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The COVID-19 Pandemic and Internet Searches for Divorce with Stay-at-Home Behavior as a Mediator: A Multinational Longitudinal Study

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Abstract

Background: Amidst the COVID-19 pandemic, varying impacts on family dynamics have been observed, with an intriguing paradox of declining divorce rates despite increased strains such as intimate partner violence.

Objective: This study investigates the pandemic's influence on divorce contemplations through internet search behaviors across 45 countries over an extended period, considering the role of stay-at-home behavior and national income levels.

Methods: A retrospective analysis was conducted using Google Trends data on divorce search volumes and Google Location History for stay-at-home behavior, alongside COVID-19 death rates, from March 2020 to October 2022. A causal mediation analysis explored the mediation effect of stay-at-home behavior on the relationship between the pandemic's severity and divorce-related searches.

Results: Across all countries, the initial two years of the pandemic saw a significant association between COVID-19 death rates and a decrease in divorce search volumes, without a notable mediation effect. In the third year, the mediation effect of stay-at-home behavior became significantly positive. Notably, in high-income countries, this mediation effect became increasingly significant, contrasting with middle-income countries where the initial negative association between COVID-19 death rates and divorce searches weakened over time.

Conclusions: The interplay between the pandemic and stay-at-home behavior on marital reconsideration transitions from acting as a protective buffer to facilitating an increase in divorce contemplations. This underscores the importance of adaptable support strategies in response to changing societal dynamics.

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Keywords: Google Trends; Google Maps; global positioning system location; social distancing; stay-at-home behavior; marriage

Introduction

The COVID-19 pandemic has not only resulted in widespread implications for public mental health (Boden et al., 2021), but studies have also illuminated an exacerbated strain on family relationships during this period, including increases in intimate partner violence (Mazza et al., 2020, Kofman and Garfin, 2020) and child abuse (Thomas et al., 2020). However, an intriguing paradox emerges when examining high-income countries such as the United States (Manning and Payne, 2021), Denmark (Fallesen, 2021), Japan (Cyrus et al., 2022), Taiwan (Chang et al., 2023), and South Korea (Kim and Kim, 2021), where divorce rates or divorce filing rates declined during the pandemic. This paradox of increases in intimate partner violence and child abuse along with a decrease in divorce rates remains unexplained. Moreover, more substantial declines in divorce rates have been reported in middle-income countries such as Mexico during the pandemic than their high-income counterparts (Hoehn-Velasco et al., 2023), although direct evidence comparing countries across income levels remains scarce. Considering that higher-income countries have demonstrated better epidemiological outcomes from containment policies than lower-income countries (Pincombe et al., 2021), the impact of the pandemic on divorce, particularly concerning different national income levels, requires further examination.

While prior investigations have assessed the effect of the COVID-19 pandemic on family relationships using divorce rates or divorce filing rates, these metrics may not comprehensively capture the overall impact. Couples seeking divorce faced formidable challenges during the pandemic due to court closures and a lack of responsiveness from legal professionals, thereby complicating the divorce process (Lebow, 2020). In addition to divorce rates, another method for gauging people's attitude towards divorce is by examining internet search volumes. Zhu et al. (2021) observed an increase in search volume for "divorce" on Baidu, a popular search engine in China, following the successive issuance of stay-at-home orders in various Chinese cities. Google search volume has also been used as a valid and convenient metric to gauge and predict public interests and behaviors, spanning areas such as mental health (Lin et al., 2023, Yang et al., 2010), attitudes towards suicide (Solano et al., 2016), compliance with health policies (Lin et al., 2020), and forecasting infection outbreaks (Husnayain et al., 2020). Analyzing search volume data can provide a higher temporal resolution than divorce rates, rendering it a robust tool for scrutinizing longitudinal shifts at the population level.

Since the onset of the COVID-19 pandemic on 2020, annual shifts in the epidemiological patterns of the SARS-CoV-2 virus and corresponding changes in public health trends have been observed. In the first year of the pandemic, governments globally implemented stay-at-home orders to halt rapid virus transmission. In the second year (2021), significant strides in pandemic control were achieved through widespread vaccine distribution (Chuenkitmongkol et al., 2022), whereas the emergence of the Omicron variant in the third year (2022) posed new challenges. Despite the ability of the Omicron variant to evade vaccine-induced immunity, its milder clinical presentation compared to earlier variants likely led to substantial natural immunity, easing some challenges for governments in epidemic prevention (Bobrovitz et al., 2023). Existing research has predominantly focused on short-term observations of divorce (filing) rates, typically less than a year, and the scarcity of long-term data limits our understanding of the lasting impact of the pandemic on family dynamics.

