Defensive behaviors during COVID-19 and the 2020-2021 firearm purchasing surge: A latent class analysis

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Abstract

Objective: This study examined the extent to which political beliefs and public health behaviors cluster together and define distinct groups of individuals and whether those groups differ on firearm purchasing behaviors.

Methods: 6,404 U.S. residents (Minnesota, n = 1,789; Mississippi, n = 1,418; New Jersey, n = 3,197) recruited via Qualtrics panels. Participants were matched to 2010 census data.

Results: Fit statistics determined a 4-class solution fit the data best. The Liberal-Many Health Behaviors class had high probabilities of voting for President Biden, reporting more liberal political beliefs than other classes, and engaging in multiple health behaviors. The Moderate-Few Health Behaviors class had high probabilities of voting for President Biden, reporting moderate political beliefs, and engaging in few health behaviors. The Conservative-Few Health Behaviors class had high probabilities of voting for former President Trump, reporting conservative political beliefs, and engaging in few health behaviors. The Conservative-Many Health Behaviors class had high probabilities of voting for former President Trump, having conservative political beliefs, and engaging in many health behaviors. The Few Health Behavior classes were more likely to have purchased firearms during the purchasing surge whereas the Many Health Behavior classes were likely to have become first time firearm owners in 2020-2021. Lastly the Few Health Behavior classes exhibited significantly less trust in the intentions of scientists.

Conclusion: Different subgroups of firearm owners may evaluate and respond to risk differently, resulting in a pattern of adopting or avoiding a range of public health recommendations. Those

who avoided mask wearing and COVID-19 vaccinations and who purchased firearms during the firearm purchasing surge appear to have less trust in science, highlighting the need for trusted messengers to increase the reach of behavioral interventions.

Defensive behaviors during COVID-19 and the 2020-2021 firearm purchasing surge: A latent class analysis

Since January 2020, the United States (US) has seen an increase in a number of risky behaviors, such as purchasing firearms, not complying with masking guidelines in public settings, and hesitancy towards COVID vaccinations. These public health decisions can increase the risk of illness and death for an individual as well as for members of their household and the community at large (Gandhi & Marr, 2021; US Department of Health and Human Services, 2021). Firearm ownership has been a highly politicized issue for a number of years (Joslyn, Haider-Markel, Baggs, & Bilbo, 2017). The COVID-19 pandemic of 2020-2021 prompted the politicization of other health behaviors (Kahane, 2021; Mayo Clinic, n.d.), including some that previously did not mirror party lines (e.g., vaccines; Kahan, 2014; Mayo Clinic, n.d.) and others that were not previously a prominent consideration in American life (e.g., mask wearing). One possible explanation for this shift is that the politicization of certain behaviors has influenced the manner in which individuals calculate risk and thus has impacted the extent to which they have seen value in and been willing to engage in behaviors aimed at curbing dangers associated with those behaviors.

Throughout 2020 and 2021, there was a substantial surge of firearm purchases in the US, likely due to COVID-19-related fears as well as racial and political tensions (Collins & Yaffe-bellany, 2020; Curcuruto, 2020; Small Arms Analytics, 2020; Small Arms Analytics, 2021). Prior work has shown that firearm access increases the risk for suicide, homicide, and unintentional shootings (Hepburn & Hemenway, 2004; Kellermann et al., 1992; Kellermann, Somes, et al., 1998). The firearm purchasing surge was particularly notable given recent data indicating that individuals who purchased firearms during this time frame – and particularly first

time firearm owners – were more likely than other firearm owners and non-firearm owners to endorse lifetime, past year, and past month suicidal ideation. (Anestis, Bandel, & Bond, 2021.; Anestis, Bond, Daruwala, Bandel, & Bryan, 2021) This indicates that a behavior already known to bestow risk of suicide – firearm purchasing – may be associated with an even further elevated risk level.

Whereas firearms have been politicized for many years, other historically apolitical health behaviors have become similarly politicized since the spring of 2020. Vaccination rates have not historically differed by political party (Kahan, 2014; Kahane, 2021). In recent years, the Centers for Disease Control and Prevention (CDC) found that California, New York, Tennessee, and North Dakota did not differ on their vaccine exemption rates for children entering school (Seither et al., 2017) despite notable political and cultural differences among these states. Furthermore, another study found there was not a pattern based on demographic factors, political affiliation, and cultural subgroups for those who were not vaccinated (Kahan, 2014). Because of bipartisan support of vaccine safety and effectiveness, previous anti-vaccine discussions generally did not impact policy (Sharfstein et al., 2021). In contrast to other common vaccinations like the flu vaccine, however, the COVID-19 vaccines have become highly politicized, as evidenced by variation in state vaccination rates. For example, as of September 2021, New Jersey (a state that usually votes for liberal Presidential candidates) had 60.2% of its population fully vaccinated (Mayo Clinic, n.d.), Mississippi (a state that usually votes for conservative Presidential candidates) had 39.6% (Mayo Clinic, n.d.), and Minnesota (a swing state that has recently been voting for liberal Presidential candidates) had 56.6% of their population fully vaccinated (Mayo Clinic, n.d.).

New COVID-19-related public health recommendations, such as mask wearing, have also been heavily politicized since early 2020. For example, mask wearing and mask mandates were more prominent in liberal states relative to conservative states (Kahane, 2021). Additionally, as children returned to in person classes in 2021, there were school mask mandate differences that began to emerge between states with different political leanings. For example, New Jersey required all faculty, staff, and students to wear masks while in school, whereas Florida (a generally conservative state) passed a law that schools could not require masks.

