3.0	3.0	2.9	2.8	2.8	2.7	2.5	2.3	2.1	2.1	2.0	1.9	1.9	1.9	
	30	4.9	4.9	4.7	4.7	4.6	4.6	4.6	4.5	4.5	4.3	4.2	4.1	4.0	3.8	3.6	3.5	3.4	3.3	3.3	3.2	3.2	
	35	6.0	5.9	5.8	5.7	5.6	5.6	5.6	5.5	5.5	5.3	5.3	5.1	5.0	4.8	4.6	4.5	4.4	4.3	4.3	4.3	4.2	
	40	6.8	6.7	6.6	6.5	6.4	6.4	6.4	6.3	6.3	6.1	6.0	5.9	5.8	5.6	5.4	5.3	5.2	5.1	5.1	5.0	5.0	
	45	7.3	7.3	7.1	7.1	6.9	7.0	6.9	6.9	6.8	6.7	6.6	6.5	6.3	6.1	6.0	5.8	5.7	5.7	5.6	5.6	5.6	5.6
	50	7.7	7.6	7.5	7.4	7.3	7.3	7.3	7.2	7.2	7.0	7.0	6.8	6.7	6.5	6.3	6.2	6.1	6.0	6.0	6.0	6.0	5.9
Men	20	2.0	1.8	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.9	0.9	
	25	5.9	5.8	5.6	5.6	5.5	5.5	5.4	5.3	5.3	5.2	5.0	4.9	4.7	4.3	4.0	3.8	3.6	3.5	3.4	3.3	3.3	
	30	8.8	8.6	8.3	8.2	8.0	8.0	7.9	7.8	7.8	7.5	7.3	7.1	6.9	6.5	6.2	6.0	5.8	5.7	5.6	5.5	5.5	
	35	10.5	10.3	10.0	9.8	9.6	9.6	9.5	9.4	9.4	9.1	8.9	8.7	8.5	8.1	7.8	7.6	7.4	7.3	7.2	7.1	7.1	
	40	11.8	11.5	11.2	11.1	10.8	10.8	10.8	10.6	10.6	10.3	10.2	9.9	9.7	9.4	9.0	8.8	8.6	8.5	8.4	8.4	8.3	
	45	12.7	12.4	12.1	12.0	11.7	11.7	11.6	11.5	11.5	11.2	11.1	10.8	10.6	10.2	9.9	9.7	9.5	9.4	9.3	9.3	9.2	
	50	13.3	13.0	12.7	12.6	12.3	12.3	12.3	12.1	12.1	11.8	11.7	11.4	11.2	10.9	10.5	10.3	10.1	10.0	9.9	9.9	9.9	
Black Men	20	7.4	7.0	6.4	5.8	5.4	5.1	5.1	5.3	5.5	5.4	5.3	4.8	4.6	4.3	4.1	3.9	3.5	3.4	3.1	2.9	2.8	
	25	20.4	19.2	17.9	17.4	16.9	16.5	16.3	16.0	15.6	14.7	14.1	13.4	12.9	12.0	11.4	10.8	10.3	9.9	9.7	9.5	9.4	
	30	28.7	27.2	25.3	24.3	23.1	22.6	22.2	21.7	21.0	19.7	19.0	18.2	17.7	16.7	16.1	15.5	15.0	14.7	14.4	14.2	14.1	
	35	32.4	30.7	28.6	27.5	26.1	25.5	25.1	24.6	23.8	22.6	21.9	21.1	20.5	19.6	19.0	18.4	17.9	17.5	17.3	17.1	17.0	
	40	34.4	32.7	30.6	29.5	28.1	27.6	27.1	26.6	25.9	24.6	24.0	23.2	22.6	21.6	21.0	20.5	19.9	19.6	19.3	19.1	19.1	
	45	35.6	34.0	31.9	30.7	29.3	28.8	28.4	27.8	27.1	25.9	25.2	24.4	23.8	22.9	22.3	21.7	21.2	20.8	20.6	20.4	20.3	
	50	36.4	34.7	32.6	31.5	30.1	29.6	29.1	28.6	27.9	26.7	26.0	25.2	24.6	23.7	23.1	22.5	22.0	21.6	21.4	21.2	21.1	
White Men	20	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	
	25	2.8	2.8	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.2	2.1	1.9	1.7	1.5	1.4	1.3	1.3	1.3	1.3	1.3	
	30	4.3	4.3	4.1	4.1	4.0	4.0	3.9	3.8	3.8	3.6	3.4	3.2	3.0	2.8	2.7	2.5	2.5	2.4	2.4	2.4	2.4	
	35	5.4	5.3	5.2	5.1	5.0	5.0	4.9	4.8	4.7	4.5	4.4	4.2	4.0	3.8	3.6	3.5	3.4	3.4	3.4	3.3	3.3	
	40	6.2	6.1	6.0	5.9	5.8	5.8	5.7	5.6	5.5	5.3	5.2	5.0	4.8	4.6	4.4	4.3	4.2	4.2	4.1	4.1	4.1	



