

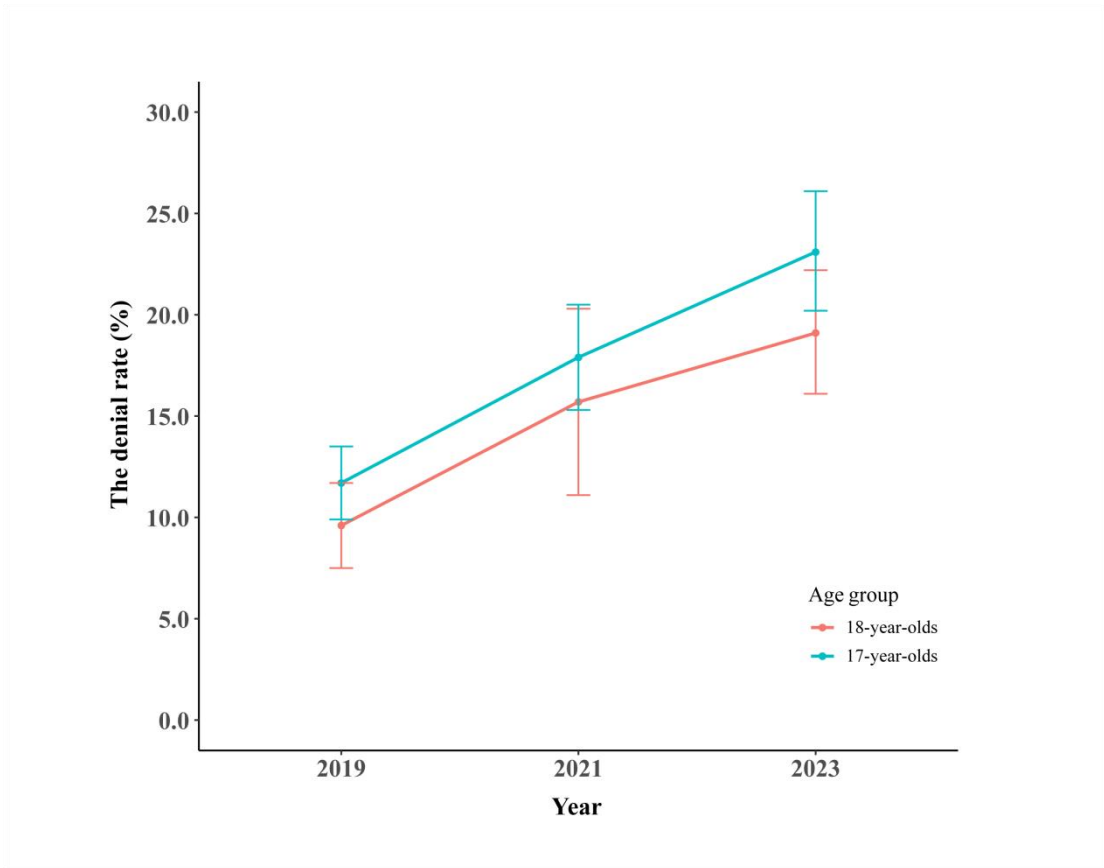
Supplementary Table S1. Characteristics of Chinese middle and high school students who were denied purchase of cigarettes due to age during 2019 and 2023

