Characterizing Grocery Store COVID-19 Controls in the Pacific Northwest

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Abstract

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Objectives: To characterize grocery store health and safety controls implemented during the COVID-19 pandemic across stores in different cities, areas of differing levels of income, and types of stores.

Methods: This longitudinal, observational study of 16 stores between Seattle, WA (n=9) and Portland, OR (n=7) was conducted from May 2020 to January 2021. Stores were visited monthly and observations of controls were recorded using a standardized checklist in REDCap. Descriptive analyses were conducted to determine the proportion of stores with a certain control.

Results: Controls like mask requirements and plexiglass screens at checkout were most common and consistent across stores and over the study period. There were no clear trends in the implementation of controls among grocery stores of different cities, in areas with differing income levels, and of different chains.

Conclusions: Of the controls observed, mask requirements and plexiglass screens were most common**.** Specific rules could ensure quick and consistent adoption of controls (e.g., mask mandate). Additionally, low maintenance, less resource intensive controls (e.g., screens) may be easier for stores to implement.

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Introduction

COVID-19 emerged at the end of 2019 in Wuhan, China, and was declared a pandemic by the World Health Organization (WHO) in March 2020 (WHO, 2020). The primary route of exposure to SARS-CoV-2, the virus that causes COVID-19, is inhalation of airborne particles (Tang et al., 2020; Tufekci, 2020), and the virus can be spread by asymptomatic persons (CDC, 2020; OSHA, 2020). As such, public spaces and indoor gatherings can be prime locations for the spread of COVID-19 if proper precautions are not implemented to mitigate exposure risk.

Throughout 2020, there have been public health efforts taken to reduce the spread of SARS-CoV-2, such as governors implementing stay-at-home orders and shuttering non-essential businesses, schools, and public gatherings (Mervosh et al., 2020; Treisman, 2020). Grocery stores are one business which have remained open during the entirety of the pandemic, to ensure continued access to food and other essentials. However, without proper controls, they can contribute to both workplace and community spread of the virus due to the potential for close contact in an indoor setting (Anderson et al., 2012; Park et al., 2020). In particular, grocery store workers face an increased risk of disease and infection at work due to their inability to work from home, instead being required to directly interact with the public during the pandemic (Baker, 2020; Lan, Suharlim, et al., 2020; Lan, Wei, et al., 2020). This is further compounded by increased traffic to grocery stores as closures and restrictions at restaurants directed more people to them for food (Bhattarai, 2020; Severson, 2020; UFCW, 2020a). With about 2.77 million grocery store workers across the United States as of June 2020 (Bureau of Labor Statistics, 2020), these facts indicate that grocery store workers have a large burden of exposure to COVID-19, and that there is a need for appropriate guidance and controls to decrease transmission at grocery stores to keep both the workers, and the public, safe.

State and federal agencies issued guidance and recommendations early in the pandemic to help mitigate the spread of COVID-19 in workplaces and allow them to continue operations (OSHA, 2020; WA L&I, 2020a). For example, in the Pacific Northwest, the WA State Department of Labor & Industries provided guidance specifically for grocery stores (WA L&I, 2020b). However, this largely was not enforceable, nor was it consistent across jurisdictions (UFCW, 2020b), until states began to implement workplace standards for COVID-19 later in the pandemic (OR OSHA, VA DOLI, WA L&I, 2020c). Even then, this only involved a handful of states establishing standards for themselves.

Despite a lack of regulatory oversight, many grocery stores or grocery chains adopted engineering and administrative controls to protect shoppers and workers, promote social distancing, and minimize exposure to vulnerable populations (Albertsons Companies, 2020; Walmart Inc, 2020; Whole Foods Market, 2020). Examples of these include marking floors to encourage social distancing, installing plexiglass barriers at checkout stands, and having special hours for higher-risk populations. However, there appeared to be limited enforcement of such measures, with reports of some stores not allowing ill workers go home or management curtailing efforts by workers to learn about COVID-19 cases or enforce safety rules in their store (Bhattarai, 2020; Dungca et al., 2020; Mayer et al., 2020).

