Projected all-cause deaths attributable to COVID-19-related unemployment in Croatia in 2020

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Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Original Research

Projected all-cause deaths attributable to COVID-19–related unemployment in Croatia in 2020

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ABSTRACT

Objectives: In 2020, Croatia reported the first increase in the unemployment rate after six consecutive years of reduction in the number of unemployed persons. Unemployment is associated with an increase in morbidity and mortality among unemployed persons. We estimated the number of potential excess deaths that could be associated with an increase in unemployment seen after the beginning of the COVID-19 pandemic in 2020.

Study design: This was a cross-sectional analytic study.

Methods: We used previously published meta-analyzed hazard ratios for the unemployment–mortality association and unemployment and mortality data from the Croatian Bureau of Statistics to estimate 1-year age-standardized deaths potentially attributable to COVID-19–related unemployment for persons aged 20–64 in Croatia.

Results: In January 2021, we observed a 19% increase in unemployment among persons aged 20–64 years compared with February 2020 (prepandemic). This increase in unemployment could lead to 23 excess deaths among newly unemployed persons. This would constitute a 42% increase in the number of deaths and 29% of all deaths among this group. Deaths were disproportionately higher among men and those aged >40 years.

Conclusions: To mitigate the negative impact of COVID-19–related unemployment on population health, interventions that will reduce the further spread of SARS-CoV-2 and policies that will ensure economic recovery and reduction of unemployment are needed. Job skills training and provision of legal and welfare advice programs for unemployed persons should be integrated with health interventions.

Introduction

COVID-19 is caused by a novel SARS-CoV-2 that emerged in late 2019 in Wuhan, China.[1] On January 30, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a public health emergency of international concern, the international spread accelerated from late February 2020, and on March 11, 2020, a pandemic was declared.[2] Croatia is a high-income country and a European Union (EU) member with a population of 4.1 million.[3] The first case of COVID-19 was reported in Croatia on February 25, 2020,[4] and as of June 2021, Croatia had 358,379 confirmed cases and 8123 deaths attributed to COVID-19.[5] In addition to the substantial impact on mortality and morbidity, the COVID-19 pandemic had a negative impact on the Croatian economy, and it had led to the 8% drop in the gross domestic product (GDP) in 2020 compared with 2019.[6]

The Croatian government implemented a set of regulations and restrictions to try to control the transmission of SARS-CoV-2.[7] The first set of regulations was introduced on March 19, 2020, and they focused on limiting travel of Croatian citizens across the national borders and limiting economic activity to only the most essential services (e.g. emergency medical services, food industry, gas stations, and grocery shops). The first increase in the number of unemployed persons was recorded in March 2020, and by January 2021, the unemployment increased by 17% compared with January 2020.[8] This increase came after six consecutive years of reduction in the number of unemployed persons, and this was the largest increase in unemployment since 2010 (Supplementary Fig. 1).[8]

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The right to work is a basic human right and a key part of economic stability in the concept of social determinants of health.[9] Job insecurity and unemployment have detrimental consequences for a person's health and well-being.[10] A person is considered unemployed if they are of working age and without work and if they are seeking work and currently available for work.[11] Unemployment is associated with excess mortality because of an increase in suicide, alcohol, and drug misuse[12–14] and an increase in heart disease and stroke mortality.[15] Negative health consequences of unemployment are often the most prominent in the first months or a year since losing the job, but an increase in the rate of unemployment can have a long-lasting impact on population health.[15]

In this article, we aim to estimate the number of potential excess deaths that could be associated with the increase in unemployment that we observed after the lockdown measures for mitigating the impacts of COVID-19 were implemented in 2020 (COVID-19–related unemployment).