Characteristics	2019			2021			2023			2019–2023	2021–2023
	Sample size	Tobacco-buyers	Weighted % (95% CI)	Sample size	Tobacco-buyers	Weighted % (95% CI)	Sample size	Tobacco-buyers	Weighted % (95% CI)	Absolute change-% (95% CI)	Absolute change-% (95% CI)
Middle school											
Total	147,270	3,925	23.4 (21.1, 25.8)	136,296	2,796	26.4 (24.0, 28.8)	134,768	4,963	34.8 (32.0, 37.6)	11.4 (7.5, 15.2)	8.4 (4.7, 12.0)
Sex											
Boys	76,492	3,058	24.6 (22.2, 27.1)	71,341	2,105	27.3 (24.8, 29.8)	70,480	3,381	42.4 (40.7, 44.1)	13.6 (9.2, 18.1)	11.0 (6.7, 15.3)
Girls	70,778	867	18.7 (14.2, 23.2)	64,955	691	23.8 (19.2, 28.3)	64,288	1,582	30.0 (27.8, 32.3)	8.2 (2.7, 13.6)	3.1 (–2.3, 8.5)
Residence											
Urban	77,317	1,505	23.7 (20.6, 26.8)	75,149	1,066	31.7 (28.0, 35.3)	72,577	2,437	38.2 (36.2, 40.1)	12.5 (7.9, 17.1)	4.6 (–0.5, 9.6)
Rural	69,953	2,420	23.3 (20.4, 26.2)	61,147	1,730	24.0 (21.0, 26.9)	62,191	2,526	38.8 (36.9, 40.7)	10.4 (5.1, 15.8)	9.8 (4.8, 14.8)
Geographic region ¹											
Eastern	50,222	1,047	22.7 (19.3, 26.1)	49,775	860	23.5 (19.4, 27.5)	47,752	1,346	33.4 (30.8, 35.9)	10.2 (4.6, 15.9)	9.5 (3.9, 15.2)
Central	46,891	1,073	16.7 (14.0, 19.4)	36,595	589	23.3 (18.5, 28.0)	35,767	1,136	31.6 (28.9, 34.3)	11.9 (5.7, 18.0)	5.3 (–1.3, 11.9)
Western	50,157	1,805	27.8 (23.9, 31.8)	49,926	1,347	32.0 (29.2, 34.8)	51,249	2,481	44.4 (42.4, 46.3)	13.6 (8.1, 19.1)	9.4 (4.3, 14.6)
Pocket money											
≤ 10 RMB	33,350	96	21.0 (14.7–27.3)	28,505	106	36.4 (28.3–44.5)	14,752	204	40.4 (34.7–46.2)	19.5 (10.8, 28.2)	4.1 (–5.5, 13.6)
11–30 RMB	50,087	316	25.7 (21.9–29.6)	45,275	295	28.3 (24.2–32.4)	21,146	346	38.5 (33.8–43.2)	12.8 (6.7, 18.9)	10.2 (3.9, 16.5)
31–50 RMB	18,249	184	21.8 (18.0–25.6)	22,926	226	25.0 (20.3–29.6)	13,595	277	34.7 (28.5–40.8)	12.8 (5.6, 20.1)	9.7 (2.7, 16.7)
≥ 51 RMB	21,310	262	22.1 (18.8–25.5)	11,994	156	20.4 (15.5–25.4)	16,440	349	29.7 (24.2–35.2)	7.5 (0.9, 14.1)	9.2 (1.6, 16.8)
Cigarette use											
No	141,492	564	20.3 (15.9, 24.6)	131,216	359	22.6 (16.5, 28.7)	129,887	2,390	36.6 (34.7, 38.5)	15.6 (10.1, 21.0)	13.2 (6.3, 20.2)
Yes	4,959	3,165	23.7 (21.2, 26.2)	4,382	2,310	26.5 (23.9, 29.2)	4,019	2,357	39.6 (37.6, 41.6)	9.5 (4.1, 15.0)	6.7 (1.6, 11.7)
Smoking frequency											