Consistent application and enforcement of store-level controls, drawing from across the hierarchy of controls (NIOSH, 2015), are important for not only ensuring a safe shopping experience for customers, but also protecting grocery store workers during the pandemic. These controls can further help protect worker health beyond COVID-19 as they can improve the safety culture and climate (Mearns & Flin, 1999), which can lead to reduced anxiety and stress among workers (Lan, Suharlim, et al., 2020; Mayer et al., 2020). Given that many grocery store workers are paid below the cost of living (Glasmeier, 2020), they are also more likely to have greater job insecurity, particularly during a pandemic (Baker, 2020, Landsbergis et al., 2014), be under greater mental strain (Karasek, 1979), and be of poorer health (Braveman et al., 2010), such that a COVID-19 infection could severely impact their mental, physical, and

financial wellbeing. Thus, it is of paramount importance for grocery stores to have robust workplace safety rules and controls for COVID-19 that can create a safe work environment for the workers.

Despite the importance of grocery store workers during the COVID-19 pandemic, there have been few studies investigating their health and safety and evaluating workplace controls that could promote them (Lan, Suharlim, et al., 2020; Mayer et al., 2020). Even more limited are explorations of how controls differ both between stores, chains, and across a city, and how controls changed, both in response to the pandemic's trajectory and regulatory guidance (Martin et al., 2020). The COVID-19 pandemic is an evolving threat, and as knowledge emerges about routes of exposure and how to protect workers and shoppers, grocery stores need to nimbly adapt to provide evidence-based controls. However, the degree to which grocery stores are implementing and enforcing these controls during the COVID-19 pandemic has not been explored well. Moreover, investigating factors that may influence implementation of controls, including whether the store is part of a local or national chain and the median income level of the community served by the grocery store, is important given other services, including quantity and quality of goods offered by grocery stores, has been observed to differ between higher and lower socioeconomic status areas (Crawford et al., 2017).

Therefore, to understand the types of controls grocery stores enacted during the COVID-19 pandemic, and to investigate how these controls differed by store and community characteristics (community median income, size of store, chain or independent), we conducted a longitudinal observational study in a purposive sample of grocery stores in two major Pacific Northwest cities. Results from this study will help us to understand how grocery stores responded during the COVID-19 pandemic and allow for the identification of areas for intervention to ensure increased customer and worker safety.

Methods

Approach

This study utilized a longitudinal, observational approach to identify health and safety controls in grocery stores. This permitted direct observation of the controls, instead of reliance on employer reports, since the public postures that stores have taken on safety can differ from their actions on it (Bhattarai, 2020, Dungca et al, 2020). Further, this allowed for observation of the stores' responses as more knowledge of SARS-CoV-2 became available and as the number of cases changed. Observed grocery stores came from a purposive sample (Palinkas et al., 2015) across Seattle, WA and Portland, OR with stores being selected with regard to both community (median income of the area it serves) and store (association with local or national chain) characteristics to investigate types of controls adopted across a variety of settings.

Study Setting and Sample

Sixteen grocery stores in the greater Seattle, WA (n=9) and Portland, OR (n=7) areas were selected into the study. Seattle and Portland represent two major urban centers in the Pacific Northwest, with regional grocery store chains that span both areas. Both states regulate occupational health and safety at the state level, which could cause differences in workplace responses between the two areas. Stores within each city were selected to include both those where the median income in the census tract immediately surrounding the store was above or below the median of their respective city ($113,300 in Seattle and $92,100 in Portland), and those that are part of local or national chains (US Census Bureau, 2019). Additional care was taken to pick chain stores within higher- and lower-income areas of the same and different city to ensure similar stores were compared between income levels and cities. Two fewer

stores were included in Portland compared to Seattle due to pandemic-related travel constraints. One store was lost to follow-up as it closed for business during the study period.

Data Collection

A standardized checklist, consisting primarily of yes/no questions, was developed in REDCap. The checklist was developed based on initial assumptions (as of April 2020) of how SARS-CoV-2 spread, industrial hygiene guidance on how to prevent spread of biological diseases, and guidance from public and occupational health agencies (OSHA, 2020, WA L&I, 2020b) on controls to consider. The checklist can be found in Appendix 1. The checklist instrument was piloted by both members of the study team and observations were discussed and compared to ensure inter-observer reliability in the interpretation and application of the checklist. After two rounds of edits, a total of 24 questions remained on the checklist, though not all questions were applicable to all grocery stores.

