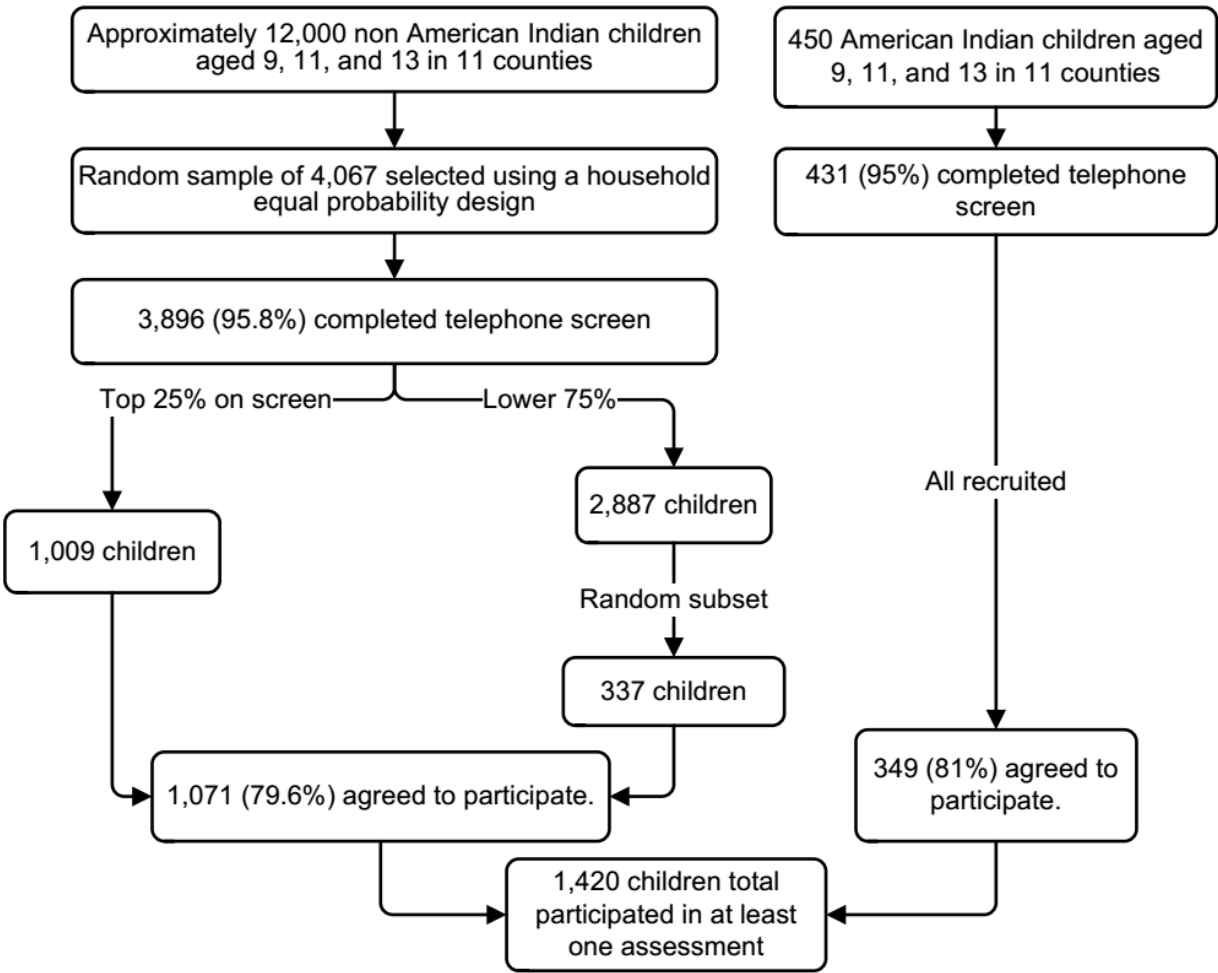


SUPPLEMENTAL MATERIALS

Figure S1. Ascertainment of the original Great Smoky Mountains study sample



1 Table S1. Observation-level descriptive statistics for study variables(N=6,674)

	N	%
Total	6,674	100%
Firearm access/ownership		
Yes	2,510	37.6%
No	4,155	62.3%
Missing	9	0.1%
Sex		
Male	3,669	55.0%
Female	3,005	45.0%
Age		
9yr-12yr	2,691	40.3%
13yr-16yr	3,983	59.7%
Cohort		
Youngest (age 9 yr)	2,996	44.9%
Middle (age 11 yr)	2,328	34.9%
Late (age 13 yr)	1,350	20.2%
Race		
American Indian	1,961	25.3%
Black	386	5.8%
White	4,597	68.9%
SES status		
Low SES	1,527	22.9%
Not low SES	4,960	74.3%
Missing	187	2.8%
Residence		
Urban	2,606	39.0%
Rural	3,825	57.3%
Missing	243	3.6%
	Mean	SD
Environment vulnerability (range 0-9)	2.1	1.7
Family dysfunction (range 0-6)	0.6	0.8
Parent problems^a (range 0-6)	0.8	1.0
Conduct disorder^b (range 0-15)	0.3	0.7
Aggression (range 0-9)	0.1	0.4
Deceitfulness/theft (range 0-3)	0.1	0.3
Violation of rules (range 0-3)	0.03	0.2
Oppositional defiant disorder^c (range 0-8)	0.7	1.2
Total anxiety (range 0-22)	0.6	1.4

Depression symptoms (range 0-10)	0.5	0.9
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Note: 6674 observations were collected on 1420 unique individuals measured at age 9-16.

a. The variable of parent problems has 4 missing observations.

b. Conduct disorder has 175 (2.6%) missing entries.

c. Oppositional disorder has 178 (2.7%) missing entries.

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1 Table S2. Percentages (survey-weighted) and counts of observations have gun access at time t+1 by the status of symptom score
2 changes from time t to t+1 and by gun access status at time t.