Methods

To calculate excess deaths due to COVID-19–related unemployment, we used a method for determining the population attributable fraction (PAF).[16] This method was used by Matthay et al. to estimate the excess deaths that could be associated with COVID-19–related unemployment in the United States of America.[17] To estimate the increase in mortality due to unemployment, we used previously published meta-analyzed hazard ratios (HRs) for the unemployment–mortality association stratified by age and gender.[14] To estimate the impact of the COVID-19 pandemic on unemployment in Croatia, we used monthly unemployment data published by the Croatian Employment Service.[8] We calculated the difference in the number of unemployed persons in February 2020 (prepandemic period) and 12 months later in January of 2021 for persons who were aged 20–64 years. We used the estimated number of persons who are aged 20–64 years and who lived in Croatia in 2020 to calculate the percentage of unemployed persons in February 2020 and January 2021 and the increase in unemployment for this period.[18] We used the 2019 annual report on the number of deaths in Croatia to estimate prepandemic mortality rates stratified by age and gender.[19]

Results

Among persons aged 20–64 years, 25,302 more people were unemployed in January 2021 compared with February 2020. This was a 1.05% point increase in the unemployment rate (from 5.52% to 6.57%) or a relative increase of 19%.

The unemployment increase in 2020 was higher among women than men (1.18% vs 0.92% points, respectively; Table 1). Half of the population aged 20–64 years were women, but they made up 55% of all unemployed persons and 56% of newly unemployed persons in 2020. Persons aged 20–29 years constituted 20% of the population, but they made 26% of all unemployed persons and 36% of newly unemployed persons in 2020. When compared with the proportion of the population, the excess deaths due to the COVID-19–related unemployment were disproportionately higher among those aged 40–64 years, men aged 40–49 years, and women aged 20–49 years (Fig. 1). In 2020, men constituted 50% of the population aged 20–64 years and 44% of newly unemployed persons, but they made up 83% of all excess deaths due to COVID-19 unemployment.

A 1.05% points increase in unemployment due to the COVID-19 pandemic could lead to 23 excess deaths in this age group. This would constitute a 42% increase in the number of deaths among

Table 1
Unemployment related risk ratios, COVID-19–related unemployment increase stratified by age and gender, estimated number of excess deaths due to COVID-19–related unemployment by age and gender, Croatia, February 2020 to January 2021.

	All					Female by age					Male by age					Female all	Male all
	20–29	30–39	40–49	50–64	Total	20–29	30–39	40–49	50–64	Total	20–29	30–39	40–49	50–64	Total		
Unemployment–mortality risk ratio (RR)	1.73	1.73	1.77	1.25	–	1.73	1.73	1.34	0.9[a]	–	1.95	1.95	1.86	1.17	–		
COVID-19–related unemployment increase in percentage points, February 2020 to January 2021	1.91	1.18	1.01	0.53	1.05	2.15	1.38	1.08	0.62	1.18	1.69	0.98	0.94	0.43	0.92	1.18	0.92
Deaths attributable to COVID-19–related unemployment	3	3	8	9	23	1	1	1	0	3	3	3	6	3	15	3	15
Percentage of all attributable deaths	13%	13%	35%	39%	100%	33%	33%	33%	0%	100%	20%	20%	40%	20%	100%	17%	83%
Percentage of total population	20%	22%	23%	35%	100%	19%	22%	22%	37%	100%	20%	23%	23%	34%	100%	50%	50%

Risk ratios calculated based on the hazard ratios presented in Roelfs et al.[14]
RR for women 50-64 was 0.94 with 95% confidence interval including 1, and this is why we treated this age group as not having an additional risk of death due to unemployment.

