



Suicide mortality in Portugal after 4 mediatized suicides from 1996 to 2020

Eudora Ribeiro^{a,*}, António Granado^b, João Gomes^c, Filipe Ramos^c

^a ICNOVA – Instituto de Comunicação da NOVA, Universidade Nova de Lisboa, Av. de Berna, 26 C, 1069-061, Lisboa, Portugal

^b ICNOVA – Instituto de Comunicação da NOVA, Universidade Nova de Lisboa, Lisboa, Portugal

^c CEAUL – Centro de Estatística e Aplicações, Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal

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ABSTRACT

Many international studies describe a relation between prominent and sensational suicide reporting and subsequent rises in suicide rates – the Werther effect –, especially when involving celebrities, but that relation has never been investigated in Portugal. In this article, we intend to examine whether there were increases in suicides in Portugal in the 3 and 5 months following four national mediatized suicides, including a triple youth suicide and the suicides of two famous entertainment celebrities and a well-known journalist. We used monthly suicide count data for Portugal from the National Institute of Statistics (INE) for the period of January 1990 to December 2020, stratified by sex, method, and age group. We conducted a Poisson regression model to determine if there were changes in suicide mortality in the 3 and 5 months after the selected suicides. We found statistically significant increases in total, male, and same age group suicides after the death of actor Pedro Lima and a rise in total, female, same age group, and poisoning suicides following the death of singer Cândida Branca Flor. However, in the latter case, the rises coincide with a major change in the suicide counting system. No such statistically significant increases in suicides were found in the months following the other two suicide cases, either by method, sex, or age group. Our findings show that the Werther Effect appears to occur in some, but not all, cases of mediatized suicides in Portugal, but these results should be considered amid several contextual factors. They provide an opportunity to alert media professionals to the importance of making suicide reporting in Portugal more responsible.

1. Introduction

There are many documented harmful effects of irresponsible depictions of suicide in the media, known as the Werther effect [1]. Numerous studies have reported evidence of a connection [2] or association [3,4] between the reporting of celebrity suicides and subsequent rises in suicides, particularly when there is a prominent and sensationalist coverage that provides details about the method. Vulnerable individuals are most at risk of being influenced [5,6]. Media reports on a suicide method increase the cognitive availability of that method, and individuals considering suicide may be more likely to choose the method used by celebrities [7].

There are studies about suicide increases after the deaths of Marilyn Monroe, Robert Enke, Robin Williams, Kate Spade, and Anthony Bourdain, which suggest a modelling effect [8] founded in Bandura's (1971) social learning theory [4,9]. In 'vertical

* Corresponding author.

E-mail address: eudora.ribeiro@campus.fctsh.unl.pt (E. Ribeiro).

identification' people tend to identify with someone who is socially superior, such as celebrities, whereas in 'horizontal identification' the social similarity between model and imitator (same age group and/or sex) stands as an important factor in identification and imitative behaviour [10]. Subsequent suicides are regularly by the same method [7] and performed by persons of the same sex or age group as those celebrities [2,11–13], and there are studies reporting that this process of social transmission happens especially in young people [14,15]. This implies an imitative effect [16] consistent with the notion of causation [17]. Furthermore, there are studies that suggest not only that celebrity suicide coverage may impact suicidal behaviour, but also that copycat suicides may increase following suicide reports regarding unknown citizens [18], if they receive enough publicity [19].

However, reporting on individuals with suicidal ideation who refrained from adopting suicidal plans and instead adopted positive coping mechanisms in adverse circumstances has been associated with a subsequent decrease in suicide rates, a phenomenon known as the Papageno effect [7,20]. There is also evidence that the media can help prevent copycat suicides if they follow certain guidelines [20–23] and that responsible suicide reporting may raise the public's awareness of suicide and its prevention, encourage persons at risk to look for help, and promote dialogue about suicide [5,6].

The WHO first released a set of recommendations to media professionals in 2000, with updates in 2008 and 2017. Several countries, such as the United Kingdom (UK) [24], the United States [25,26], Canada [27,28], and Australia [29], have also developed media guidelines aiming to promote responsible reporting of suicide. In Portugal, there is a National Suicide Prevention Plan [30] that includes recommendations for sensitive media reporting on suicide, based on the WHO guidelines, and a complete background on the subject.