Although there has been a recent increase in politicization of various health behaviors, limited research has been conducted on the manner in which these behaviors might relate to one another. The decision to engage or not engage in specific health behaviors is driven by many factors (e.g. local cultural norms, perceptions of risks and rewards associated with specific behaviors) and it may be that individual tendencies with respect to medically-based health behaviors (e.g. mask wearing, vaccination) correspond with tendencies with respect to non-medical health behaviors (e.g. firearm purchasing). Each of these behaviors could be conceptualized as defensive efforts – protection against potential physical or medical threats – and thus may be influenced by how individuals perceive and weigh various sources of risk. Those who perceive themselves and their communities as vulnerable to COVID-19 would likely engage in defensive behaviors geared towards preventing illness transmission (e.g. mask wearing, vaccination) as long as those behaviors do not require them to act in a manner inconsistent with their broader system of values, whereas those who perceive themselves and their communities as vulnerable to other people would likely engage in defensive behaivors geared towards preventing any form of attack by other individuals (e.g. firearm purchasing) so long as those behaviors are consistent with their broader set of ideals. Given the ongoing firearm

purchasing surge within the US, it is particularly important to establish if and how these varied behaviors cluster together within and across specific communities. By establishing which communities tend to utilize – or not utilize – specific defensive behaviors, we can then seek out information regarding trusted messengers, thereby developing a path through which to develop targeted communications to foster increased use of public health recommendations.

The first goal of the present study was to use a sample collected in early 2021 and derived from three states – New Jersey, Minnesota, and Mississippi – that differ from one another with respect to geographic location, culture, political leanings, firearm ownership rates, and rates of gun violence, to examine the extent to which political beliefs and public health behaviors cluster together in such a way that defines distinct groups of individuals. For political beliefs, we considered both self-reported political beliefs and self-reported voting behavior during the 2020 Presidential election. The 2020 Presidential election was contentious and given the stark differences in messaging around public health recommendations between the leading candidates, we felt it was important to differentiate between political beliefs and political behaviors. For public health behaviors, we considered past month mask wearing, COVID-19 vaccine intent and status, and frequency of receiving annual flu shots. These data were collected prior to widespread COVID vaccination and before booster shots were available and, as such, reflect early trends in vaccine behavior. We then sought to understand how these groups, defined by political leanings and health behaviors, differed on firearm surge purchasing and reasons for purchasing during the surge. Finally, in an effort to provide a preliminary roadmap for work aimed at promoting increased adoption of public health recommendations, we sought to examine if classes exhibit different levels of confidence that various prominent sources for

information on health risks (elected officials, journalists, scientists) act in the best interests of the public.

Method

Participants were 6,404 U.S. residents recruited via Qualtrics panels, all of whom resided in either Minnesota (1,789), Mississippi (1,418), or New Jersey (3,197) and who were recruited between January and June 2021. New Jersey and Mississippi were selected because members of the research team have lived and worked in these states for the past decade. Additionally, the three states were selected in an effort to reflect areas of the country that differ from one another with respect to geographic location, political leaning, culture, firearm ownership rates, and gun violence rates. Quota sampling was used such that participants were matched to state level demographic distributions from the 2010 census. Although unrelated to the present analysis, in Minnesota we oversampled from Minneapolis and St Paul ZIP codes (54.6% of statewide sample) to center Minnesota data around the 2020 police killing of George Floyd (The New York Times," n.d.). Participants were compensated in the form and amount agreed upon when they joined Qualtrics Panels (e.g. gift cards, airline miles, cash), consent was obtained prior to beginning the study, and all study procedures were approved by the relevant Institutional Review Board. Further details on recruitment and study procedures can be found in a prior study by the research team (Anestis et al., 2021). All data are available upon request.

Measures

Demographics. Demographic information was collected using items assessing age, gender, race, ethnicity, income, educational attainment, and rurality. Population density was calculated using individual ZIP codes via The Population Density by Zip website (Population Density by Zip, n.d.). Population density was coded into groups (Rural, Metropolitan Rural, and

Urban) using established thresholds utilized by the US Census Bureau and the US Department of Agriculture.

Firearms. Firearm ownership was assessed via: "Do you currently own a firearm?" Firearm surge purchasing was assessed via: "Have you purchased a firearm since March 2020?" Those who reported purchasing a firearm during the surge were then asked if this was their first firearm via the question "Was the firearm(s) you purchased since March 2020 the first firearm(s) you have ever acquired?" Although these items were developed by our research team, they closely mirror those used in other large scale epidemiological surveys. For instance, Wertz and colleagues (2014) assessed firearm ownership by asking "Do you personally own a gun?" and, in the same survey assessed recency of purchased by asking "Thinking about the gun you most recently acquired, approximately when did you acquire it?" Similarly, after establishing if any firearms are stored in or around respondants' homes, Johnson and colleagues (2021) assessed firearm owners by asking "Do any of the guns belong to you, personally?"

Vaccines. Influenza (flu) vaccination frequency was assessed using a single item: "How often do you typically get the flu shot?;" possible responses were "Every year," "Every few years," "Rarely or Never." COVID-19 vaccination status or intent was also assessed using a single item: "If a vaccine to prevent COVID-19 were available to you today, would you:" with the following response options: "Definitely get the vaccine," "Probably get the vaccine," "Probably NOT get the vaccine," "Definitely NOT get the vaccine," and "I have already received the vaccine." Although not worded precisely the same, our item assessing flu shot frequency closely mirrors items from prior work. For instance, Ernsting, Lippke, Schwarzer, and Schneider (2011) asked participants "How often did you get the flu shot within the last 5 year," with answer choices including "Not at all," "Once," "Twice," "More than twice, but not annually," and

"Annually." In prior research, COVID-19 vaccination intent has been assessed in a variety of ways. For instance, early in the pandemic – a timeframe similar to our study – Obasanya and colleagues (2022) asked participants to indicate whether they would get a COVID-19 vaccination if recommended by their doctor (yes/no).