The 16 stores were visited monthly by the same observer for nine consecutive months, from May 2020 to January 2021. This ensured data was collected during months with both increased and decreased numbers of cases. In each store, the observer collected data on the presence or absence of observable controls (engineering and administrative) at the stores visited, such as changes in store operating hours, limitations on the number of customers in a store, and screens or signage to minimize direct contact between grocery store workers and customers and promote social distancing. Observations occurred throughout the entire store floor, while focusing on certain locations where people would tend to congregate (e.g., the front of the store and sections like the deli and the butcher). Observations were recorded into REDCap using smart phones while in the field.

Data Analysis

Data were numerically coded prior to analysis. Some questions relating to particular store sections were re-coded to ease analysis. For example, instead of considering whether social distancing markers were used at individual sections of the store (e.g., the bakery or deli) these measures were combined into one that considered whether the store had social distancing markers in all sections, at least one section, or no sections. Store hours were recorded as the change in total store hours relative to its baseline hours (in May 2020). Each store was deidentified and assigned a unique store ID prior to analysis. Exploratory and descriptive analyses of the data were conducted and tabulated in RStudio (R version 3.6.1) to compare the count and proportion of stores that implemented a particular type of control within and across cities, as well as between stores serving higher and lower income areas and between local and national chain stores, to observe differences in these groups.

Ethics

The study protocol was reviewed by the University of Washington Human Subjects Division, was determined to not be human subjects research, and was not subject to institutional review board review.

Results

Across all 15 stores visited during the study period, controls like mask requirements and plexiglass screens at checkout were most common. Additionally, controls tended to be consistent across stores and over the study period, so there were no clear trends in the implementation of controls among grocery stores of different cities, in areas with differing median income levels, and of different chains. Further details on the controls observed are described in the following sections, organized by the areas of the store the controls were observed in.

Store Entrance Controls

Controls observed include signage relating to COVID-19 and hour changes, as well as limits to or additional requirements for entry. Table 1 details the controls observed at the store entrances over time. The most prevalent entry controls among all stores were requiring customers to wear masks (100% of stores after June 2020, when statewide mask mandates were in effect) and signage relating to COVID-19 (>80% of stores each month). A high proportion of Portland stores consistently had signage at entrances (100% each month), whereas there was more variability seen across Seattle stores (56% to 100% of stores each month). Similarly, a larger proportion of stores in higher income level communities had signage at entrances compared to stores in lower income level communities.

While mask requirements were consistently implemented, there were some variations regarding the presence of staff for enforcement. From July, while there was limited variability across cities, a larger proportion of stores in lower income level communities had staff present compared to higher income level communities. Some stores offered PPE (masks) to customers alongside their mask requirements, but most stores did not (<33% of stores each month after June 2020).

Regarding other entrance controls, there were few differences in the adoption of special hours or customer limits between the two cities or the income level of the communities they are in. Of note, signage for special hours declined over the study period, from 87% of all stores in May 2020 to 33% in January 2021. Additionally, a larger proportion of stores in lower income level communities had customer limits compared to higher income level communities.

Store Floor Controls

Store floor controls are detailed in Table 2, and include social distancing markers at store sections or traffic lanes throughout the store, as well as the presence of wipes or employees for cart and basket cleaning. Wipe dispensers were the most commonly observed control in this category (73% to 100% of

all stores each month), with more Portland stores with dispensers compared to Seattle stores (100% each month in Portland v. 56%-100% in Seattle). Further, a larger proportion of Portland stores and stores in higher income level communities compared to Seattle stores and stores in lower income level communities had employees cleaning baskets and carts.

Social distancing markers for store sections were commonly observed (60% to 80% of stores each month). However, a larger proportion of Portland stores had markers in at least one store section (and markers in all sections) compared to Seattle stores. Similarly, a larger proportion of stores in higher income level communities had markers in at least one section compared to stores in lower income level communities. Also, a larger proportion of Portland stores had aisle demarcations than Seattle stores in all months except January 2021 and a larger proportion of stores in lower income level communities had the lanes compared to stores in higher level communities.