1.1. Aims

There are multiple studies about media coverage of suicides and its impact on suicidal behaviour of populations from several countries, but there has never been a study in Portugal about suicide mortality patterns following mediatized suicide cases. This is so despite there being more deaths by suicide than by transport accidents in Portugal [31] and even though some Portuguese regions are particularly affected by historically high suicide numbers [32]. There is a strong relationship between suicide and mental health. Studies based on psychological autopsies suggest that 90% of suicides are associated with a diagnosable mental illness [33], and in all epidemiological studies, depression is systematically associated with between 45% and 80% of suicides [34]. Almost a fifth of the Portuguese population suffers from mental illness and Portugal is the fifth country in the European Union with the highest incidence of these disorders [35].

This study intends to fill this gap in the research by investigating if there were increases in suicide numbers in Portugal in the months following four national mediatized suicides, including the deaths of two celebrities and a well-known journalist as well as a case of a triple youth suicide, between 1996 and 2020.

2. Materials and methods

2.1. Case selection

We selected four cases of suicide, between 1996 and 2020, that were quite mediatized in Portugal. Two of them were of Portuguese entertainment celebrities, one was of a well-known journalist, and the other was a triple suicide of unknown young people:

1. Three young people, on 3 February 1996. Ricardo, 21 years, Paulo, 19 years, and Alice, 16 years, jumped off the Duarte Pacheco Viaduct onto Avenida de Ceuta, in Lisbon, the capital city of Portugal, while holding hands.
2. Journalist Miguel Ganhão Pereira, on 4 December 2000. The 29-year-old anchor of the main nightly newscast of the national television channel TVI jumped off Lisbon's 25 April Bridge into the Tagus River below.
3. Singer Cândida Branca Flor, on 11 July 2001. The famous artist, who was called 'Portuguese Marilyn' [36], died at the age of 51 by ingesting pills and alcohol at her home in Massamá, in the outskirts of Lisbon.
4. Actor Pedro Lima, on 20 June 2020. The famous soap opera heartthrob was found dead at Praia do Abano, in Cascais. He was 49 years old and left five children.

In selecting these suicides we prioritized, more than the amount of media reporting on each case, the fact that the coverage lasted more than a day and spanned across different types of media, namely, the three national generalist television channels, the daily newspapers with the largest circulation in Portugal and their websites, and the three radio stations with a greater portion of their programming time allocated to the news. The news coverage of all these cases was criticized, which was also relevant to their selection for this analysis [37–39].

2.2. Data and source

The monthly suicide mortality numbers for Portugal from 1990 to 2020 were obtained from the National Institute of Statistics (INE). These anonymized data were provided by suicide method, sex, age group, suicide method and sex, and suicide method and age group.

2.3. Methodology

Using the monthly series of suicides as a starting point, our aim was to understand if there was a suicide increase after the selected mediatized suicides, which could be evidence of a contagion effect.

Poisson regression [4,12,40] was used to estimate the monthly incidence of total suicides and suicides by selected causes, sex, and age group (10–19; 20–29; 30–44; 45–59; +60). The independent variables were year and month, and they were evaluated considering p values lower than 0.05. To evaluate the quality of the model, we used McFadden's R-Squared.

To ascertain whether some mediatized suicides were associated with increases in suicides, we evaluated the 5 months preceding each event and the 5 months following it – a period used in previous similar studies [2,12,13,41] – to test whether the observed values (x) could be considered to be above the expected values ($\hat{\lambda}$) fitted by the model $P(X = \hat{\lambda}) < 0.05$. This approach was also identical to those developed in previous research [4,12]. However, we additionally included a similar analysis of a shorter period of 3 months. Most studies – some older and some more recent – consider that copycat suicides are most prevalent or stronger right after a suicide incident, for up to seven days [42,43], ten days [44,45], two weeks [3,46], four weeks, or a month [16,47], with the possibility of a longer effect, for one to two months [4,7], five months [2,12,13], a year [8], or two years [3].

