The Increase in COVID-19 Cases is Associated with Domestic Violence

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XQ and KCY formulated the research idea, designed the research, and drafted the manuscript. XQ analyzed the data. MYX analyzed the data and provided critical revisions to the manuscript. HZ provided critical revisions to the manuscript. All authors approved the final version for submission.

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Abstract

Numerous anecdotal reports suggest that domestic violence has increased globally since the COVID-19 pandemic, but rarely are there cross-country empirical support for this claim. Using two unique datasets which comprises official domestic violence data from Southern China ($N = 152$ daily data points from January 1st to May 31st, 2020) and Google Trends data across four English-speaking countries (i.e., Australia, Canada, the United Kingdom, and the United States; $N = 728$ daily data points from January 1st to June 30th, 2020), we test the association between daily confirmed cases of COVID-19 and daily reports of domestic violence. We find that daily new cases are positively associated with domestic violence in Australia, Canada, the United Kingdom, and the United States, but not in China. However, one nuance of our findings in China is that this association is lagged. We speculate that it is because that China is the first to experience the pandemic during which many people were not acutely aware of or affected by COVID-19. These findings suggest that the COVID-19 health toll is beyond its direct costs on its infectees and provide insights into social policies on public health crises. Governments need to balance their COVID-19 responses with corresponding assistance toward women and children who might be at risk of domestic violence in this difficult time.

Keywords: domestic violence; COVID-19; women

“Peace is not just the absence of war. Many women under lockdown for #COVID19 face violence where they should be safest: in their own homes. Today I appeal for peace in homes around the world. I urge all governments to put women’s safety first as they respond to the pandemic.”

——UN Secretary General António Guterres (April 6th, 2020)

Introduction

Globally, one of three women¹ have experienced some form of domestic violence committed by their spouses or partners (World Health Organization, 2013, 2020). The consequences of such domestic violence are devastating – domestically abused women are more likely to be depressed, commit suicide, and contract HIV (Cohen et al., 2000; Devries et al., 2011; Mertin & Mohr, 2001; World Health Organization, 2013). These negative consequences can further trickle down to the children of abused women (Fantuzzo et al., 1997; Holt et al., 2008; Kitzmann et al., 2003; Mullender et al., 2002; Sternberg et al., 1993). For example, children who witness such abuses are more likely to be victims of domestic violence themselves and to experience emotional and behavioral problems (Holt et al., 2008; Kitzmann et al., 2003; Sternberg et al., 1993).

Anecdotal reports suggest that COVID-19 has escalated the prevalence of domestic violence globally (Taub, 2020). Countries such as Brazil, Spain, the United Kingdom, Indonesia, and Singapore have all reported a significant surge in domestic violence (Bradbury-Jones & Isham, 2020). In response, the UN Secretary General António Guterres has called for measures to address a “horrific global surge in domestic violence” (Guterres, 2020). In this research, we test the hypothesis that the

¹ We acknowledge that men can be victims of domestic violence as well. However, given that domestic violence disproportionately affects women, we use the term “abused women” throughout.

number of daily confirmed COVID-19 cases in a specific country, which is a proxy of the severity of the pandemic, is positively associated with daily domestic violence.

There are multiple theoretical reasons to support this hypothesis. First, COVID-19 has disrupted the global economy and led to mass unemployment, and economic stress is positively associated with domestic violence (Benson & Fox, 2002; Renzetti, 2009). Second, lockdowns and other policies to curb the mobility of citizens make it more difficult for women to physically escape from their abusers and access social services that would otherwise help them (Usher et al., 2020). Third, in some developing countries, law enforcement officers might be forced to release, or not arrest, offenders due to a fear of the risk of the spread of COVID-19 in overcrowded prisons (Siregar, 2020; Telles et al., 2020). More generally, the stress associated with dealing with the pandemic might lead people to engage in more undesirable behaviors, including domestic violence. All of these phenomena are directly or indirectly associated with an increase in domestic violence.

One nuance of this hypothesized direct, positive relationship between the COVID-19 pandemic and domestic violence is that the detrimental effects of COVID-19 might take time to unfold. For example, during the early phase of the pandemic (e.g., January 2020), few people realized the impending widespread effects of COVID-19, and most were not even acutely aware of the disease itself. As infection has become more widespread and the number of deaths pile up, people slowly began to understand the widespread impacts of COVID-19. This nuance suggests that the effects of daily COVID-19 cases on daily domestic violence might be lagged, particular for countries that experienced the pandemic earlier (e.g., most Asian countries relative to their Western counterparts). In contrast, for counties that began to experience the pandemic later (e.g., the United Kingdom and the United States),

this time lag would be shorter and might even be nonexistent because the stress associated with dealing with COVID-19 was already fully perceived at the time of the initial outbreaks in those countries. In sum, we therefore predict that (1) as daily COVID-19 cases increase, there should be a corresponding increase in domestic violence and (2) there will be a time-lag effect for countries that experienced the pandemic the earliest, while the time-lag will be shorter or nonexistent for countries that experienced the pandemic later.

