

Materials and Methods:

The Dealer Record of Sales Database

Firearm acquisitions in California are regulated under California Penal Code §§26500, 27545. Virtually all licit acquisitions, including transfers between private parties, online sales, and acquisitions at gun shows must be transacted through licensed dealers and end up in the Dealer Record of Sales (“DROS”) database. The only licit firearm acquisitions not systematically recorded by DROS are bequests among immediate family members and long gun acquisitions prior to 2014.

We accessed records of firearm acquisitions from January 1, 1996–September 30, 2021 through an extract of the DROS database. These records include information at the acquisition, person, and weapon level. **Fig. S3** reproduces the form on which licensed firearm dealers gather the information that eventually constitutes the DROS database.

Long gun (rifle and shotgun) acquisitions were not routinely archived until January 1, 2014. From January 1, 2014, a change in the California Penal Code (§§11106, 26905) mandated the reporting of long gun acquisitions and details of those acquisitions were incorporated into DROS. The incomplete information on long gun acquisitions prior to 2014 motivated our decision to focus all ownership-related analyses (including the designation of first-time acquisitions) on handguns.

Each record in DROS has a unique, time-constant person identifier. We corrected obvious errors in this identifier (e.g., individuals with the same identifier but different names or dates of birth), following procedures used in previous analyses of DROS records (8, 9, 19–21, 23, 24). These corrections required the use of data in the Automated Firearm System (“AFS”) from the California Department of Justice. Our corrections affected fewer than 1 percent of records.

U.S. Census

We measured the demographic distribution of adults living in California using the 2020 all-count census. We downloaded these data directly from the U.S. Census Bureau County Population by Characteristics: 2010–2020.

National Instant Criminal Background Check System

For the national purchasing data shown in Fig. S1, we measured firearm acquisitions across the U.S. using the Federal Bureau of Investigation’s (“FBI”) National Instant Criminal Background Check System (“NICS”). These data are commonly used as proxy for firearm acquisitions in the U.S. at the state-month or more aggregated levels (1–3, 9, 12, 17). **Fig S4.** shows that patterns of California handgun acquisitions in DROS closely align with NICS data from California and the U.S.

Variable Definitions and Construction

Total Firearm Acquisitions

We measured firearm acquisitions using the count of records appearing in DROS. To count as an acquisition in our study, we required a record to have the following characteristics:

1. The acquisition must be coded in DROS as a transfer (i) of a firearm between a licensed dealer and a private party, (ii) of a firearm between two private parties, or (iii) of a curio. We did not count as acquisitions records marked as (i) loans, (ii) pawn redemptions, (iii) non-roster peace officers, (iv) out-of-state registrations, or (v) unique serial number applications.
2. Have valid identifiers for both the acquiring individual and the weapon being acquired. We used this restriction to filter out false or premature entries into the DROS system, following extensive consultation with system administrators at the California Department of Justice.

Handgun and Long Gun Acquisitions

We partitioned firearm acquisitions in DROS into handguns and long guns according to information stored in the weapon-level database. To qualify as a handgun, the firearm must have been coded as a (i) handgun, (ii) semi-automatic pistol, (iii) derringer, or (iv) other handgun. To qualify as a long gun, the firearm must have been coded as a (i) long gun, (ii) rifle, (iii) shotgun, (iv) rifle/shotgun combo, or (v) bolt action. We treated acquisitions without one of the above codes as having an invalid weapon identifier.

First-Time and Repeat Handgun Acquisition

We measured whether an individual in California acquired a handgun for the first time using historical records of handgun acquisitions appearing in DROS. We defined a handgun acquisition as first-time if (i) it was a valid handgun transfer and (ii) we observed no prior handgun acquisitions attached to the acquiring person key in DROS. All acquisitions not classified as first-time were classified as repeat.