Masks. Frequency of mask wearing was assessed using a single item asking "In the past month, how often, if ever, have you worn a mask or face covering when in stores or other businesses?" with response options including "All or most of the time," "Some of the time," "Hardly ever," "Never," and "Have not gone to those types of places." Although prior research has assessed mask wearing behavior, no best practices exist in terms of designing survey items on this topic. Prior research, however, has utilized similarly worded questions. For instance, Byrne and colleagues (2021) asked participants to indicate the percentage of time they wore masks in public settings (e.g. grocery stores, malls, restaurants) during the course of the most recent 4-8 weeks, with a slider bar available for selecting the relevant percentage. Similarly, Baumkotter and colleagues (2022) asked participants how often they wore masks while shopping, working, or on public transportation, with answer choices on a 5-point Likert scale ranging from "never" to "always/almost always."

Political variables. Political affiliation was assessed with a single item asking "How would you characterize your political beliefs?" and possible response options were "Highly Conservative," "Somewhat Conservative," "Moderate," "Somewhat Liberal," or "Highly Liberal." Prior research has demonstrated that single item assessments of political beliefs produce results similar to more extensive measures while diminishing participant burden (Branscombe, Weir, & Crosby, 1991; Nail, McGregor, Drinkater, Steele, & Thompson, 2009). Participants were also asked "Who did you vote for in the 2020 presidential election?" The large

majority endorsed having voted for Joe Biden (50.2%) or Donald Trump (31.3%). In total, 963 (15.0%) indicated they preferred not to answer, 4 (0.1%) skipped the question, and 217 (3.4%) indicated that they voted for another candidate or did not vote at all. Several answer choices could have been endorsed by individuals who did not vote. Due to an inability to definitively identify non-voting behavior, we opted to only include endorsement of voting for Trump or Biden in the model. As such, although all participants were sorted into classes, those who endorsed a different voting behavior were treated as though they had missing data for this item.

Confidence in Sources. To assess mean levels of confidence in specific sources of information, participants were asked "how much confidence, if any, do you have in each of the following to act in the best interests of the public?" Answer choices included elected officials, journalists, and scientists. Answer values ranged from 0 to 4 and choices included "No confidence," "Little confidence," "Some confidence," "Much confidence," and "Total confidence." To our knowledge, no prior study has assessed this specific variable. In related work, however, Storopoli, Levey Braga da Silva Neto, and Mesch (2020) assessed confidence in specific public instututions' ability to manage aspects of the COVID-19 pandemic by asking "how confident are you in the government's ability to deal with the coronoavirus pandemic," "how confident are you with the ability of hospitals to deal with the coronavirus pandemic," "how confident are you with the ability of medical workers to deal with the coronavirus pandemic," and "how confident are you with the ability of the media to transfer useful information about the coronavirus pandemic?" Participants could respond on a 4-point Likert scale ranging from "not at all confident" to "very confident," with the structure of this item based upon guidance from Gallup surveys.

Data Analysis

Latent Class Analysis (LCA) was used to determine the different classes of firearm owners that exist within the data set. Multiple LCAs were run to determine the number of classes with optimal fit. Fit was examined based on the lowest Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC), as well as by examining the Bootstrapped Lo-Mendel-Ruben and significance value. The percent breakdown of each class and class interpretability were also used to determine ideal number of classes.

To examine between class differences on surge firearm purchasing, chi-squared analyses were utilized, with phi serving as an index of effect size. To examine between class differences on means levels of confidence that specific sources have the best interests of the public in mind, we used three univariate analyses of variance, with class membership serving as the independent variable in each analysis and specific sources serving as the dependent variable in each analysis. Partial eta squared served as an index of effect size. Due to a gender imbalance, sample weights were applied in order to improve the representativeness of the sample. Weights were derived by dividing 2010 statewide Census demographic distributions by sample demographic distributions, such that the weight applied to each participant was based upon their state of residence. Analyses and tables reflect weighted data.

Results

Demographic characteristics for the sample can be found in Table 1. Data were collected between January 2021 and June 2021. A large majority of participants took part in the survey within the first two months (71.3% from 1/26/2021-3/26/2021), with participation slowing dramatically after the third month (88.2% obtained by 4/26/2021). Given diminished returns and a desire to limit the timeframe of the data collection process, we opted to halt collection on June

25, 2021. The slow data acquisition was due to a misestimate of the time needed to acquire such a large sample from a limited (three state) pool of participants. Participation rate was 59%.

Latent Class Analysis

Fit statistics supported a 4-class solution (Table 2). The classes significantly differed on several indicator variables (Table 3). Class 1 was the largest class (32.9% of participants) and was labeled the Liberal-Many Health Behaviors class because participants had high probabilities of voting for President Biden, reporting more liberal political beliefs than all other classes, and engaging in multiple health behaviors. This class reported greater intent to get the COVID-19 vaccine, higher flu shot frequency, and were more likely to wear a mask all or most of the time compared to every other class.

Class 2 (25.2% of participants) was labeled the Moderate-Few Health Behaviors class because participants had high probabilities of voting for President Biden, reporting moderate political beliefs, and engaging in few health behaviors. This class reported greater reluctance to get the COVID vaccine, lower flu shot frequency, and less mask wearing compared to classes 1 and 4.

Class 3 (16.1% of participants) was labeled the Conservative-Few Health Behaviors class because participants had high probabilities of voting for former President Trump, reporting conservative political beliefs, and engaging in few health behaviors. Compared to all other classes, this class reported the greatest reluctance to get the COVID vaccine, lowest rates getting the flu shot, and the lowest rates of wearing a mask all or most of the time.

Class 4 (25.8% of participants) was labeled the Conservative-Many Health Behaviors class because participants had high probabilities of voting for former President Trump, having conservative political beliefs, and engaging in many health behaviors. This class reported greater

intent to get the COVID vaccine, higher flu shot frequency, and were more likely to wear a mask all or most of the time compared to classes 2 and 3.

