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On the Effect of COVID-19 on Drivers' Behavior: A Survey Study

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Abstract

COVID-19 had a disruptive effect on the global community. This study looks at the effects that the stringent lockdown measures enacted in March 2020 had on motorists' driving patterns. In particular, given the greater portability of remote working associated with the drastic decline in personal mobility, it is hypothesized that these may have served as accelerators for distracted and aggressive driving. To answer these questions, an online survey was conducted in which 103 respondents were asked to report on their own and other drivers' driving behavior. While respondents agreed they drove less frequently, they also indicated that they were not prone to more aggressive driving or engaging in potentially distracting activities whether for work or personal purposes. When asked to report on other motorists' behavior, however, respondents indicated they had witnessed more aggressive and distracting drivers on the road after March 2020 relative to the time before the pandemic. These findings are reconciled with the existing literature on self-monitoring and self-enhancement bias, and the existing literature on the effect of comparable large-scale, disruptive events on traffic patterns is used to discuss the hypothesis on how driving patterns may change after the pandemic.

Keywords

distraction, driver attitudes, driver behavior, human factors of vehicles, pedestrians, bicycles, human factors

The arrival of COVID-19 in March 2020 took the world by surprise. Within weeks the World Health Organization declared it a global pandemic (*1*), resulting in governments worldwide enacting strict lockdown and stay-at-home measures. The ensuing social and economic transformations upended the mobility sector. The adoption of shared transportation plummeted by between 30% and 70% depending on the geography and mode of transport (*2*). Private vehicles (which because of the economic hardship brought by the pandemic underwent poorer maintenance) became the preferred means for the few still commuting to work (*3*).

As COVID-19 rapidly spread, government-mandated lockdowns forced employees worldwide to work from home (*4*). With remote working up 44% in March 2020 (*5*), it became evident that work habits were beginning to change. Commuting to the office was no longer mandatory and working from home (WFH) became the "new normal." A study by Savić (*6*), examined the unprecedented impact that the pandemic had on a sudden demand for WFH. It was concluded that the workforce was undergoing a "digital transformation." Such a digital transformation required the quick adoption of a digital workforce mindset, which included digital literacy and virtual collaboration (*6*). The new WFH culture obliged many to become more heavily reliant on technology, such as web conferencing systems like Zoom and Microsoft Teams (*7*) as means to communicate in the workplace.

As the amount of time spent WFH escalated, the traditional separation between work and personal life blurred (*8*), a situation that contributed to a rise in the consumption of alcohol, drugs, and pharmaceuticals in the years 2020 and 2021 (*9*, *10*). Workers started feeling a greater pressure to work longer hours, with work hours increasing by 30% beginning in March 2020 (*11*). These factors, combined with the greater portability of remote working and the widespread availability of video conferencing apps, led to an increase in the tendency to divide

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time and attention among multiple work and life activities (*12*, *13*), both inside and outside the home office.

Literature Review

Multitasking, or the condition wherein multiple tasks are performed simultaneously, can be particularly perilous when resources are directed away from the execution of safety-critical tasks (*14*). Distracted driving is a common example of multitasking wherein the driver directs their already limited attentional capacity away from the primary driving task toward non-safety-critical tasks like talking on a cellphone or using mobile apps (*15*). Recent studies investigating the distracting effect of using in-vehicle infotainment functions found that the level of distraction associated with performing these activities while driving equals or even exceeds that of completing complicated mathematical operations (*16*). Distracted driving research also found that while the collision risk of carrying on conversations on a cellphone can be up to three times greater than that of driving with no distraction, using handheld devices for texting or navigating mobile apps increases that risk up to 23 times (*17*).

Less obvious factors such as emotional distress can also lead to distracted driving. A 2009 report from the U.S. National Highway Traffic Safety Administration, for example, warns about the safety risks of driving while dealing with strong emotions (*18*) whose severe magnitude could cloud the driver's safety-related decision making (*19*). To a similar extent, the emotional distress caused by large-scale events such as natural disasters could also result in an increase in road collisions. The study by Casey et al. (*20*), for example, recognized psychological distress as the primary contributing factor to the 4.6% increase in road crashes observed in the aftermath of the 2010 to 2016 Oklahoma earthquake seasons.