0 day	141,492	564	20.3 (15.9, 24.6)	131,216	359	22.6 (16.5, 28.7)	129,887	2,390	36.6 (34.7, 38.5)	15.6 (10.1, 21.0)	13.2 (6.3, 20.2)
1–9 days	3,363	1,803	25.7 (22.0, 29.4)	3,079	1,379	29.3 (26.2, 32.5)	2,733	1,411	42.3 (39.7, 44.9)	10.3 (4.0, 16.6)	6.6 (1.1, 12.1)
10–19 days	597	494	18.7 (12.8, 24.5)	473	349	16.9 (11.1, 22.8)	491	380	35.8 (31.0, 40.6)	10.1 (0.9, 19.4)	11.9 (7.4, 16.3)
20–30 days	999	868	22.6 (19.1, 26.1)	830	582	25.8 (20.5, 31.1)	795	566	35.3 (31.4, 39.3)	6.7 (–0.27, 13.62)	3.5 (–4.0, 11.0)
Smoking intensity											
≤ 5 cigs	145,650	3,093	24.4 (21.6, 27.1)	134,491	2,176	26.2 (23.1, 29.2)	132,855	4,184	38.6 (37.1, 40.1)	11.4 (7.4, 15.3)	9.4 (5.6, 13.3)
6–10 cigs	378	339	17.6 (11.9, 23.3)	286	237	30.7 (21.9, 39.5)	339	284	34.9 (29.3, 40.4)	13.0 (4.6, 21.4)	–0.10 (–14.5, 14.3)
11–20 cigs	140	130	25.5 (15.3, 35.7)	128	95	15.5 (5.8, 25.2)	135	117	34.2 (25.6, 42.8)	3.3 (–10.5, 17.1)	13.3 (7.7, 19.0)
>20 cigs	188	159	23.6 (15.9, 31.3)	162	111	33.6 (18.0, 49.2)	147	100	28.0 (19.2, 36.8)	3.1 (–0.4, 6.6)	–6.9 (–18.7, 5.0)
Purchasing patterns											
No	136,247	0	–	126,249	0	–	127,392	0		0	0
Pack	3,002	2,987	20.7 (18.6, 22.8)	2,109	2,108	24.8 (22.2, 27.3)	2,280	2,170	38.7 (36.7, 40.8)	12.0 (7.0, 17.0)	7.9 (2.9, 13.0)
Individual sticks	565	561	36.2 (30.2, 42.2)	353	353	39.4 (29.3, 49.5)	291	269	55.8 (49.8, 61.7)	13.2 (2.3, 24.2)	10.0 (–2.4, 22.4)
Carton	284	279	19.1 (13.2, 24.9)	265	265	25.3 (17.6, 33.0)	262	223	35.0 (28.7, 41.2)	7.8 (–2.57, 18.2)	1.6 (–2.6, 5.7)
High school											
Total	140,922	8,865	11.6 (10.5, 12.7)	132,954	6,481	19.7 (16.9, 22.4)	126,686	8,119	27.2 (26.2, 28.1)	13.6 (11.3, 16.0)	5.6 (2.1, 9.0)
Sex											
Boys	68,753	7,688	11.7 (10.5, 12.9)	66,666	5,625	20.2 (17.2, 23.1)	66,379	6,506	27.7 (26.6, 28.8)	13.3 (10.7, 15.9)	4.9 (1.1, 8.7)
Girls	72,169	1,177	10.6 (8.1, 13.1)	66,288	856	15.9 (12.3, 19.4)	60,307	1,613	25.0 (22.9, 27.1)	15.3 (10.9, 19.7)	10.0 (5.1, 14.9)
Residence											
Urban	75,737	4,394	12.3 (10.5, 14.1)	73,898	3,053	18.8 (17.0, 20.7)	68,703	4,196	26.9 (25.6, 28.2)	13.7 (10.8, 16.7)	7.2 (4.3, 10.1)
Rural	65,185	4,471	11.2 (9.8, 12.5)	59,056	3,428	20.4 (15.6, 25.1)	57,983	3,923	27.4 (26.0, 28.8)	13.3 (9.6, 17.0)	4.1 (–1.9, 10.0)
Geographic region*											
Eastern	48,012	2,295	12.4 (10.0, 14.8)	48,367	1,847	18.0 (15.3, 20.7)	45,764	2,131	23.9 (22.1, 25.7)	10.4 (6.6, 14.2)	4.8 (0.7, 8.9)
Central	46,483	2,769	10.6 (8.1, 13.1)	36,253	1,635	16.0 (13.4, 18.5)	34,198	1,902	25.1 (23.2, 27.1)	12.9 (8.3, 17.5)	7.5 (3.4, 11.7)
Western	46,427	3,801	11.8 (10.6, 13.0)	48,334	2,999	23.5 (17.7, 29.3)	46,724	4,086	29.8 (28.4, 31.2)	16.5 (12.9, 20.2)	4.9 (–2.1, 11.8)