3

	% and n of decrease in score	% and n of no change in score	% and n of increase in score	% change increase vs. no change	% change increase vs. decrease
Among those with access to unlocked gun/own gun at time baseline (time t)					
Conduct disorder	81.1% (173/230)	62.6% (808/1,242)	71.6% (127/183)	9.0	-9.5
Aggression	77.6% (103/147)	64.2% (928/1,396)	68.9% (77/112)	4.7	-8.7
Deceitfulness/theft	77.1% (89/117)	65.2% (961/1,444)	60.0% (58/94)	-5.2	-17.1
Violation of rules	66.2% (24/35)	65.1% (1,060/1,586)	78.9%(24/34)	13.8	12.7
Depression symptoms	67.1% (266/396)	66.6% (619/907)	58.7% (223/352)	-7.9	-8.4
Total anxiety	66.7% (230/334)	64.6% (704/1,066)	66.6% (174/255)	2.0	-0.1
Oppositional defiant disorder	73.5% (288/408)	66.0% (578/869)	55.7%(212/326)	-10.3	-17.8
Among those without access to unlocked firearm/not an owner at baseline (time t)					
Conduct disorder	20.7% (109/439)	22.2% (567/2,369)	17.3% (45/239)	-4.9	-3.4
Aggression	19.1% (63/266)	22.1% (631/2,641)	16.1% (27/140)	-6.0	-3.0
Deceitfulness/theft	23.9% (54/213)	21.8% (643/2,704)	17.7% (24/130)	-4.1	-6.2
Violation of rules	14.3% (18/76)	22.0% (696/2,924)	8.4%(7/47)	-13.6	-5.9
Depression symptoms	21.9% (176/719)	22.0% (405/1,680)	21.0% (140/648)	-1.0	-0.9
Total anxiety	21.0% (165/690)	22.3% (464/1,887)	20.0% (92/470)	-2.3	-1.0
Oppositional defiant disorder	26.8% (192/753)	20.9% (426/1,758)	17.9%(75/442)	-3.0	-8.9

1 Table S3. Mixed-effects logistic regression models on changes in symptoms from time t to t+1 predicting access to unlocked gun at
2 time t+1 among children with gun access at time t by sex adjusting for demographics and familial attributes (n=1,657).