Acquirer Demographics

We measured the demographics of firearm acquirers using information recorded on the DROS form, as shown in Fig. S3. We measured gender as stated on the form. To measure age, we used the unrounded number of years between the date of firearm acquisition and the acquirer's birth date. As the race groups coded in DROS do not perfectly correspond to measures of race and ethnicity in the U.S. census or other contemporary measures, we employed the following coding scheme for acquirer's race and ethnicity:

1. White: White
2. Black: Black
3. Hispanic: Hispanic
4. Asian: Chinese, Cambodian, Korean, Japanese, Laotian, Vietnamese, Asian Indian, or Other Asian
5. Other: American Indian, Filipino, Guamanian, Pacific Islander, Samoan, Hawaiian, Other, Unknown

Pandemic Dates

We denoted a transaction as occurring in the pandemic era if it occurred on or after March 1, 2020. This closely corresponds to the March 2 date on which the Governor of California declared a state of emergency due to the COVID-19 pandemic.

NICS Data

We measured firearm acquisitions in the U.S. using the count of background checks recorded by NICS. We applied a standard methodology (25) to aggregate different types of background checks into a single, unified value. When analyzing handgun and long gun acquisitions separately in NICS data, we used a modification of our aggregation by weapon type:

$$\text{Weapon-Type Acquisitions} = 1.1 * (\text{Weapon-Type NICS}) + \text{Multi-Gun NICS}.$$

We applied the same schemes when analyzing NICS data from California in Fig. S4.

Analytic Methods

Aggregating DROS Records over Time

California state law requires a 10-day (240 hour) waiting period between the purchase/transfer agreement and the physical acquisition of a firearm (19). During this period, the licensed firearm dealer who completes the DROS worksheet stores the firearm. We measured firearm acquisitions using the (earlier) date on which the transfer agreement was effected, not the (later) date on which the acquirer took physical ownership of the firearm.

We aggregated counts of firearm acquisitions in California from DROS to the year-month level. We associated each DROS record with the calendar month and year in which it occurred and counted the number of such occurrences within each period, sometimes disaggregated by characteristics including race and/or ethnicity, gender, and age.

Figure 1 displays monthly trends in firearm acquisitions for handguns and long guns across all individuals in California from January 1, 2017–September 30, 2021

Figure 2 displays monthly trends in handgun acquisitions by first-time and repeat handgun acquirers in California from January 1, 2017–September 30, 2021.

Figure 3 presents monthly trends in first-time handgun acquirers by gender and race or ethnicity in California from January 1, 2017–September 30, 2021. Monthly levels were constructed for each group, as summarized in Table S1. The values in Figure 3 represent these levels as the percent change from the pre-pandemic monthly mean. To compute this value, we began by calculating the monthly mean level of first-time handgun acquisitions for each group between January 1, 2017–February 29, 2020. We then calculated the percent change for each group at each monthly data point by subtracting one from the ratio between the observed level of first-time handgun acquisitions in a month to the associated group's pre-pandemic mean.

Figure 4 uses a different aggregation of these monthly counts to depict how changes in first-time handgun acquisitions averaged over the pandemic period correspond to changes in per capita handgun ownership, by gender and race and/or ethnic group. The vertical axis presents the number of first-time handgun acquisitions in the average month of the pandemic period relative to the average month in the pre-pandemic period, minus one (i.e., the relative increase in first-time handgun purchasing). The horizontal axis presents our measure of

handgun ownership per capita by gender and race and/or ethnic group as computed on February 29, 2020 (i.e., the last day of the pre-pandemic period) and September 30, 2021 (the end of the pandemic study period).