Pocket money											
≤ 10 RMB	7,591	59	21.0 (13.6–28.4)	6,772	45	22.8 (13.5–32.1)	2,126	27	23.2 (12.5–33.9)	2.3 (–7.2, 11.7)	0.4 (–6.4, 7.3)
11–30 RMB	29,841	217	14.2 (11.8–16.6)	28,847	252	24.7 (20.3–29.1)	7,599	110	19.5 (14.6–24.5)	5.4 (–0.2, 10.9)	–5.1 (–12.0, 1.7)
31–50 RMB	24,724	189	11.1 (8.9–13.3)	39,407	384	20.9 (16.7–25.1)	12,101	189	26.4 (21.0–31.8)	15.3 (9.5, 21.0)	5.5 (–1.5, 12.4)
≥ 51 RMB	64,437	547	10.5 (8.9–12.1)	39,552	453	17.2 (14.3–20.1)	44,771	1,016	23.4 (20.7–26.1)	12.9 (9.8, 16.0)	6.2 (2.2, 10.2)
Cigarette use											
No	129,706	698	15.1 (8.3, 22.0)	123,571	460	19.4 (14.1, 24.7)	118,013	2,040	29.3 (27.3, 31.3)	13.6 (6.0, 21.2)	9.3 (2.8, 15.9)
Yes	10,298	7,859	11.3 (10.2, 12.4)	8,552	5,778	19.5 (16.7, 22.3)	7,714	5,667	26.0 (24.9, 27.2)	12.2 (9.7, 14.8)	4.0 (0.3, 7.7)
Smoking frequency											
0 day	129,706	698	15.1 (8.3, 22.0)	123,571	460	19.4 (14.1, 24.7)	118,013	2,040	29.3 (27.3, 31.3)	13.6 (6.0, 21.2)	9.3 (2.8, 15.9)
1–9 days	4,978	3,001	12.9 (11.2, 14.7)	4,410	2,321	22.0 (17.9, 26.2)	3,701	2,266	30.9 (29.0, 32.8)	15.6 (11.6, 19.5)	6.5 (0.9, 12.0)
10–19 days	1,588	1,415	12.5 (9.8, 15.2)	1,190	974	21.3 (17.7, 24.9)	1,100	925	27.2 (24.4, 30.1)	10.6 (5.5, 15.7)	1.8 (–3.6, 7.2)
20–30 days	3,732	3,443	9.4 (7.9, 10.9)	2,952	2,483	16.2 (13.1, 19.4)	2,913	2,476	21.0 (19.4, 22.6)	9.4 (6.6, 12.2)	2.5 (–1.6, 6.6)
Smoking intensity											
≤ 5 cigs	137,805	6,533	11.8 (10.5, 13.0)	129,822	4,608	18.9 (15.9, 21.8)	123,370	5,941	28.7 (27.5, 29.8)	15.1 (12.5, 17.7)	8.3 (4.7, 11.8)
6–10 cigs	1,265	1,188	11.4 (8.5, 14.2)	985	883	20.0 (15.0, 25.1)	1,108	1,016	21.4 (18.8, 23.9)	5.7 (1.0, 10.3)	–3.0 (–9.3, 3.3)
11–20 cigs	537	494	9.0 (5.2, 12.7)	494	444	21.8 (13.6, 30.0)	523	472	19.1 (15.5, 22.6)	8.3 (1.5, 15.1)	–4.6 (–14.7, 5.5)
> 20 cigs	392	334	5.6 (2.6, 8.5)	314	237	15.7 (9.2, 22.2)	269	207	21.7 (16.1, 27.4)	15.2 (6.4, 24.1)	5.1 (–6.4, 16.5)
Purchasing patterns											
No	125,417	0	–	118,991	0	–	116,103	0		0	0
Pack	7,615	7,567	10.5 (9.3, 11.7)	5,382	5,380	18.3 (16.3, 20.2)	5,435	5,361	26.4 (25.2, 27.6)	13.7 (11.2, 16.3)	6.0 (3.0, 8.9)
Individual sticks	587	582	21.7 (16.8, 26.6)	384	382	40.0 (26.4, 53.6)	317	293	41.0 (35.3, 46.6)	16.9 (12.3, 21.6)	–1.4 (–6.2, 3.5)
Carton	593	588	15.6 (10.6, 20.5)	611	611	17.5 (12.1, 22.9)	599	557	22.6 (19.1, 26.1)	4.5 (–3.0, 12.0)	2.6 (–5.4, 10.6)

