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Research article

The influence of social conformity on mask-wearing behavior during the COVID-19 pandemic

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ABSTRACT

Over the course of the COVID-19 pandemic, in addition to vaccination, health authorities have strongly advocated the wearing of face masks as a crucial measure in combating the virus. Nevertheless, the recommendation or legal requirement to wear a face mask is no guarantee of adherence to the rules. A person's decision to wear a mask may also be based on their beliefs and is likely to be influenced by their observation of the mask-wearing behavior of other people. This study aims to explore the role of conformity on the wearing of masks during the COVID-19 pandemic. Given that there is little evidence on how the mask-wearing behavior of others and demographic factors affect people's decisions to wear face masks in public settings, we performed a large-scale observational study in the Czech Republic during a period of rapidly increasing COVID-19 related cases and deaths. We observed a total of 1753 customers and 472 employees in 67 highly frequented shopping venues. The data were collected by trained observers and analyzed using multilevel logistic regression modeling. The results indicate that the mask-wearing behavior of new customers was influenced by the proportion of other customers wearing masks and the behavior differed according to the demographics of age and sex. A notable finding was that the greater the presence of customers wearing masks in a store, the lower the propensity of new visitors to wear masks. Which may be evidence of problematic free-riding behavior. These findings therefore have policy implications and can aid the formulation of specific (communication) strategies to promote mask-wearing behavior.

1. Introduction

There have been more than 663 million confirmed COVID-19 cases and over 6.8 million related deaths worldwide as of January 2023 [1]. In economic terms, the pandemic has led to a global contraction in various sectors and has greatly influenced the daily routines of individuals. Thus, preventing the spread of the disease has been of paramount importance. Apart from vaccination [2], one of the most effective and commonly used ways of preventing the further spread of the virus has been the proper and continuous use of face masks. Face masks can significantly reduce transmission rates of the virus, especially in indoor venues (e.g., stores, shopping malls, etc.) [3]. It has been reported that where face masks are worn properly (i.e., covering the nose and mouth), they can substantially reduce the risk of contracting the virus or transmitting the disease, by up to 60% [4]. As the virus became an acute global problem affecting many aspects of society, local, national, and international health authorities imposed rules on mandatory

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mask-wearing across their jurisdictions [5]. Although these regulations have been continually changing since the beginning of the pandemic, their purpose remains the same – to reduce the transmission rate of COVID-19. Changes in the mask-wearing regulations have primarily reflected the cyclical nature of the pandemic (i.e., the various waves), and the diverse approaches of authorities in different countries [6,7]. However, the frequent changes in regulations have influenced mask-wearing behavior (i.e., adherence or non-adherence to mandatory regulations) and people's propensity to wear them at all [8].

Extensive academic attention has been directed toward the COVID-19 pandemic and its implications for various domains. One of the most frequently addressed areas in this regard has been mask-wearing behavior. Some studies have been anchored in the local context [4,9], and have investigated both motivating [10,11] and de-motivating factors for mask-wearing [12]. Others have focused on adherence and non-adherence to mask-wearing [4,8,13], the role of face masks in reducing social distancing and free riding [14], and the primary factors related to mask-wearing [15]. As far as we know, there has been no study that has investigated mask-wearing behavior through the lens of social conformity. However, as individual behavior is supposedly influenced by the observed behavior of others (e.g., through the concept of social groups [16]), it is an important perspective. Broadly defined, conformity implies the tendency of individuals to accept the behavior, values, and attitudes of the social group (e.g., a group of customers waiting in line) [17]. In the context of mask-wearing behavior, conformity suggests that if an individual not wearing a mask enters a store where all (or the majority) are wearing face masks, it is more probable that the person will conform to the group behavior and wear a mask. As the wearing of masks is relatively easily observed, individuals can easily reflect on the behavior of others and make their decision accordingly. In this regard, higher levels of observed mask-wearing behavior may produce a social norm that increases the likelihood of wearing a mask (for example, when face masks are worn by the majority, it induces the creation of a social norm that depicts the group's accepted/promoted behavior) and vice-versa.

Our stance on conformity is based on the fact that people who wear masks tend to consider others who wear them more favorably [18] and that people who self-report that individuals socially close to them (e.g., friends, family, partners, etc.) wear masks regularly have a greater tendency to do too [19]. Similarly, Barcelo and Sheen [7] found that the propensity of individuals to wear masks is highly correlated to whether their immediate neighbors are wearing them. Wu and Huber [20] found that, in terms of social-distancing measures, individuals are more inclined to adhere to a prescribed rule if their social networks are doing likewise. These findings provide an array of evidence to suggest that mask-wearing behavior may be influenced by the behavior of other people.

