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A Cross-Sectional Study and Observational Assessment of Shoppers' COVID-19 Prevention Behaviors in Southwestern Ontario, Canada

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Original Research

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Abstract

Objective: The aim of this study was to observe the level of alcohol-based sanitizer, mask use, and physical distancing across indoor community settings in Guelph, ON, Canada, and to identify potential barriers to practicing these behaviors.

Methods: Shoppers were observed in June 2022 across 21 establishments. Discrete in-person observations were conducted and electronically recorded using smartphones. Multilevel logistic regression models were fitted to identify possible covariates for the 3 behavioral outcomes.

Results: Of 946 observed shoppers, 69% shopped alone, 72% had at least 1 hand occupied, 26% touched their face, 29% physically distanced ≥ 2 m, 6% used hand sanitizer, and 29% wore masks. Sanitizer use was more commonly observed among people who wore masks and in establishments with coronavirus disease (COVID-19) signage posted at the entrance. Mask use was more commonly observed during days without precipitation and in establishments with some or all touch-free entrances. Shoppers more commonly physically distanced ≥ 2 m when they were shopping alone.

Conclusions: This supports evidence for environmental context influencing COVID-19 preventive behaviors. Intervention efforts aimed at visible signage, tailored messaging, and redesigning spaces to facilitate preventive behaviors may be effective at increasing adherence during outbreaks.

The coronavirus disease (COVID-19) pandemic was caused by the rapid human-to-human spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), resulting in over 613 million cases and 6.5 million deaths globally as of September 2022.[1,2] In particular, the virus is spread through aerosols or larger droplets, and infection can lead to a respiratory illness with the most frequently reported symptoms being fever, cough, fatigue, and loss of taste or smell.[1] Besides practicing respiratory etiquette, self-isolation when sick, following community guidelines, and getting vaccinated against COVID-19, the World Health Organization also recommends physical distancing, wearing a mask, and practicing good hand hygiene to reduce transmission.[1] The current evidence points to increased transmission in indoor spaces, crowded settings, and being close to someone with COVID-19,[3] and in contrast, risk is reduced when people receive COVID-19 vaccinations and engage in preventive behaviors such as mask use, hand hygiene, and physical distancing.[3]

Non-pharmaceutical interventions (NPIs), which include closures of various settings, movement restrictions, travel restrictions, and mask use, have been effective at reducing community COVID-19 transmission.[4] However, there have been concerns raised about psychological and policy fatigue associated with these restrictions,[5,6] and these factors may contribute to reduced efficacy of restrictions over time.[4] In 2022, many countries, including Canada and the United States, began easing restrictions.[7,8] The uncertainty concerning the epidemiology of new COVID-19 variants of concern, shift in policy instruments, and support[9] as well as criticisms for such policies[10] has highlighted the importance of interventions aimed at reducing COVID-19 transmission through modifying the built environment, appealing to the public to engage in healthy behaviors via tailored health messages, and targeting at-risk settings or populations (eg, older adults, those with underlying medical conditions).[11,12]

Among NPIs, health behaviors have remained relevant given the growing evidence that physical distancing, mask use, and hand hygiene reduce COVID-19 transmission.[13–16] These interventions may be increasingly salient during the pandemic as countries move away from regulatory community health policies and move toward individual approaches such as education and targeted modification of volitional factors. Studies have identified factors that predict favorable health behaviors during the COVID-19 pandemic, though many have focused on

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self-reported measures, qualitative methods, and assessed them while restrictions were in place.[13,17–19] Few research studies have assessed COVID-19 preventive behaviors in community settings using observational methods.[20,21] Therefore, there is a need to fill this gap and further our understanding by conducting a cross-sectional study to evaluate current COVID-19 preventive behaviors among the public in the Canadian context, especially in the absence of COVID-19 regulatory health policies. The objective of this study was to evaluate the prevalence of physical distancing, mask use, and alcohol-based hand sanitizer (AHS) use in various indoor community settings and identify potential factors that affect these COVID-19 preventive behaviors. Findings from this study will aim to provide insights to inform future research and interventions.

Methods

Study Design

A cross-sectional design with direct visual observations of establishments and shoppers was applied. These observations were conducted discretely by AT and RZ to reduce the impact of the Hawthorne effect, which states that unexpected outcomes may result from the observed subject being aware they are being observed.[22] The first author trained the research technician (RZ) to be inconspicuous during the observational period to reduce any detection from shoppers. All observations were conducted between June 6 and June 30, 2022, and recorded on a smartphone, using an observational instrument integrated in Google Forms (Google LLC, Mountain View, California, USA).