All evaluations were performed using statistical software R [48]. Additionally, for each case, and for both the 5-month and the 3-month period after each suicide occurrence, we determined the value of the Incident Rate Ratio (IRR) and its confidence interval [49]. We included the month of the suicide occurrence in the evaluation period for all the analysed cases, except Pedro Lima's suicide, which was the only one registered during the second half of the month (20 June 2020). For this case, we included the month of occurrence in the control period.

In the tables below, we present the control period covering the 5 and 3 months before each analysed suicide to verify if the number of suicides showed normal patterns in that period. The existence of alerts (small probabilities) registered during the control window would mean that other alerts during the month of a suicide occurrence, and/or in the following months, should be considered in the context of an atypical period (before and after the analysed suicide occurrence).

In the analysis of our long series, we detected a significant change in suicide behaviour pattern due to the transition from the International Classification of Diseases, Ninth Revision (ICD-9), to the International Classification of Diseases, Tenth Revision (ICD-10), in 2002. In this sense, the year 2001 is presented as a 'jump' breakpoint with a period of transition between mid-2001 and mid-2004, characterized by a jump in suicide rates [50].

For this reason, to ensure a better adjustment of the model, we divided the suicide data into two parts: (i) from January 1990 to December 2001; and (ii) from January 2002 to December 2020. We fitted models for the overall number of suicides as well as for suicides stratified by suicide method, sex, and age group.

For both time intervals (from 1990 to 2001 and from 2002 to 2020), we estimated, for our four cases, the total expected monthly suicides, the expected monthly suicides by the method of each case, and the expected monthly suicides by gender and age group to look for potential gender and age identification, respectively. In the case of Pedro Lima, we estimated the monthly suicides by falling from a high place and by drowning, which were the two methods combined in his death in June 2020.

Most of the above models had a good quality of fit (R^2), with the 'year' and 'month' variables justifying the variability in the number of suicides by more than 55% (adapted to each case).

3. Results

The number of suicides in Portugal in the analysed period, from January 1990 to December 2020, was subject to fluctuations throughout the months of the year (Fig. 1), with higher values during the spring and summer months. Moreover, there is a noticeably different pattern starting from 2001, which coincides with the change from ICD-9 to ICD-10.

Taking this into account, and after dividing the data into two sections, we present below the findings for each case study.

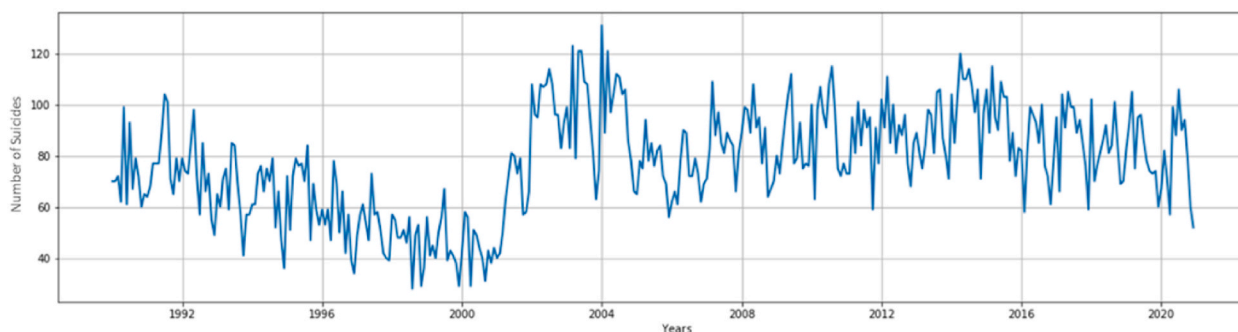


Fig. 1. Number of suicides (1990–2020) time series.

3.1. Triple youth suicide on 3 February 1996

There was a statistically significant higher-than-expected number of suicides in May 1996, but not in February, March, or April (Table 1). There is also evidence of a 6% increase in all suicides in the 5-month period following this triple suicide, between February and June, but without statistical significance (Incident Rate Ratio [IRR] = 1.06; 95% confidence interval [CI] = [0.90, 1.25]).