We assembled two datasets to test this hypothesis. The first dataset (i.e., Study 1) included the official daily data on help-seeking related to domestic violence from the Chinese government agency – the Women’s Federation of Guangdong Province ($N = 152$ daily data points from January 1st to May 31st, 2020). The Guangdong Province is the most populous province with over 100 million residents, and this dataset offers us unique strengths because when victims seek help through official avenues in China, the level of abuse is usually severe (Dong, 2016; Zhang & Zhu, 2015). This restriction of range thus enables us to test our hypothesis in a particularly conservative manner. In addition, China is the first country to suffer from the COVID-19 pandemic, and these data allow us to test whether there is a cross-sectional or time-lagged effect in the association between daily COVID-19 cases and domestic violence.

The second dataset (Study 2) included Google Trends data for the keyword “domestic violence hotline” across four English-speaking countries: Australia, Canada, the United Kingdom, and the United States ($N = 728$ daily data points from January 1st to June 30th, 2020). We suggest that Google Trends data are appropriate in this context because a logical first step for abused victims is to search for the keyword “domestic violence hotline” online if they have experienced domestic

violence. Moreover, while Google Trends data are often treated as proxies for latent constructs (Baldwin & Mussweiler, 2018; Bento et al., 2020; Yang et al., 2015), in this context, they might actually be more accurate measures of incidents of domestic violence compared to phone calls or police reports filed because victims might fear that they would be overheard by abusers if they seek help via telephones during lockdown or social distancing measures imposed as a result of COVID-19 (Graham-Harrison et al., 2020). Finally, this dataset allows us to test the generalizability of our hypothesis in multiple countries that differ in terms of culture, geographical location, and the severity of the COVID-19 pandemic.

Study 1: Results

Analytic Strategy. We employed a series of hierarchical linear regressions to test our hypotheses, where daily domestic violence reports were regressed on daily new COVID-19 cases. Figure 1 depicts the trajectory of new COVID-19 cases and domestic violence reports from January 1st to May 31st, 2020, in China. Since both new COVID-19 cases and domestic violence reports were highly skewed, we log-transformed them before testing our hypotheses. Additionally, this period included the Chinese Spring Festival, the most important and largest holiday in China, so we generated a dummy variable (the days from January 24th to February 2nd, 2020 [i.e., statutory holidays] = 1, other days = 0) and included it as a control variable. All variables were also grand-mean centered.

Figure 1. The trajectory of new COVID-19 cases and domestic violence from January 1st to May 31st, 2020, in China. Regarding the date format, 0101 means January 1st, 2020.

Models. The results of hierarchical linear regressions revealed that the effect of the focal day's new COVID-19 cases on domestic violence was not significantly positive, with ($b = -0.034$, $SE = 0.024$, $p = 0.161$, 95% confidence interval (CI) $[-0.081, 0.014]$; all statistical analyses reported are two-sided tests) or without ($b = -0.070$, $SE = 0.024$, $p = 0.004$, 95% CI $[-0.117, -0.023]$) the Chinese Spring Festival dummy being controlled. Additionally, the effect of the Chinese Spring Festival dummy was strongly and negatively associated with domestic violence ($b = -1.039$, $SE = 0.239$, $p < 0.001$, 95% CI $[-1.507, -0.571]$), revealing that there were fewer domestic violence cases reported during the Chinese Spring Festival.

As stated above, we further tested the time-lagged effects of new COVID-19 cases on domestic violence. Specifically, we tested the effects of new COVID-19 cases from $t-1$ day to $t-90$ days on the focal day's domestic violence, controlling for the Chinese Spring Festival dummy and the focal day's new COVID-19 cases (see Table 1 and Figure 2; see the results without the Chinese Spring Festival dummy

being controlled in the Supplementary Information). The results revealed that new COVID-19 cases from t-24 days ($b = 0.064$, $SE = 0.022$, $p = 0.004$, 95% CI [0.021, 0.107]) to t-55 days ($b = 0.040$, $SE = 0.019$, $p = 0.033$, 95% CI [0.003, 0.077]) were consistently and positively associated with the focal day's domestic violence. These results suggested that, in China, the country that experienced the COVID-19 pandemic the earliest, COVID-19 cases increased domestic violence three to eight weeks (i.e., 24-55 days) later rather than on the focal day.