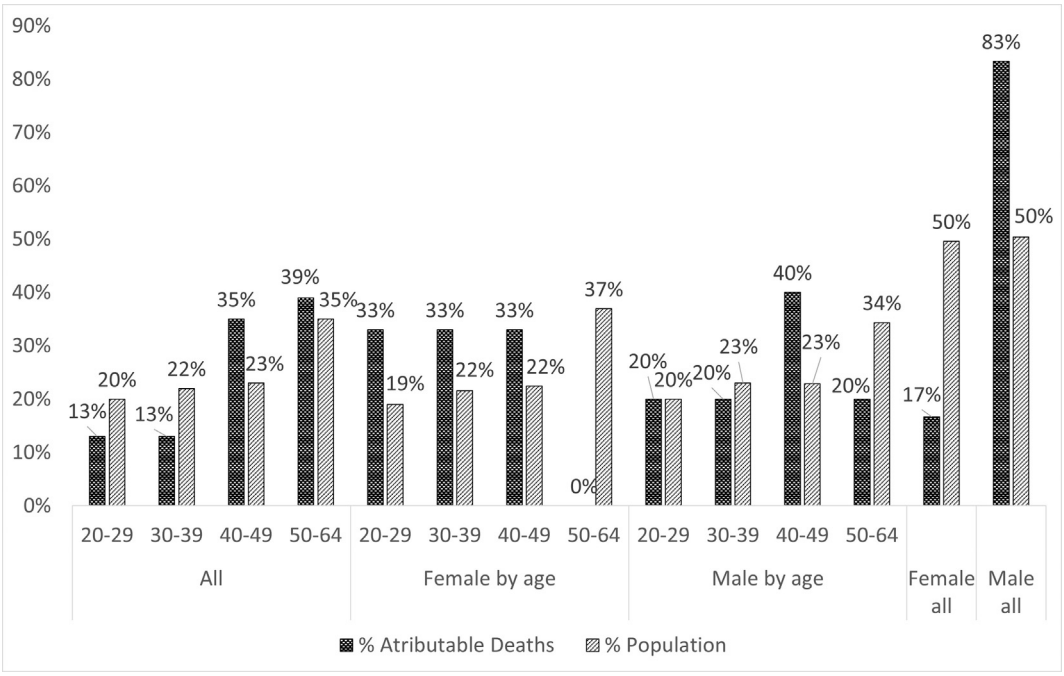

Fig. 1. Estimated 1-year age-standardized death count attributable to COVID-19 -related unemployment for the Croatian population aged 20 -64 years stratified by age and gender, Croatia, Feb 2020 -Jan 2021. Values indicate the attributable death count due to COVID-19 related unemployment, percentage of attributable deaths, and percentage of population in each group.

newly unemployed persons and 29% of all deaths among newly unemployed (Fig. 2).

We explored scenarios where COVID-19–related unemployment increases were five times (5.25 percentage points) and 10 times (10.5 percentage points), the observed level of increase in unemployment (Table 2). Excess deaths attributable to COVID-19–related unemployment in these two potential scenarios would be 114 and 222, respectively.