According to our calculations, the number of suicides of people aged between 10 and 29 was not significantly higher than expected during either the 3- or the 5-month period after the triple youth suicide.

It is important to note that if the probability value is lower than 0.05 (5% significance level), it means that the observed number is a completely atypical value, compared to what was expected, and thus there is statistically significant evidence to support the statement that the observed number of suicides is much higher than would be expected.

In the 5-month period following this triple suicide, observed suicides by falling from a high place surpassed those expected by 46%, an increase with statistical significance, mainly due to the month of June (IRR = 1.46; 95% CI = [0.80, 2.67]). In the 3-month period, there was an excess of 25%, but without statistical significance (Table 2). Overall, for the subsequent 3 and 5 months, no statistically significant increases were found for either gender.

3.2. Suicide of journalist Miguel Ganhão Pereira on 4 December 2000

The number of suicides was not higher than expected in either the 3- or the 5-month period following the death of Miguel Ganhão Pereira. In fact, there were decreases of 20% and 17% in these periods, respectively, though without statistical significance. Only in December did the observed suicides surpass those expected by 26%, but also without statistical significance. However, in the month of the journalist's suicide, the suicides of people aged between 20 and 44 (the journalist's age group) exceeded those expected by 80%, with statistical significance (probability = 0.01). Nevertheless, in the 3- and 5-month period after that occurrence, suicides in his age group were lower than expected.

As for male suicides, their number was of the expected standard, whether in December or in the following 3 or 5 months, and the same was found regarding suicides by falling from a high place.

3.3. Suicide of singer Cândida Branca Flor on 11 July 2001

We found a statistically significant higher-than-expected number of suicides in September 2001, and also in July and August, but without considerable differences (Table 3). Table 3 also provides evidence of a 16% increase in all suicides over the 3-month period after the singer's death, from July to September (IRR = 1.16; 95% CI = [0.96, 1.40]), and of an 11% rise over the 5-month period, from July to November (IRR = 1.11; 95% CI = [0.95, 1.30]).

We also found a statistically significant higher-than-expected number of suicides of people aged between 45 and 59 in July 2001, and in the 3-month period after Cândida Branca Flor's suicide there was an increase of 38% in the suicides in this age group, also with statistical significance (probability = 0.014; IRR = 1.38; 95% CI = [0.89, 2.13]). As for female suicides, their number was significantly higher than expected in the month of Cândida Branca Flor's death, and above the anticipated values in August and September, but without statistical significance (Table 4). There is also evidence of 30% and 21% increases in female suicides in the 3- and 5-month period following this singer's suicide, respectively, both with statistical significance.

The number of observed suicides due to poisoning with solid or liquid substances was also considerably higher than expected in the

Table 1
Poisson Regression: Number of suicides per month (February 1996).

	Month	Observed (x_i)	Expected (λ_i)	Probability
Control period	September	47	62.04	0.97
	October	69	63.16	0.21
	November	59	55.72	0.30
	December	53	53.77	0.51
	January	59	53.61	0.21
(3 months)	November–January	171	163.09	0.253
(5 months)	September–January	287	288.30	0.515
Month of occurrence	February	53	51.81	0.40
Evaluation period	March	59	56.84	0.35
	April	47	55.19	0.85
	May	78	61.87	0.02*
	June	69	62.54	0.19
	(3 months)	February–April	159	163.84
(5 months)	February–June	306	288.25	0.142

* Warning: the number of suicides is considerably higher than expected.

Probability = $P(X > x_i | \lambda_i)$ where $X \sim P(\lambda_i)$.

Table 2

Poisson Regression: Number of suicides per month for self-inflicted injury from falling from a high place (February 1996).

	Month	Observed (x_i)	Expected (λ_i)	Probability
Control period	September	2	3.38	0.66
	October	6	4.40	0.16
	November	6	4.40	0.16
	December	5	3.07	0.09
	January	2	3.13	0.60
(3 months)	November – January	13	10.59	0.183
(5 months)	September – January	21	18.37	0.227
Month of occurrence	February	3	2.83	0.32
Evaluation period	March	5	4.69	0.33
	April	5	2.83	0.07
	May	2	3.32	0.65
	June	11	4.10	0.00*
	(3 months)	February – April	13	10.36
(5 months)	February – June	26	17.79	0.025*

* Warning: the number of suicides is considerably higher than expected.