It is also crucial to elucidate the mechanisms through which the COVID-19 pandemic has influenced family relationships. Stay-at-home orders have been proven to be highly effective in mitigating infections (Castillo et al., 2020), but they have also been associated with adverse consequences for public mental health (Niedzwiedz et al., 2021, Pieh et al., 2021, Rossi et al., 2020). In addition, their impact on family relationships has yet to be comprehensively examined. In this study, we conducted a causal mediation analysis to explore the mediating role of human mobility during the pandemic on internet search volume for “divorce”.

This study aims to (1) assess the impact of the COVID-19 pandemic on the search volume of “divorce” within the initial three years of its outbreak, (2) elucidate the pathways linking the pandemic to divorce-related search volume, and (3) explore potential variations in these pathways influenced by disparities in national income levels.

Methods

Study Design and Data Sources

This retrospective study explored the interplay between monthly national COVID-19 death rates, stay-at-home behavior, and internet searches for "divorce" in local languages across 45 countries throughout the initial three-year period of the COVID-19 pandemic (from March 1, 2020 to October 15, 2022). The internet search volume for "divorce" was retrieved from the Google Trends database. The quantification of stay-at-home behavior was estimated using Google Location History data, which tracked the duration of cell phone activity within residences. We analyzed the impact of COVID-19 death rates on changes in the search volume for “divorce”, as well as assessing the proportion mediated by alterations in stay-at-home behavior.

Internet Search Volume for “Divorce”

Data on the Google search volume for “divorce” from March 1, 2015 to October 15, 2022 across 45 countries were retrieved from the Google Trends database. The term “divorce” was translated from both Chinese and English into local languages of the 45 countries with back-translation on Google Translate (Lin et al., 2023), as shown in Table 1.

Table 1. Translations of “divorce”, average COVID-19 monthly death rates, average changes in daily home activities, and average changes in weekly Google search volume for divorce from March 1, 2020 to October 15, 2022 across 45 countries.

Country	Translated keyword for divorce	Average COVID-19 monthly death rates	Average changes in home activities (%)	Average changes in Google search volume (%)
Middle-income countries				
Argentina	Divorcio	1.689	7.886	-1.783
Brazil	Divórcio	1.948	6.811	13.643
Colombia	Divorcio	1.671	9.538	-3.187
Egypt	طلاق	0.133	2.600	13.240
India	□□□□	0.220	12.518	-31.312
Indonesia	perceraian	0.305	10.336	1.968
Malaysia	perceraian	0.468	14.871	-1.671
Mexico	Divorcio	1.635	7.946	-6.487
Peru	Divorcio	4.393	15.888	-8.425
South Africa	isehlukaniso	1.016	14.384	-6.678
Thailand	□□□□	0.169	5.938	-2.991
Turkey	boşanma	0.616	4.557	-1.564
Venezuela	Divorcio	0.111	11.379	5.007
Vietnam	ly hôn	0.169	2.968	7.494
High-income countries				
Australia	divorce	0.140	7.232	-2.225
Austria	Scheidung	1.279	5.283	-0.317
Bolivia	Divorcio	1.161	11.635	3.274
Canada	divorce	0.648	8.965	-1.195
Chile	Divorcio	1.622	13.976	-0.762
Czech Republic	rozvod	2.285	4.511	2.587
Finland	avioero	0.338	5.032	-9.820
France	divorce	1.430	6.501	0.424
Germany	Scheidung	0.945	5.918	2.587
Greece	διαζύγιο	1.353	2.954	-1.584
Hong Kong	□□	0.339	9.533	16.531
Hungary	válás	2.612	4.443	-1.845
Israel	גירושים	0.664	7.296	2.388
Italy	divorzio	1.862	6.127	1.733
Japan	□□	0.126	6.674	2.937
Netherlands	scheiden	0.897	6.581	-6.379
New Zealand	tokorau	0.068	7.554	1.185
Norway	skilsmisse	0.248	4.608	-8.613