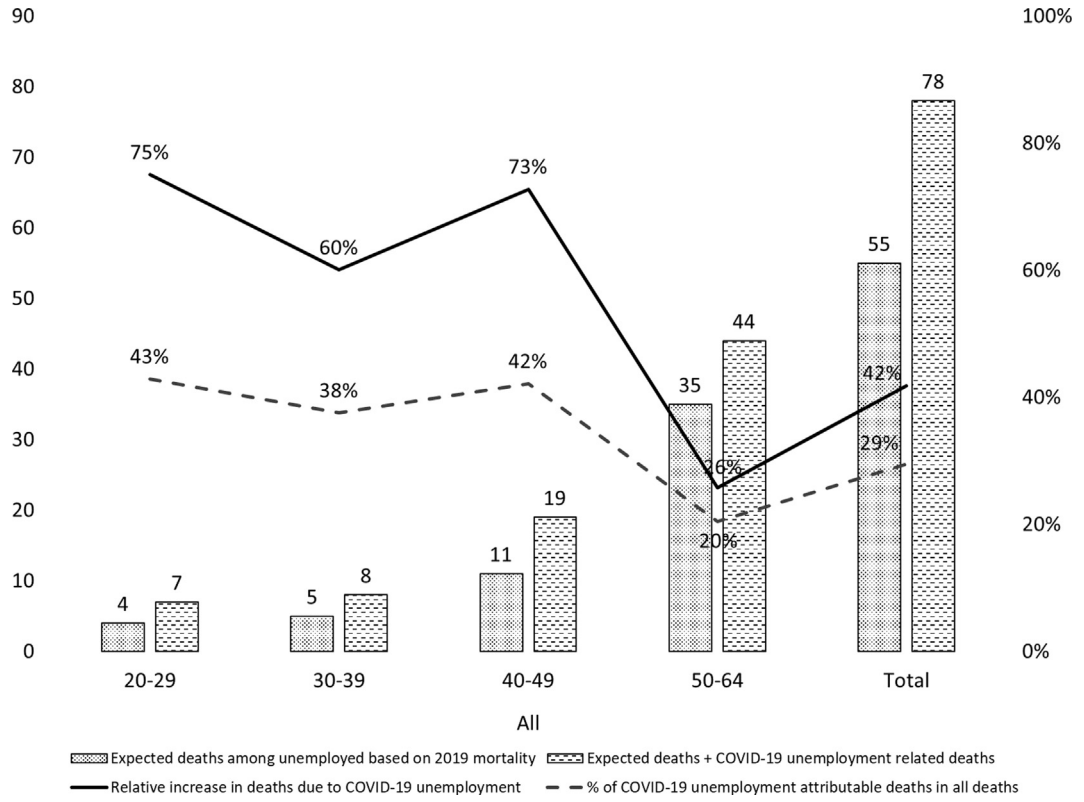

Fig. 2. Estimated deaths among unemployed persons, relative increase and percentage of excess deaths due to COVID-19 related unemployment stratified by age, Croatia, Feb 2020 -Jan 2021.

Table 2
Estimated number of COVID-19 attributable deaths if the COVID-19–related unemployment in 2020 increased by 5.25 percentage points (5× of official estimates) or 10.5 percentage points (10× official estimates), Croatia, February 2020 to January 2021.

Increase in COVID-19 related unemployment	20–29	30–39	40–49	50–64	Total	% of total deaths among 20 to 64 in 2019 (n = 8411)	% of estimated total COVID-related deaths as of February 2021 (n = 5011)
Unemployed persons on January 2021 (at 5.25 percentage points increase)	45,170	31,235	27,505	22,600	126,510		
Deaths attributable to COVID-19 unemployment	14	17	40	43	114	1.36%	2.28%
Unemployed persons on January 2021 (at 10.5 percentage points increase)	90,340	62,470	55,010	45,200	253,020		
Deaths attributable to COVID-19 unemployment	25	34	77	86	222	2.64%	4.44%

Discussion

Our analysis suggests that an increase in unemployment that happened after the start of the COVID-19 pandemic could result in 23 excess deaths among the working-age population in Croatia. The excess deaths will be disproportionally higher among those aged >40 years of age and men. To put this estimate into context, as of February 2021, a total of 5011 deaths attributable to COVID-19 were recorded,[20] whereas a total number of deaths among persons aged 20–64 years in 2019 was 8411.[19]

A similar analysis that was done for the United States showed that estimated excess deaths due to COVID-19–related unemployment were approximately 8% of the total number of COVID-19–related deaths in 2020.[17] The much smaller excess deaths in Croatia (<1% of all COVID-19–related deaths) could be partially explained by the much lower increase in COVID-19–related unemployment in Croatia compared with the United States (1 vs 10 percentage points increase), by lower mortality rates in working-class population in Croatia and by a larger increase in unemployment among the older working-age population in the United States compared with Croatia.

The non-pharmaceutical interventions (e.g. physical distancing, face coverings mandates, banning of large in-person gatherings, school and workplace closures, etc.) implemented to mitigate the impact of the COVID-19 pandemic on population health resulted in a significant reduction in transmission, hospitalization, and deaths related to COVID-19 across the world.[21] The evaluation of the implementation of non-pharmaceutical interventions in Organization for Economic Co-operation and Development countries showed faster economic recovery when implemented early enough in the pandemic.[22] However, these interventions can also lead to a reduction in economic activity and an increase in unemployment, which can have a negative impact on the population health.[14,15]

Before the COVID-19 pandemic Croatian GDP growth was accelerating, with a growth rate of 2.9% in 2019.[6] In 2020, the GDP growth turned negative and contracted sharply by 8.0% driven mainly by a fall in the tourism sector, domestic consumption, and difficulties in exports. Among the 27 EU member states, only Spain (10.8%), Italy (8.9%), and Greece (8.2%) experienced more severe GDP contractions in 2020.[6] The pandemic also had a negative impact on public finance. The public debt in Croatia reached 88.7% of GDP in 2020, a 15.9% points rise from 2019.[23] Croatia still has to catch up with the rest of the EU: the country's GDP per capita stands at 64% of the EU average in 2020 and labor participation remains low at 51.7%.[6]