Checkout Controls

Controls observed at checkout are detailed in Table 3, and include the presence of plexiglass screens, social distancing markers at the checkout area, and cleanings of the checkout and self-checkout stands (self-checkout stands were only present in chain stores and were excluded from analyses of self-checkout controls). All stores tended to have plexiglass screens at least one-breathing zone in size at the checkout stands, separating the worker from the shopper (>87% of stores each month) with no notable differences among stores. Fewer stores had a second plexiglass screen behind the worker (<33% of stores each month). However, a larger proportion of Seattle stores and stores in higher income level communities had plexiglass screens behind workers compared to Portland stores and stores in lower income level communities.

Table 1: Proportions of stores with observed controls at the store entrance

Entry Controls

	Special Hours for Vulnerable Populations					Limits to the Number of Customers Allowed					COVID-19 Related Signage				
	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total
May-20	89%	83%	100%	75%	87%	56%	67%	57%	63%	60%	56%	100%	100%	75%	87%
Jun-20	89%	83%	86%	88%	87%	44%	33%	57%	25%	40%	89%	100%	100%	88%	93%
Jul-20	33%	50%	43%	38%	40%	22%	33%	14%	38%	27%	89%	100%	100%	88%	93%
Aug-20	78%	33%	57%	63%	60%	33%	33%	29%	38%	33%	78%	100%	86%	88%	87%
Sep-20	44%	33%	43%	38%	40%	22%	50%	43%	25%	33%	100%	100%	100%	100%	100%
Oct-20	33%	17%	29%	25%	27%	22%	33%	29%	25%	27%	67%	100%	86%	75%	80%
Nov-20	22%	33%	29%	25%	27%	100%	67%	71%	100%	87%	78%	100%	100%	75%	87%
Dec-20	22%	33%	14%	38%	27%	22%	50%	14%	50%	33%	89%	100%	100%	88%	93%
Jan-21	33%	33%	29%	38%	33%	22%	50%	14%	50%	33%	78%	100%	100%	75%	87%
n	9	6	7	8	15	9	6	7	8	15	9	6	7	8	15

	Mask Wearing Required					Mask Wearing Required with Enforcement					Providing PPE to Customers				
	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total
May-20	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Jun-20	11%	0%	14%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Jul-20	100%	100%	100%	100%	100%	44%	17%	14%	50%	33%	0%	33%	14%	13%	13%
Aug-20	100%	100%	100%	100%	100%	11%	17%	0%	25%	13%	0%	33%	14%	13%	13%
Sep-20	100%	100%	100%	100%	100%	44%	17%	29%	38%	33%	22%	33%	43%	13%	27%
Oct-20	100%	100%	100%	100%	100%	22%	17%	14%	25%	20%	22%	17%	29%	13%	20%
Nov-20	100%	100%	100%	100%	100%	22%	17%	0%	38%	20%	11%	0%	14%	0%	7%
Dec-20	100%	100%	100%	100%	100%	22%	33%	14%	38%	27%	56%	0%	43%	25%	33%
Jan-21	100%	100%	100%	100%	100%	44%	67%	57%	50%	53%	33%	0%	29%	13%	20%
n	9	6	7	8	15	9	6	7	8	15	9	6	7	8	15

Table 2: Proportions of stores with observed controls within the store in general