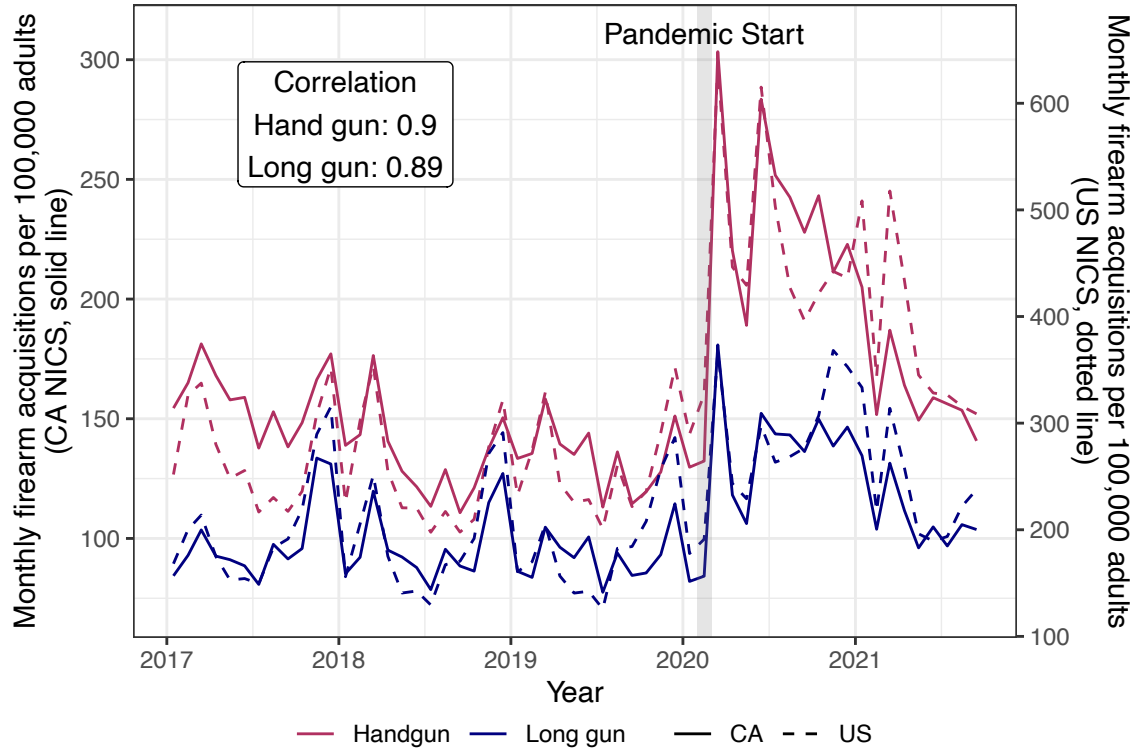


Figure. S1. Time Trends in Handgun and Long Gun Acquisitions per capita in California and the U.S. Monthly trends in firearm acquisitions per 100,000 adults from January 1, 2017–September 30, 2021. Solid lines and left axis are acquisitions in California; dotted lines and right axis are acquisitions in the U.S. Axes are scaled so series align at their maximal values. Both measures are based on adjusted NICS records. NICS adjustment by gun type uses 1.1 times the number of associated NICS checks plus the number of multi-gun checks (25). Red series are handguns and blue series are long guns. Correlation is the Pearson correlation coefficient between the California and US series computed by gun type. Gray bar denotes a range of pandemic start dates from the WHO emergency declaration (January 31, 2020) to the California state of emergency declaration (March 2, 2020).