In an attempt to mitigate the severe consequences of the COVID-19 pandemic on both companies and employees, the Croatian State Aid Model to microcompanies and small- and medium-sized enterprises affected by the COVID-19 pandemic was developed, amounting to a total of 653.3 million EUR between April 2020 and April 2021. It aimed to ensure that companies that are experiencing cash difficulties due to the pandemic have the liquidity to maintain their activities during and after the pandemic. For example, as of February 2021, more than 32,000 employers were receiving government subsidies to sustain 127,278 persons employed during the pandemic.[24] This number is similar to the estimated 126,510 unemployed persons if the increase in unemployment was five times the observed one (5.25 percentage points). In this scenario, the estimated excess deaths due to COVID-19 unemployment would be 114, and this would make 1.4% of total deaths in the 20–64 years age group in 2019. Therefore, while the rise in unemployment due to the COVID-19 pandemic in Croatia seems much smaller compared with the one in the United States, for now, it seems that a more drastic increase was mitigated by the government programs designed to assist employers to keep their workers employed during the pandemic. Additional research to explore the health benefits of government programs that provided basic support for workers during the pandemic should be done, and it should include EU countries with a diverse set of support programs to estimate the economic and health impact of different approaches.

Research findings analyzing data from the past 30 years found that fiscal consolidation equal to 1% of GDP, typically reduces GDP by about 0.5% within 2 years and raises the unemployment rate by about 0.3 percentage points.[25] The impact on long-term unemployment is apparent, and it hurts wage-earners disproportionately more than profit- and rent-earners, hindering the recovery and worsening job prospects.[25] The potential benefits of fiscal consolidation should be balanced against the short- and medium-run adverse impacts on growth and jobs.

Deaths related to the COVID-19 unemployment will disproportionally burden men and persons who are aged 40–49 years (23% of population and 35% of excess deaths) and 50–64 years (35% of population and 39% of excess deaths). The main reason for the disproportional number of excess deaths in men and persons >40 years is much higher baseline mortality compared with women and persons <40 years (Supplementary Table 2). While men constitute 50% of the population and 44% of newly unemployed in 2020, more than 80% of all excess deaths due to COVID-19 unemployment were among men. We observed higher COVID-19–related unemployment among women than among men, but the excess deaths due to the COVID-19 unemployment among women constituted only 17% of all the excess deaths. A similar pattern was reported in the US analysis where 21% of excess deaths due to COVID-19–related unemployment were among women while they made 50% of the working population.[17] This discrepancy in the excess deaths among women can be explained by lower unemployment–mortality association for women in each age group [14] and by substantially lower mortality rates among 20- to 64-year-old women compared with men (Supplementary Table 2). For example, in Croatia in 2019, women constituted 50% of the population aged 20–64 years, and only 31% of all deaths in this age group.[19]

The immediate excess deaths due to unemployment are attributed to an increase in the risk of suicide[13,26] and an increase in

alcohol and drug misuse that leads to an increase in morbidity and mortality.[12] In the recent analysis of trends in the number of suicides in the early months of the COVID-19 pandemic, Croatia seems to have a higher number of suicide deaths compared with the same time in 2019.[27] To mitigate these risks, it will be essential to address mental health challenges of the economic crisis by producing good access to mental health and primary health care services for unemployed persons and their families, with the adequate capacity to early recognize mental health problems, suicidal ideas, and heavy drinking or drug use (e.g. using hotlines for mental health counseling, raising awareness of the importance of mental health in the time of economic downturn, public health campaigns for reducing stigma around mental health).[13,26] In addition to access to mental health services, it has been shown that participation in group job skills training reduced the symptoms of depression and enhanced the emotional functioning of unemployed persons.[28] Provision of legal and welfare advice co-located with primary health care can improve mental health outcomes for unemployed persons.[29] Therefore, making sure that unemployed persons, especially the ones aged >40 years, have easy access to mental health services that are integrated with referrals to job skills training and access to legal and welfare advice could help reduce the negative impact of unemployment on health.