Study Setting

This study was conducted solely in the city of Guelph located in Southwestern ON, Canada. In 2021, the population of Guelph was 143 740.[23] The average age of the population was 40 years, and the breakdown among age groups were 0 to 14 years (16.4%), 15 to 64 years (67.3%), and ≥ 65 years (16.4%).[23] The average income in private households was $118 355.[23]

A non-probability sampling approach was used. Establishments were selected to cover all neighborhoods in the city rather than collecting data from all eligible establishments to ensure shoppers from varying socioeconomic statuses were observed. Most major grocery, department, and hardware stores throughout the city along with 1 movie theater and the only major shopping center were visited during the data collection period. The shopping center contains over 100 stores and was visited multiple times throughout the data collection period due to the range of shoppers across all age groups that could be observed. Two research team members (AT and RZ) recorded observations at all entrances at the shopping center, which was the only establishment with multiple entrances.

Observational Instrument

An observational checklist was developed by reviewing previously published studies that have employed observational methods to record health behaviors of various populations,[20,24,25] and in discussion with the research team to identify key indicators of interest. The data collection instrument was pre-tested by assessing 30 customers at a shopping center entrance in June 2022. Two independent raters (AT and RZ) evaluated the same customers' characteristics, behaviors, and establishment characteristics for the pre-test. Interrater reliability was assessed using the kappa statistic for dichotomous outcomes and > 2 categories. The intraclass correlation coefficient (ICC) was estimated for the continuous outcome measurement.[26] The scores indicated almost perfect agreement. The average kappa across 6 measurements was 0.83 (range = 0.43-1.00) and the ICC was 0.95 for a mixed-effects, absolute agreement, single-rater model. The data collection instrument was modified in discussion with the research team to improve clarity of questions and ease of use. Questions were revised after pre-testing to ensure evaluators had adequate time to assess shoppers' behaviors. For instance, when a group of ≥ 2 shoppers entered an establishment, 1 shopper was randomly selected and assessed within the group. Furthermore, visual cues were used to assess whether shoppers were together as part of a group (eg, holding hands, walking at the same pace) and whether they were employees of establishments (eg, uniforms, name tags).

The final instrument contained a form to evaluate establishment characteristics and another form to evaluate shopper-level characteristics and behaviors. The establishment form contained 6 questions, which included the name of the establishment, time visited, day visited, AHS dispenser availability (yes vs no), presence of COVID-19 signage at or near the entrance (yes vs no), and door entry type (ie, touch-free vs manual). For accuracy, the mean outside ambient temperature (°C) and precipitation (yes vs no) were recorded after the data collection period, based on historical data from the Environment and Climate Change weather station located at the Guelph Turfgrass Institute.[27] The shopper-level form contained 10 questions and included various characteristics such as group size (counts), mask use (yes vs no), AHS use (yes vs. no), and maintaining ≥ 2 meters from others upon entry (yes vs no). A copy of the observational instrument can be accessed as supplementary material.

Data Analysis

Recorded data from Google Forms were exported to Microsoft Excel (Microsoft, Redmond, Washington, USA). The data set was subsequently cleaned, coded, and descriptive summaries were calculated using frequency tabulations. Mask use was collapsed from 3 to 2 categories due to insufficient observations among partial wearers. The following independent variables were evaluated across all models: establishment type; day of week; time of day; mean temperature; presence of precipitation; signage; dispenser availability at establishment; door type; group size; individual's hands are occupied (yes vs no); individual is a caregiver, guardian, or parent to someone else within the group (yes vs no); and type of mask worn (medical, cloth, and N95 fitted or equivalent). Correlation coefficients (ie, Pearson, Phi, Point-biserial) were assessed to determine whether any variables were highly correlated (ie, > |0.80|). Linearity was assessed between the only continuous independent variable and the log odds of the selected outcomes of interest, using locally weighted scatterplot smoothing curves to examine whether the variable needed to be transformed to a categorical variable or modeled as a quadratic term. StataSE 17.0 (StataCorp, College Station, TX, USA) was used to fit statistical models to assess associations between establishment, environmental, and individual characteristics in 3 selected outcomes: (1) use of AHS upon entry, (2) wearing of a mask upon entry, and (3) maintaining ≥ 2 meters from others upon entry if others are present.