Store Floor Controls

	Wipe Dispensers Available					Employees Cleaning Baskets and/or Carts					Demarcation of Traffic Lanes				
	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total
May-20	56%	100%	86%	63%	73%	44%	33%	57%	25%	40%	56%	67%	43%	75%	60%
Jun-20	78%	100%	100%	75%	87%	56%	33%	57%	38%	47%	56%	67%	43%	75%	60%
Jul-20	100%	100%	100%	100%	100%	11%	50%	29%	25%	27%	33%	67%	29%	63%	47%
Aug-20	89%	100%	86%	100%	93%	22%	50%	57%	13%	33%	44%	67%	43%	63%	53%
Sep-20	89%	100%	100%	88%	93%	33%	50%	71%	13%	40%	44%	50%	43%	50%	47%
Oct-20	100%	100%	100%	100%	100%	33%	50%	86%	0%	40%	11%	33%	14%	25%	20%
Nov-20	100%	100%	100%	100%	100%	11%	50%	57%	0%	27%	11%	17%	14%	13%	13%
Dec-20	89%	100%	100%	88%	93%	11%	17%	29%	0%	13%	22%	33%	29%	25%	27%
Jan-21	78%	100%	100%	75%	87%	11%	67%	29%	13%	20%	22%	17%	29%	13%	20%
n	9	6	7	8	15	9	6	7	8	15	9	6	7	8	15

	Social Distancing Markers at at least One Store Section					Social Distancing Markers at All Store Sections				
	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total
May-20	67%	100%	86%	75%	80%	0%	50%	29%	13%	20%
Jun-20	44%	100%	71%	63%	67%	0%	33%	14%	13%	13%
Jul-20	44%	83%	71%	50%	60%	0%	33%	14%	13%	13%
Aug-20	44%	83%	71%	50%	60%	11%	33%	29%	13%	20%
Sep-20	44%	83%	71%	50%	60%	11%	33%	14%	25%	20%
Oct-20	44%	83%	71%	50%	60%	0%	33%	14%	13%	13%
Nov-20	67%	83%	86%	63%	73%	0%	33%	14%	13%	13%
Dec-20	67%	83%	86%	63%	73%	11%	33%	14%	25%	20%
Jan-21	56%	83%	71%	63%	67%	11%	50%	29%	25%	27%
n	9	6	7	8	15	9	6	7	8	15

Table 3: Proportions of stores with observed controls at the checkout section

Checkout Controls																
	Screens at Checkout (at least one-breathing zone in size)					Plexiglass Screens Behind Checkout Stands					Cleaning of the Checkout Stand				
	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total
May-20	78%	100%	86%	88%	87%	22%	17%	29%	13%	20%	33%	50%	29%	50%	40%
Jun-20	89%	100%	100%	88%	93%	33%	17%	29%	25%	27%	22%	17%	14%	25%	20%
Jul-20	89%	100%	86%	100%	93%	44%	17%	43%	25%	33%	22%	0%	29%	0%	13%
Aug-20	100%	100%	100%	100%	100%	44%	17%	43%	25%	33%	22%	0%	29%	0%	13%
Sep-20	100%	100%	100%	100%	100%	44%	17%	43%	25%	33%	22%	0%	14%	13%	13%
Oct-20	100%	100%	100%	100%	100%	44%	17%	43%	25%	33%	0%	0%	0%	0%	0%
Nov-20	100%	100%	100%	100%	100%	44%	17%	43%	25%	33%	0%	0%	0%	0%	0%
Dec-20	100%	100%	100%	100%	100%	44%	17%	43%	25%	33%	0%	33%	14%	13%	13%
Jan-21	100%	100%	100%	100%	100%	44%	17%	43%	25%	33%	0%	0%	0%	0%	0%
n	9	6	7	8	15	9	6	7	8	15	9	6	7	8	15
	Social Distancing Markers at the Checkout					Plexiglass Screens between Stands at Self-Checkout					Cleaning of the Self-Checkout Stand				
	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total	Seattle	Portland	>Median	<Median	Total
May-20	100%	100%	100%	100%	100%	29%	20%	60%	0%	25%	29%	20%	20%	29%	25%
Jun-20	100%	100%	100%	100%	100%	43%	20%	60%	14%	33%	29%	0%	20%	14%	17%
Jul-20	100%	100%	100%	100%	100%	43%	20%	60%	14%	33%	14%	0%	20%	0%	8%
Aug-20	100%	100%	100%	100%	100%	43%	20%	60%	14%	33%	29%	20%	20%	29%	25%
Sep-20	100%	100%	100%	100%	100%	43%	40%	60%	29%	42%	0%	0%	0%	0%	0%
Oct-20	67%	100%	86%	75%	80%	43%	40%	60%	29%	42%	14%	0%	20%	0%	8%
Nov-20	78%	100%	100%	75%	87%	57%	40%	60%	43%	50%	0%	0%	0%	0%	0%
Dec-20	89%	100%	100%	88%	93%	57%	40%	60%	43%	50%	0%	0%	0%	0%	0%
Jan-21	100%	100%	100%	100%	100%	57%	40%	60%	43%	50%	0%	0%	0%	0%	0%
n	9	6	7	8	15	7	5	5	7	12	7	5	5	7	12