Loss of income and isolation exacerbated the risk of family violence during the COVID-19 pandemic in many settings.[30] Among the interventions for mitigating the impact of family violence are specific funding for measures to prevent and respond to violence, ensuring that the public, in particular women and children, are aware of the resources and types of services available by broadcasting violence hotline numbers via mass media, including social media platforms, and maintenance and expansion of hotlines and shelters. According to the United Nations recommendation, services for victims of violence and support to civil society and women's rights organizations should be included in the national COVID-19 preparedness, response, and recovery plan.[31]

In addition to more immediate effects on mortality, the increase in the rate of unemployment was associated with increased cardiovascular and cerebrovascular mortality up to 5 years after the unemployment increase.[15] To mitigate the longer-term effects of unemployment on cardio and cerebrovascular health, unemployed persons should have access to interventions that reduce high systolic blood pressure, improve smoking cessation, increase physical activity, promote a healthy diet (e.g. reduction of sodium intake), and improve stress management.[32]

Limitations

Our analysis has several limitations. First, the mortality HRs for unemployment were extracted from the meta-analysis that reported the median follow-up of 8 years. Therefore, by estimating the annual excess of deaths due to unemployment, we may have overestimated the number of excess deaths in first year because some causes required a longer duration to lead to death.[17] However, this and other analyses have shown that the highest increase in mortality was observed in the first few years since the unemployment.[15,26] Second, our estimates reflect 1-year attributable mortality among persons who lost their job due to the COVID-19 pandemic, but the long-term impacts of the recession on the Croatian and world economy and employment levels are still unclear, and they may last far longer, compounding the negative impact on the population health. Third, Croatian Employment Service reports the number of unemployed persons by month, but they do not provide monthly estimates of the active labor force stratified by age and gender that is needed to calculate the exact unemployment rate. Therefore, to calculate the unemployment rate stratified by age and gender, we used the 2020 population estimates reported by the Croatian Bureau of Statistics. Given that the entire population is not included in the official unemployment rate calculations, our estimates of the unemployment rate were lower in comparison to the official national estimates that use only the active labor force as the denominator (e.g. for February 2020, official unemployment rate was 8.2%, and our estimate was 5.5%). However, for estimating PAF due to unemployment, we used the difference in prepandemic and pandemic unemployment rate; and the difference between the prepandemic and pandemic unemployment rates for both approaches were almost identical (1.1% vs 1.05%). Forth, while we observed the increase in the unemployment after the first lockdown measures for limiting economic activity were implemented, we cannot know if all newly unemployed persons since March 2020 were unemployed because of the impact of the COVID-19 pandemic or some other reason. However, given the change in the rate and the absolute number of unemployed persons that happened right after the start of the COVID-19 pandemic, we believe that majority of unemployment could be attributed to the impact of COVID-19. Fifth, it is unclear how the pandemic impacted the health risk of persons who are not employed but are not in active pursuit of a job. Finally, the majority of newly unemployed persons in 2020 had a high school education (68%), 22% had an education level higher than high school, and 10% had an education level lower than high school,[8] but we were not able to estimate excess deaths due to unemployment stratified by level of education because we did not have access to the necessary unemployment data stratified by education level and age. This estimate would be important for better understanding the distribution of excess deaths and targeting prevention interventions based on education level.

Conclusions

A relatively modest increase in unemployment due to the COVID-19 pandemic in Croatia resulted in a small number of excess deaths related to unemployment. In situations of a larger increase in unemployment, deaths attributable to unemployment could add to deaths directly associated with the COVID-19 and will disproportionately burden men and those who are aged 40–64 years. A combination of non-pharmaceutical interventions and vaccination is needed to reduce the further spread of SARS-CoV-2 and reduce the burden of COVID-19 on the population. To mitigate the negative impacts of unemployment on population health, policies that will ensure economic recovery and aim to reduce unemployment to prepandemic levels are needed. Interventions aimed at preventing health conditions responsible for the majority of the negative health consequences associated with unemployment (e.g. suicide, alcohol, and drug use, mental health disorders, cardio and cerebrovascular diseases) should be accessible and integrated with the job skills training and provision of legal and welfare advice programs for unemployed persons.

Author statements

Ethical approval

This study was based entirely on publicly available secondary data and was therefore exempt from institutional review board review.

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Competing interests

The authors have no conflicts of interest to report.

Appendix A. Supplementary data

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