A backwards stepwise elimination approach was applied in multilevel logistic regression modeling. Models were fitted for each behavioral outcome using the mean-variance adaptive Gauss–Hermite quadrature method.[28] A random intercept was included in each model to account for establishment-level clustering.

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Two-way interactions between were assessed one at a time in the main effects model. Using a liberal significance level ($\alpha = 0.20$), variables were pre-screened for inclusion in the multivariable models. The Wald's χ^2 test was used to evaluate the overall significance of variables with > 2 categories. Variables that did not meet the statistical criteria for backwards elimination model building were reintroduced into the model if it caused a ≥ 20% change in the coefficient of any significant variable upon removal and if it was considered a confounding or distorter given that it was also a non-intervening variable. Variables were retained in the final multivariable models if they met one of the following conditions: statistically significant ($\alpha = 0.05$), part of a statistically significant interaction, or behaved as a confounder or distorter variable to another independent variable.

Outliers were assessed using Pearson and deviance residuals. Normality and homoscedasticity assumptions for the random intercepts were evaluated using the best unbiased predicted values at the establishment level. ICCs at the establishment level were estimated and were equal to the variance partition coefficients (VPC) because these were 2-level, random intercept models.[29] The use of the term *statistically significant* in this paper does not imply causation or epidemiological importance.[30] Instead, it is referred to in an exploratory sense (vs confirmatory) to indicate that sufficient evidence to infer the measure of association for an independent variable is different from the null value.

Ethics

The study protocol was reviewed by the University of Guelph Research Ethics Board and was exempt from requiring ethics approval because the research involved observations of people in public places where (1) no intervention was staged by the researcher, (2) no direct interaction took place, (3) individuals had no reasonable expectation of privacy, and (4) no individuals were identified in the dissemination of research results.[31]

Results

Establishment Characteristics

In total, 34 observational sessions resulted in 946 observations recorded between June 6 and June 30, 2022. Only 32.4% of these sessions had recorded any precipitation (> 0 mm) for the day (n = 11). The mean temperature during the observational period was 19°C and ranged between 13 and 23.5°C. Descriptive details of the establishments are listed in Table 1. Most establishments were grocery stores (n = 14), had AHS dispensers available (n = 17), and fully automatic or touchless entry (n = 16). Several grocery stores also offered sanitizing wipes intended for shopping carts (n = 6).

Shopper Characteristics and Behaviors

Out of 946 observations, most were alone (n = 650), had at least 1 hand occupied upon entry (n = 685), and were visibly healthy (n = 937). Among all shoppers, only 6% (n = 59) used AHS upon entry. Across all observations, only 1 person used a personal pocket sanitizer instead of the available dispenser at the establishment. During the observational period, only a few individuals used sanitizing wipes for shopping carts (n = 9) or their hands (n = 1). Of the shoppers who entered an establishment while others were also in the vicinity (n = 521), only 26% practiced safe distancing of ≥ 2 meters.

Table 1. Characteristics of establishments in the study examining shoppers' disease prevention behaviors in Southwestern ON, Canada (n = 21)

Characteristic	N	%
Type of establishment		
Shopping center	1	4.8
Grocery store	14	66.7
Department store	2	9.5
Hardware	3	14.3
Theater	1	4.8
Alcohol-based hand sanitizer dispenser available		
Yes	17	81.0
No	4	19.0
Signage available at entrance[a]		
Yes	8	38.1
No	13	61.9
Automatic or touchless entry available		
Yes, all doors	16	76.2
Yes, some doors	2	9.5
No	3	14.3

[a]Includes any poster, sign, or graphic depicting COVID-19 prevention.

Overall, 29% of the observed shoppers wore face masks (n = 269). Some put their mask on while entering the establishment (n = 8), others had a mask in hand but did not wear it (n = 1), replaced their mask with another upon entering (n = 1), wore 2 masks (n = 1), or took the mask off upon entering (n = 1). Most masks worn by shoppers were medical type (n = 185). Details on shoppers and time of observations are provided in Table 2.

Regression Modeling Results

Across all models, the following variables were considered for inclusion: establishment type, day of visit, time of day, mean temperature, precipitation, presence of COVID-19 signage, hand sanitizer dispenser availability, entry type, group status, shopper is a visible parent or guardian, shopper's hand(s) are occupied, mask use, mask type, hand sanitizer used upon entry, and visible or audibly coughing/sneezing from observed shopper. The fitted univariable models are provided as supplementary material.