Probability = $P(X > x_i | \lambda_i)$ where $X \sim P(\lambda_i)$.**Table 3**

Poisson Regression: Number of suicides per month (July 2001).

	Month	Observed (x_i)	Expected (λ_i)	Probability
Control period	February	42	60.38	0.99
	March	50	66.24	0.98
	April	63	64.31	0.53
	May	72	72.10	0.47
	June	81	72.89	0.16
(3 months)	April – June	216	209.30	0.306
(5 months)	February – June	308	335.92	0.934
Month of occurrence	July	80	72.80	0.18
Evaluation period	August	73	69.04	0.29
	September	79	58.36	0.00*
	October	57	59.41	0.59
	November	58	52.41	0.20
	(3 months)	July – September	232	200.20
(5 months)	July – November	347	312.03	0.024*

* Warning: the number of suicides is considerably higher than expected.

Probability = $P(X > x_i | \lambda_i)$ where $X \sim P(\lambda_i)$.

month following the singer's suicide (probability = 0.02). In the 3-month period after that occurrence, the observed suicides by this method exceeded those expected by 38%, with statistical significance (IRR = 1.38; 95% CI = [0.88, 2.15]), and there was an increase of 12% in the following 5-month period, but without statistical significance.

3.4. Suicide of actor Pedro Lima on 20 June 2020

There was a statistically significant higher-than-expected number of suicides in July 2020, the month after Pedro Lima's death, and numbers were also above those forecasted in August, September, and October, but without statistical significance (Table 5). There is also evidence of a 16% rise in all suicides in the 3 months after Pedro Lima's suicide (IRR = 1.16; 95% CI = [0.98, 1.37]) and of an 11% increase in the following 5-month period, between July and November (IRR = 1.11; 95% CI = [0.97, 1.28]). Both increases are statistically significant and were largely accounted for by the July numbers.

The suicides of people aged between 45 and 59, which was the age group of the famous Portuguese actor, were also statistically significantly higher than expected in July (probability = 0.00). There was also a 27% increase in suicides in Pedro Lima's age group in the 3-month period following his death (probability = 0.019; IRR = 1.27; 95% CI = [0.90, 1.78]). Additionally, in the 5-month period after this occurrence, there was a 14% rise in suicides in this age group, but without statistical significance.

Furthermore, we found evidence of considerably higher-than-expected values for male suicides in July (Table 6). In August, September, and October, male suicide numbers were also higher than expected, but not considerably. Male suicides exceeded the

Table 4
Poisson Regression: Female suicides per month (July 2001).

	Month	Observed (x_i)	Expected (λ_i)	Probability
Control period	February	9	15.63	0.95
	March	13	14.82	0.62
	April	14	14.50	0.48
	May	16	16.60	0.49
	June	20	17.25	0.21
(3 months)	April – June	50	48.35	0.370
(5 months)	February – June	72	78.80	0.758
Month of occurrence	July	26	16.84	0.01*
Evaluation period	August	15	13.93	0.32
	September	16	13.20	0.18
	October	12	13.04	0.54
	November	16	13.04	0.17
	(3 months)	July – September	57	43.98
(5 months)	July – November	85	70.05	0.036*

* Warning: the number of suicides is considerably higher than expected.

Probability = $P(X > x_i | \lambda_i)$ where $X \sim P(\lambda_i)$.

Table 5
Poisson Regression: Number of suicides per month (June 2020).

	Month	Observed (x_i)	Expected (λ_i)	Probability	
Control period	February	82	71.65	0.10	
	March	71	84.91	0.93	
	April	57	80.38	1.00	
	May	99	89.02	0.13	
	(3 months)	April – June**	244	256.35	0.769
(5 months)	February – June**	397	412.91	0.775	
Month of occurrence	June	88	86.94	0.43	
Evaluation period	July	106	84.39	0.01*	
	August	90	83.50	0.22	
	September	94	82.03	0.09	
	October	79	71.60	0.17	
	November	60	64.15	0.67	
	(3 months)	July – September	290	249.93	0.006*
	(5 months)	July – November	429	385.67	0.014*

* Warning: the number of suicides is considerably higher than expected.