In general, a high proportion of stores had social distancing markers at checkout (>80% of all stores each month), with no notable differences across stores observed. Few stores were observed to conduct checkout stand cleanings (<40% of stores each month) with no notable differences between stores as well. However, cleanings at both staffed and self-checkout stands declined from May 2020 to January 2021, from 40% to 0% (25% to 0% for self-checkout).

Discussion

This study presents valuable insights on how grocery stores responded to the COVID-19 pandemic through the controls they implemented, and provides a first of its kind look at implementation of controls over time by grocery stores during the pandemic. While there were no clear trends in the implementation of controls across types of stores and settings, there were some notable trends with regard to certain controls. For example, mask requirements were one of the most prevalent and consistently adopted controls among the stores visited. Other prevalent and consistently adopted controls include plexiglass screens at checkout stands and COVID-19 related signage at entrances. Controls like these could serve as examples to guide the pandemic response in grocery stores and protect worker health and safety.

Though stores largely did not require masks in May and June of 2020, all had mask requirements in place by July (aligned with mask mandates implemented by Washington and Oregon in late June/early July) and they remained until the end of the study. Many of the other controls, such as cleanings of baskets, carts, and check stands and entrance limitations, did not have the same level of consistent adoption and implementation as the mask requirement, likely due to the fact the mask mandates were enforceable regulations and not voluntary guidance like some of the other observed controls. However, despite these high levels of adoption, the enforcement of the mask requirement (e.g., having staff at entrances to ensure masks are worn) was limited, as was the provision of masks to customers. Similarly,

stores commonly had social distancing controls (e.g., lanes and markers), but limited enforcement was observed. These findings corroborate those from the Arizona Frontline Worker Survey where grocery store management was found to infrequently enforce health and safety rules, such as mask wearing, that were in place at their stores (Mayer et al., 2020). Health and safety rules may need to be more comprehensive in that they not only require certain controls, but also are specific in approaches to enforcement to protect workers more thoroughly.

Plexiglass screens at checkout stands (particularly those at the front of the stand) and COVID-19 related signage at entrances were also common controls among stores visited. In contrast, controls that were not as common were mostly those that involved cleaning. The difference in the adoption of these controls could indicate that generally low maintenance, less resource intensive controls were easier for stores to implement. As such, emphasis on such controls may ensure that stores are consistent in their implementation of controls during the COVID-19 pandemic and future pandemics. However, the disparity in the controls observed might be a consequence of the fact that observations for each month reflect a particular point in time and may not fully capture activities that occur sporadically (e.g., cleaning) well.

Our study is limited to the controls considered in the checklist, which was developed early in the pandemic (April 2020) as evidence about disease transmission—and thus appropriate controls—was evolving. At the time, SARS-CoV-2 was thought to spread via droplets and close contact with those infected and fomites. As such, controls revolving around cleaning, social distancing, and screens seemed most relevant for mitigating the spread of the virus, and that was what public health agencies were recommending at the time. As evidence accumulated, the importance of aerosols in virus transmission became more understood. However, controls aimed at minimizing aerosol exposure were largely absent from our protocol. Moreover, several administrative and engineering controls that could not be readily

observed, but important to protecting worker and customer health, were omitted. For example, questions regarding the ventilation systems, sick leave policies, and employee tracing would have provided more insight on efforts to mitigate potential airborne exposure from SARS-CoV-2 and to protect the health and wellbeing of grocery store workers more directly, especially if they contract COVID-19.