Poland	rozwód	1.701	3.668	-14.521
Portugal	Divórcio	1.387	8.939	4.800
Qatar	طلاق	0.165	5.494	-2.394
Saudi Arabia	طلاق	0.186	8.357	-1.277
Singapore	divorce	0.089	15.931	10.927
South Korea	□□	0.149	3.422	20.897
Spain	Divorcio	1.532	5.239	-1.943
Sweden	skilsmässa	1.223	5.225	-2.522
Switzerland	Scheidung	1.043	5.811	1.971
Taiwan	□□	0.081	4.550	12.370
United Arab Emirates	طلاق	0.158	9.276	-1.479
United Kingdom	divorce	2.083	9.381	2.012
United States	divorce	1.810	6.790	1.031

We compared the observed weekly search volume between March 1, 2020 and October 15, 2022 with the expected search volume for each country, as estimated from a 5-year baseline between March 1, 2015 and February 28, 2020. This 5-year time window was selected as baseline to account for seasonal variations in search volumes. Using the search volume of the 5-year baseline, we forecasted a counterfactual scenario of the expected search volumes had the COVID-19 outbreak not occurred. The expected search volumes were estimated using Hyndman and Khandakar's algorithm for seasonal autoregressive integrated moving average (sARIMA) modeling (Zeileis et al., 2008). Weekly differences between the observed volume and expected volume in each country from March 1, 2020 to October 15, 2022 were then averaged to yield a monthly value for each country.

Quantification of stay-at-home behavior

We used Google Location History data in this study, which is anonymized cell phone location data derived from Google accounts on cell phones owned by users who opt in to have their location data made available. Cell phone locations could be divided into six categories: workplace, retail, transit stations, grocery stores, parks, and residences. Recent research has demonstrated that regional cell phone activities at the residence can be used to predict changes in local COVID-19 cases (Sehra et al., 2020). Therefore, we used aggregated country-level cell phone activity at the residence to quantify stay-at-home behavior. The daily time spent at the residence from March 1, 2020 to October 15, 2022 was compared with the median value from a 5-week baseline period (January 3 to February 6, 2020) to calculate percentage changes. While the first and second years of the COVID-19 pandemic encompassed full 12-month periods (from March 1, 2020 to February 28, 2021, and from March 1, 2021 to February 28, 2022, respectively), data for the third year were limited to the period from March 1, 2022 to October 15, 2022, because Google Location History data were no longer made available after this date.

Severity of the COVID-19 pandemic

To evaluate the severity of the COVID-19 pandemic in each country during the study period, data on the number of daily deaths of each country (JHU, 2023) were obtained and then divided by the respective population size obtained from Wikipedia to calculate daily death rates. These rates were subsequently aggregated on a monthly basis. The preference for death rates over confirmed cases was due to the constrained availability of population-wide testing in many countries, particularly

those contending with swiftly escalating COVID-19 outbreaks.

Statistical Analysis

We conducted a causal mediation analysis (VanderWeele, 2015) to explore the role of stay-at-home behavior on the mechanism linking the spread of COVID-19 with search volume for “divorce” (Figure 1). COVID-19 spread and change in search volume were treated as the exposure and outcome variables, respectively. Technically, the causal mediation analysis decomposed the overall causal effect of COVID-19 spread on the change in search volume (termed the *total effect*) into two parts: (1) the part involving a change in stay-at-home behavior (termed the *mediation effect* or *indirect effect*), and (2) the part not involving a change in stay-at-home behavior (termed the *alternative effect* or *direct effect*). The proportion mediated (PM), which was calculated as the ratio of mediation effect to total effect, indicated the extent of mediation involving stay-at-home measures. Data were stratified by time periods and the national income level (Bank, 2023) to assess potential effects. Results were analyzed for the first year (March 1, 2020 to February 28, 2021), second year (March 1, 2021 to February 28, 2022), and third year (March 1, 2022 to October 15, 2022).