Probability = $P(X > x_i | \lambda_i)$ where $X \sim P(\lambda_i)$.

**The month of occurrence is counted in the control period.

expected values by 14% between July and September (IRR = 1.14; 95% CI = [0.94, 1.39]) and by 10% from July to November (IRR = 1.10; 95% CI = [0.94, 1.28]). Both increases were statistically significant.

According to our calculations, in the months following the actor's suicide, the numbers of suicides by falling from a high place or by drowning were not significantly higher than anticipated.

4. Discussion

This study, which analysed suicide rates in Portugal after four mediatized suicides, found evidence of an increase in total and male suicides after the death of Pedro Lima, besides a rise in suicides in this actor's age group. An increase was also observed in total, female, same age group, and poisoning suicides after the death of singer Cándida Branca Flor. These results are in line with previous evidence that famous entertainment celebrities tend to be followed by Werther effects. Several studies from multiple countries have reported rises in suicides following reporting of celebrity suicides [2–4,8,9,11–13,16,17,44,46,47]. A systematic review and meta-analysis of 31 studies published between 1974 and 2019 and covering the period between 1947 and 2016 concluded that the risk of suicide increased by 13% in the period after the media reported a celebrity suicide [7]. Suicide stories about well-known entertainment and political celebrities spark a greater degree of identification than stories about the suicides of other persons, such as ordinary people, and the entertainment celebrity has the greatest impact on copycat suicide [9].

Table 6
Poisson Regression: Number of male suicides per month (June 2020).

	Month	Observed (x_i)	Expected (λ_i)	Probability
Control period	February	60	54.91	0.22
	March	61	65.98	0.70
	April	49	63.48	0.96
	May	77	70.12	0.19
(3 months)	April – June**	195	199.14	0.598
(5 months)	February – June**	316	320.04	0.575
Month of occurrence	June	69	65.55	0.31
Evaluation period	July	80	66.46	0.04*
	August	71	66.41	0.26
	September	72	62.23	0.09
	October	60	54.72	0.21
	November	47	50.97	0.68
	(3 months)	July – September	223	195.10
(5 months)	July – November	330	300.78	0.045*

* Warning: the number of suicides is considerably higher than expected.

Probability = $P(X > x_i | \lambda_i)$ where $X \sim P(\lambda_i)$.

**The month of occurrence is counted in the control period.

Regarding the triple youth suicide, in February 1996, we could first say that a relation between it and the suicide increases we found is improbable, given the fact that the significantly higher-than-expected number of total suicides was only observed in May of that year, and not in the previous months. Besides, although suicides by falling from a high place surpassed those expected by 46% in the 5-month period following this triple suicide, that was mainly due to the month of June.

Let us recall that most studies consider that copycat suicides are most prevalent right after a suicide event, for up to seven days [42, 43], ten days [44,45], two weeks [3,46], four weeks, or a month [16,47]. However, there are also studies (some of which more recent) that have found the possibility of a longer effect, for one to two months [4,7], five months [2,12,13], a year [8], or two years [3]. In this sense, evidence shows that copycat behaviours frequently occur immediately following an event, but it can be argued that the reason why some recent studies have considered a 5-month window is that they can occur later as well. On this basis, we could say that the interval between the triple youth suicide in February and the increase in suicides in May, along with the 6% increase in overall suicides in the 5 following months – though not statistically significant – may be consistent with a small Werther effect.

Of our four case studies, this triple youth suicide was the second most prominently covered by the national media, preceded only by the death of actor Pedro Lima, according to a forthcoming study that is in process of being published (revision phase). Furthermore, it was the case which presented the highest number of negative criteria after an analysis of news items assessed for adherence to the WHO guidelines for responsible reporting on suicide. These criteria included the location of each news item (if prominent), the use of the word suicide in the title (if applicable), the description of the suicide method, and the citation of a suicide note, among others.