In addition to social conformity, social (peer) pressure has an effect on an individual's (mask-wearing) behavior [21]. Given that social pressure implies the "exertion" of certain influences on the behavior of individuals (e.g., demands, persuasion, or threats) [4,14], adhering to commonly accepted behavior may be perceived as "social inertia". Although both conformity and social pressure are focused on perceptions, social pressure may be perceived negatively and, if wrongly and inappropriately applied, might result in more vigorous resistance (e.g., rejection of the social norms) [22]. We operationalize the social pressure through the assumption that the number of customers in the observed store induces certain (mask-wearing) behavior. For illustration, the fact that the store is cluttered with customers during COVID-19 will put a layer of stress on those entering the store to wear a mask and obey the widely accepted social norm. Essentially, the more customers are present the greater the expected inner urge to adhere to the social pressure – even when the individual belief collides with the particular social norm. This stance can be further elaborated by bandwagoning behavior [23] - although both social pressure and bandwagoning are routed in social conformity [23].

Academic contributions on this topic have been almost exclusively based on self-reported perceptions and attitudes (e.g., via surveys and controlled experiments), whereby, due to the disadvantages of the particular data collection methods [24,25], the quantification of actual (mask-wearing) behavior was not possible. What has largely been missing in the literature is the capturing of real-life mask-wearing behavior in an everyday setting (e.g., while shopping). This would allow us to map the current situation and inform stakeholders tasked with designing measures to combat the further spread of the disease.

Given the above-mentioned deficits, we conducted a large-scale field observational study to facilitate a greater understanding of the background social forces that influence mask-wearing behavior. The research was carried out in Brno, the Czech Republic's second-largest city. During the period of observation, mask-wearing regulations were strictly enforced and anybody entering an indoor venue was obliged to wear respiratory protection (FFP2, KN95, or equivalent). Failure to comply was subject to a penalty. Sixty-seven frequently visited shopping locations were carefully selected to ensure coverage of a range of diverse types, sizes, and store locations. The study took place in a period of increasing numbers of COVID-19-related cases and deaths.

The primary goal of the study was to determine whether social factors play a significant role in explaining mask-wearing behavior. We also wanted to find out whether mask-wearing behavior differs between age and sex categories and, if so, the extent to which it is the case.

By addressing recognized voids, we make three significant contributions to social conformity and social pressure literature. Firstly, by performing the observation of real-life mask-wearing behavior, we directly responded to open and recent calls to quantify actual behavior [10,12,26], unlike perceived that has been captured on several occasions to date. Secondly, this is one of the first scientific attempts that attempt to portray the actual mask-wearing behavior through lenses of social conformity and social pressure. By providing empirical evidence that conformity and social pressure led to changes in actual mask-wearing behavior, our findings extend the respective domain literature and point toward several research prospects. Thirdly, the results indicate that the older female category adheres the most to the valid COVID-19 regulations (mask-wearing). This is important on two levels. Firstly, it follows up on the evidence from the literature [7,19,20,27] that assumed the role of conformity and social pressure on actual behavior. Secondly, it indicates to the authorities that more efforts must be made to focus and communicate efficiently with other age (youth, mid-age) and sex (male) categories.

Having laid out the primary research goals, information on the methodology and data collection procedures is presented in the next part of the paper. This is followed by the results, the discussion, and the conclusion. The paper concludes by identifying limitations of

the study and possible directions of future research.

1.1. The interplay between COVID-19, conformity, and social pressure

Essentially, the concept of social conformity implies the tendency to follow accepted behavior inside specific social groups (e.g., in our case customers in the store) [28]. In broad terms, conformity implies that individuals adhere to the group's values, attitudes, and consequently behavior [29]. Originally, Crowne [30] argues that social conformity is primarily related to the degree to which one seeks social approval or, contrary, disapproval (for example, through concepts of self-presentations or self-disclosure). In practical terms, conformity implies following the group's behavior (even if such a behavior is not in line with one's attitudes and beliefs) [17]. For instance, mandatory mask-wearing even for individuals that are not in a vulnerable demographic group, are vaccinated against COVID-19, or can not wear facemasks due to other reasons. Observing COVID-19's context, the role of conformity is assumably critical in changing the overall group's behavior. For illustration, health authorities may have counted that the indirect influence of social groups will push more skeptical segments of the population to adhere to the regulations (e.g., to wear a mask, social distancing rule, etc.), as they would be influenced by social groups they belong to (e.g., partners, family, etc.). Yet, the effect of conformity could potentially backfire on a societal level [31]. For instance, the social groups consisting of skeptical segments may induce further impact on the other undecided individuals – consequently leading to the growing issue of non-adherence and sub-optimal behavior.