Table 1. Daily New COVID-19 Cases and Domestic Violence in China

Days Lagged	N	Effect of Daily New COVID-19 Cases on Domestic Violence
t-0	152	$b = -0.034$, $SE = 0.024$, $p = 0.161$
t-1	152	$b = 0.024$, $SE = 0.060$, $p = 0.694$
t-2	152	$b = 0.033$, $SE = 0.060$, $p = 0.583$
t-3	152	$b = 0.081$, $SE = 0.055$, $p = 0.141$
t-4	152	$b = 0.080$, $SE = 0.049$, $p = 0.104$
t-5	152	$b = 0.051$, $SE = 0.045$, $p = 0.254$
t-6	152	$b = -0.001$, $SE = 0.042$, $p = 0.990$
t-7	152	$b = 0.012$, $SE = 0.039$, $p = 0.754$
t-8	152	$b = 0.029$, $SE = 0.038$, $p = 0.445$
t-9	152	$b = 0.024$, $SE = 0.037$, $p = 0.511$
t-10	152	$b = 0.053$, $SE = 0.035$, $p = 0.125$
t-11	152	$b = 0.062$, $SE = 0.034$, $p = 0.065$
t-12	152	$b = 0.049$, $SE = 0.033$, $p = 0.143$
t-13	152	$b = 0.028$, $SE = 0.033$, $p = 0.390$
t-14	152	$b = 0.047$, $SE = 0.032$, $p = 0.145$
t-15	152	$b = 0.036$, $SE = 0.032$, $p = 0.264$
t-16	152	$b = 0.045$, $SE = 0.031$, $p = 0.151$
t-17	152	$b = 0.044$, $SE = 0.030$, $p = 0.135$
t-18	152	$b = 0.043$, $SE = 0.028$, $p = 0.125$
t-19	152	$b = 0.049$, $SE = 0.026$, $p = 0.058$
t-20	152	$b = 0.042$, $SE = 0.025$, $p = 0.095$
t-21	152	$b = 0.037$, $SE = 0.024$, $p = 0.121$
t-22	152	$b = 0.047$, $SE = 0.023$, $p = 0.043$
t-23	152	$b = 0.043$, $SE = 0.023$, $p = 0.060$
t-24	152	$b = 0.064$, $SE = 0.022$, $p = 0.004$
t-25	152	$b = 0.057$, $SE = 0.022$, $p = 0.008$
t-26	152	$b = 0.052$, $SE = 0.021$, $p = 0.015$
t-27	152	$b = 0.055$, $SE = 0.021$, $p = 0.009$
t-28	152	$b = 0.056$, $SE = 0.021$, $p = 0.007$
t-29	152	$b = 0.052$, $SE = 0.021$, $p = 0.012$
t-30	152	$b = 0.051$, $SE = 0.021$, $p = 0.015$
t-31	152	$b = 0.057$, $SE = 0.021$, $p = 0.006$