Note. *CI* = confidence interval; RMB = renminbi. Eastern region: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan; Central region: Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan; Western region: Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Inner Mongolia, Guangxi.



Supplementary Figure S1. Trends in the denial rate by group, 2019–2023.

Supplementary Table S2. Logistic DID regression analyses of the effect of revised tobacco policies on cigarette purchase denial among 16 to 17-year-olds and 18 to 19-year-olds

Variable	Model 1			Model 2		
	Estimate	Odds ratio (95% CI)	P-value	Estimate	Odds ratio (95% CI)	P-value
Age (16–17 vs. 18–19)	0.37	1.45 (1.17, 1.79)	< 0.05*	0.37	1.49 (1.18, 1.88)	< 0.05*
Policy implementation (2023 vs. 2019–2021)	0.69	2.00 (1.37, 2.91)	< 0.05*	0.69	1.96 (1.32, 2.90)	< 0.05*
Interaction	–0.05	0.95 (0.65, 1.39)	0.78	–0.05	0.95 (0.63, 1.43)	0.81
Residence (ref = Rural)			0.13			0.22
Urban	–0.07	0.88 (0.74, 1.04)		–0.07	0.90 (0.75, 1.07)	
SES (ref = Eastern)			0.01*			0.03*
Central	–0.09	0.91 (0.72, 1.15)		–0.09	0.93 (0.73, 1.19)	
Western	0.21	1.23 (1.00, 1.51)		0.21	1.23 (1.00, 1.53)	
School type (ref = Middle school)			0.25			0.24
High school	–0.08	0.85 (0.64, 1.12)		–0.08	0.84 (0.63, 1.12)	
Gender (ref = Female)			0.01*			0.02*
Male	–0.14	0.76 (0.61, 0.93)		–0.14	0.76 (0.60, 0.95)	
Pocket money per week (ref = ≤ 10 RMB)			0.04*			0.02*
11–30 RMB	–0.01	0.99 (0.72, 1.36)		–0.01	0.95 (0.68, 1.33)	
31–50 RMB	–0.04	0.96 (0.73, 1.28)		–0.04	0.97 (0.72, 1.32)	
≥ 51 RMB	–0.24	0.79 (0.59, 1.06)		–0.24	0.78 (0.58, 1.04)	
Smoking frequency (ref = 1–9 days)			< 0.05*			< 0.05*
0 days	0.11	1.12 (0.80, 1.57)		–	–	–
10–19 days	–0.12	0.88 (0.73, 1.07)		0.11	0.88 (0.73, 1.07)	
20–30 days	–0.38	0.68 (0.58, 0.81)		–0.12	0.68 (0.58, 0.81)	
Smoking intensity (ref = ≤ 5 cigs)			0.06			0.06
6–10 cigs	–0.07	0.93 (0.75, 1.17)		–0.38	0.93 (0.75, 1.17)	
11–20 cigs	0.07	1.07 (0.77, 1.49)		–0.07	1.07 (0.77, 1.49)	
> 20 cigs	–0.61	0.54 (0.34, 0.85)		0.07	0.54 (0.34, 0.85)	
Purchasing patterns (ref = Individual sticks)			< 0.05*			< 0.05*
Pack	–0.70	0.50 (0.39, 0.64)		–0.61	0.50 (0.39, 0.65)	
Carton	–0.31	0.73 (0.53, 1.02)		–0.70	0.74 (0.52, 1.05)	

Note. CI = confidence interval; RMB= renminbi. * $P < 0.05$. Model 1 focuses on students who have purchased cigarettes in the past 30 days. Model 2 targeted current smokers who had purchased cigarettes.