While conformity pushes behavioral changes to align with the group's norms and expectations, social pressure is a complex and subjective concept whereby an individual is encouraged to adhere to certain norms or behave in a specific manner [14]. In terms of COVID-19, to be motivated to behave following the currently valid measures to curb the pandemic. Practically, each individual is motivated by others to perform a certain task (e.g., to wear a mask) as they find those tasks to be so-called socially desirable in the present context [10]. On contrary, socially undesirable actions would imply exclusion from a social group [8,10,32]. For instance, those that do not wear facemasks (socially undesirable in the context of the pandemic) may not be allowed to enter the store. Given the challenges to quantify social pressure (due to its subjectivity [33]), we operationalize it by estimating the number of present customers in the store who adhere to the COVID-19 measures. We anchor our reasoning in an assumption that customers that are in the store would like (and expect) those entering to adhere to the valid regulations and assist in fighting the spread of the virus. We found additional support for this reasoning in herd behavior, which postulates that individuals are aligning their behavior primarily based on local interactions (e.g., observations) and without centralized coordination [31,34].

In any case, it is of paramount importance to portray the real-life dynamics within social groups, as those prove to be very influential in times of crisis. Although the literature recognizes numerous psychological frameworks that could help in understanding mask-wearing behavior, of which social conformity and pressure are only two socially supported ones. Notably, the scientific output is fragmented and inconclusive (for instance 12, 14, 18,26,35) and based on self-reported data often suffers from questionable reliability [25,35].

2. Methods

Data were obtained by observing compliance with the COVID-19 measures valid at the given time in selected stores in Brno, Czech Republic. The data collection took place on November 4th, 2021. To decrease the chances of the Hawthorne effect [36], we performed the non-participatory covert observation of compliance behavior. That means, we observed individuals' behavior in the everyday environment without any interruptions from the observers' side.

The data were collected at both the store level and the individual level (individuals being employees and customers). To reduce bias, observations were conducted in pre-defined locations, which were selected by the study authors for the availability of pre-defined types of stores within reasonable walking distance. A wide range of stores was selected for observation to capture the diversity in behavior: more specifically, drugstores, pharmacies, electrical stores, clothing stores, bookstores, tobacconists, and grocery stores.

The observations were conducted during two-time blocks, i.e., morning (7:00–13:30) and afternoon (13:30–20:00), with each store observed twice in a block (i.e., four times during the data collection). Multiple observations were meant to capture different time-related patterns (e.g., bookstores being visited rather in the afternoon). They also increase the validity and reliability of the findings (especially in the case of smaller, less frequented stores [37]).

The observations were conducted by trained observers, who received a monetary reward for carrying out the task. Nineteen observers were divided up into eight pairs and one group of three to increase the reliability of the collected data. To ensure inter-rater reliability we followed the suggestion by Belur and others [38], whereby the observers were thoroughly trained in completing the forms, and then received training in a real-life model situation. Observations were recorded on pre-prepared forms (see below) and individual pairs were instructed to fill in the data only once they mutually agree on the entries. However, the pairs of observers collected data independently of each other, in line with the provided guidelines. They were also informed as to how to answer any questions from the people they were observing and how to act in the case of a potential conflict.

2.1. Observation forms

The observers completed two types of forms. The customer and employee observation form (S1 Checklist - customers) contained information on the time of observation, an estimate of the number of customers in the store at the time of observation, an estimate of the percentage of customers wearing respiratory protection, and information on individual employees and customers entering the store (sex, age, respiratory protection, use of disinfection, entering in a close group). Children, not able to walk independently were not

included in the observation, as children under two years old were exempted from mask-wearing regulations.

This form was complemented by the store observation form (S2 Checklist - store). The store observation form contained information on the type of store, its location and size, the location of the restriction notices, the provision of protective equipment, and signs about social distancing.