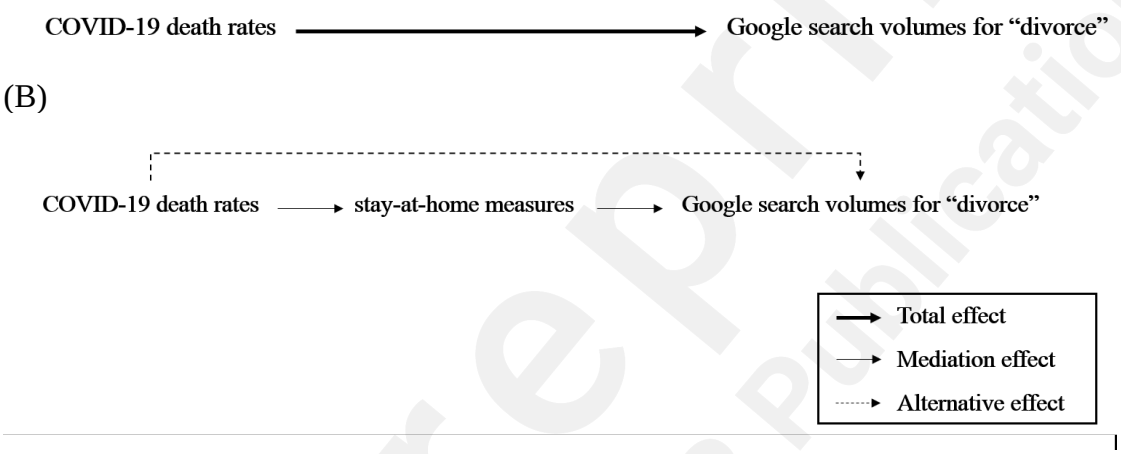

Figure 1. The causal pathways of COVID-19 death rates, stay-at-home behavior, and Google search volume for “divorce.” (A) The total effect of COVID-19 spread on Google search volume for “divorce.” (B) The total effect was decomposed into the mediation effect and alternative effect.

To conduct the causal mediation analysis, we first built three regression models as follows:

Model 1: $E[(\text{Google search volumes for "divorce"})]_{ct} \mid \text{COVID-19 death rates}_{ct}] = \beta 01 + \beta 1 \times \text{COVID-19 death rates}_{ct}$

Model 2: $E[(\text{Google search volumes for "divorce"})]_{ct} \mid \text{COVID-19 death rates}_{ct}, \text{stay-at-home measures}_{ct}] = \beta 02 + \beta 2 \times \text{COVID-19 death rates}_{ct} + \beta 3 \times \text{stay-at-home measures}_{ct}$

Model 3: $E[\text{stay-at-home measures}_{ct} \mid \text{COVID-19 death rates}_{ct}] = \beta 4 \times \text{COVID-19 death rates}_{ct} + \gamma_c + \delta_t$

These regression models were built based on the concept of fixed effect panel regression (Brüderl and Ludwig, 2015). In panel regression, the intercept consists of two fixed effects, namely the fixed group effect and the fixed time effect. Because the search volume had been standardized by the expected search volume for each country, neither the fixed time effect nor the group effect was added into these models. In contrast, the fixed time effect, δ_t, and fixed country effect, γ_c, were added into Model 3.

The causal mediation analysis was based on these models. Models 1 and 2 were regression models in which the search volume for “divorce” was the dependent variable. The coefficient of COVID-19 spread (i.e., β_1) in Model 1 was a measure of the total effect of COVID-19 spread on the Google search volume for “divorce”. The coefficient β_3 could be interpreted as stay-at-home behavior leading to the impact on Google search volume, while the coefficient β_4 represented COVID-19 spread leading to stay-at-home behavior. The *product* of β_3 in Model 2 and β_4 in Model 3 was used to estimate the indirect effect of COVID-19 spread on Google search volume through stay-at-home behavior (i.e., the mediation effect). Alternatively, the effect of COVID-19 spread on the Google search volume if unmediated by stay-at-home behavior (i.e., the alternative effect) was calculated by subtracting the mediation effect from the total effect. The delta method was applied to estimate the standard error.

We conducted a comparative analysis to assess the difference in effects between high- and middle-income countries. The effects of middle-income countries were subtracted from those of high-income countries. Subsequently, we applied the delta method, assuming no correlation between the two groups. Standard deviation (SD) was computed under this assumption, and p-values were obtained by assuming a normal distribution. Only the resulting p-values were retained for further analysis.

Analyses were conducted using R software, version 3.6.3 (R Foundation for Statistical Computing). A *p-value* < .05 was regarded as being statistically significant.