Surge Firearm Purchasing

The four classes significantly differed with respect to the proportion of their members who endorsed various firearm ownership statuses ($\chi^2 = 89.83$, $p < .001$; $\varphi = .12$). Individuals in the Conservative-Few Health Behaviors class endorsed the highest frequency (13%) of surge purchasing, followed by the Moderate-Few Health Behaviors class (9.1%), Conservative-Many Health Behaviors class (8.0%), and the Liberal-Many Health Behaviors class (6.8%). When considering only participants who had purchased firearms during the surge, the Liberal-Many Health Behaviors class endorsed the highest frequency of first time firearm owners (66.2%), followed by the Conservative-Many Health Behaviors class (60.3%), the Moderate-Few Health Behaviors class (53.1%), and the Conservative-Few Health Behaviors class (50.4%).

Confidence in Sources

Univariate analyses of variance indicated the four classes differed in their mean levels of confidence that elected officials ($F = 7.04$; $p < .001$; ${}_p\eta^2 < .01$), journalists ($F = 5.08$; $p = .002$; ${}_p\eta^2 < .01$), and scientists ($F = 30.66$; $p < .001$; ${}_p\eta^2 = .01$) act in the best interests of the public. None of these differences were substantial in scope, however. The differences related to elected officials and journalists were particularly small and reflected a uniform lack of confidence in these individuals. With respect to scientists, the Moderate-Few Health Behaviors and Conservative-Few Health Behaviors classes exhibited the lowest level of confidence, indicating that individuals across party lines who tend not to engage in health behaviors are skeptical about the intentions and behavior of the scientists who often advocate for the use of health behaviors.

Discussion

The primary aim of this study was to leverage latent class analysis to examine how political beliefs and health behaviors differentiate individuals from one another and to what extent those classes differ from one another in their firearm ownership status. Secondarily, we examined whether surge firearm purchasers in different classes endorsed different reasons for purchasing firearms during that time period and if they exhibited varying levels of confidence regarding whether elected officials, journalists, and scientists act in the best interests of the public. We anticipated that the results of our latent class analysis would reflect a highly polarized population in which defensive behaviors – particularly politicized ones such as mask wearing and COVID-19 vaccination – would correspond with political beliefs and behaviors and that the groups least likely to adopt public health recommendations on defensive behaviors aimed at avoiding virus transmission (e.g. mask wearing, vaccination) would be most likely to endorse having purchased firearms during the 2020-2021 firearm purchasing surge. Consistent with these expectations, a four class solution indicated that our sample – derived from New Jersey, Minnesota, and Mississippi and matched to Census demographics – could be meaningfully organized into four subgroups: (1) politically liberal individuals who engage in a large number of health behaviors, (2) politically moderate individuals who engage in few health behaviors, (3) politically conservative individuals who engage in few health behaviors, and (4) politically conservative individuals who engage in a large number of health behaviors. Notably, although individuals in the Conservative-Many Health Behaviors class endorsed more conservative beliefs than did the Conservative-Few Health Behaviors class, they were less likely to have voted for Donald Trump in the 2020 Presidential election (73.3% vs 90.1%). The four classes also differed fairly widely in their firearm purchase status.

The two classes marked by limited engagement in health behaviors – one politically moderate and the other politically conservative – had the highest percentage of members who identified as having purchased firearms during the surge. This pattern may reflect that the two groups marked by little engagement in health behaviors do not feel threatened by COVID-19 and thus opt not to engage in behaviors designed to defend against contracting and spreading the illness (mask wearing, vaccination). Alternatively, they may perceive threats related to COVID-19, but perceive threats associated with the public health recommendations that, in their opinion, outweight the defensive benefits of those behaviors. At the same time, these groups may feel at risk of attack by people and thus were more likely to engage in a behavior designed to protect themselves and their loved ones from perceived physical threats (firearm purchasing). Even if they believed the likelihood of attack by others was low – perhaps even lower than the likelihood of contracting COVID-19 – they might perceive the consequences of that low probability event as more important to protect against, thereby prompting them to purchase a firearm. These decisions, although likely viewed as effective defensive efforts by the individuals themselves, increased their overall risk for severe medical and physical consequences. The precise rationale for individuals perceiving risk in this skewed manner is not entirely clear – it could represent errors in probabilistic thinking or availability heuristics – but ultimately one or more cognitive or psychological processes appears to be resulting in the more likely threat being downplayed relative to the less likely threat.

An unanticipated but noteworthy finding was that, among individuals who purchased firearms during the surge, individuals in the classes marked by high levels of health behaviors – one politically liberal and the other politically conservative – were more likely to endorse having become a firearm owner for the first time during the surge. It is not clear whether the decision to

become a firearm owner was a matter they had considered for an extended period of time or whether this was a quick reaction to external circumstances unique to the moment. Regardless, this indicates that individuals otherwise prone to minimizing risk opted to engage in a behavior (purchasing a firearm) that, on average, increases the risk of death for everyone in their home. Prior findings from this dataset indicated that surge purchasers are more likely than other firearm owners and non-firearm owners to have experienced lifetime, past year, and past month suicidal ideation and that, among surge purchasers, first time firearm owners are more likely than established firearm owners to have experienced suicidal ideation (Anestis, Bond, Daruwala, Bandel, & Bryan, 2021) In this sense, the largest proportion of risk is being absorbed by the low health behavior classes; however, where risk emerges in the other two classes, it may be particularly pronounced.

Given that surge purchasers in the classes marked by high levels of health behaviors tended to be first time firearm owners, it appears that the circumstances of the previous year influenced these individuals to make a decision that, in some ways, represents a departure from their general efforts at securing their own safety and that of their community. Although protection at or away from home is consistently the most frequent reason for firearm ownership, data robustly demonstrate that firearm access increases the risk for a host of problematic outcomes without any clear evidence that they increase the safety of members of the household (Hepburn & Hemenway, 2004; Kellermann et al., 1992; Kellermann et al., 1998).