To ensure the data quality and compliance with the guidelines and instructions, both forms were subject to rigorous checks by the research team before further data processing (e.g., complete filling, proper format of data entered, all data being readable and understandable for further analyses, etc.).

3. Ethics

A prominent part of the study was to observe compliance with rules and legal norms in force at the given time in the Czech Republic. Non-compliance with them might have been considered a misdemeanor or an offense in more severe cases.

Since this is an observational study in a public space of ordinary behavior, no ethical approval was needed. We respect the psychological well-being and privacy of all involved subjects, and we did not collect any personal data of individuals. Thus, we did not seek informed consent, nor we intervene in the observed situation in any capacity. Furthermore, all data collectors were instructed to provide basic information on research and contact information on request. No researcher in our study has any conflict of interest regarding results, methods, or any other part of the study. Given that all research procedures involved public observations and used publicly available data, official approval by an Institutional Review Board is not needed. For the sake of transparency, we are attaching the official communication received from the Research Ethics Committee of Masaryk University (Appendix A).

3.1. Research sample

Given the population of the city of Brno (386,000 inhabitants) [39] and using a margin of error of 5%, confidence level of 99%, and response distribution of 50%, the required sample size for this study is 384 individual observations [40]. Our sample is significantly larger than the required minimum. The data is based on observations of 67 stores, 472 employees, and 1753 customers. To capture a variety of store types, we intentionally selected those shopping areas that had most of these types. The sample consisted of 13% grocery stores, 10% bookstores, 13% tobacconists, 15% pharmacies, 10% electrical stores, 15% fashion stores, 12% drug stores, and 10% other stores. A total of 73% of the stores were part of a shopping center, with the remaining 27% of stores located outside shopping centers. We observed a wide range of sizes of stores, ranging between 10 and 17,000 m^2. The observed individuals consisted of 62% females and 38% males between the ages of 2 and 80.

3.2. Variables

Dependent variable. The dependent variable was a dummy indicating whether a customer correctly used respiratory protection. Two conditions needed to be satisfied simultaneously (at the moment customers entered the store) to code respiratory protection as having been correctly used: the person needed to be wearing one of the prescribed types of face masks (FFP2, KN95, or equivalent), and be wearing it correctly (over their mouth and nose). The motivation behind measuring mask-wearing at the moment of entering the store was motivated by the fact that the entrance represents a spot common to all stores. For example, observing the behavior inside the store (after the entrance) would be problematic as there is significant heterogeneity in other characteristics of store design, for example, size or presence of aisles.

Independent variables. We included three variables that represent external conditions that could induce social conformity. The first was the proportion of employees of a given store correctly wearing respiratory protection (see above). The second was the proportion of customers already in the store and visible from the entrance correctly wearing respiratory protection (see above). The third variable was social pressure, as measured by the estimated number of customers per square meter of a shopping area.

4. Controls

We controlled several customer and shop-level variables. At the customer level, we had four controls: age, sex, entrance in a close group, and observation time. We measured customer age by modifying the estimate (in years) of the age of customers entering the store. In the modification, we transformed customer age to a range between 0 and 1, with 0 being the lowest observed age [2] and 1 being the highest observed age (80). Thus, the values are relative to the ones observed in the sample. The sex of the customer was a dummy variable with 1 indicating that the customer was a woman. Entrance in a close group was a dummy variable, with 1 indicating that a customer entered a store as a member of a close group of customers entering at the same time (e.g., a family). Only customers that were entering in close groups (based on closeness, verbal/non-verbal interaction, or other distinctive characteristics) were coded as close group members. We choose this more restrictive approach as such coherent groups represent contexts in which the in-group similarity is the most pronounced and thus the most important to control. Finally, we categorized the observation time into four dummy variables, with the first indicating an observation time before 10:00, the second between 10:00 and 11:59, the third between 12:00 and 14:59, and the fourth from 15:00 onwards. The fourth dummy variable served as a reference in our model and was omitted. At the shop level, we used one additional control: a dummy variable that indicated whether the entrance at which observers collected data was from outside the building (an outdoor entrance). Our research framework is illustrated in Fig. 1.

4.1. Estimation

Therefore, To estimate the models, we used logistic regression, which is specifically designed for binary dependent variables [41]. Moreover, customers were observed inside individual stores that were located inside individual shopping areas. Consequently, there is a good reason to assume that these observations may share certain characteristics caused, for example, by different enforcement of restrictions in individual shops or areas. Therefore, we used a multilevel form of logistic regression, which takes into account this drawback and is relevant in the epidemiologic context [42]. Specifically, we used three levels for the analysis: customer (individual), store, and shopping area.