Results

Results of the causal mediation analysis are shown in Table 2. Subtle variations in the impact of COVID-19 death rates on search volumes for "divorce" were noted across the three study time periods. In the overall analysis encompassing all 45 countries, during the initial two years of the pandemic (March 2020 to February 2021, and March 2021 to February 2022), substantial associations were observed between COVID-19 death rates and search volumes for “divorce”. Essentially, a higher COVID-19 death rate corresponded to a more pronounced decline in divorce-related search volumes within the same month. However, there was no statistically significant mediation effect during these two years. As the pandemic progressed into the third year (March 2022 to October 15, 2022), the association between COVID-19 death rates and search volumes for “divorce” became insignificant, while a positive significant mediation effect emerged, and the proportion mediated was 14.4%.

Table 2. Estimations of all effects of COVID-19 death rate on the search volume of “divorce”.
(A) All 45 countries

	First year (Mar. 2020 to Feb. 2021)			**Second year (Mar. 2021 to Feb. 2022)**			**Third year (Mar. 2022 to Oct. 2022)**		
	Estimate	**95% CI**	**P value**	**Estimate**	**95% CI**	**P value**	**Estimate**	**95% CI**	**P value**
Total effect	-1.01×10^4	(-1.56×10^4, -4.74×10^3)	<.001***	-1.65×10^4	(-2.34×10^4, -9.57×10^3)	.002**	7.60×10^2	(-1.67×10^4, 1.72×10^4)	.886
Mediation effect	-1.13×10^3	(-2.70×10^3, 3.15×10^2)	.0118	8.29×10^2	(-1.30×10^3, 3.00×10^3)	.448	2.45×10^3	(1.94×10^2, 5.20×10^3)	.028*
Alternative effect	-8.98×10^3	(-1.46×10^4, -3.52×10^3)	<.001***	-1.73×10^4	(-2.38×10^4, -1.07×10^4)	<.001***	-1.69×10^3	(-1.89×10^4, 1.43×10^4)	.854
Proportion Mediated (%)	10.8	(-3.3, 32.7)	.118	-4.9	(-22.5, 7.6)	.450	14.4	(-320.4, 485.8)	.878

(B) Middle-income countries

	First year (Mar. 2020 to Feb. 2021)			Second year (Mar. 2021 to Feb. 2022)			Third year (Mar. 2022 to Oct. 2022)		
	Estimate	**95% CI**	**P value**	**Estimate**	**95% CI**	**P value**	**Estimate**	**95% CI**	**P value**
Total effect	-1.76×10^4	(-2.73×10^4, -7.87×10^3)	<.001***	-2.73×10^4	(-3.93×10^4, -1.43×10^4)	.002**	-3.52×10^4	(-8.86×10^4, 1.70×10^4)	.186
Mediation effect	-3.05×10^3	(-6.63×10^3, -5.90×10^2)	.004*	-1.54×10^3	(-4.71×10^3, 8.52×10^2)	.210	3.32×10^2	(-2.11×10^3, 3.60×10^3)	.802
Alternative effect	-1.46×10^4	(-2.38×10^4, -5.21×10^3)	<.001***	-2.57×10^4	(-3.67×10^4, -1.28×10^4)	.002**	-3.55×10^4	(-8.96×10^4, 1.65×10^4)	.182
Proportion Mediated (%)	16.8	(3.6, 41.9)	.004**	5.0	(-3.2, 17.9)	.212	-0.2	(-36.3, 18.4)	.860

(C) High-income countries

	First year (Mar. 2020 to Feb. 2021)			Second year (Mar. 2021 to Feb. 2022)			Third year (Mar. 2022 to Oct. 2022)		
	Estimate	**95% CI**	**P value**	**Estimate**	**95% CI**	**P value**	**Estimate**	**95% CI**	**P value**
Total effect	-3.72×10^3	(-1.00×10^4, 2.98×10^3)	.244	-6.99×10^2	(-1.02×10^4, 8.88×10^3)	.902	1.57×10^4	(-1.55×10^3, 3.30×10^4)	.076
Mediation effect	1.22×10^3	(-8.71×10^2, 3.42×10^3)	.256	6.87×10^3	(3.32×10^3, 1.12×10^4)	<.001***	7.22×10^3	(2.80×10^3, 1.28×10^4)	<.001***
Alternative effect	-4.93×10^3	(-1.19×10^4, 1.66×10^3)	.140	-7.57×10^3	(-1.62×10^4, 9.70×10^2)	.082	8.52×10^3	(-7.78×10^3, 2.50×10^4)	.336
Proportion Mediated (%)	-23.5	(-325.4, 309.2)	.440	-57.2	(-1970.7, 1929.7)	.902	44.2	(-164.8, 270.0)	.076