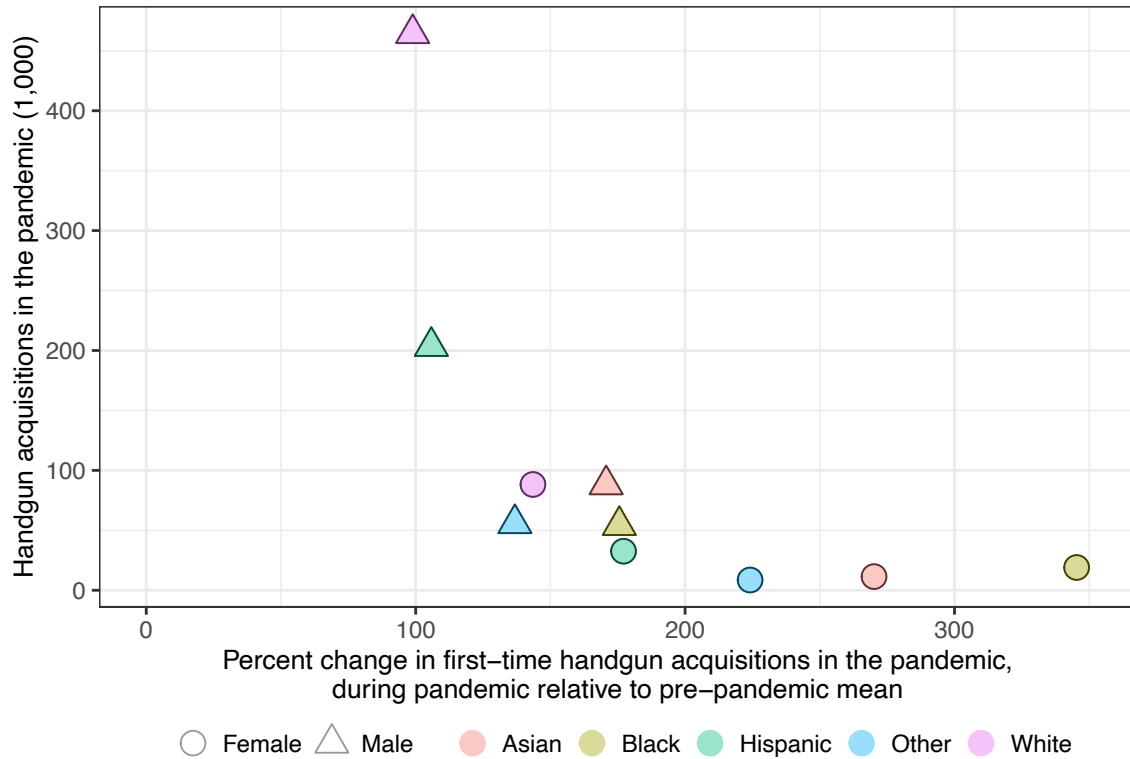


Figure S2. Percent Changes in Handgun First Acquisitions and Levels of Handgun Acquisitions by Race/Ethnicity and Gender during the Pandemic. Percentage increase in first-time handgun acquisitions (horizontal axis) and the count of handgun acquisitions in DROS during the pandemic (vertical axis). Each point represents a combination of a gender (shape) and racial/ethnic group (color). Horizontal axis presents the percentage increase between monthly first-time handgun acquisitions during and before the pandemic. Vertical axis is total handgun acquisitions during the pandemic computed using DROS acquisitions from March 1, 2020–September 30, 2021.



**CALIFORNIA DEPARTMENT OF JUSTICE
BUREAU OF FIREARMS
Dealer's Record of Sale (DROS) Worksheet**



CFD No.:

DROS No.:

Transaction Information								
Transmission Date:	Transmission Time:	Delivery Date:	Delivery Time:	Gun Show Transaction <input type="checkbox"/> Yes <input type="checkbox"/> No				
Firearm Type: <input type="checkbox"/> Long Gun <input type="checkbox"/> Handgun	Transaction Type: (All but "Dealer Sale" cert-list exempt) <input type="checkbox"/> Dealer Sale <input type="checkbox"/> Private Party Transfer <input type="checkbox"/> Curio/Relic/Olympic/Other Exempt <input type="checkbox"/> Loan <input type="checkbox"/> Pawn/Consignment Return <input type="checkbox"/> Peace Officer			Transaction exempt from 1 handgun per 30 day limit. <input type="checkbox"/>				
Waiting Period Exemptions								
Purchaser claims the following waiting period exemption pursuant to Penal Code sections 26950 through 26970 and 27650 through 27670.								
<input type="checkbox"/> PEACE OFFICER STATUS (must have agency letter)	<input type="checkbox"/> CA FIREARMS DEALER Enter CFD Number: _____	<input type="checkbox"/> SPECIAL WEAPONS PERMIT Enter Type and Permit Number. (does not include CCW permit)	Permit Type _____ Permit Number _____	<input type="checkbox"/> COLLECTOR STATUS (curio/relic only) Enter COE Number: _____				
Firearm Information								
Make: (Colt, Remington, etc.)	Model: (Commander, 870, etc.)	Caliber(s):	Barrel Length:	Serial Number:	Other Number: (if different)			
Firearm Type: <input type="checkbox"/> Long Gun <input type="checkbox"/> Handgun	If Long Gun: <input type="checkbox"/> Rifle <input type="checkbox"/> Shotgun	If Handgun: <input type="checkbox"/> Revolver <input type="checkbox"/> Semi-Auto <input type="checkbox"/> Other: _____ <input type="checkbox"/> Single Shot <input type="checkbox"/> Derringer:		Frame Only: <input type="checkbox"/> Yes <input type="checkbox"/> No	New Firearm: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Firearm Origin: (USA, Italy, etc.)	Firearm Color: (Black, Green, Silver, etc.)	Comments:						
Purchaser Information								
First Name:		Middle Name:		Last Name:		Suffix:		
Alias First Name:		Alias Middle Name:		Alias Last Name:		Alias Suffix:		
Street Address:				City:		Zip Code:		
One of the following forms of identification is required to legally purchase firearms in California: California driver license (CDL), California ID (CID) card issued by the DMV, or Military ID (MID) for active duty military accompanied by permanent duty station orders indicating that the purchaser is stationed in California.								
ID Type: (check one) <input type="checkbox"/> CDL <input type="checkbox"/> CID <input type="checkbox"/> MIL	ID Number: _____	US Citizen: <input type="checkbox"/> Yes <input type="checkbox"/> No If NO, enter Alien Registration or I-94 Number and Country of Citizenship Alien Registration or I-94 Number _____ Country of Citizenship _____						
Telephone Number: () _____	Date of Birth: (mm/dd/yyyy)	Place of Birth:	Race:					
Sex:	Height:	Weight:	Hair Color:	Eye Color:	HSC Number or Exemption Code: (handguns only)			
<input type="checkbox"/> Yes <input type="checkbox"/> No	Has purchaser ever been convicted of a felony or of any offense specified in Penal Code sections 23515 and 29905, or convicted of assault, battery, or other misdemeanor offense specified in Penal Code section 29805 in the last 10 years?							
<input type="checkbox"/> Yes <input type="checkbox"/> No	Is purchaser a danger/threat to self or others pursuant to Welfare and Institutions Code section 8100, or a person who has been admitted to a mental health facility as a danger to self or others pursuant to Welfare and Institutions Code sections 5150 through 5152 within the past 5 years?							
<input type="checkbox"/> Yes <input type="checkbox"/> No	Has purchaser ever been adjudicated by a court to be a danger to others, found not guilty by reason of insanity, found incompetent to stand trial, or placed under a conservatorship, pursuant to Welfare and Institutions Code section 8103?							
<input type="checkbox"/> Yes <input type="checkbox"/> No	Is purchaser currently the subject of any restraining order pursuant to Family Code section 6380?							
I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.								
Signature of Purchaser _____				Date _____				
Private Party Transfer (Seller Information)								
First Name:		Middle Name:		Last Name:		Suffix:		
Street Address:				City:		Zip Code:		
ID Type: (check one) <input type="checkbox"/> CDL <input type="checkbox"/> CID <input type="checkbox"/> MIL	ID Number: _____	US Citizen: <input type="checkbox"/> Yes <input type="checkbox"/> No If NO, enter Alien Registration or I-94 Number and Country of Citizenship Alien Registration or I-94 Number _____ Country of Citizenship _____						
Date of Birth: (mm/dd/yyyy)	Place of Birth:	Race:	Sex:	Height:	Weight:	Hair Color:	Eye Color:	
I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.								
Signature of Seller _____				Date _____				
Dealer Information								
Firearm Safety Device Description and/or Comments:				Telephone Number: () _____				
Sales Person Printed Name and COE Number if Issued:								
I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.								
Signature of Salesperson _____				Date _____				

Falsification of information on this form is a crime, punishable by up to 18 months in state prison. (Pen. Code, § 28250.)

Figure S3: Standardized form completed by firearm dealer to record firearm transfers.