Aside from calculating individual multilevel logistic regression models, we also calculated the average marginal effects (AMEs) of predictors. The AMEs describe the marginal effects the predictors have on average over the observed values in the sample [43]. These measures allow us to estimate the effect of a given variable on observed behavior while controlling for other variables, i.e. to assess its contribution to observed behavior.

5. Results

Table 1 contains the descriptive statistics and correlations for the observed sample. Most of the values of the variables ranged between 0 and 1, with two exceptions. First, the lowest level of respiratory protection among customers was 0.15, which means that there were no shops in which there were only customers without masks. Second, social pressure (number of customers per m^2) is not naturally bounded between 0 and 1, although it had a maximum value of 0.5. The maximum value represents an interesting observation as it far exceeds the restrictions imposed by legislation (1 customer per 15 m^2, which is approximately 0.067 customers per 1 m^2). The data indicates that on around one-third of occasions the number of customers per square meter did not comply with the legal regulations. The majority of these observations comes from stores below 200 m^2.

Table 2 shows the results of the multilevel regression models. The first model contained only control variables, while the second included variables related to social conformity.

While statistical significance p indicates that the effect of a given variable exists, it does not reflect effect size, which may differ considerably across variables. For this reason, we calculated the average marginal effects (AMEs) of all variables in Model 2 (see Table 3 for the values).

Three variables stand out for their effect on the correct use of respiratory protection by customers entering a store. First, the chances that a customer has correct respiratory protection increase with age (AME 0.288). Moreover, two of our three predictors for social conformity have a notably large effect. The effect of respiratory protection on customers already in the shop (AME 0.612) is very strong and remains so over the 95% confidence interval. The higher the proportion of correctly protected customers in a store, the higher the chances are that customers entering the store will wear their respiratory protection correctly. Contrary, a higher estimated number of customers per square meter (social pressure) has the opposite effect. The more customers per square meter, the less likely it is that customers entering the store will wear their respiratory protection correctly. While this effect is strong (AME 0.417), its 95%

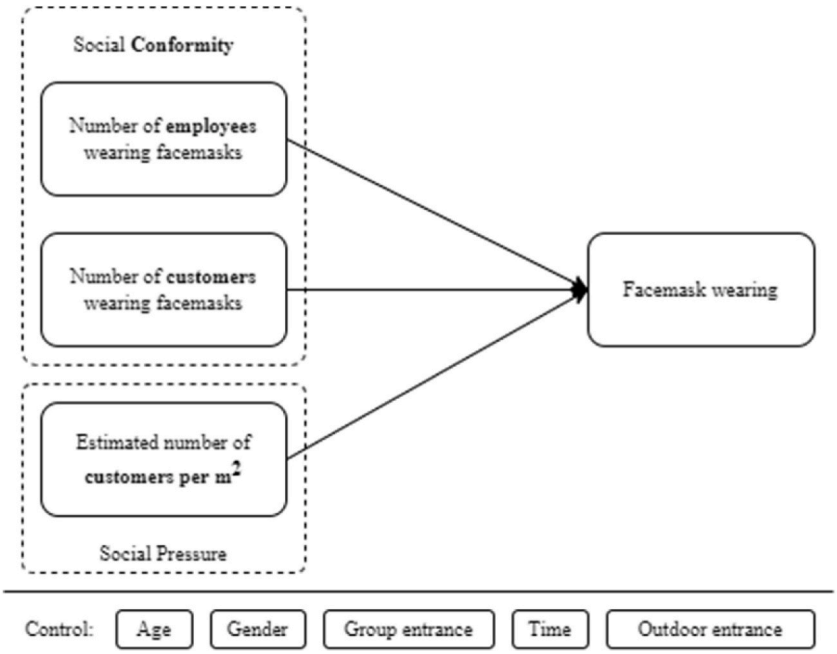

Fig. 1. Research framework (Source: Authors).