Alongside the sudden shift in work habits, the plummeting traffic volumes that occurred from March 2020 may also have affected motorists' behavior on the road. A recent ZenDrive (*21*) report compared the driving data from five weeks before the first stay-in-place order (February 6–March 15, 2020) with data generated over the course of the next five weeks under the stay-in-place order (March 16–April 19, 2020). Analysis revealed that fewer vehicles on the road led to an increase in speeding and hard braking by 27% and 25%, respectively. Katrakazas et al. (*22*) found similar trends, with speeding increasing by 6% to 11% and harsh accelerating and braking up 12%. While the seemingly higher rates of aggressive driving were initially attributed to the sudden rush in preparing for the incoming stay-at-home orders, it was later hypothesized that they were associated with a heightened sense of freedom and greater opportunity for speeding experienced on emptier highways (*23*). Support for this hypothesis comes from the study by Li et al. (*24*) which examined changes in driving patterns following road congestion. That study found that, post-congestion, drivers tended to become more aggressive, possibly as a direct response to the prolonged sense of confinement experienced during the traffic jam combined with the enhanced sense of freedom thereafter.

Objectives

With the disruptive effect that COVID-19 has had on the global society at large, the focus of this paper is on investigating the consequences that the dramatic shifts in work and traffic patterns had on the prevalence of dangerous driving. As roadways during the pandemic suddenly became less congested, it is unknown how this influenced drivers' engagement in distracting or aggressive behaviors. This study set out to answer the following three questions:

Objective 1. How has the issuance of stay-at-home orders affected driving patterns?
Objective 2. Have drivers engaged in more aggressive driving after March 2020?
Objective 3. Have drivers engaged in more distracted driving after March 2020?

Related studies have aimed to address similar questions. For example, Vanlaar et al. (*25*) surveyed the motorist population in Canada and the United States to explore the impact that COVID-19 had on the prevalence of excessive speeding, distracted driving, and driving under the influence of alcohol or drugs. Tucker and Marsh (*26*) instead focused on speeding as a key metric to explore changes in traffic patterns during the pandemic. While these studies asked participants to self-assess their own behavior, this investigation is unique in that the respondents were instructed to report on both their own and other motorists' engagement in aggressive and distracting behaviors. This was intended to unearth any inconsistencies between self-ratings and ratings of other drivers on the road. In exploring aggressive and distracted driving, the questionnaire also encompassed a wider diversity of behaviors that did not receive consideration in other studies.

Methods

Participants

One hundred and three respondents were recruited for this study. Eligibility requirements included: having held a driver's license for at least 12 months, and providing consent to participate in the research. All participants indicated that the introduction of COVID-19 stay-at-

home measures affected their social habits, work, or study duties which, at the time of the study, required them to make more frequent use of social and video conferencing applications.

The composition of the participant sample was as follows:

- Sex: 51 out of the 103 participants were females, and the remaining 52 participants were males.
- Age: 16 to 24 years (n = 38), 25 to 34 years (n = 22), 35 to 44 years (n = 24), 45+ years (n = 19).
- Driving experience: 52.4% of the sample had more than 10 years of driving experience, with the rest of the participant sample having between two and 10 years of driving experience.

Eighty percent of the participants were recruited using social media with the remainder being recruited via word-of-mouth. Only institutional social media accounts (e.g., University of Windsor) were used for the recruitment to avoid any bias in the participant selection. Respondents received a $5 Amazon gift card in exchange for their participation. This research was approved by the University of Windsor Research Ethics Board (REB# 20-201).

Design and Procedure

The survey was divided into three blocks. Block 1 included questions relating to the road and traffic conditions along the daily route, and addressed how the issuance of stay-at-home orders affected participants' driving patterns (objective #1). Block 2 included questions related to the respondents' own perceived driving behavior. Block 3 investigated other motorists' driving behavior. Distinct subsets of block 2 and 3 questions were used to determine to what extent motorists engaged in more aggressive (objective #2) or distracted driving (objective #3) following March 2020. All the questions are presented in Table 1. The questionnaire took approximately 5 min to complete, and was administered between November 18, 2020, and January 4, 2021, via Qualtrics.