	Male					Female				P value for sex difference
Predictors	OR	CI	CI	P value		OR	CI	CI	P value	
Conduct disorder	0.56	0.36	0.86	0.009		1.71	0.75	3.87	0.20	0.006
Aggression	0.75	0.39	1.43	0.38		2.21	0.51	9.55	0.29	0.09
Deceitfulness/theft	0.26	0.11	0.61	0.002		2.47	0.59	10.33	0.22	0.03
Violation of rules	0.48	0.14	1.63	0.24		0.001	0.00	200.88	0.39	0.28
Oppositional defiant disorder	0.41	0.31	0.54	<0.001		0.44	0.25	0.80	0.007	0.21
Total anxiety	0.85	0.68	1.07	0.17		1.08	0.78	1.49	0.65	0.10
Depression symptoms	0.86	0.65	1.14	0.29		0.56	0.35	0.91	0.02	0.26

3 Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models
4 included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets. Statistically
5 significant results (p<0.05) were stressed.
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Table S4. Mixed-effects logistic regression models on changes in symptoms from time t to t+1 predicting access to unlocked gun at time t+1 among children with firearm access at time t by race adjusting for demographics and familial attributes (N=1,627).

	White					American Indian				P value for racial difference
Predictors	OR	CI	CI	P value		OR	CI	CI	P value	
Conduct disorder	0.72	0.51	1.03	0.07		0.94	0.39	2.27	0.89	0.54
Aggression	0.97	0.57	1.65	0.91		1.28	0.36	4.57	0.71	0.16
Deceitfulness/theft	0.47	0.23	0.95	0.03		0.48	0.07	3.54	0.47	0.27
Violation of rules	0.31	0.09	1.06	0.06		0.85	0.09	8.09	0.89	0.92
Oppositional defiant disorder	0.44	0.35	0.54	<0.001		0.86	0.48	1.54	0.62	0.91
Total anxiety	0.97	0.82	1.15	0.72		0.90	0.61	1.31	0.57	0.54
Depression symptoms	0.73	0.58	0.92	0.007		1.07	0.58	1.99	0.83	0.98

Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets. Statistically significant results ($p < 0.05$) were stressed.

Table S5. Mixed-effects logistic regression models on changes in symptoms from time t to t+1 predicting access to unlocked gun at time t+1 among children with no firearm access at time t by age adjusting for demographics and familial attributes (n=3,054).

	Age 9-12					Age 13-16				P value for age difference
Predictors	OR	CI	CI	P value		OR	CI	CI	P value	
Conduct disorder	1.26	0.72	2.19	0.41		0.83	0.47	1.46	0.52	0.34
Aggression	2.01	0.96	4.17	0.06		1.32	0.56	3.11	0.53	0.59
Deceitfulness/theft	2.51	0.62	10.16	0.20		0.33	0.13	0.83	0.02	0.14
Violation of rules	0.35	0.11	1.11	0.08		9.63	0.25	375.42	0.23	0.09
Oppositional defiant disorder	1.04	0.82	1.33	0.74		0.60	0.44	0.80	<0.001	0.001
Total anxiety	1.30	1.06	1.59	0.01		0.86	0.64	1.17	0.35	0.001
Depression symptoms	1.08	0.81	1.43	0.60		1.04	0.80	1.36	0.75	0.67

Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets. Statistically significant results (p<0.05) were stressed.

Table S6. Mixed-effects logistic regression models on changes in symptoms from time t to t+1 predicting access to unlocked gun at time t+1 among children with no firearm access at time t by sex adjusting for demographics and familial attributes (n=3,054).