Abbreviation: 95% CI, 95% confidence interval. *p-value < 0.05, **p-value < 0.01, ***p-value < 0.001

Variations were also noted across different income groups. In middle-income countries, mirroring the trends observed in the overall analysis, there was a negative association between COVID-19 death rates and search volumes for “divorce” during the initial two years, with the effect diminishing in the third year. The mediation effect of stay-at-home behavior was significant in the first year, accounting for approximately 16.8% of the total effect. However, as the pandemic progressed into the second year, although the overall effects of COVID-19 death rates on the search volume for "divorce" remained significant within middle-income countries, the mediation effect of stay-at-home behavior lost significance. In the third year of the pandemic, both the total effect and mediation effect diminished.

In contrast to middle-income countries, the impact of COVID-19 death rates did not have a significant impact on search volumes for "divorce" throughout the three-year study period in high-income countries. However, as the pandemic extended into its third year, the trend in the total effect in high-income countries gradually approached borderline significance. This observation indicated that the relationship between COVID-19 death rates and search volumes progressively evolved towards a positive correlation. Additionally, as the pandemic continued into its second and third years, the impact of stay-at-home behavior on search volume in high-income countries became noteworthy. The proportions mediated were 57.2% and 44.2% for the second and third years,

respectively. This underscores that, with the changing temporal context, the total effect, i.e., the impact of COVID-19 death rates on search volumes for “divorce,” gradually tended towards a positive correlation, and that this shift was attributable to the significant mediation effect of stay-at-home behavior.

The comparative analysis between high- and middle-income countries is presented in Table 3. When examining the three-year period of the pandemic, significant distinctions were observed in the total, mediation, and alternative effects between the high- and middle-income countries. Furthermore, when considering the annual variations in the pandemic, there were notable disparities in the total effect between the two income groups during the first and second years, with this discrepancy diminishing in the third year. In addition, there were significant differences in the mediation effect in each year.

Table 3. P-values of comparisons between middle- and high-income countries.

	All 3 years (Mar. 2020 to Oct. 2022)	First year (Mar. 2020 to Feb. 2021)	Second year (Mar. 2020 to Feb. 2021)	Third year (Mar. 2022 to Oct. 2022)
Total effect	<.001***	.015*	.002**	.050
Mediation effect	<.001***	.024*	<.001***	.005**
Alternative effect	.003**	.095	.027*	.087

*p-value < 0.05, **p-value < 0.01, ***p-value < 0.001

Discussion

This study analyzed the impact of the COVID-19 pandemic on global "divorce" search trends in 45 countries over three years, elucidating the dynamic interplay between pandemic severity, stay-at-home behavior, and online divorce inquiries. Results indicate a diminishing protective effect of higher COVID-19 death rates on divorce searches over time, influenced predominantly by stay-at-home practices. A comparative analysis between middle-income and high-income countries revealed distinct patterns. In middle-income countries, the initial negative correlation between COVID-19 death rates and divorce search volumes, influenced by stay-at-home behavior, weakened progressively. Conversely, high-income countries experienced a shift from a negligible to a positive correlation, with the exacerbating mediation effect of stay-at-home behavior becoming more pronounced over the pandemic's duration. Despite these variations, a common trend emerged across both income groups: the influence of COVID-19 death rates in reducing divorce-related searches waned annually, attributable to the evolving impact of stay-at-home behavior. This trend manifested as a decreasing protective role in middle-income countries and an intensifying detrimental effect in high-income countries over time.