Block 1. Traffic Conditions (Q1 to Q3 in table 1). Block 1 was designed to investigate how the issuance of stay-at-home orders influenced respondents' driving patterns and the perceived changes in traffic conditions. To encourage participants to compare the circumstances on their daily route before the pandemic with those existing after March 2020, they were presented with the following prompt: "In this section, we ask you questions about your personal driving behavior. In answering the questions, consider how your behavior may have changed shortly following the beginning of the lockdown in March 2020, relative to the past." Participants were then asked to express their level of agreement with the following statements: Q1: "I have encountered fewer vehicles on the road"; Q2: "I have encountered more pedestrians or cyclists"; Q3: "My total number of driving hours a week has decreased." Participants responded on a seven-point Likert scale anchored by 1 = Strongly agree and 7 = Strongly disagree, with a midpoint of 4 = Neither agree nor disagree.

Block 2. One's Perceived Driving Behavior (Q4 to Q13 in table 1). Block 2 was designed to encourage respondents to reflect on their personal driving behavior and how it changed following March 2020. After receiving the following prompt: "In this section, we ask you questions about your personal driving behavior. In answering the questions, consider how your behavior may have changed shortly following the beginning of the lockdown in March 2020, relative to the past," they were asked to reflect on how the shift in work and social habits affected the occurrence of potentially distracting leisure or work-related activities while driving. Using seven-point Likert scales with 1 = Strongly agree and 7 = Strongly disagree, participants expressed their level of agreement with the following statements: Q4: "I tend to answer phone calls and text messages while driving more than usual"; Q5: "I have been more impatient or driven more aggressively, including tailgating"; Q6: "I have been speeding more often"; Q7: "I have shown more behaviors like honking and shouting at others"; Q8: "I have more often used my phone for work or school-related matters while driving"; Q9: "I have been more cautious toward surrounding road environments as more pedestrians and cyclists are out"; Q10: "I have used social media apps more often while driving to make up for the limited face-face interaction with friends and family"; Q11: "I have participated in more business or school meetings via Zoom or other virtual conferencing apps while driving"; Q12: "I have used voice interaction apps (e.g., Apple Siri) more often while driving"; Q13: I have participated in more stunt driving (i.e., exceeding the speed limit by 50km/h, or causing tires to lose traction)."

Block 3. Other Motorists' Driving Behavior (Q14 to Q18 in table 1). Block 3 was designed to investigate respondents' own perceptions about other motorists' driving behavior following March 2020. After receiving the following prompt: "In this section, we ask you questions about the behaviors of other drivers on the road. In answering the questions, consider how the behavior of other drivers may have changed shortly following the beginning of the lockdown in March 2020, relative to the past,"

Table 1. Summary of the Questions Included in the Questionnaire

#	Question
Q1	I have encountered fewer vehicles on the road
Q2	I have encountered more pedestrians or cyclists
Q3	My total number of driving hours a week has decreased
Q4	I tend to answer phone calls and text messages while driving more than usual
Q5	I have been more impatient or driven more aggressively, including tailgating
Q6	I have been speeding more often
Q7	I have shown more behaviors like honking and shouting at others
Q8	I have more often used my phone for work or school-related matters while driving
Q9	I have been more cautious toward surrounding road environments as more pedestrians and cyclists are out
Q10	I have used social media apps more often while driving to make up for the limited face-face interaction with friends and family
Q11	I have participated in more business or school meetings via Zoom or other virtual conferencing apps while driving
Q12	I have used voice interaction apps (e.g., Apple Siri) more often while driving
Q13	I have participated in more stunt driving (i.e., exceeding the speed limit by 50 km/h, or causing tires to lose traction)
Q14	I have seen more drivers speeding
Q15	I have seen more drivers engaged in activities like using their cellphone for calling or texting
Q16	Drivers around me have been more impatient showing aggressive driving behaviors like tailgating
Q17	Drivers have been less patient or showing signs of road rage by, for example, shouting or honking their horns
Q18	Drivers have been more cautious toward surrounding road environments as more pedestrians and cyclists are out

respondents were asked to consider their witnessing of potentially distracting or aggressive behaviors by other motorists. They expressed the level of agreement or disagreement on the same seven-point Likert scale (1 = Strongly agree, 7 = Strongly disagree) to the following statements: Q14: "I have seen more drivers speeding"; Q15: "I have seen more drivers engaged in activities like using their cellphone for calling or texting"; Q16: "Drivers around me have been more impatient showing aggressive driving behaviors like tailgating"; Q17: "Drivers have been less patient or showing signs of road rage by, for examples, shouting or honking their horns"; Q18: "Drivers have been more cautious toward surrounding road environments as more pedestrians and cyclists are out."