The observed greater-than-expected suicide increase in May and June 1996 is also in line with the seasonal rises in spring and summer months, a tendency that has been investigated on a global scale. Some authors found a significant and positive association between temperature rises and incidence of suicide, with peaks precisely in spring and summer [51]. A possible triggering mechanism is that, after the cold nights, the experience of warmth during the day in the human body can cause the overactive temperature-responsive brown fat tissue, an intensification of anxiety and mental activity, and, finally, increase the risk of suicide; another explanation that is mentioned is that high temperature can increase impulsive and aggressive behaviour through high levels of serotonin [51]. In most countries, a seasonal increase in suicide rates has not yet been proven, despite them being higher in spring and summer in Southern Europe [34].

Concerning the suicide of Portuguese journalist Miguel Ganhão Pereira, at the age of 29, we found no evidence of a subsequent significant increase in total, male, and same method suicides. There was only a statistically significant higher-than-expected number of suicides of people aged between 20 and 44 (the journalist's age group) in the month of his death, but that tendency was not observed in the following months. According to a forthcoming study on the quality of suicide reporting in Portugal, the suicide of Ganhão Pereira was the least prominently covered by the Portuguese media, and the performance of the released news items was mostly negative in 10 of 24 analysed criteria.

Differently, another study documenting the effects of media coverage after the suicide of Gaëtan Girouard, a popular television reporter in Québec, Canada, on 14 January 1999, showed a significant increase in provincial suicide rates during the 4 weeks following his suicide and until the end of that year [8]. This journalist hanged himself at the age of 33. Another conclusion of that study was precisely that suicides by hanging rose by 18% between 1998 and 1999, while the suicides by other methods increased by 7% over the same period. Moreover, in this case, most guidelines for responsible suicide reporting were not applied.

Regarding the suicide of Cândida Branca Flor, on 11 July 2001, we observed a significant higher-than-expected number of total and female suicides in the 3- and 5-month period after her death. There was also a considerably higher-than-expected number of suicides of people from the same age group in the month of her death (July), as well as deaths by the same method in the following month

(August).

Of our four case studies, the suicide of Cândida Branca Flor was the third most prominently covered by the national media, according to a forthcoming study. She was called ‘Portuguese Marilyn’ [36] because of some similarities with Marilyn Monroe, who also died by ingesting pills in August 1962. Furthermore, considering suicide from an historical perspective, European females most commonly died by hanging, poisoning, and falls; and specifically in Portugal, Portuguese females are noted to poison themselves [52]. This appears to be a case followed by copycat suicides, since we have evidence of a possible identification by gender and age group, in addition to a potential replication of the suicide method used by the singer.

However, these results coincide entirely with the period of change between suicide counting systems. The year 2001 was a ‘jump’ breakpoint with a period of transition between mid-2001 and mid-2004 and characterized by a jump in suicide rates [50]. Nevertheless, in terms of observed suicides, October and November 2001 (the fourth and fifth months after Cândida Branca Flor’s suicide) (Table 2) were identical to the same months in 1996 (Table 1), in contrast to September, for example.

As for the suicide of actor Pedro Lima, it was, of our four case studies, the one most prominently covered by the national media, according to the same recent forthcoming study. Similarly to what happened with the famous goalkeeper Robert Enke in Germany, who died in a railway suicide by jumping in front of a train, a public mourning was held in Portugal at the Cascais Hippodrome, which was prepared to receive several dozens of the actor’s family members and friends, complying with the safety standards in place due to the COVID-19 pandemic [53]. The tribute to the actor was attended by the President of the Republic, who recalled him as a ‘portrait of life, happiness, and the wish to create happiness in others’ [54]. In the case of Robert Enke, funeral services were held in the Hannover football stadium with leading representatives of the German government, which transformed the funeral into a state ceremony likely to suggest to vulnerable individuals that society honours the suicidal behaviour of the football star [4].

In Germany, there was an 81% increase in railway suicide acts (93.4% of them fatal) after the death of Robert Enke and until the end of 2009, compared with the control time window in the preceding three years [4]. Additionally, there was an increase of almost 120% in railway suicide acts in the 28 days after the death of the goalkeeper, compared to the previous 28 days [4]. Another study also identified a 19% increase in railway suicidal acts in Germany in the two-year period after Robert Enke’s death, especially for men, which was not explained by a general increase in suicide rates [3].