t-32	152	b = 0.055, SE = 0.021, p = 0.008
t-33	152	b = 0.053, SE = 0.021, p = 0.009
t-34	152	b = 0.053, SE = 0.020, p = 0.009
t-35	152	b = 0.047, SE = 0.020, p = 0.021
t-36	152	b = 0.047, SE = 0.020, p = 0.020
t-37	152	b = 0.047, SE = 0.020, p = 0.022
t-38	152	b = 0.054, SE = 0.020, p = 0.007
t-39	152	b = 0.050, SE = 0.020, p = 0.013
t-40	152	b = 0.051, SE = 0.020, p = 0.011
t-41	152	b = 0.049, SE = 0.020, p = 0.013
t-42	152	b = 0.046, SE = 0.020, p = 0.020
t-43	152	b = 0.041, SE = 0.020, p = 0.037
t-44	152	b = 0.044, SE = 0.020, p = 0.025
t-45	152	b = 0.048, SE = 0.020, p = 0.013
t-46	152	b = 0.045, SE = 0.020, p = 0.021
t-47	152	b = 0.044, SE = 0.019, p = 0.024
t-48	152	b = 0.039, SE = 0.019, p = 0.045
t-49	152	b = 0.037, SE = 0.019, p = 0.056
t-50	152	b = 0.042, SE = 0.019, p = 0.029
t-51	152	b = 0.040, SE = 0.019, p = 0.038
t-52	152	b = 0.045, SE = 0.019, p = 0.018
t-53	152	b = 0.041, SE = 0.019, p = 0.031
t-54	152	b = 0.038, SE = 0.019, p = 0.047
t-55	152	b = 0.040, SE = 0.019, p = 0.033
t-56	152	b = 0.033, SE = 0.019, p = 0.085
t-57	152	b = 0.039, SE = 0.019, p = 0.039
t-58	152	b = 0.038, SE = 0.019, p = 0.045
t-59	152	b = 0.043, SE = 0.019, p = 0.022
t-60	152	b = 0.040, SE = 0.019, p = 0.032
t-61	152	b = 0.039, SE = 0.019, p = 0.036
t-62	152	b = 0.033, SE = 0.019, p = 0.075
t-63	152	b = 0.035, SE = 0.019, p = 0.059
t-64	152	b = 0.036, SE = 0.019, p = 0.055
t-65	152	b = 0.033, SE = 0.019, p = 0.075
t-66	152	b = 0.038, SE = 0.019, p = 0.045
t-67	152	b = 0.039, SE = 0.019, p = 0.036
t-68	152	b = 0.039, SE = 0.019, p = 0.037
t-69	152	b = 0.033, SE = 0.019, p = 0.076
t-70	152	b = 0.032, SE = 0.019, p = 0.086
t-71	152	b = 0.037, SE = 0.019, p = 0.049
t-72	152	b = 0.035, SE = 0.019, p = 0.066
t-73	152	b = 0.043, SE = 0.019, p = 0.024
t-74	152	b = 0.042, SE = 0.019, p = 0.027
t-75	152	b = 0.041, SE = 0.019, p = 0.031
t-76	152	b = 0.032, SE = 0.019, p = 0.094
t-77	152	b = 0.033, SE = 0.019, p = 0.090
t-78	152	b = 0.030, SE = 0.019, p = 0.115
t-79	152	b = 0.031, SE = 0.019, p = 0.109
t-80	152	b = 0.040, SE = 0.019, p = 0.039
t-81	152	b = 0.032, SE = 0.020, p = 0.103

t-82	152	$b = 0.036, SE = 0.020, p = 0.065$
t-83	152	$b = 0.032, SE = 0.020, p = 0.103$
t-84	152	$b = 0.028, SE = 0.020, p = 0.164$
t-85	152	$b = 0.026, SE = 0.020, p = 0.193$
t-86	152	$b = 0.028, SE = 0.020, p = 0.166$
t-87	152	$b = 0.028, SE = 0.020, p = 0.158$
t-88	152	$b = 0.027, SE = 0.020, p = 0.187$
t-89	152	$b = 0.025, SE = 0.020, p = 0.226$
t-90	152	$b = 0.022, SE = 0.020, p = 0.289$

Note. t-n indicates that the focal day's domestic violence was regressed on new

COVID-19 cases on t-n days, with the Chinese Spring Festival dummy and the focal day's new COVID-19 cases being controlled.

Figure 2. The trajectory of the p values of the effects of new COVID-19 cases on t-n days on the focal day's domestic violence from January 1st to May 31st, 2020, in China. To focus on the p values below 0.05, p values higher than 0.10 were not depicted in the figure.

Study 2: Results

Analytic Strategy. In Study 2, we employed identical approaches as those used in Study 1 to test our hypotheses, except that we group-mean centered all variables to avoid confounding cross-nation variations. Figure 3 depicts the trajectory

of new COVID-19 cases and domestic violence from January 1st to June 30th, 2020, across the four countries.

Models. The results of hierarchical linear regressions (see Table 2) revealed that the effect of the focal day's new COVID-19 cases on domestic violence was significant ($b = 0.096$, $SE = 0.016$, $p < 0.001$, 95% CI [0.064, 0.127]). This effect was also significant when we examined individual countries. That is, the effect was significant in Australia ($b = 0.190$, $SE = 0.074$, $p < 0.010$, 95% CI [0.046, 0.335]), Canada ($b = 0.127$, $SE = 0.035$, $p < 0.001$, 95% CI [0.059, 0.196]), the United Kingdom ($b = 0.115$, $SE = 0.033$, $p < 0.001$, 95% CI [0.049, 0.180]), and the United States ($b = 0.054$, $SE = 0.013$, $p < 0.001$, 95% CI [0.030, 0.079]).