Some of the questions in blocks 2 and 3 are organized by theme (e.g., Q6 and Q14 both address speeding), but while block 2 questions ask about one's own behavior (e.g., "I have been speeding more often"), block 3 questions address other motorists' behavior (e.g., "I have seen more drivers speeding"). Themes investigated are: cellphone use (Q4 and Q15), aggressive driving (Q5 and Q16), speeding (Q6 and Q14), road rage (Q7 and Q17), and cautious driving (Q9 and Q18).

Cronbach's alpha was calculated to measure the reliability and internal consistency of the questionnaire (*27*). Internal consistency represents the extent to which the items in a questionnaire are interrelated. Cronbach's alpha calculated on all questions revealed an acceptable level of consistency ($\alpha = 0.76$). Acceptable levels of consistency were also found when alphas were calculated separately for questions measuring perceptions on respondents' own ($\alpha_{block\ 2} = 0.79$) and other motorists' ($\alpha_{block\ 3} = 0.75$) driving behaviors, respectively (*27*).

Data Analysis

Data collected in Qualtrics were anonymized and identification numbers were assigned to participants. Following the adoption of seven-point Likert scales for the questions, wherein 4.00 represent the midpoint between 1.00 (strongly disagree) and 7.00 (strongly disagree), the use of midpoint analysis was selected (*28*). For this, the sample of responses collected for each question is compared against an equally-sized sample of midpoints using the linear statistical model Student's t-test. This is a common approach in related literature (*29–31*). Cohen's *d* was also calculated as the effect size measure. For the stratified analysis where the assumption of equal sample sizes was violated, nonparametric Kruskal–Wallis tests and Mann–Whitney post-hoc tests were conducted (*32*). RStudio was used for data processing and analysis (*33*).

Results

Results are presented by the research questions. Stratified analyses are presented below. Figure 1 shows the means and standard errors for all questions. Figure 2 shows the means and standard errors for questions by theme.

Objective #1. How Has the Issuance of Stay-at-Home Orders Affected Your Driving Pattern?

When asked to report on their own driving patterns, participants indicated that they encountered fewer vehicles

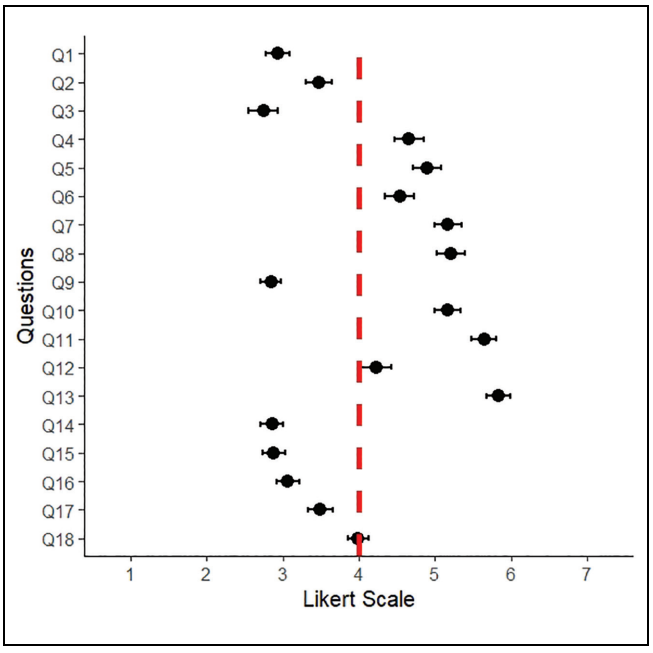

Figure 1. Plot containing means and standard errors for Q1 to Q18.
Note: The dashed red line represents the midway point, 1 = Strongly agree and 7 = Strongly disagree.