Table 1
Descriptive statistics and correlations (Source: Authors).

		mean	sd	1	2	3	4	5	6	7	8	9	10	11
1	Correct use of respiratory protection	0.705	0.456	1.000										
2	Age of customer	0.487	0.184	0.121	1.000									
3	Sex of customer (1 = woman)	0.584	0.493	0.050	−0.006	1.000								
4	Customer being member of a close group	0.239	0.427	−0.028	−0.145	0.004	1.000							
5	Observation time (before 10:00)	0.185	0.389	−0.014	−0.015	0.062	−0.093	1.000						
6	Observation time (10:00–12:00)	0.335	0.472	0.027	0.020	−0.037	0.029	−0.337	1.000					
7	Observation time (12:00–15:00)	0.258	0.437	−0.018	0.060	0.017	−0.045	−0.283	−0.412	1.000				
8	Outdoors entrance	0.275	0.447	0.011	0.051	0.051	0.042	−0.032	0.029	−0.017	1.000			
9	Respiratory protection - employees	0.574	0.361	0.076	0.039	0.038	−0.057	0.044	−0.009	−0.092	0.161	1.000		
10	Respiratory protection - customers	0.893	0.122	0.176	0.051	0.013	−0.085	0.100	−0.134	0.080	0.034	0.122	1.000	
11	Social pressure (customers per m^2)	0.061	0.069	−0.038	0.043	0.047	−0.107	−0.008	−0.006	0.045	0.081	−0.036	0.176	1.000

Note: n = 1754 (customer level).

Table 2
Multilevel logistic regression models (Source: Authors).

	Model 1: Controls only		Model 2: Full model	
	Odds Ratio	p-value	Odds Ratio	p-value
Customer (individual) level				
Age of customer (relative)	5.261	0.000	4.615	0.000
Sex of customer (1 = woman)	1.297	0.021	1.295	0.022
Customer as member of a close group	1.042	0.757	1.023	0.868
Store level				
Observation time (before 10:00)	0.710	0.097	0.684	0.061
Observation time (10:00–12:00)	0.920	0.644	1.035	0.848
Observation time (12:00–15:00)	0.865	0.404	0.834	0.287
Outdoor entrance	1.082	0.686	1.030	0.859
Respiratory protection - employees			1.083	0.659
Respiratory protection - customers			25.609	0.000
Social pressure (customers per m^2)			0.110	0.033
ICC area	0.052		0.035	
ICC store within area	0.080		0.041	
AUC (95% Conf. Interval)	0.678 (0.651–0.705)		0.682 (0.654–0.709)	

Note: Models contain no additional variables for the shopping area level; Constant not reported.

Table 3
Average marginal effects (AMEs) of predictors (Source: Authors).

	AME	p-value	95% Conf. Interval	
Age of customer (relative)	0.288	0.000	0.171	0.406
Sex of customer (1 = woman)	0.049	0.022	0.007	0.090
Customer as member of a close group	0.004	0.868	−0.046	0.054
Observation time (before 10:00)	−0.072	0.059	−0.146	0.003
Observation time (10:00–12:00)	0.006	0.849	−0.060	0.073
Observation time (12:00–15:00)	−0.034	0.287	−0.097	0.029
Outdoor entrance	0.006	0.859	−0.056	0.067
Respiratory protection - employees	0.015	0.659	−0.052	0.082
Respiratory protection - customers	0.612	0.000	0.418	0.806
Social pressure (est. customers per m^2)	−0.417	0.034	−0.802	−0.032

confidence interval also includes relatively small AME values. The other effects are small despite their statistical significance. For example, women are more likely to have the correct respiratory protection (p-value 0.022), but the effect is not high (AME 0.049).

Fig. 2 graphically illustrates the AMEs of individual variables using a point estimate as well as a 95% confidence interval for it. The dashed line indicates zero effect on observed behavior.

6. Discussion

The goal of this study was to explore the role of social conformity in mask-wearing behavior. As far as we know, there has been no peer-reviewed or observational study that has focused on real mask-wearing behavior from this perspective and thus no research

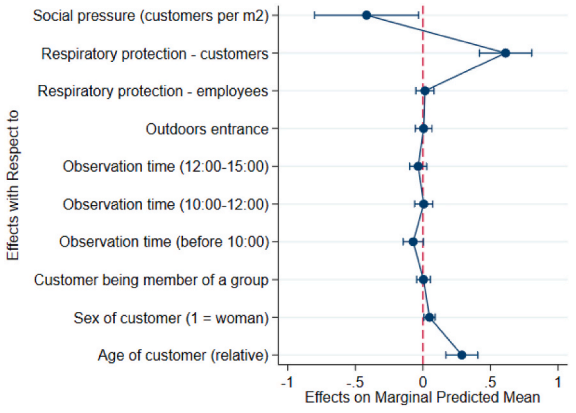

Fig. 2. Average marginal effects (AMEs) of predictors (Source: Authors).

against which we can directly compare our results. This study also contributes to current knowledge by providing empirical evidence of real-life mask-wearing behavior in a unique context, i.e., the Czech Republic. The results are based on observations made in heavily frequented shopping venues.