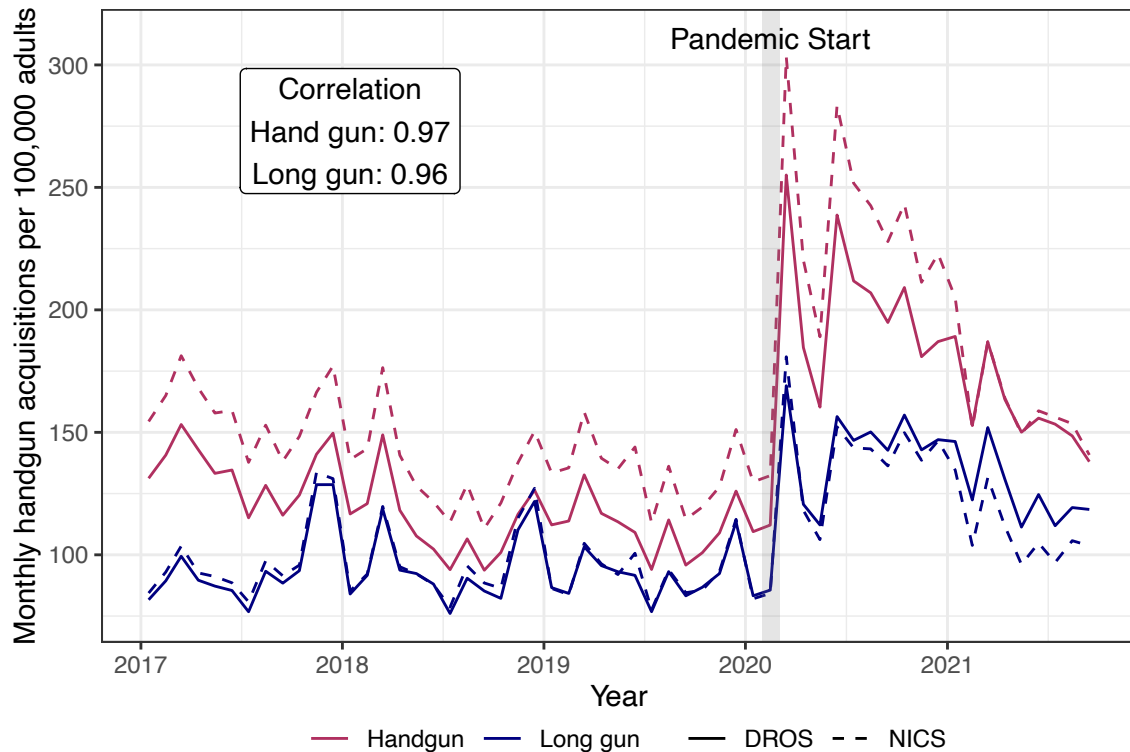


Figure. S4. Time Trends in Handgun and Long Gun Acquisitions per capita in California across data sources. Monthly trends in firearm acquisitions per 100,000 adults from January 1, 2017–September 30, 2021 in California. Solid lines are acquisitions recorded in DROS dat, as used in the main text. Dotted lines are acquisitions recorded from adjusted NICS records. NICS adjustment by gun type uses 1.1 times the number of associated NICS checks plus the number of multi-gun checks (25). Red series are trends in handguns and blue series are trends in long guns. Correlation is the Pearson correlation coefficient between data sources computed by gun type. Gray bar denotes a range of pandemic start dates from the WHO emergency declaration (January 31, 2020) to the California state of emergency declaration (March 2, 2020).

Gender	Race/ Ethnicity	Adult Population	Monthly Total Firearm Acquisitions		Monthly First-Time Handgun Acquisitions		Handgun Ownership	
			Pre- pandemic	During pandemic	Pre- pandemic	During pandemic	02/2020	09/2021
Female	Asian	2620670	273	804	116	437	16706	25023
Male	Asian	2286139	4821	7879	727	1953	136599	174056
Female	Black	980585	281	1209	169	758	26052	40550
Male	Black	957287	1972	4433	549	1510	108910	138129
Female	Hispanic	4749657	913	2293	431	1211	55578	78714
Male	Hispanic	4750820	11365	18571	2335	4832	383683	477107
Female	Other	773445	225	612	97	315	15931	21951
Male	Other	755696	3192	5163	477	1124	108776	130457
Female	White	5874825	3347	6455	1260	3088	256345	315255
Male	White	5821148	36399	46727	4585	9176	1368083	1545178
Total		29570272	62788	94146	10746	24404	2476663	2946420

Table S1: Firearm acquisitions and firearm ownership in California from 01/2017–09/2021, by demographic characteristics and pandemic status. Columns 1 and 2 describe a demographic cell. Column 3 is the cell’s adult population in California per the 2020 all-count census. Columns 4 and 5 are the average monthly count of total firearm acquisitions before and during the pandemic, respectively. Columns 6 and 7 are the average monthly count of first-time handgun acquisitions before and during the pandemic, respectively. Columns 8 and 9 are the count of handgun owners in the month before the pandemic and in the last month of our data, respectively.