(Q1), $t(102) = 6.78$, $p < 0.05$, Cohen's $d = .94$, and pedestrians or cyclists (Q2), $t(102) = 2.99$, $p < 0.05$, Cohen's $d = 0.41$, on the road. They also reported driving fewer hours (Q3), $t(102) = 6.5$, $p < 0.05$, Cohen's $d = 0.91$. As expected, these data confirm the hypothesis that the issuance of stricter stay-at-home orders in March 2020 had a drastic effect on traffic volume.

Objective #2. Have Drivers Engaged in More Aggressive Driving After March 2020?

When asked about their own driving behavior, analysis revealed that participants denied engaging more in behaviors like tailgating (Q5), $t(102) = 4.91$, $p < 0.05$, Cohen's $d = 0.96$, speeding (Q6), $t(102) = 2.83$, $p < 0.05$, Cohen's $d = 0.39$, honking or shouting (Q7), $t(102) = 6.55$, $p < 0.05$, Cohen's $d = 0.91$, or stunt driving (Q13), $t(102) = 11.67$, $p < 0.05$, Cohen's $d = 1.63$. Additionally, respondents agreed they were more cautious toward other road users (Q9), $t(102) = 8.46$, $p < 0.05$, Cohen's $d = 1.18$. When asked about other motorists' behavior, however, participants agreed to witnessing more drivers engaged in aggressive behaviors such as: honking or shouting (Q17), $t(102) = 3.17$, $p < 0.05$, Cohen's $d = 0.44$, tailgating (Q16), $t(102) = 6.08$, $p < 0.05$, Cohen's $d = .084$, or speeding (Q14), $t(102) = 7.64$, $p < 0.05$, Cohen's $d = 1.06$.

Objective #3. Have Drivers Engaged in More Distracted Driving?

Midpoint analysis conducted on block 2 questions revealed that following March 2020 participants denied using their phone more often while driving, $t(102) = 3.38$, $p < 0.05$, Cohen's $d = 0.47$, no matter if it were for work or school (Q8), $t(102) = 6.59$, $p < 0.05$, Cohen's $d = 0.92$, leisure activities (Q10), $t(102) = 6.69$, $p < 0.05$, Cohen's $d = 0.93$, or to engage in virtual conferencing (Q11), $t(102) = 9.94$, $p < 0.05$, Cohen's $d = 1.38$. When asked about other motorists' behavior, however, participants agreed they had seen more drivers

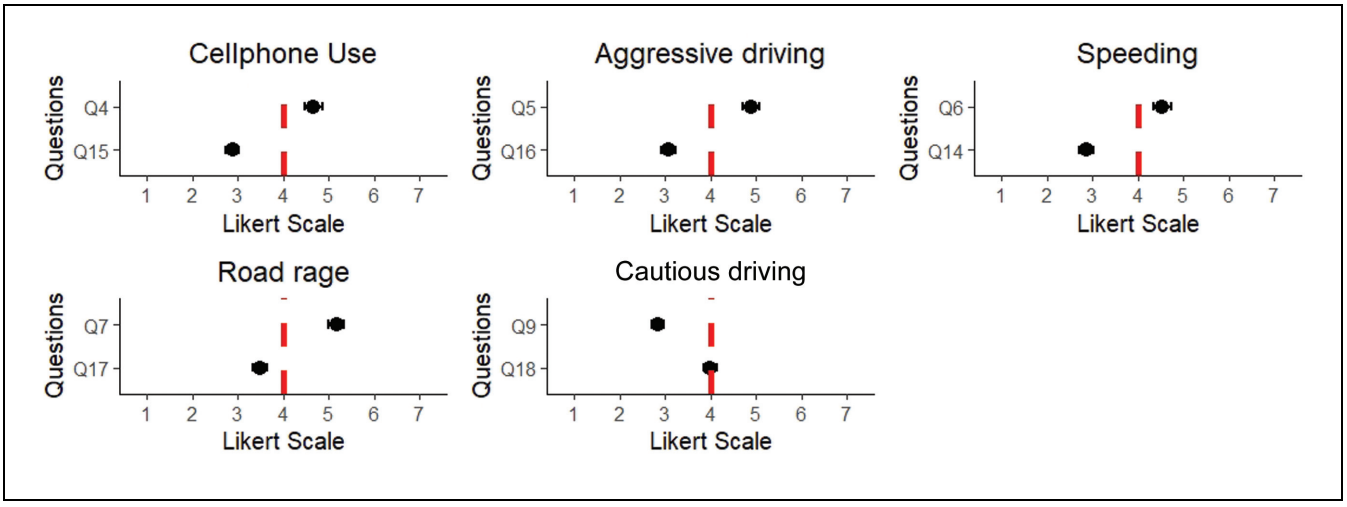

Figure 2. Plot containing means and standard errors for questions by theme.
Note: The dashed red line represents the midway point, 1 = Strongly agree and 7 = Strongly disagree.

engaged in distracting behaviors following March 2020 (Q15), $t(102) = 7.67$, $p < 0.05$, Cohen's $d = 1.07$.