Three factors (respiratory protection of employees, respiratory protection of customers, and estimated number of customers per m^2) were operationalized to examine conformity and social pressure, which resulted in interesting statistical outputs. While the mask-wearing of fellow customers had a strong positive influence on a person's propensity to adhere to face mask regulations – thereby supporting the effect of conformity – we observed the opposite effect (negative relation) in relation to the estimated number of customers per m^2. This conflicts with the assumption that the more customers per m^2 (crowded stores), the stronger the influence will be on mask-wearing behavior in the same direction (e.g., due to the social pressure originating in the particular social group). This finding goes against Bir and Wildmar's [14] and Bryson's [44] recent studies that concluded that social pressure can be a significant motive to adopt social group behavior. Our counterintuitive finding can be attributed to free-riding behavior [23,45,46], as an adverse and unforeseen reaction to social pressure or even to inattention and mistakes made by other people. For example, customers entering a store with a high proportion of customers wearing masks may decide not to wear masks, as they perceive the store to be a safe area given that the rest are wearing masks. Hypothetically, free riders may pursue everybody to wear masks, but not to wear them themselves (similar logic may apply to vaccination skepticism [23]). They might even find another person not wearing a face mask, thus justifying their decision not to wear one. Additionally, the notion that social pressure has a negative effect on mask-wearing behavior may be partially interpreted as a rebellious (and unlawful) behavior toward authorities [47], or in our case accepted social and legal norms.

Another notable finding is that the respiratory protection of employees did not have a significant impact on mask-wearing behavior. Store employees (e.g., retail workers) are expected to behave in a manner that promotes and communicates the company's position and etiquette on certain issues (e.g., mask-wearing), thereby cascading the message and influencing the behavior of others. Still, we did not capture any statistically meaningful relationship between the mask-wearing behavior of employees and that of customers, which calls into question the aforementioned idea and seems a promising area for future research. This may be explained by the proposition that the influence of other customers' (in-group) mask-wearing behavior overruled the potential impact of employee behavior. This is similar to the situation of mass events, where individuals align primarily with the observed behaviors of their peers, largely ignoring their information base and other exogenous influences (e.g., the behavior of retail staff) [48], which leads to social herding [31]. This is a noteworthy premise that requires further research attention.

With regard to customer-level characteristics, the results revealed that older age categories are more inclined to wear masks. This is understandable given the scale and content of Czech communication campaigns that (primarily at the beginning of the COVID-19 pandemic) focused on the elderly, presenting them as one of the categories most vulnerable to the virus [49]. Moreover, our findings support those of Haischer et al. [50], who found that older people are more inclined to mask-wearing in comparison to young or middle-aged individuals. Conversely, these findings indicate that younger people are more unprotected and thus potentially more vulnerable in terms of contracting and spreading the virus, which is borne out by the high incidence of confirmed cases among this category [50]. This might also be considered as a consequence of the dominant and prevailing narrative from the beginning of the pandemic in which young people were presented as either immune to the virus or largely unaffected by it. In terms of sex, the propensity of women to use face masks was found to be higher than that of men [51]. This can be attributed to the women's higher health care awareness (e.g., 32, 33) and the more prevalent risk-taking behavior of men in terms of health issues [50]. This is in line with Moran and Del Valle [51], who concluded that women are more involved in so-called non-pharmaceutical behaviors (e.g., the use of disinfectant, hand washing, mask-wearing, etc.) than men. Moreover, our findings reflect the more empathetic altruistic, and prosocial behavior of women [52].

The time of the observation (morning, afternoon, or evening), whether a customer entered the store individually or as a member of a close group and the location of the store entrance did not have any statistically significant relation to mask-wearing behavior. Therefore, we found no empirical evidence that suggests these variables influence the wearing of masks.