Table 3 shows results from the multilevel logistic regression models. For the model examining hand sanitizer use upon entry, 4 statistically significant variables were identified. The odds of observing this behavior were significantly greater in establishments that had COVID-19 signage posted at the entrance (see Table 3). The odds of observing hand sanitizer use were significantly lower in locations with fully touch-free entrances compared to some and no touch-free entrances (see Table 3). Shoppers were significantly more likely to be observed using AHS if they had a mask on and significantly less likely to be observed using it when their hands were occupied (see Table 3). The percentage of variance explained at the establishment level was quite low (VPC < 0.01%).

Three statistically significant variables were identified for the outcome examining mask use upon entry (see Table 3). The odds of shoppers being observed wearing masks were significantly greater in establishments that had some or all automatic or touch-free entrances. When comparing fully touch-free entrances compared to some touch-free entrances, no significant association was found (see Table 3). The odds of observing shoppers wearing masks were significantly greater among shoppers who used AHS

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Table 2. Shopper characteristics and breakdown of observations in June 2022 for analysis of factors associated with their COVID-19 prevention behaviors (n = 946)

Characteristic	N	%
Day of the week		
Monday	143	15.1
Tuesday	158	16.7
Wednesday	155	16.4
Thursday	187	19.8
Friday	170	18.0
Saturday	32	3.4
Sunday	101	10.7
Time of day		
Morning	224	23.7
Afternoon	387	40.9
Evening	286	30.2
Night	49	5.2
Precipitation		
Yes	295	31.2
No	651	68.8
Group size		
1	650	68.7
2	210	22.2
3	51	5.4
4	26	2.8
≥ 5	9	1.0
If in a group, does the individual being observed look like a parent, guardian, or caregiver to someone else within that group?		
Yes	103	35.0
No	191	65.0
Is the individual carrying, pushing, or holding item(s)?		
Yes, 1 or both hands are occupied	685	72.4
No, empty-handed	261	27.6
Does the individual show signs of illness through visible or audible coughing and/or sneezing?		
Yes	9	1.0
No	937	99.1
Does the shopper touch her or his face, eyes, mouth, or nose?		
Yes	246	26.0
No	700	74.0
If others are present, does the individual under observation maintain ≥ 2 m distance from others?		
Yes	152	29.2
No	369	70.8
Does the individual use alcohol-based hand sanitizer upon entry?		
Yes	59	6.2
No	887	93.8
Is the individual wearing a mask?		
Yes	257	27.2
Yes, partial[a]	12	1.3
No	677	71.6
If wearing a mask, what type of mask was worn?		
Cloth	38	14.2
Fitted N95 or equivalent	45	16.8
Medical	185	69.0

[a]Nose and/or mouth is exposed while mask is worn.

(see Table 3). Further, the odds of observing individuals wearing masks were significantly less likely during days with precipitation (see Table 3). The percentage of variance explained at the establishment level was quite low (VPC < 0.01%).

Two statistically significant variables were identified for the model explaining distancing from others (see Table 3). The odds of observing shoppers physically distancing from others were significantly less likely when the mean temperature was greater and when shoppers were in groups of ≥ 2 compared to individuals by themselves (see Table 3). Approximately 30.5% of the variance in this outcome after accounting for fixed-effects was explained at the establishment level (vs shopper level).

Discussion

This was the first study to report on shoppers' observed physical distancing, mask use, and AHS use behaviors across various indoor community settings in Canada. Regarding infrastructure, many establishments had AHS dispensers and touch-free entryways, but only a few had COVID-19 signage available at the entrance. Although this was not a comprehensive sampling of all indoor settings, the lack of signage may indicate that corporate social responsibility has diminished throughout the course of the pandemic.[32] It is also speculated that the removal of health messages may have resulted from a conflict with brand and marketing messages aimed at drawing in customers. Signage has been shown to change behavior in many categories and spaces,[33] and thus visible and tailored health messages can promote favorable health behaviors. Additionally, the effectiveness of messaging is dependent on the customization,[32,34] and levels of message fatigue,[35] but the present study did not evaluate the extent of the messaging beyond its presence. Further research exploring store managers' perceptions of health messaging may elucidate public health messaging preferences and needs from a market perspective.