In this sample, the majority of surge purchasers in all classes – whether first time or established firearm owners – endorsed protection at home as a reason for purchasing a firearm during the surge. Differences emerged, however, when considering specific environmental circumstances that coincided with the surge. For instance, whereas 48.9% of Liberal-Many

Health Behaviors first time firearm owners endorsed COVID-19 as a reason for having purchased a firearm since March 2020, only 10.4% of established firearm owners from that same class endorsed that same reason. In contrast, established firearm owners in the Liberal-Many Health Behaviors class more frequently endorsed supply chain concerns (56.3% vs 31.9%), the racial justice protests (37.5% vs 19.1%), and concerns that they would need to protect their family because law enforcement could not maintain the peace (50.0% vs 20.2%) than did first time firearm owners in that same class. Within the Conservative-Many Health Behaviors class, COVID-19 (43.0% vs 23.1%) and concerns about gun violence (39.2% vs 21.2%) were more frequently endorsed among first time firearm owners relative to established firearm owners, whereas supply chain concerns (44.2% vs 22.8%) and concerns they would need to protect their family because law enforcement could not maintain the peace (34.6% vs 18.9%) were more frequently endorsed by established firearm owners. Across all four classes, regardless of political beliefs and health behavior tendencies, first time firearm owners consistently endorsed COVID-19 as a motivating factor in surge purchasing whereas established firearm owners more consistently endorsed supply chain concerns and concerns that they would need to protect their family due to law enforcement being unable to maintain the peace.

One possible interpretation of this pattern of findings is that the entire sample was marked by increased threat perception prompted by the tumultuous nature of 2020 and 2021, but that the groups differed widely in their perception of the source of the threat. In this sense, all four groups were engaging in defensive behaviors aimed at countering the potential detrimental effects of external forces, but half of the group saw the pandemic as the source and aimed to defend against it by wearing masks and obtaining vaccines whereas the other half perceived the threat as coming from other people and aimed to defend against it by acquiring firearms to ward

off attack on person or property by other individuals. This interpretation would indicate that the various groups are viewing the same set of circumstances through entirely different lenses, undoubtedly influenced not only by their own cognitive and psychological processes, but also via the framing of the situation by elected officials, journalists, and scientists and the various groups' perceptions of who to trust on these issues.

The above findings, considered in combination, highlight the heterogeneity of firearm owners. A group of firearm owners generally disinclined to follow a variety of medically-recommended health behaviors (mask wearing, vaccine acquisition) and typically moderate or conservative politically, appears to have been stockpiling additional firearms during the purchasing surge, motivated most frequently by a sense that the supply chain was threatened and that they may need to take their safety into their own hands in response to societal breakdown. These individuals may emphasize defensive behaviors that involve taking action to protect themselves from physical threats and either view themselves as not being particularly vulnerable to disease or simply do not see substantial value in recommended prevention efforts. A different group of individuals endorsing conflicting political preferences – liberal or conservative – but relatively equal in their tendency to adopt public health recommendations, appears to have more frequently made the decision to become firearm owners for the first time during the firearm purchasing surge, motivated frequently to do so directly in response to COVID-19. These individuals appear to generally trust medical advice with respect to behaviors that can defend themselves and their community from disease, but a subset of them may have been influenced by the19rovidet events to take action (firearm purchasing) in an effort to take their physical safety into their own hands. Given the existence of these disparate groups, it may be that receptiveness to efforts at increasing the use of health behaviors may vary as well.

Along these lines, our final set of analyses examined the extent to which the various classes endorsed confidence that three prominent sources of information on defensive behaviors – elected officials, journalists, and scientists – are driven to pursue the best interests of the public. The classes differed only minimally from one another with respect to elected officials and journalists, with each class exhibiting mean levels of "little" to "some" confidence in each source. This seems to indicate that none of the classes have particularly high levels of confidence in either of these prominent sources for information, but that to the extent they do have confidence, it is likely higher for individuals who align with their own views. With respect to scientists, the Liberal-Many Health Behaviors class exhibited the most confidence, followed by the Conservative-Many Health Behaviors class, and then the two classes marked by engagement in few health behaviors. For all classes, mean confidence levels were between "some" and "much." The effect size for these differences was modest; however, the finding nonetheless indicates some support for the notion that the widespread adoption of defense against people (firearm purchasing) and limited use of defense against illness (mask wearing, vaccination) within these two groups may be driven by a lack of belief in the scientists that study these phenomena. This is problematic in the sense that it means that pointing to the scientific evidence for or against specific defensive behaviors is unlikely to prompt behavior change. At the same time, the finding highlights the importance of identifying and deploying credible messengers better able to persuade specific communities to engage in behaviors that serve their own interests and those of their fellow community members. With respect to firearms, data point towards law enforcement officers and past and current military servicemembers as particularly powerful voices that could influence otherwise wary audiences (Anestis, Bond, Bryan, & Bryan, 2021).

Our results do not point to one side of the political spectrum and attach negative judgment. Rather, our results acknowledge that political beliefs and behaviors are one of several meaningful ways in which communities differ from one another, not only in terms of their identify and value systems, but also in the ways in which they consume information, the sources from which that information is derived, and the ways in which they perceive and respond to threats in their environments. Indeed, our results highlight that individuals of all political stripes engage in risky behaviors, highlighted in particular in our results examining the decision to become first time firearm owners. At the same time, our analyses provide an opportunity to demonstrate that some communities, defined in part by their political beliefs, are particularly vulnerable to risk analyses that result in adopting high risk defensive behaviors (firearm purchasing) while avoiding low risk defensive behaviors (mask wearing, vaccination). Promoting an adjusted perception of risk within those communities is thus paramount in order to decrease the risk of injury, illness, and death. Doing so likely will require considerations of who is21rovideng information on these topics and through what channels.