Of the controls surveyed, masks were ultimately among the most effective at COVID-19 prevention. As the virus was determined to be spread largely by inhalation of airborne particles, masks effectively facilitate source control by limiting the exhalation of virus containing droplets and particles, and can serve as a barrier against them (Brooks & Butler, 2021). Controls like screens and cleanings, while effective for reducing close contact spread via droplets and fomites, respectively, are less effective at limiting the airborne spread of SARS-CoV-2. Signage also serves to alert and inform workers and the public of mask requirements and of the signs and symptoms of COVID-19. Additionally, social distancing controls (such as demarcations) may be effective by limiting person-to-person spread, especially with more robust enforcement of distancing in tandem with stricter limits on entry to reduce the number of persons in a store. More data on case numbers among grocery store workers at the stores visited would be particularly useful for evaluation of the appropriateness of timing and implementation of the controls, which this study cannot address.

Similarly, the results may not be generalizable beyond the urban centers in the Pacific Northwest visited. Rural communities were not included in our study, and our findings cannot speak to the efforts, or the lack thereof, made by those stores to control the spread of the virus. Additionally, the small sample size and sampling strategy limits our ability to detect differences between stores or generalize to other stores. Future work should involve a larger, random sample of stores across a larger geographic region to provide generalizable results, and conclusions.

The results of this study provide important insights on controls implemented by grocery stores throughout the pandemic. While the study only captured observable controls, these may have had the most impact on grocery store workers and customers' perceptions of safety and health while working or shopping. For workers, their ability to socially distance themselves or have access to workplace controls like masks, screens, and signage contributed to their perceptions of workplace safety and their risk of anxiety and depression (Lan, Suharlim, et al., 2020; Mayer et al., 2020). The presence of these controls served as a sign that stores are taking efforts to keep workers safe and reduce exposure to SARS-CoV-2. However, the creation of a safe working environment in grocery stores also contributes to the public's perception of safety in stores as workers and customers both share the same space and interact with each other. Workers who are safe and healthy would ensure that customers are safe and healthy as well. The converse is also true, and so the health and safety of grocery store workers and the public (during a pandemic in particular) are linked. The effectiveness of these controls at minimizing COVID-19 transmission should be investigated in future studies in order to provide recommendations that would better protect the health and safety of grocery store workers, as well as the customers and communities they serve.

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Appendix 1

Grocery Store Observation Checklist

Grocery Store Checklist

Please complete the survey below.

Thank you!

Pre-visit

Select a city:
- ◯ Seattle, WA
- ◯ Portland, OR

Your name:

_____

Date and time of visit:

_____

Select a store:
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9

Select a store:
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7

Visit: Entry

Remember to wear face masks and practice social distancing while in the field

Prior to entering the store, take note of the following:

1) Current store hours:

_____

2) Are there special hours for vulnerable populations?
- ◯ Yes
- ◯ No

Please record the special hours:

_____

3) Are there limits to the number of customers allowed in the store?
- ◯ Yes
- ◯ No

Please describe these limitations:

_____

4) Are there limited entrances and/or exits for the store?
◯ Yes
◯ No

Please describe these limitations:

_____

5) Are customers required to wear masks to enter?
◯ Yes
◯ No

Are there employees specifically present for enforcing PPE usage (e.g. preventing entry to those without face masks)?
◯ Yes
◯ No

6) Are customers required to wear gloves to enter?
◯ Yes
◯ No

Are there employees specifically present for enforcing PPE usage (e.g. preventing entry to those without gloves)?
◯ Yes
◯ No

7) Is PPE being provided for customers?
◯ Yes
◯ No

8) Is there signage at the entrance mentioning "COVID-19", "coronavirus", and/or "social distancing"?
◯ Yes
◯ No

Is the signage new (has not been observed before)?
◯ Yes
◯ No

Please take a picture of the entrance and upload.