Only 6% of shoppers observed in this study used AHS upon entering establishments. Previous research studies have shown the public to have unfavorable hand hygiene adherence prior to and during the COVID-19 pandemic.[21,36,37] Across establishments sampled in our study, various types of AHS dispensers (eg, motion sensing, free-standing, wall-attached) and sanitizers (eg, scented, volume output) were observed. Studies investigating hospital visitors' AHS use found that compliance was generally low without any interventions, but increased with a free-standing AHS dispenser, as well as with certain combinations of interventions that use specific signage, colors, and wording.[37–39] The present study also found that most individuals observed were carrying, pushing, or holding an item or person, and these shoppers were less commonly observed to use AHS compared to those who had both hands free. Therefore, hand hygiene can be promoted through multiple modalities such as having visible signage, applying theory-driven approaches (eg, Health Belief Model, Theory of Planned Behavior [TPB], Social Cognitive Theory) to design messages,[35] and well-placed free-standing AHS dispensers.

Approximately 29% of the observed shoppers wore masks, and most wore them correctly to cover their nose and mouth. Shoppers were less commonly observed to wear masks during days with precipitation, suggesting that humidity or rainfall may cause greater discomfort and present a barrier to mask use. This study did not find temperature as being salient, but a previously published article reported most people felt uncomfortable while wearing masks during hot weather.[40] Masks were also more commonly observed in establishments where automatic or touch-free entries

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Table 3. Results of 3 multilevel logistic regression models evaluating individuals' infectious disease prevention behaviors

Behavior outcome/covariate	OR	95% CI	*P* value
Uses alcohol-based hand sanitizer upon entry (yes vs no)[a]			
COVID-19 signage posted at entrance (yes vs no)	2.47	1.39, 4.39	0.002
Automatic or touch-free door entry?			< 0.001[f]
No (referent)	—	—	—
Yes, some doors	0.78	0.33, 1.83	0.568
Yes, all doors[b]	0.20	0.10, 0.42	< 0.001
Carrying, pushing, or holding item or person (yes vs no)	0.33	0.19, 0.58	< 0.001
Individual is wearing a mask (yes vs no)	3.32	1.89, 5.81	< 0.001
Wears mask upon entry (yes vs no)[c]			
Automatic or touch-free door entry?			< 0.001[f]
No (referent)	—	—	—
Yes, some doors	2.08	1.24, 3.49	0.006
Yes, all doors[d]	1.80	1.32, 2.47	< 0.001
Precipitation (yes vs no)	0.61	0.43, 0.85	0.003
Alcohol-based hand sanitizer used upon entry (yes vs no)	3.52	2.03, 6.09	< 0.001
Maintains ≥ 2 m distance from others (yes vs no)[e]			
Mean temperature (°C, continuous)	0.86	0.79, 0.94	0.001
Group status (in group of ≥ 2 vs alone)	0.46	0.29, 0.74	0.001

[a]N = 946 shoppers, 21 establishments. Variance explained at the establishment-level was < 0.01%.
[b]Reported on this level when "Yes, some doors" was the referent category (OR = 0.26, 95%; CI = 0.10, 0.69; *P* = 0.007).
[c]N = 946 shoppers, 21 establishments. Variance explained at the establishment-level was < 0.01%.
[d]Reported on this level when "Yes, some doors" was the referent category (OR = 0.87, 95%; CI = 0.53, 1.43; *P* = 0.576).
[e]N = 521 shoppers, 21 establishments. Variance explained at the establishment-level was 31%.
[f]Represents *P* values for the entire categorical variable.

were present, but this is more likely due to these establishments being in higher socioeconomic neighborhoods. Such establishments likely attract more shoppers of higher income and education, and these sociodemographic factors have been shown to be predictors of mask use.[41] Several studies have applied theories to determine psychosocial factors explaining mask use,[42–44] and constructs from the TPB along with findings from this study can support the design of effective interventions. Public health practitioners must consider climate, season, sociodemographic, and psychosocial characteristics during the implementation and distribution of health campaigns geared toward mask use. Future research using experimental designs should explore whether provision of masks and educational interventions can increase mask use among the public.