To further test the time-lagged effects of new COVID-19 cases on domestic violence, similar to Study 1, in Study 2, we tested the effects of new COVID-19 cases from $t-1$ day to $t-90$ days on the focal day's domestic violence, controlling for the focal day's new COVID-19 cases (see Table 3 and Figure 4). The results revealed that nearly all the new COVID-19 cases on $t-n$ days were not significantly associated with the focal day's domestic violence. These results suggested that in the four countries (i.e., Australia, Canada, the United Kingdom, and the United States) where the COVID-19 pandemic unfolded later, COVID-19 cases increased domestic violence on the focal day rather than days or weeks later.

Figure 3. The trajectory of new COVID-19 cases and domestic violence from January 1st to June 30th, 2020, across four countries. Regarding the date format, 0101 means January 1st, 2020.

Table 2. New COVID-19 Cases and Domestic Violence across Four Countries

Country	N	Effect of Daily New Cases on Domestic Violence
Overall	727	$b = 0.096$, $SE = 0.016$, $p < 0.001$
Australia	182	$b = 0.190$, $SE = 0.074$, $p < 0.010$
Canada	182	$b = 0.127$, $SE = 0.035$, $p < 0.001$
United Kingdom	181	$b = 0.114$, $SE = 0.033$, $p < 0.001$
United States	182	$b = 0.054$, $SE = 0.013$, $p < 0.001$

Note. The data point for new cases for May 21st, 2020, was negative (i.e., -525) in the United Kingdom and was excluded from analyses.

Table 3. Daily New COVID-19 Cases and Domestic Violence across Four Countries

Days Lagged	N	Effect of Daily New Cases on Domestic Violence
t-0	727	$b = 0.096$, $SE = 0.016$, $p < 0.001$
t-1	727	$b = -0.064$, $SE = 0.096$, $p = 0.502$
t-2	727	$b = 0.068$, $SE = 0.093$, $p = 0.464$
t-3	727	$b = 0.026$, $SE = 0.086$, $p = 0.761$
t-4	727	$b = 0.007$, $SE = 0.081$, $p = 0.930$
t-5	727	$b = -0.050$, $SE = 0.074$, $p = 0.493$

t-6	727	b = -0.075, SE = 0.068, p = 0.272
t-7	727	b = -0.103, SE = 0.064, p = 0.105
t-8	727	b = -0.048, SE = 0.059, p = 0.417
t-9	727	b = -0.029, SE = 0.054, p = 0.592
t-10	727	b = -0.030, SE = 0.051, p = 0.558
t-11	727	b = -0.007, SE = 0.048, p = 0.877
t-12	727	b = -0.001, SE = 0.045, p = 0.983
t-13	727	b = -0.039, SE = 0.043, p = 0.364
t-14	727	b = -0.031, SE = 0.040, p = 0.446
t-15	727	b = -0.017, SE = 0.038, p = 0.654
t-16	727	b = -0.012, SE = 0.036, p = 0.747
t-17	727	b = -0.014, SE = 0.035, p = 0.687
t-18	727	b = -0.020, SE = 0.033, p = 0.553
t-19	727	b = -0.016, SE = 0.032, p = 0.620
t-20	727	b = -0.017, SE = 0.031, p = 0.575
t-21	727	b = -0.004, SE = 0.030, p = 0.887
t-22	727	b = -0.019, SE = 0.029, p = 0.511
t-23	727	b = -0.008, SE = 0.028, p = 0.781
t-24	727	b = -0.016, SE = 0.027, p = 0.562
t-25	727	b = -0.014, SE = 0.027, p = 0.589
t-26	727	b = -0.025, SE = 0.026, p = 0.346
t-27	727	b = -0.020, SE = 0.025, p = 0.434
t-28	727	b = -0.019, SE = 0.025, p = 0.438
t-29	727	b = -0.022, SE = 0.024, p = 0.372
t-30	727	b = -0.027, SE = 0.024, p = 0.268
t-31	727	b = -0.023, SE = 0.024, p = 0.331
t-32	727	b = -0.016, SE = 0.023, p = 0.476
t-33	727	b = -0.026, SE = 0.023, p = 0.252
t-34	727	b = -0.025, SE = 0.022, p = 0.257
t-35	727	b = -0.029, SE = 0.022, p = 0.193
t-36	727	b = -0.022, SE = 0.022, p = 0.310
t-37	727	b = -0.028, SE = 0.022, p = 0.191
t-38	727	b = -0.027, SE = 0.021, p = 0.209
t-39	727	b = -0.025, SE = 0.021, p = 0.235
t-40	727	b = -0.033, SE = 0.021, p = 0.116
t-41	727	b = -0.030, SE = 0.021, p = 0.143
t-42	727	b = -0.033, SE = 0.021, p = 0.109
t-43	727	b = -0.033, SE = 0.020, p = 0.102
t-44	727	b = -0.028, SE = 0.020, p = 0.167
t-45	727	b = -0.033, SE = 0.020, p = 0.103
t-46	727	b = -0.027, SE = 0.020, p = 0.175
t-47	727	b = -0.034, SE = 0.020, p = 0.084
t-48	727	b = -0.028, SE = 0.020, p = 0.157
t-49	727	b = -0.029, SE = 0.020, p = 0.146
t-50	727	b = -0.029, SE = 0.020, p = 0.138
t-51	727	b = -0.028, SE = 0.020, p = 0.151
t-52	727	b = -0.027, SE = 0.020, p = 0.167
t-53	727	b = -0.024, SE = 0.019, p = 0.211
t-54	727	b = -0.026, SE = 0.019, p = 0.181
t-55	727	b = -0.029, SE = 0.019, p = 0.141