It is necessary to mention several limitations of the study that may have influenced our findings. Firstly, although we provided structured and validated checklists for the observations and one-day training for the observers, and divided them into pairs to ensure consistent and independent data collection, observation, by its nature, tends to be subjective assessment. There is a risk of incorrect estimation due to the subjective evaluations of the observers (e.g., the age of customers, the proportion of customers with correct respiratory protection in a store or the identification of mask type may have been incorrectly estimated). Secondly, given the research design, we did not ask customers and employees if they perceived that their mask-wearing had been influenced by others in any way, and thus conformity behavior was investigated only indirectly. This presents a promising area of future research in which, for example, an experiment could be designed that would capture the causal relations. Although our variables measure real-life behavior (in contrast to previous studies that mostly relied on self-reported perceptions (e.g., 20, 32–38)), more insights are needed to fully understand mask-wearing behavior. Future studies could follow our research design and add a brief survey to triangulate the observed variables more precisely. Thirdly, we did not find a way of operationalizing whether someone had been vaccinated. Vaccination status may have an impact on a person's decision not to adhere to mask-wearing regulations, as those who are vaccinated may perceive themselves to be immune to the COVID-19 virus [53]. Moreover, the study could be repeated at various points in time to capture the longitudinal dynamic and changes in mask-wearing behavior. Also, we could not safeguard if individuals were not subjects of two or more observations at different stores. Similarly, our research design may be censored in a way that does not account for those that are made uncomfortable by the presence of mask/not-masking-wearing crowd in the store and decided to stay outside. The potential remedy would be to perform a photo-epidemiology study and rely on video surveillance data and focus on individuals having face-masks in their hands. These amendments would lead to an increase in the robustness of results at a population level [52]. Scholars

should factor these limitations into future studies, given the existing risk of skewed and censored results. Lastly, the cultural background and broader contextual dynamics could have influenced the real-life mask-wearing behavior. Therefore, to fully comprehend the role of conformity in the wearing of masks, the study should be replicated in a cultural context distant from the Czech one. Thus, these are some issues that are worthy topics for further research.

There are several practical implications of our study. In order to promote the wearing of masks, strict social distancing measures need to be enforced and mask-wearing must be systematically and continuously monitored. The results of this study suggest that ensuring individuals wear masks would have a secondary or cumulative effect on others. More specifically, it would have a knock-on effect, whereby others would align their own behavior with the behavior they observe [54]. Moreover, given the surprising finding that the more crowded stores provoke more resistance to mask-wearing regulations among incoming customers, more emphasis should be placed on restricting the number of customers in stores and preventing mass gatherings. Furthermore, in terms of content, communication campaigns should focus not only on altruistic behavior with regard to categories vulnerable to the virus (e.g., the elderly [55]), but also portray all the categories as being affected by the virus in some way. Also, to increase the impact of communication campaigns, particular social categories (e.g., students, seniors, etc.) should be targeted and the required behavior within those categories should be promoted (e.g., students wear masks), in order to create an unconscious bond between peers. Public policies and communication campaigns should pay more attention to those categories that are inclined to resist the regulations (young people and men), regardless of the extent to which these categories are affected by the virus themselves [56], as their refusal to wear masks can influence others.

7. Conclusion

The findings of this study indicate that social conformity influences mask-wearing behavior. More specifically, the higher the proportion of customers wearing masks properly in a store, the greater the chances that new customers will behave in the same way. In addition, we found an increased propensity to wear masks among women and the older population. Although mask-wearing behavior needs to be virtually universal to have a major impact on the dynamic and development of the pandemic [50], a portion of customers were observed in breach of COVID-19 regulations, which increases the infection risk of other customers, employees and the individuals concerned [57]. This suggests that the authorities should enforce the wearing of to face masks and social distancing measures more strictly, as this will have a knock-on effect on customers, the wider public, and store owners. This may help reduce free-riding and promote consistent mask-wearing behavior. Moreover, stores could introduce policies whereby they provide free masks to subtly promote and stimulate the prescribed wearing of masks and exert pressure on those who do not adhere to the regulations.

Overall, the wearing of face masks to combat the spread of COVID-19 is a complex and sensitive topic that is finely balanced between ideas of collective responsibility and personal freedom. Therefore, a careful approach is required when investigating the mechanisms that underpin real-life behavior in order to determine the best course of action in promoting the appropriate conduct and protecting public health.

Author contribution statement

Dušan Mladenović: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper. Michal Jirásek: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper. Tomáš Ondráček: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper. Zuzana Opatrná; Radmila Štangová: Performed the experiments; Wrote the paper.

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Data availability statement

Data associated with this study has been deposited at Mendeley under the name Social Conformity and Mask-Wearing; URL: 10.17632/wwsx932dsm.1.

Declaration of interest's statement

The authors declare no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e14496.

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