Taken together, our findings highlight three vital points. First, firearm purchasing behavior during the purchasing surge appears to correspond with individual tendencies towards other defensive behaviors (e.g. mask wearing, vaccine hesitancy). Second, whereas surge purchasers marked by engagement in few health behaviors appear to have largely involved established firearm owners acquiring additional firearms in response to supply chain concerns and the need to protect themselves in response to societal breakdown, surge purchasers marked by otherwise high levels of health behaviors were more frequently first time firearm owners driven to purchase directly in response to concerns related to COVID-19. Lastly, the various classes identified in our latent class analysis appear to differ with respect to their confidence that

specific groups – particularly scientists – act in the best interests of the public and, as such, efforts to promote broader use of health behaviors could be hindered by efforts that rely heavily on scientists themselves outlining the evidence supporting the use of such behaviors.

Several limitations are worth noting. First, our cross-sectional data precludes the use of analyses that can capture how firearm purchasing habits have changed over time in response to specific events. Second, the data were collected before COVID-19 vaccines were widely available (or required), so it is unclear to what extent the stated intentions of the individuals across the four classes truly correspond to behavior now that vaccines are far more easily accessible. Third, our use of quota-sampling rather than probability-based sampling decreases confidence in the representativeness of the sample. Fourth, although we believe the health behaviors assessed in our protocol and used in these analyses are relevant and provide a cogent model, the list was not comprehensive and, as such, our model may not have been ideal for characterizing our sample. Fifth, it is worth noting that a paper such as this, focusing on highly politicized behaviors, political affiliation, and voting patterns lends itself to be viewed inherently as politically driven. While it is impossible for the research team to be entirely apolitical, it is not our intention that this paper be seen as a way to create further divide among party lines. The goal of this paper is simply to better understand these trends and use the information to help inform future public health initiatives. Sixth, because each of the measures utilized in these analyses was developed by our research team, we lack data on reliability and validity of our assessments. It may be that the wording or structure of the items we developed are imprecise or poorly suited to address the question at hand, diminishing confidence in our results. Lastly, some have criticized latent class analysis as an approach for differentiating groups of individuals on the basis of complex behavioral, cognitive, and emotional constructs (Achterhof, Huntjens,

Meewisse, & Kiers, 2019; Van Loo, Wanders, Wardenaar, & Fried, 2018). It may be that other statistical approaches would yield incompatible results and, in that scenario, determining the validity of one set of results versus another would be complicated. In this sense, our results must be viewed within the context of the limitations of the analytical approach we employed.

Despite these limitations, we believe these results provide incrementally valuable information that helps highlight the heterogeneity of firearm owners and the extent to which behavior in one health domain (firearm purchasing) corresponds with general tendencies towards engaging in behaviors that promote the health of individuals and their communities. Furthermore, these results have meaningful implications for efforts aimed at promoting health behaviors. As further research is conducted to better understand the individuals driving the ongoing firearm purchasing surge, these results can help inform efforts to evaluate and mitigate risk.

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Table 1. Descriptive statistics and levels of confidence in various sources of information across classes.

	Full Sample	**Class 1 Liberal – Many Health Behaviors (32.9%)**	**Class 2 Moderate – Few Health Behaviors (25.2%)**	**Class 3 Conservative – Few Health Behaviors (16.1%)**	**Class 4 Conservative – Many Health Behaviors (25.8%)**	
		N (%)	**N (%)**	**N (%)**	**N (%)**	
Gender						$X^2 = 50.76$; $p < .001$; $\varphi = .09$
Male	3,132 (48.8%)	1,010 (48.0%)$_{a,b}$	788 (48.7%)$_{b}$	591 (56.4%)$_{c}$	739 (45.1%)$_{a}$	
Female	3,217 (50.2%)	1,084 (51.5%)$_{a,b}$	803 (49.7%)$_{b}$	443 (42.3%)$_{c}$	886 (54.0%)$_{a}$	
Transgender	33 (0.5%)	3 (0.1%)$_{a}$	16 (1.0%)$_{b}$	6 (0.6%)$_{b}$	8 (0.5%)$_{a,b}$	
Other	32 (0.5%)	8 (0.4%)$_{a}$	10 (0.6%)$_{a}$	7 (0.7%)$_{a}$	7 (0.4%)$_{a}$	
Race						
Am.In/Ak Native	138 (2.2%)	42 (2.0%)$_{a}$	37 (2.3%)$_{a}$	26 (2.5%)$_{a}$	33 (2.0%)$_{a}$	$X^2 = 1.08$; $p = .872$; $\varphi = .01$
Asian	412 (6.4%)	185 (8.8%)$_{a}$	81 (5.0%)$_{b}$	34 (3.2%)$_{c}$	111 (6.8%)$_{d}$	$X^2 = 42.96$; $p < .001$; $\varphi = .08$
Black	1,086 (16.9%)	385 (18.3%)$_{a}$	218 (13.5%)$_{b}$	185 (17.7%)$_{a}$	295 (18.0%)$_{a}$	$X^2 = 18.28$; $p < .001$; $\varphi = .05$
Nat.Haw/Pac.Isl.	40 (0.6%)	13 (0.6%)$_{a}$	14 (0.9%)$_{a}$	5 (0.5%)$_{a}$	8 (0.5%)$_{a}$	$X^2 = 2.37$; $p = .499$; $\varphi = .02$
White	4,706 (73.4%)	1,462 (69.5%)$_{a}$	1,270 (78.5%)$_{b}$	800 (76.4%)$_{b}$	1,175 (71.6%)$_{a}$	$X^2 = 45.47$; $p < .001$; $\varphi = .08$
Other	220 (3.4%)	74 (3.5%)$_{a}$	56 (3.5%)$_{a,b}$	23 (2.2%)$_{b}$	67 (4.1%)$_{a}$	$X^2 = 6.98$; $p = .072$; $\varphi = .03$
Ethnicity						$X^2 = 8.85$; $p = .033$; $\varphi = .04$
Hispanic/Latin(x)	569 (8.9%)	205 (9.8%)$_{a}$	144 (8.9%)$_{a}$	69 (6.6%)$_{b}$	151 (9.2%)$_{a}$	
Education						$X^2 = 166.52$; $p < .001$; $\varphi = .16$
< High School	191 (3.0%)	34 (1.6%)$_{a}$	67 (4.1%)$_{b}$	47 (4.5%)$_{b}$	42 (2.6%)$_{c}$	
High School	2,469 (38.5%)	664 (31.6%)$_{a}$	709 (43.8%)$_{b}$	421 (40.2%)$_{b}$	673 (41.0%)$_{b}$	
Associate's Degree	1,097 (17.1%)	329 (15.6%)$_{a}$	286 (17.7%)$_{a,b}$	160 (15.3%)$_{a}$	320 (19.5%)$_{b}$	
Bachelor's Degree	1,472 (23.0%)	569 (27.0%)$_{a}$	325 (20.1%)$_{b}$	233 (22.3%)$_{b}$	345 (21.0%)$_{b}$	
Master's Degree	949 (14.8%)	411 (19.5%)$_{a}$	182 (11.3%)$_{b}$	153 (14.6%)$_{c}$	345 (12.4%)$_{b,c}$	
Doctoral Degree	235 (3.7%)	97 (4.6%)$_{a}$	48 (3.0%)$_{b}$	32 (3.1%)$_{b}$	57 (3.5%)$_{a,b}$	
Annual Household Income						$X^2 = 425.81$; $p < .001$; $\varphi = .26$
< $10,000	560 (8.7%)	130 (6.2%)$_{a}$	164 (10.1%)$_{b}$	106 (10.1%)$_{b}$	161 (9.8%)$_{b}$	
$10,000-$19,999	476 (7.4%)	116 (5.5%)$_{a}$	139 (8.6%)$_{b,c}$	101 (9.6%)$_{c}$	120 (7.3%)$_{b}$	
$20,000-$29,999	606 (9.5%)	155 (7.4%)$_{a}$	163 (10.1%)$_{b}$	121 (11.5%)$_{b}$	166 (10.1%)$_{b}$	
$30,000-$39,999	533 (8.3%)	123 (5.8%)$_{a}$	149 (9.2%)$_{b}$	108 (10.3%)$_{b}$	152 (9.3%)$_{b}$	
$40,000-$49,999	499 (7.8%)	117 (5.6%)$_{a}$	156 (9.6%)$_{b}$	89 (8.5%)$_{b}$	138 (8.4%)$_{b}$	
$50,000-$59,999	464 (7.2%)	128 (6.1%)$_{a}$	145 (9.0%)$_{b}$	91 (8.7%)$_{b}$	99 (6.0%)$_{a}$	
$60,000-$69,999	355 (5.5%)	90 (4.3%)$_{a}$	98 (6.1%)$_{b}$	61 (5.8%)$_{a,b}$	106 (6.5%)$_{b}$	