t-56	727	b = -0.026, SE = 0.019, p = 0.178
t-57	727	b = -0.029, SE = 0.019, p = 0.141
t-58	727	b = -0.029, SE = 0.019, p = 0.132
t-59	727	b = -0.023, SE = 0.019, p = 0.243
t-60	727	b = -0.026, SE = 0.019, p = 0.178
t-61	727	b = -0.030, SE = 0.019, p = 0.119
t-62	727	b = -0.027, SE = 0.019, p = 0.168
t-63	727	b = -0.027, SE = 0.019, p = 0.168
t-64	727	b = -0.030, SE = 0.020, p = 0.126
t-65	727	b = -0.028, SE = 0.020, p = 0.155
t-66	727	b = -0.022, SE = 0.020, p = 0.266
t-67	727	b = -0.028, SE = 0.020, p = 0.163
t-68	727	b = -0.026, SE = 0.020, p = 0.184
t-69	727	b = -0.022, SE = 0.020, p = 0.264
t-70	727	b = -0.024, SE = 0.020, p = 0.226
t-71	727	b = -0.024, SE = 0.020, p = 0.242
t-72	727	b = -0.027, SE = 0.020, p = 0.184
t-73	727	b = -0.026, SE = 0.020, p = 0.207
t-74	727	b = -0.020, SE = 0.021, p = 0.321
t-75	727	b = -0.024, SE = 0.021, p = 0.254
t-76	727	b = -0.023, SE = 0.021, p = 0.270
t-77	727	b = -0.023, SE = 0.021, p = 0.274
t-78	727	b = -0.022, SE = 0.021, p = 0.296
t-79	727	b = -0.021, SE = 0.022, p = 0.337
t-80	727	b = -0.018, SE = 0.022, p = 0.404
t-81	727	b = -0.021, SE = 0.022, p = 0.335
t-82	727	b = -0.022, SE = 0.023, p = 0.329
t-83	727	b = -0.020, SE = 0.023, p = 0.378
t-84	727	b = -0.023, SE = 0.023, p = 0.327
t-85	727	b = -0.022, SE = 0.024, p = 0.350
t-86	727	b = -0.017, SE = 0.024, p = 0.475
t-87	727	b = -0.015, SE = 0.025, p = 0.534
t-88	727	b = -0.021, SE = 0.025, p = 0.394
t-89	727	b = -0.020, SE = 0.026, p = 0.440
t-90	727	b = -0.022, SE = 0.027, p = 0.412

Note. t-n indicates that the focal day's domestic violence was regressed on new

COVID-19 cases on t-n days, with the focal day's new COVID-19 cases being controlled.

Figure 4. The trajectory of the p values of the effects of new COVID-19 cases on $t-n$ day on the focal day's domestic violence from January 1st to June 30th, 2020, across four countries.

Discussion

Numerous anecdotal reports suggest that domestic violence has increased globally since the COVID-19 pandemic, but rarely are there cross-country empirical support for this claim (for an exception, see Piquero et al., 2020). Here, we provide evidence for this effect across five countries. One nuance of our findings is that the association between daily COVID-19 cases and domestic violence is lagged in China, which we speculate is because China is the first to experience the pandemic during which many people were not acutely aware of or affected by COVID-19. For the other countries in our dataset that experienced the pandemic later, the association between daily COVID cases and daily reports of domestic violence becomes cross-sectional. These findings suggest that the COVID-19 health toll is beyond its direct costs on its infectees.