Stratified Analysis

Statistical tests were conducted to explore possible age-based differences. Given the unequal sample sizes for the four age groups: 16–24 years (n = 38), 25–34 years (n = 22), 35–44 years (n = 24), 45+ years (n = 19), Kruskal–Wallis tests were conducted. Significant differences were found for Q5 (I have been more impatient or driven more aggressively, including tailgating), $H(3) = 8.61$, $p < .05$, and Q14 (I have seen more drivers speeding), $H(3) = 7.87$, $p < .05$. Post-hoc Mann–Whitney tests revealed significant differences between the 16 to 24 years age group and the older cohorts. In particular, respondents aged 16 to 24 years reported being more impatient than their 35 to 44 year-old counterparts, $U(N_{16–24} = 38, N_{35–44} = 24) = 277.00$, $z = -2.64$, $p < .05$, and seeing more drivers speeding compared with the 25 to 34 years age group $U(N_{16–24} = 38, N_{25–34} = 24) = 247.00$, $z = -2.69$, $p < .05$. Further sex-based analyses were conducted on Q5 and Q14 to investigate sex differences in the younger cohort. Interestingly, young males reported being more impatient than their female counterparts, $U(N_{males} = 23, N_{females} = 15) = 100.00$, $z = -2.19$, $p < .05$.

Discussion

The current study aims to further our understanding of the impact that COVID-19 had on traffic patterns and risky driving behaviors on the emptier roads following government-mandated stay-at-home restrictions. As the world was undergoing major transitions that discouraged mobility, it was expected that notable changes would be seen in driving patterns and behaviors otherwise likely resistant to change under normal, non-pandemic conditions.

For objective 1, the aim was to investigate to what extent the issuance of stay-at-home-orders in March 2020 affected respondents' driving patterns. Preliminary survey findings proved a disruption in normal traffic mobility patterns in the months following March 2020. The results confirmed that many people were now driving for fewer hours and encountering fewer vehicles along their typical driving routes following stay-at-home orders. A significant reduction in driving time was expected (*34*) as many began WFH to adapt to the "new normal." This is consistent with previous findings in which a 10% reduction in work-related trips (*35*) had been reported. Results also suggest that the stringent lockdown measures ceasing mobility proved to be successful in discouraging non-essential travel, as fewer vehicles were reported being seen on the shared roadways.

Objectives 2 and 3, respectively, aimed to understand the extent to which motorists engaged in more aggressive or distracting behaviors during the pandemic months. When asked to reflect on their own driving, most participants disagreed they had any increased engagement in distracting and aggressive driving behaviors. Relative to the pre-pandemic period, they denied a greater engagement in tailgating (Q5), speeding (Q6), honking or shouting (Q7). They also disagreed to a more frequent use of their phone for either work or study reasons, leisure activities, or virtual conferencing (Q8 to Q11). These results appear to be inconsistent with the existing literature suggesting a greater prevalence of distracted and aggressive driving during the early stages of the pandemic (*21*).

Despite this, however, a closer look at the data showed a diametrically opposite pattern when respondents were asked to report on *other motorists*' behavior, and not their own. In particular, they agreed to seeing more aggressive drivers, with higher rates of honking and shouting (Q17), tailgating (Q16), and speeding (Q14) following March 2020. Respondents also agreed they had seen more drivers engaged in distracting driving involving the use of handheld devices (Q15). The contrasting patterns are clearly visible in Figure 2, wherein responses pertaining to one's own behavior and other motorists' behavior, respectively, fall on opposite sides of the Likert spectrum.