9) Are health screenings being conducted at the entrance?
◯ Yes
◯ No

Other observations:

_____

Visit: General In-Store

After entering, conduct a lap around the store and take note of the following:

10) Is there a dispenser for cart/basket wipes?
◯ Yes
◯ No

Are there still wipes available?
◯ Yes
◯ No

11) Are there employees cleaning carts and/or baskets?
◯ Yes
◯ No

12) Is there demarcation of traffic lanes on the store floor?	◯ Yes ◯ No
Are there employees specifically present for enforcing the lanes (e.g. directing traffic)?	◯ Yes ◯ No
Is there clear labeling of traffic lanes?	◯ Yes ◯ No
Is the labeling new?	◯ Yes ◯ No
Please take a picture of the labeling and upload.	
13) Are there employees restocking?	◯ Yes ◯ No
Are aisles closed/areas around employee restricted?	◯ Yes ◯ No
Other observations:	_____

Visit: Store Sections

Conduct another lap around the store and take note of the following:

14) Is there a pharmacy?	◯ Yes and open ◯ Yes and closed ◯ No
Please record the hours of operation:	_____
Are there demarcations on the store floor to provide social distancing guidance?	◯ Yes ◯ No
Are there plexiglass screens between employees and customers?	◯ Yes ◯ No
What is the size of the screen?	◯ Less than one breathing zone ◯ One to two breathing zones ◯ Greater than two breathing zones
15) Is there a deli?	◯ Yes and open ◯ Yes and closed ◯ No
Are there demarcations on the store floor to provide social distancing guidance?	◯ Yes ◯ No
Are there plexiglass screens between employees and customers?	◯ Yes ◯ No

What is the size of the screen?	◯ Less than one breathing zone ◯ One to two breathing zones ◯ Greater than two breathing zones
19) Is there a self-service soup bar?	◯ Yes ◯ No
Is it available for customer access?	◯ Yes ◯ No
20) Is there a self-service hot bar?	◯ Yes ◯ No
Is it available for customer access?	◯ Yes ◯ No
21) Is there a self-service cold bar?	◯ Yes ◯ No
Is it available for customer access?	◯ Yes ◯ No
16) Is there a bakery?	◯ Yes and open ◯ Yes and closed ◯ No
Are there demarcations on the store floor to provide social distancing guidance?	◯ Yes ◯ No
Are there plexiglass screens between employees and customers?	◯ Yes ◯ No
What is the size of the screen?	◯ Less than one breathing zone ◯ One to two breathing zones ◯ Greater than two breathing zones
22) Is there a self-service pastry bar?	◯ Yes ◯ No
Is it available for customer access?	◯ Yes ◯ No
17) Is there a butcher/manned meat section?	◯ Yes and open ◯ Yes and closed ◯ No
Are there demarcations on the store floor to provide social distancing guidance?	◯ Yes ◯ No
Are there plexiglass screens between employees and customers?	◯ Yes ◯ No
What is the size of the screen?	◯ Less than one breathing zone ◯ One to two breathing zones ◯ Greater than two breathing zones

18) Is there a fishmonger/manned seafood section?	◯ Yes and open ◯ Yes and closed ◯ No
Are there demarcations on the store floor to provide social distancing guidance?	◯ Yes ◯ No
Are there plexiglass screens between employees and customers?	◯ Yes ◯ No
What is the size of the screen?	◯ Less than one breathing zone ◯ One to two breathing zones ◯ Greater than two breathing zones
Other observations:	_____

Visit: Check Out

Observe a total of two customers going through two separate checkout lanes and take note of the following:

23) Are there manned checkout lanes open?	◯ Yes ◯ No
Are there plexiglass screens between employees and customers?	◯ Yes ◯ No
What is the size of the screen?	◯ Less than one breathing zone ◯ One to two breathing zones ◯ Greater than two breathing zones
Please take a picture of the screen and upload.	
Are there plexiglass screens behind employees?	◯ Yes ◯ No
Are there demarcations on the store floor to provide social distancing guidance?	◯ Yes ◯ No
Does an employee clean the checkout stand after each customer?	◯ Yes (both lanes) ◯ Yes (one lane) ◯ No
Does an employee pack bags?	◯ Yes (both lanes) ◯ Yes (one lane) ◯ No
24) Are there self-checkout lanes open?	◯ Yes ◯ No
Are there plexiglass screens between stations?	◯ Yes ◯ No

Does an employee clean self-checkout stands after each customer?	◯ Yes ◯ No

Other observations:

_____