Our findings could have important policy implications for public health crises. As an example, we encourage governments to balance their COVID-19 responses

with corresponding assistance toward women and children who might be at risk of domestic violence in this difficult time. Equally importantly, governments need to consider the potential time-lagged effects based on the times of different COVID-19 outbreaks.

Materials and Methods

Data on Domestic Violence in China. We obtained the China data on domestic violence from the Chinese government agency – the Women's Federation of Guangdong Province in China (<http://www.gdwomen.org.cn/>).

Data on Domestic Violence across Countries. We coded the cross-country domestic violence data using Google Trends for the key word “domestic violence hotline” from January 1st, 2020, to June 30th, 2020, in 4 English-speaking countries (i.e., Australia, Canada, the United Kingdom, and United States). We conducted the search for all English-speaking countries, but only these four countries had Google Trends data for “domestic violence hotline” (<https://trends.google.com>).

Data on COVID-19 Cases. We obtained data on the national daily rates of confirmed COVID-19 cases from a COVID-19 tracking project (<https://ourworldindata.org/coronavirus-data>). Prior to the analyses, we identified one data point from the United Kingdom in the COVID-19 tracking data with negative testing values (-525, May 21st, 2020). According to the COVID tracking project, the artificial negative values resulted from administrative errors related to out-of-state testing. We excluded this data point prior to analyses. Additionally, we noticed one day (February 13th, 2020) in China with a very large spike in new cases. We retained this data point, and we noted that excluding it yielded similar lagged results: from t-

23 days ($b = 0.048$, $SE = 0.023$, $p = 0.040$, 95% CI [0.002, 0.094]) to t-48 days ($b = 0.039$, $SE = 0.020$, $p = 0.048$, 95% CI [0.0003, 0.078]).

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Supplementary Information

Table S1. Daily New COVID-19 Cases and Domestic Violence in China (without the Chinese Spring Festival dummy being controlled)

Days Lagged	N	Effect of Daily New COVID-19 Cases on Domestic Violence
t-0	152	b = -0.070, SE = 0.024, p = 0.004
t-1	152	b = 0.031, SE = 0.063, p = 0.621
t-2	152	b = 0.061, SE = 0.063, p = 0.329
t-3	152	b = 0.118, SE = 0.057, p = 0.040
t-4	152	b = 0.124, SE = 0.050, p = 0.013
t-5	152	b = 0.096, SE = 0.046, p = 0.037
t-6	152	b = 0.053, SE = 0.043, p = 0.211
t-7	152	b = 0.067, SE = 0.039, p = 0.082
t-8	152	b = 0.089, SE = 0.036, p = 0.014
t-9	152	b = 0.087, SE = 0.034, p = 0.010
t-10	152	b = 0.107, SE = 0.031, p = 0.001
t-11	152	b = 0.111, SE = 0.029, p < 0.001
t-12	152	b = 0.102, SE = 0.028, p < 0.001
t-13	152	b = 0.087, SE = 0.027, p = 0.001
t-14	152	b = 0.098, SE = 0.026, p < 0.001
t-15	152	b = 0.090, SE = 0.025, p < 0.001
t-16	152	b = 0.094, SE = 0.024, p < 0.001
t-17	152	b = 0.091, SE = 0.024, p < 0.001
t-18	152	b = 0.087, SE = 0.023, p < 0.001
t-19	152	b = 0.087, SE = 0.023, p < 0.001
t-20	152	b = 0.080, SE = 0.022, p < 0.001
t-21	152	b = 0.072, SE = 0.022, p = 0.001
t-22	152	b = 0.078, SE = 0.022, p < 0.001
t-23	152	b = 0.073, SE = 0.022, p = 0.001
t-24	152	b = 0.089, SE = 0.021, p < 0.001
t-25	152	b = 0.083, SE = 0.021, p < 0.001
t-26	152	b = 0.077, SE = 0.021, p < 0.001
t-27	152	b = 0.079, SE = 0.021, p < 0.001
t-28	152	b = 0.078, SE = 0.020, p < 0.001
t-29	152	b = 0.076, SE = 0.020, p < 0.001
t-30	152	b = 0.074, SE = 0.020, p < 0.001
t-31	152	b = 0.080, SE = 0.020, p < 0.001
t-32	152	b = 0.078, SE = 0.020, p < 0.001
t-33	152	b = 0.076, SE = 0.020, p < 0.001
t-34	152	b = 0.075, SE = 0.020, p < 0.001
t-35	152	b = 0.069, SE = 0.020, p = 0.001
t-36	152	b = 0.068, SE = 0.020, p = 0.001
t-37	152	b = 0.067, SE = 0.020, p = 0.001
t-38	152	b = 0.074, SE = 0.020, p < 0.001
t-39	152	b = 0.070, SE = 0.020, p < 0.001
t-40	152	b = 0.070, SE = 0.020, p < 0.001
t-41	152	b = 0.068, SE = 0.020, p = 0.001