$70,000-$79,999	441 (6.9%)	124 (5.9%)$_{a}$	131 (8.1%)$_{b}$	73 (7.0%)$_{a,b}$	113 (6.9%)$_{a,b}$	
$80,000-$89,999	281 (4.4%)	72 (3.4%)$_{a}$	77 (4.8%)$_{b}$	48 (4.6%)$_{a,b}$	83 (5.1%)$_{b}$	
$90,000-$99,999	310 (4.8%)	106 (5.0%)$_{a}$	67 (4.1%)$_{a}$	51 (4.9%)$_{a}$	86 (5.2%)$_{a}$	
$100,000-$149,999	1,140 (17.8%)	534 (25.4%)$_{a}$	215 (13.3%)$_{b}$	128 (12.2%)$_{b}$	262 (16.0%)$_{c}$	
$150,000 or more	747 (11.7%)	410 (19.5%)$_{a}$	113 (7.0%)$_{b}$	71 (6.8%)$_{b}$	153 (9.3%)$_{c}$	
State of Residence						$X^2 = 709.59$; $p < .001$; $\varphi = .33$
New Jersey	1,797 (28.0%)	1,350 (64.2%)$_{a}$	717 (44.3%)$_{b}$	181 (17.3%)$_{c}$	949 (57.9%)$_{d}$	
Minnesota	1,418 (22.1%)	466 (22.1%)$_{a}$	509 (31.5%)$_{b}$	428 (40.9%)$_{c}$	393 (24.0%)$_{a}$	
Mississippi	3,197 (49.9%)	288 (13.7%)$_{a}$	392 (24.2%)$_{b}$	437 (41.8%)$_{c}$	298 (18.2%)$_{d}$	
Minnesota Region						$X^2 = 12.52$; $p = .006$; $\varphi = .08$
Twin Cities	982 (15.3%)	285 (61.2%)$_{a}$	263 (51.7%)$_{b}$	235 (54.8%)$_{a,b}$	199 (50.5%)$_{b}$	
Non-Twin Cities	815 (12.7%)	181 (38.8%)$_{a}$	246 (48.3%)$_{b}$	194 (45.2%)$_{a,b}$	195 (49.5%)$_{b}$	
Area of Residence						$X^2 = 282.84$; $p < .001$; $\varphi = .21$
Non-Metro Rural	2,301 (35.9%)	542 (26.0%)$_{a}$	635 (39.7%)$_{b}$	575 (55.7%)$_{c}$	549 (33.8%)$_{d}$	
Metro Rural	1,794 (28.0%)	687 (32.9%)$_{a}$	407 (25.5%)$_{b}$	230 (22.3%)$_{b}$	468 (28.8%)$_{c}$	
Urban	2,251 (35.1%)	858 (41.1%)$_{a}$	557 (34.8%)$_{b}$	228 (22.1%)$_{c}$	608 (37.4%)$_{b}$	
Suicidal Ideation						
Lifetime	2,257 (35.2%)	625 (29.7%)$_{a}$	626 (38.7%)$_{b}$	412 (39.4%)$_{b}$	594 (36.2%)$_{b}$	$X^2 = 45.13$; $p < .001$; $\varphi = .08$
Past Year	1,549 (24.2%)	401 (19.0%)$_{a}$	441 (27.3%)$_{b,c}$	300 (28.7%)$_{c}$	407 (24.8%)$_{b}$	$X^2 = 50.38$; $p < .001$; $\varphi = .09$
Past Month	738 (11.5%)	184 (8.7%)$_{a}$	215 (13.3%)$_{b}$	143 (13.7%)$_{b}$	196 (12.0%)$_{b}$	$X^2 = 25.92$; $p < .001$; $\varphi = .06$
		M (SD)	**M (SD)**	**M (SD)**	**M (SD)**	
Age	44.81 (18.45)	46.41 (17.95)$_{a}$	42.00 (18.84)$_{b}$	42.72 (18.27)$_{b}$	44.83 (18.05)$_{c}$	$F = 24.20$; $p < .001$; $_{p}\eta^2 = .01$
Best Interests of Public						
Elected Officials	1.51 (1.05)	1.57 (1.03)$_{a}$	1.44 (1.04)$_{b}$	1.43 (1.06)$_{b}$	1.52 (1.04)$_{a,b}$	$F = 7.04$; $p < .001$; $_{p}\eta^2 < .01$
Journalists	1.49 (1.12)	1.54 (1.12)$_{a}$	1.41 (1.11)$_{b}$	1.46 (1.17)$_{a,b}$	1.50 (1.10)$_{a,b}$	$F = 5.08$; $p = .002$; $_{p}\eta^2 < .01$
Scientists	2.49 (1.10)	2.64 (1.04)$_{a}$	2.35 (1.13)$_{b}$	2.32 (1.13)$_{b}$	2.46 (1.11)$_{c}$	$F = 30.66$; $p < .001$; $_{p}\eta^2 = .01$