While self-perceived data may appear to be in direct conflict with opinions pertaining to other motorists' behavior, the existing distracted driving literature is called on to bring the two together. Previous research has shown that driving while distracted not only affects the driver's own driving performance—as highlighted by poorer vehicle control and slower responses to safety-relevant events (*36*)—but also their self-awareness. Sanbonmatsu et al. (*37*), for example, looked at the effect that carrying on cellphone conversations had on drivers' actual versus perceived driving performance. As the actual performance declined in the cellphone condition relative to baseline driving, the same effect was not found when participants were asked to report on their perceived driving performance. The authors ascribed these seemingly conflicting findings to the "Mr. Magoo effect," wherein the driver, albeit showing little regard for traffic regulations, continues to do so as a result of their lacking self-awareness. This explanation is even more plausible when considering that, while distracted, some of the resources that could otherwise be used for self-monitoring are now committed to the execution of other non-driving, attention demanding tasks, therefore hindering self-awareness (*38*).

These findings also find agreement in the broader literature on self-enhancement bias whereby individuals inflate the perception of their own skills to have their self-image better align with acceptable social norms (*39*). This effect finds wide application in driving wherein motorists are often observed to judge their own driving skills as well above average (*40*, *41*). In a study by Amado et al. (*42*), for instance, 158 male drivers' perceptions of their own driving were compared with expert assessments conducted by a third-party evaluator. The overwhelming majority of the sample were subject to the bias, with over 98% of the drivers reporting inflated ratings. It is posited that this effect, combined with the possible paucity of attentional resources allocated to driving, is what caused the seemingly conflicting findings in this study that resulted in the respondents' less than veracious reports on their own driving.

Stratified analysis revealed significant age-based differences, with the younger of the four cohorts (16–24 years) reporting being more impatient (Q5) and witnessing more drivers speeding (Q14) after March 2020, relative to the older groups. Further analysis conducted on the same two questions also revealed a significant effect of sex, with younger males reporting being more impatient relative to their female counterparts. These data are consistent with the broader literature on teen drivers showing younger, especially male, cohorts being more prone to aggressive driving than other populations (*43*, *44*).

Despite the relevance of this study, it is worth pointing to some limitations. First, because respondents were asked to report on possible illicit behaviors, this may have somewhat distorted their judgments of their own behavior, a phenomenon that is common across self-reported studies investigating road safety (*45*). More importantly, it should be noted that respondents completed the questionnaire several months after the issuance of the first stay-at-home orders in March 2020, during which time government-mandated measures might have differed across geographies. However, while this might have had an effect on respondents' driving patterns, it is worth considering that all participants resided in the same area, therefore reducing the risk of this effect on the data. It is also worth considering that the sample was limited to slightly over 100 respondents, which is however consistent with the sample sizes adopted in some related studies (*31*, *46*).

Conclusion

This study adds to the growing literature investigating the effects that the COVID-19 pandemic had, and in certain geographies still has, on traffic patterns. The results find agreement in the broader literature exploring the prevalence of vehicle collisions in 2020. NHTSA (*47*), for example, found an increase in traffic fatalities from speeding during the pandemic in the United States. Likewise, a report from Transport Canada (*48*) also highlights an increase in the rate of fatal collisions attributable to distraction or aggressive driving in the months following the issuance of stay-at-home orders. Consistent results are also found in the same geographies of the participants in this study, wherein aggressive driving increased by 52% in the second quarter of 2020 relative to the same period in 2019 (*49*).

Together with the rest of the literature, these findings may be used by traffic safety stakeholders and policy makers to better understand how comparable large-scale disruptive events may affect drivers' behavior. In particular, the authors foresee the results being used in forecasting models to estimate how the prevalence of distracted and aggressive driving may be affected in similar scenarios. It is posited that, post-pandemic, driving and traffic patterns are bound to return to pre-COVID figures. While traffic trends showed meaningful yet temporary increases in road collisions in the aftermath of similar natural disasters (*20*, *50*), it is hypothesized that the changes in driving habits brought about by COVID-19 too will subside following the return to more typical work conditions.

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Author Contributions

The authors confirm contribution to the paper as follows: study conception and design: F. Biondi, E. Lopetrone; data collection: E. Lopetrone; analysis and interpretation of results: F. Biondi, E. Lopetrone; draft manuscript preparation: F. Biondi, E. Lopetrone. All authors reviewed the results and approved the final version of the manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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