	Male					Female				P value for sex difference
Predictors	OR	CI	CI	P value		OR	CI	CI	P value	
Conduct disorder	1.11	0.65	1.90	0.70		0.87	0.48	1.56	0.63	0.44
Aggression	2.14	1.06	4.32	0.04		0.94	0.41	2.18	0.89	0.09
Deceitfulness/theft	0.62	0.27	1.42	0.26		1.90	0.47	7.63	0.37	0.09
Violation of rules	0.66	0.22	1.98	0.46		0.40	0.06	2.64	0.35	0.50
Oppositional defiant disorder	0.99	0.79	1.24	0.94		0.79	0.60	1.04	0.10	0.05
Total anxiety	1.72	1.33	2.23	<0.001		0.92	0.74	1.15	0.49	<0.001
Depression symptoms	1.17	0.96	1.43	0.13		1.01	0.77	1.32	0.92	0.50

Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets. Statistically significant results (p<0.05) were stressed.

1 Table S7. Mixed-effects logistic regression models on changes in symptoms from time t to t+1 predicting access to unlocked gun at
2 time t+1 among children with no firearm access at time t by race adjusting for demographics and familial attributes (n=2,815).

	White					American Indian				P value for racial difference
Predictors	OR	CI	CI	P value		OR	CI	CI	P value	
Conduct disorder	1.02	0.69	1.51	0.91		0.76	0.40	1.43	0.39	0.85
Aggression	1.27	0.76	2.10	0.36		0.83	0.37	1.86	0.64	0.63
Deceitfulness/theft	0.85	0.43	1.68	0.64		0.55	0.12	2.50	0.44	0.35
Violation of rules	0.59	0.22	1.56	0.28		0.51	0.06	4.47	0.55	0.99
Oppositional defiant disorder	0.88	0.75	1.04	0.14		0.92	0.60	1.40	0.69	0.89
Total anxiety	1.08	0.95	1.24	0.25		0.97	0.70	1.34	0.87	0.42
Depression symptoms	1.07	0.90	1.26	0.46		0.94	0.58	1.54	0.82	0.68

3 Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models
4 included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets.
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1 Table S8. Mixed-effects multinomial logistic regression models of change in symptom scores predicting access to unlocked gun at
2 time t+1 among children with no gun at home at time t (n=2,291).

	Locked up vs. Non-owner					Access vs. Non-owner					Access vs. Locked up			
Predictors	OR	CI	CI	P value		OR	CI	CI	P value		OR	CI	CI	P value
Conduct disorder	0.84	0.64	1.11	0.22		0.80	0.62	1.02	0.08		0.95	0.69	1.30	0.75
Aggression	0.85	0.58	1.24	0.39		0.87	0.61	1.24	0.43		1.03	0.66	1.60	0.90
Deceitfulness/theft	0.96	0.60	1.54	0.87		0.89	0.57	1.39	0.61		0.94	0.54	1.65	0.84
Violation of rules	0.61	0.29	1.29	0.19		0.46	0.23	0.93	0.03		0.67	0.27	1.64	0.38
Oppositional defiant disorder	0.97	0.85	1.11	0.65		0.89	0.78	1.02	0.10		0.91	0.77	1.08	0.27
Total anxiety	0.91	0.82	1.02	0.11		0.96	0.86	1.07	0.44		1.04	0.91	1.18	0.60
Depression symptoms	0.86	0.73	1.01	0.07		0.85	0.73	1.00	0.04		0.96	0.79	1.17	0.71

3 Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models
4 included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets. Statistically
5 significant results (p<0.05) were stressed.
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Table S9. Mixed-effects multinomial logistic regression models of change in symptom scores predicting access to unlocked gun at time t+1 among children with gun at home but no access/locked at time t (n=763).