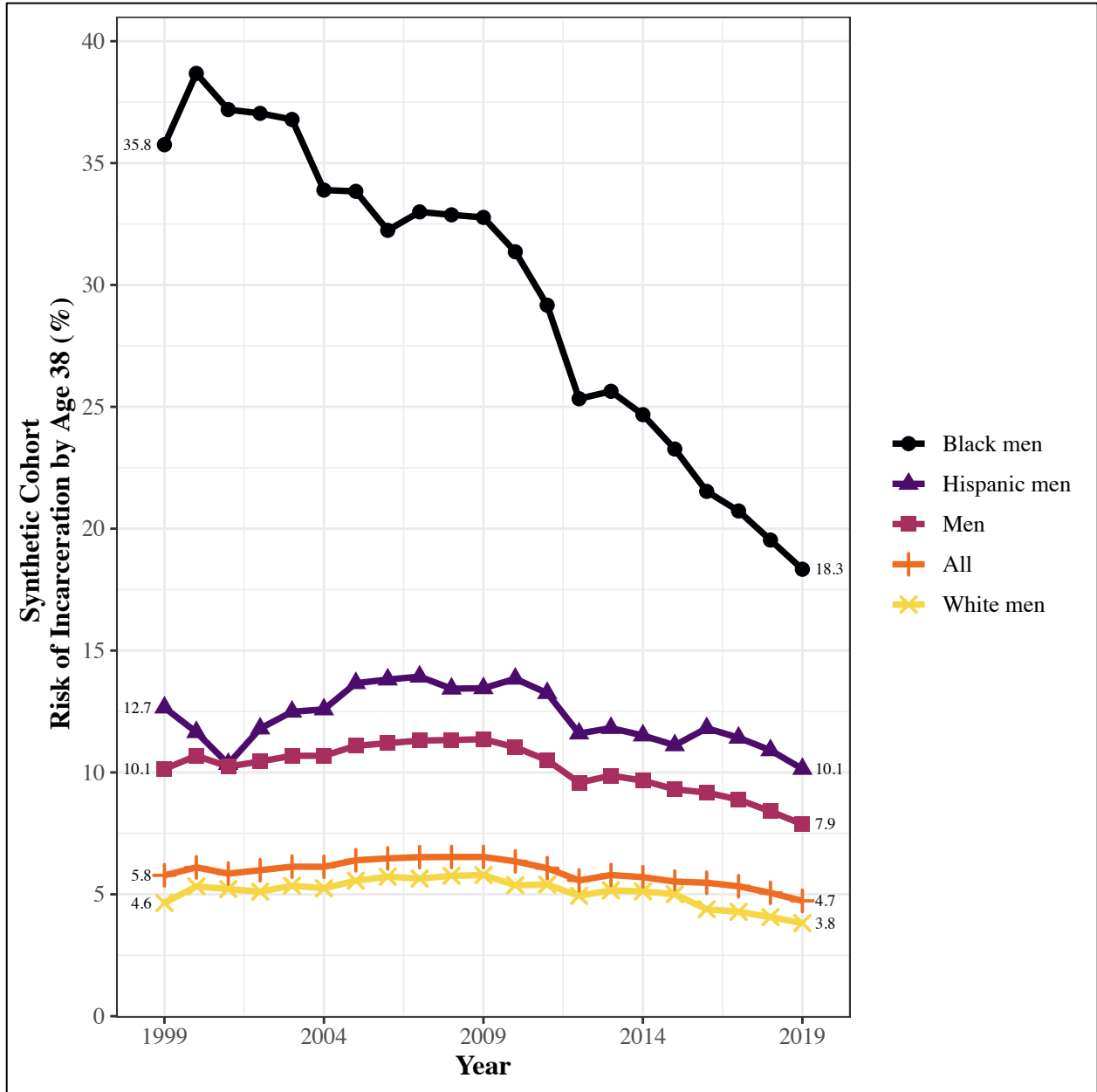
	45	6.8	6.7	6.6	6.5	6.4	6.4	6.3	6.2	6.1	5.9	5.8	5.6	5.4	5.2	5.0	4.9	4.8	4.8	4.7	4.7	4.7
	50	7.2	7.1	7.0	6.9	6.8	6.8	6.7	6.6	6.5	6.3	6.2	6.0	5.8	5.6	5.4	5.3	5.2	5.2	5.1	5.1	5.1
Hispanic Men	20	1.7	1.5	1.6	1.7	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.7	1.6	1.6	1.5	1.4	1.2	1.1	1.1
	25	5.9	5.9	6.0	6.2	6.3	6.4	6.2	6.0	5.9	5.9	5.9	5.9	5.8	5.6	5.3	5.1	4.9	4.7	4.5	4.4	4.4
	30	9.6	9.4	9.4	9.4	9.2	9.3	9.3	8.9	8.9	8.8	8.9	8.8	8.6	8.4	8.1	7.9	7.7	7.5	7.3	7.3	7.2
	35	11.8	11.6	11.5	11.6	11.3	11.3	11.3	10.9	10.9	10.8	10.9	10.7	10.6	10.3	10.1	9.9	9.6	9.5	9.3	9.2	9.2
	40	13.4	13.2	13.0	13.1	12.9	12.8	12.8	12.4	12.5	12.4	12.4	12.3	12.1	11.9	11.6	11.5	11.2	11.0	10.8	10.8	10.7
	45	14.6	14.4	14.2	14.3	14.0	14.0	14.0	13.6	13.7	13.6	13.6	13.5	13.3	13.1	12.8	12.7	12.4	12.2	12.0	12.0	11.9
	50	15.4	15.2	15.0	15.1	14.9	14.8	14.8	14.4	14.5	14.4	14.4	14.3	14.1	13.9	13.6	13.5	13.2	13.0	12.8	12.8	12.8