Note: Values within rows that do not share subscripts differ from one another at the $p < .05$ level. Confidence that various sources act in the best interest of the public was scored as 0 (No confidence), 1 (Little confidence), 2 (Some confidence), 3 (Much confidence), and 4 (Total confidence).

Table 2. Fit Statistics for Latent Class Analysis

	BIC	AIC	Log-likelihood	Entropy	Bootstrap LMR	*p*
2-Class	64071.552	63861.852	-31899.926	0.636	-33092.597	<.001
3-Class	63011.885	62693.952	-31299.976	0.689	-31899.926	<.001
4-Class	**62643.283**	**62217.118**	**-31045.559**	**0.678**	**-31299.976**	**<.001**
5-Class*	62040.896	62575.293	-30941.448	0.664	--	--
6-Class*	62611.656	6169.026	-30889.513	0.677	--	--

Note: * indicates the LMR was not trustworthy or did not replicate
Bold indicates the model of best fit

Table 3. Class Probability Scales on Indicator Variables and Between Class Differences on Firearm Ownership Status

Variable	Class 1 "Liberal – Many Health Behaviors" (32.9%)	Class 2 "Moderate – Few Health Behaviors" (25.2%)	Class 3 "Conservative – Few Health Behaviors" (16.1%)	Class 4 "Conservative – Many Health Behaviors" (25.8%)	
COVID Vaccine Intent					
Definitely not get the vaccine	0.0%	19.3%	58.8%	1.3%	
Probably not get the vaccine	0.0%	31.6%	27.3%	7.4%	
Probably get the vaccine	7.1%	34.9%	10.9%	17.1%	
Definitely get the vaccine	66.1%	12.1%	1.1%	50.0%	
I have already received the vaccine	26.7%	2.1%	1.9%	24.2%	
Flu Vaccine Frequency					
Rarely or never	19.4%	55.4%	77.6%	18.0%	
Every few years	11.0%	25.9%	7.1%	12.7%	
Every year	69.6%	18.7%	15.3%	69.3%	
Mask Wearing					
Never	0.3%	2.4%	5.0%	0.7%	
Hardly ever	0.3%	7.1%	10.3%	2.3%	
Some of the time	2.2%	12.0%	15.9%	9.1%	
All or most of the time	96.3%	75.9%	67.3%	86.5%	
Haven't gone to those types of places	0.8%	2.6%	1.5%	1.5%	
Political Beliefs					
Highly conservative	0.8%	3.8%	27.3%	24.4%	
Somewhat conservative	0.0%	6.6%	30.2%	45.6%	
Moderate	39.2%	61.1%	41.5%	29.1%	
Somewhat liberal	36.2%	17.8%	0.7%	0.1%	
Highly liberal	23.9%	10.7%	0.2%	0.0%	
Voting Behavior					
Trump	1.7%	10.0%	90.1%	73.3%	
Biden	98.3%	90.0%	9.9%	26.7%	
	N (%)	**N (%)**	**N (%)**	**N (%)**	
Firearm Group					$X^2 = 89.83$; $p < .001$; $\varphi = .12$
Non-Firearm Owner	1,633 (77.7%)$_a$	1,193 (73.8%)$_b$	663 (63.3%)$_c$	1,267 (77.2%)$_a$	
Non-Surge Firearm Purchaser	326 (15.5%)$_a$	277 (17.1%)$_a$	249 (23.8%)$_b$	242 (14.7%)$_a$	
Surge Firearm Purchaser	143 (6.8%)$_a$	147 (9.1%)$_b$	136 (13.0%)$_c$	132 (8.0%)$_{a,b}$	

Surge Firearm Purchase Group					$X^2 = 8.81$; $p = .032$; $\varphi = .13$
1st Time Firearm Owner	94 (66.2%)$_a$	78 (53.1%)$_b$	68 (50.4%)$_b$	79 (60.3%)$_{a,b}$	
Established Firearm Owner	48 (33.8%)$_a$	69 (46.9%)$_b$	67 (49.6%)$_b$	52 (39.7%)$_{a,b}$	