t-42	152	b = 0.065, SE = 0.020, p = 0.001
t-43	152	b = 0.060, SE = 0.020, p = 0.003
t-44	152	b = 0.062, SE = 0.020, p = 0.002
t-45	152	b = 0.066, SE = 0.020, p = 0.001
t-46	152	b = 0.062, SE = 0.020, p = 0.002
t-47	152	b = 0.061, SE = 0.020, p = 0.002
t-48	152	b = 0.056, SE = 0.020, p = 0.005
t-49	152	b = 0.054, SE = 0.020, p = 0.007
t-50	152	b = 0.058, SE = 0.020, p = 0.003
t-51	152	b = 0.056, SE = 0.020, p = 0.005
t-52	152	b = 0.060, SE = 0.019, p = 0.002
t-53	152	b = 0.056, SE = 0.020, p = 0.004
t-54	152	b = 0.053, SE = 0.020, p = 0.007
t-55	152	b = 0.055, SE = 0.019, p = 0.004
t-56	152	b = 0.047, SE = 0.019, p = 0.015
t-57	152	b = 0.053, SE = 0.019, p = 0.006
t-58	152	b = 0.052, SE = 0.019, p = 0.008
t-59	152	b = 0.056, SE = 0.019, p = 0.004
t-60	152	b = 0.053, SE = 0.019, p = 0.006
t-61	152	b = 0.052, SE = 0.019, p = 0.007
t-62	152	b = 0.046, SE = 0.019, p = 0.018
t-63	152	b = 0.048, SE = 0.019, p = 0.014
t-64	152	b = 0.048, SE = 0.019, p = 0.014
t-65	152	b = 0.045, SE = 0.020, p = 0.022
t-66	152	b = 0.048, SE = 0.019, p = 0.013
t-67	152	b = 0.050, SE = 0.020, p = 0.011
t-68	152	b = 0.049, SE = 0.020, p = 0.013
t-69	152	b = 0.043, SE = 0.020, p = 0.029
t-70	152	b = 0.042, SE = 0.020, p = 0.036
t-71	152	b = 0.046, SE = 0.020, p = 0.020
t-72	152	b = 0.043, SE = 0.020, p = 0.030
t-73	152	b = 0.050, SE = 0.020, p = 0.011
t-74	152	b = 0.049, SE = 0.020, p = 0.013
t-75	152	b = 0.048, SE = 0.020, p = 0.017
t-76	152	b = 0.038, SE = 0.020, p = 0.057
t-77	152	b = 0.038, SE = 0.020, p = 0.057
t-78	152	b = 0.036, SE = 0.020, p = 0.077
t-79	152	b = 0.036, SE = 0.020, p = 0.078
t-80	152	b = 0.044, SE = 0.020, p = 0.030
t-81	152	b = 0.036, SE = 0.021, p = 0.084
t-82	152	b = 0.039, SE = 0.021, p = 0.057
t-83	152	b = 0.035, SE = 0.021, p = 0.093
t-84	152	b = 0.030, SE = 0.021, p = 0.153
t-85	152	b = 0.028, SE = 0.021, p = 0.186
t-86	152	b = 0.029, SE = 0.021, p = 0.168
t-87	152	b = 0.029, SE = 0.021, p = 0.167
t-88	152	b = 0.027, SE = 0.021, p = 0.205
t-89	152	b = 0.025, SE = 0.022, p = 0.254
t-90	152	b = 0.021, SE = 0.022, p = 0.322

Note. t-n indicates that the focal day's domestic violence was regressed on new COVID-19 cases on t-n days, with the Chinese Spring Festival dummy and the focal day's new COVID-19 cases being controlled.

Figure S1. The trajectory of the p values of the effects of new COVID-19 cases t-n days on the focal day's domestic violence from January 1st to May 31st, 2020, in China. To focus on the p values below 0.05, p values higher than 0.10 were not depicted in the figure (*without the Chinese Spring Festival dummy being controlled*).