	Lock up vs. Non-owner					Access vs. Non-owner					Access vs. Locked up			
Predictors	OR	CI	CI	P value		OR	CI	CI	P value		OR	CI	CI	P value
Conduct disorder	1.04	0.67	1.61	0.86		1.00	0.64	1.55	1.00		0.98	0.69	1.39	0.89
Aggression	1.09	0.63	1.88	0.77		1.09	0.62	1.91	0.78		1.06	0.67	1.67	0.81
Deceitfulness/theft	0.79	0.35	1.75	0.56		0.65	0.27	1.55	0.33		0.79	0.42	1.52	0.48
Violation of rules	1.61	0.40	6.48	0.50		2.51	0.57	11.06	0.22		1.54	0.49	4.81	0.46
Oppositional defiant disorder	0.98	0.79	1.22	0.89		0.98	0.78	1.23	0.89		0.97	0.82	1.14	0.68
Total anxiety	1.12	0.94	1.34	0.19		1.22	1.02	1.45	0.03		1.06	0.93	1.22	0.36
Depression symptoms	0.89	0.70	1.13	0.33		1.10	0.87	1.40	0.42		1.21	1.01	1.45	0.04

Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets. Statistically significant results (p<0.05) were stressed.

Table S10. Mixed-effects multinomial logistic regression models of change in symptom scores predicting access to unlocked gun at time t+1 among children with gun access at time t (n=1,657).

	Locked up vs. Non-owner					Access vs. Non-owner					Access vs. Locked up			
Predictors	OR	CI	CI	P value		OR	CI	CI	P value		OR	CI	CI	P value
Conduct disorder	1.04	0.76	1.42	0.81		0.89	0.7	1.13	0.35		0.85	0.66	1.09	0.19
Aggression	1.16	0.71	1.90	0.55		1.00	0.68	1.46	0.99		0.85	0.58	1.24	0.40
Deceitfulness/theft	0.78	0.42	1.45	0.44		0.66	0.42	1.05	0.08		0.82	0.51	1.33	0.42
Violation of rules	1.48	0.53	4.12	0.45		1.02	0.43	2.43	0.97		0.71	0.32	1.54	0.38
Oppositional defiant disorder	0.89	0.74	1.07	0.23		0.71	0.62	0.83	<0.001		0.8	0.69	0.93	0.003
Total anxiety	0.96	0.83	1.12	0.64		0.95	0.85	1.07	0.42		0.99	0.88	1.12	0.93
Depression symptoms	1.09	0.87	1.36	0.45		0.94	0.79	1.11	0.47		0.86	0.72	1.03	0.10

Note: All models adjusted for age cohort, sex, race, urbanicity, SES status, environment vulnerability, family dysfunction and parent problems. All models included individual-level random effects and were survey weighted. All results are pooled using Rubin's formula based on 10 imputed datasets. Statistically significant results (p<0.05) were stressed.

Supplement 1

Low socioeconomic status is determined by meeting at least two of the following: poverty (household poverty status according to federal guidelines), low educational attainment (parents did not graduate from high school), and low occupational prestige (parental occupational status in the bottom 25% on NORC General Social Survey occupational prestige scale, e.g., clerk, grocery bagger).¹

Environmental vulnerability is determined based on the following: single-parent households, unemployment of parents, impoverished environment, family poverty by family size, one or both parents teenagers at child subject's birth, 4 or more siblings in the home, living with a stepparent, living with an adoptive parent, experience in foster home, moved 4 or more times in past 5 years, living in a dangerous neighborhood, and attending a dangerous school.

Family dysfunction is determined based on the following: low parental supervision, high levels of parental conflict, maternal depression, perceived as sickly by self or parent, harsh discipline by parents, overprotective parents, and treating the child as a scapegoat.

Parent problems are determined based on serious mental illnesses (treated for mental health problems or scored 9+ in Mood or Feelings Questionnaire), substance use (any biological or resident parent treated for drug or alcohol problems), or criminality (biological or resident parent convicted of crime).

References:

1. Nakao K, Treas J. *The 1989 Socioeconomic Index of Occupations: Construction from the 1989 Occupational Prestige Scores*. National Opinion Research Center Chicago, IL; 1992.