*Note:* Authors' calculations from multiple-decrement life tables for real and synthetic cohort risks of incarceration in state or federal prison. Boxes shaded in gray represent estimates that required projections based on synthetic cohorts. Unshaded boxes are real cohort estimates of incarceration risk by age. For cohorts that reached the age before the end of the observation period (*birth year + age* ≤ 2019), the estimates shown here are real cohort estimates. For all other cohorts, we assume the 2019 incarceration rates would hold until the individuals reach age *x*. Thus, these estimates combine the real cohort estimates through 2019 and the projected synthetic cohort estimates for all years beyond 2019. For example, to estimate the risk of incarceration by age 40 for the 1981 birth cohort, we begin with our real cohort estimate by age 38 in 2019 and assume the 2019 incarceration rates held for individuals age 39 and 40 in 2020 and 2021.



**Figure A1.** Incarceration Rates per 100,000 Adult Women, United States, 1999-2019

*Note:* Authors' calculations based on race-gender-specific counts of women in state and federal prisons and race-ethnicity-gender-specific estimates of the adult population.



**Figure A2.** Synthetic Cohort Risk of Incarceration by Age 38, United States, 1999-2019.

*Note:* Authors' calculations from multiple-decrement life tables for synthetic cohort risks of incarceration in state or federal prison.