To our knowledge, this is the first study to examine the enduring effect of the COVID-19 pandemic on online search behavior related to divorce, and the first study to provide direct evidence for differences between national income groups. Our findings align with previous research showing a decline in divorce rates during the early stages of the pandemic, with a more pronounced effect in middle-income countries such as Mexico compared to high-income counterparts (Hoehn-Velasco et al., 2023). Notably, as the severity of the pandemic increased, our results showed a more significant reduction in online searches related to divorce during the initial year, primarily influenced by the mediating role of stay-at-home behavior. In middle-income countries, this trend may be rooted in psychological mechanisms triggered by the crisis, such as the initial fostering of family cohesion (Cohan and Cole, 2002) and increased commitment to marriage (Karpowitz and Pope, 2020). However, as the pandemic progressed, this protective influence may have diminished as crisis awareness subsided.

It is noteworthy that, in both middle-income and high-income countries, the protective effect of the severity of the pandemic on divorce-related search volumes diminished with the duration of the pandemic, and this was associated with stay-at-home behavior. This suggests that prolonged mobility restrictions, especially in the later stages of the pandemic, may have increased the likelihood of individuals searching for information related to divorce. Similarly, prior research on intimate partner violence has indicated that the mobility restrictions imposed during the pandemic also escalated the severity of violence (Lyons and Brewer, 2022). This may indicate that the benefits of stay-at-home measures gradually diminished, and subsequently disrupted marital relationships.

This study had several strengths. Data from 45 countries with varying COVID-19 transmission rates and divergent infection control measures were used for analysis. Since these countries may have had different baseline internet search volumes for “divorce” and seasonal patterns, panel regression and sARIMA modelling were utilized to adjust for time effects. Instead of treating stay-at-home status as a binary variable, we measured stay-at-home behavior as a continuous variable, thereby accounting for real-world variations in lockdown policies (Adams-Prassl et al., 2020). Lastly, by taking advantage of the high spatiotemporal resolution of search and location data, we were able to observe interactions between human mobility, online activities, and marital relationships. Our findings emphasize the value of internet search volumes as a metric for understanding public sentiment and attitudes. Examining search behavior provides timely insights into how significant events, such as a global pandemic, influence individuals' thoughts. In the context of divorce, analyzing search volumes could complement conventional divorce rate data, offering a more comprehensive understanding of the dynamics at play.

Specific methodological limitations should be noted when interpreting our findings. As the unit of analysis was by nation, the association between research variables may not hold true at the individual level. In addition, the generalizability of our findings may be susceptible to sampling bias. Since Google Location History data are generated by mobile devices and internet access is necessary for Google search, aggregated data obtained from nations where smartphones and internet services are not widely available would not be representative. Therefore, international comparisons are not an intention of this study. Furthermore, although the generational divide is becoming less significant in modern society, mobile phone ownership and internet reliance decline with age (Gilleard et al., 2015, Gafni and Geri, 2013). In other words, our findings could be generalized across digitally active populations, especially young couples with smartphones and internet access. Moreover, based on Google Location History alone, we could not identify specific reasons for people to stay at home. Therefore, further studies are warranted to compare the psychological effects of staying at home voluntarily and being forced into quarantine.

Beyond the academic context, our findings may have implications for public health and policymaking, in particular the need for targeted interventions and support measures to address the evolving impact of the pandemic on family relationships. Recognizing the role of stay-at-home measures and their mediating effect can guide policymakers in tailoring resources and services to mitigate potential strains on couples and families. In addition, our findings underscore the importance of ongoing monitoring and research to capture the dynamic nature of public sentiment and behavior during prolonged disasters such as the COVID-19 pandemic. Understanding how these trends evolve over time can inform more effective responses and interventions.

Conclusions

This study revealed intricate associations among the pandemic, stay-at-home behavior, and online searches related to divorce. As the pandemic persisted, the protective effect of the severity of the pandemic on divorce search volumes diminished, predominantly influenced by stay-at-home behavior. Our findings highlight the evolving nature of the impact of the pandemic on family relationships and emphasize the need for nuanced, data-informed approaches to address these

challenges effectively. Future investigations could explore the psychological mechanisms underlying divorce search behavior, providing more profound insights. Vigilance and adaptability concerning the evolving nature of family relationships remain essential as societies navigate similar global challenges.

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Conflicts of Interest

Disclose any personal financial interests related to the subject matters discussed in the manuscript here. For example, authors who are owners or employees of Internet companies that market the services described in the manuscript will be disclosed here. If none, indicate with “none declared”.

Abbreviations

sARIMA : Seasonal Autoregressive Integrated Moving Average
PM : Proportion Mediated
SD : Standard Deviation

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