Regarding physical distancing, only 29% of observed shoppers in our study maintained a safe distance from others if others were present. Additionally, people in groups of ≥ 2 were less likely to distance from others outside of their group compared to if they were alone. The current study found that nearly 31% of the variability in distancing was explained at the establishment level. An investigation of outdoor trail users found that trail width and visitor density impacted physical distancing,[45] suggesting physical limitations likely affect the capacity to practice distancing. Apart from the environmental context, internal and normative pressures may also exist. According to 1 study, young people were less likely to comply with distancing guidelines,[46] and another study revealed young adults reported perceived social pressures were barriers to physical distancing.[47] The design of new indoor spaces or redesign of existing community spaces must consider distancing to overcome physical barriers, and applying behavior change techniques to bolster positive attitudes by providing information about health consequences to friends and family members may overcome internal and normative barriers.[46] Therefore, multimodal approaches that target both the built environment and norms are recommended to increase distancing in community settings during outbreaks.

A few limitations were identified in this study. This study was conducted within a 1-month time frame in 1 city, and findings may not be generalizable to year-round or even other regions of Canada. Furthermore, certain characteristics were not collected through observation (eg, gender, adult vs child) because they rely on assumptions. Due to the unintrusive nature of this study, shoppers were not approached to collect these characteristics and other sociodemographic information (eg, age, income, education) known to be determinants of these preventive health behaviors.[13,17,19] As the pandemic evolves over time, the practice of these behaviors and public perceptions surrounding them may change. Therefore, these findings provide only a cross-section of observed practices and may not reflect true variability in outcomes at each establishment or over time. Moreover, the study location was conducted in a city that is defined as a large urban center with over 100 000 people,[48] and our results may not be applicable to rural settings. A relatively small number of establishments included for investigation in this study resulted in limited power to assess establishment-level variables. Last, some types of indoor establishments, such as fitness centers, recreational centers, and sporting venues, were not included due to concerns about a fee for entry and loitering during observations. Future studies in this area are encouraged to investigate observed health behaviors in these venues, lower traffic settings, rural areas, use a greater sample size of establishments, and repeat this observational assessment during another time of year or extend the data collection period.

Public and private establishments can implement changes to promote preventive behaviors among their clientele. The results

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of this study suggest the following as possible interventions: using free-standing AHS dispensers to increase hand hygiene compliance in public spaces, tailoring messages to encourage these behaviors as prosocial, and modifying spaces to facilitate physical distancing during infectious disease outbreaks known to spread through droplets. Public health officials may benefit from connecting with these larger indoor community settings to co-create effective and brand-friendly signage. Going forward, public health policies aimed at promoting these behaviors can consider the use of regulatory instruments imposed on larger establishments to have signage and consider financial instruments for these settings to subsidize or provide rebates to certain evidence-based resources shown to be effective at increasing compliance (eg, free-standing AHS dispensers, improved ventilation, touch-free entryways). Public health crises vary, and careful planning and implementation are required to avoid policy fatigue, reduce the likelihood of a perceived barrier toward favorable health behaviors, and reduce criticisms toward governing institutions.[6,47]

Conclusion

This study used observational methods to identify gaps in preventive behaviors among shoppers in various community settings during the COVID-19 pandemic. Sanitizer use, mask use, and physical distancing were generally low among the public. These preliminary findings suggest that specific characteristics, group norms, and certain environmental factors influence these behaviors. Although only a small amount of the variance in sanitizer and mask use was explained at the establishment level, a substantial amount of physical distancing was explained at this level and suggests that efforts to modify indoor community settings may positively impact distancing during infectious disease outbreaks. Masks and sanitizer use can be strengthened through prioritizing educational interventions along with the provision of free-standing AHS dispensers. Future research could investigate observed preventive behaviors during other seasons, regions, and settings (eg, rural, recreational venues); collect sociodemographic and known psychosocial characteristics of participants along with employing observational assessments; and evaluate the effectiveness of various health messages and interventions on the level of compliance, using experimental study designs.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/dmp.2023.48

Data availability statement. Individual and aggregate data are available as supplementary information.

Author contributions. Conceptualization: AT, IY, and AP; Formal analysis: AT; Investigation: AT, IY, DP, RZ, and AP; Methodology: AT, IY, DP, and AP; Project administration: AT and AP; Supervision: IY, DP, and AP; Validation: IY, DP, and AP; Writing—Original Draft Preparation: AT; Writing—Review and Editing: AT, IY, DP, RZ, and AP. All authors contributed substantially to this study, to the editing, and to the final approval of the manuscript.

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Competing interest. None

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