In fact, we found a considerably higher-than-expected number of suicides in the month after Pedro Lima’s death, July 2020, and the numbers remained higher in August, September, and October, but without statistical significance in these months. July 2020 was indeed the month with the most suicides that year (106). We also found a considerably higher-than-expected number of male suicides in July, and equally in August, September, and October, but again without statistical significance. Besides, suicides in his age group were also above the expected number in July, with an increase of 27% in the 3-month period after his death. In this sense, we cannot exclude a connection between these suicide increases and the death of Pedro Lima, since we have evidence of an identification by gender and age, but we also cannot determine with certainty whether these rises are attributable to the actor’s suicide.

It is important to note that the year 2020 was strongly impacted by the COVID-19 pandemic in Portugal, various containment measures, including lockdowns, confinement periods, limits on freedom of movement, and much uncertainty about the future. According to a systematic review [55], some studies found an increasing trend in suicidal deaths during the COVID-19 pandemic [56–58], other studies reported no increased or decreased trends [59–61], one study reported a decreased trend [62], and another found a decreased trend during the crisis and an increase after the immediate crisis [63]. In a more recent study on 33 countries [64] there was no evidence of greater-than-expected numbers of suicides in most countries/areas-within-countries during the first 9–15 months of the COVID-19 pandemic compared with existing trends. In Portugal, there are no studies on this matter.

4.1. Protective factors in Portugal

It is also relevant to note that there are several possible reasons for the absence of a (strong) Werther effect in Portugal. Firstly, this is a country of Catholic tradition, especially in the North [65,66], which is described as a protective factor against suicide behaviour. Typically, Protestants have higher suicide rates than Catholics, who are more protected by ritual (such as catechism, communion, and saying the rosary) and tend to view taking of life as God’s exclusive prerogative, thus tending to find suicide sinful and abhorrent [67]. In fact, in Christianity, for Catholics and for Lutherans, Calvinists, and Anglicans, suicide is a diabolical act [68]. In Catholic countries, such as Spain, Portugal, and Italy, the prevalence of suicide is low [69].

Secondly, Portugal is a country marked by 48 years of dictatorship and censorship. From 1926 to 1933 there was a military dictatorship, and from then on until 25 April 1974 there was the so-called ‘Estado Novo’. This dictatorship had ‘Football, Fado [Portuguese musical style], and Fátima [Catholic religion]’ as the three pillars of the regime to pacify the population and keep it alienated from the country’s politics at the time. From 1942 onward, the oscillating tendency of suicides in Portugal moved downwards until 1975 [65].

The above reasons might explain why in Portugal suicide is often perceived as a confusing death, with complex, multidetermined, and poorly understood causes [70], a social taboo that seems to extend to the news media. Almost 64% of the journalists surveyed in a recent study stated that suicide is taboo in Portuguese journalism [71]. However, this is not a rare case, as suicide continues to be a taboo issue, steeped in religious, moral, political, social, and cultural stigmas [72], also pointed out as such by journalists in other countries [[73], for example].

Although most of the published studies have found evidence of copycat effects, especially after celebrity suicides, there are some examples of the opposite. For instance, a recent study found no apparent increase in suicide deaths in the population of England and Wales after widespread reporting of the suicide of Robin Williams [41]. However, he was an actor and comedian in the United States (US), where there was an increase of suicides by 10% after his death [2]. The media coverage in the US may have been quite different

from the one in the United Kingdom (UK), but studies evaluating the quality of UK reporting of Robin Williams' suicide over that period are lacking [41]. A few decades ago, there was also no increase in suicides in the 7 weeks following the death of Kurt Cobain, the lead singer of Nirvana, who ended his life in April 1994 [22]. It was hypothesized that the lack of an apparent Werther effect was due to 'a high degree of professionalism and responsibility' in the media coverage, the severity of his self-inflicted gunshot, and the crisis centre and community outreach interventions [22].

4.2. Strengths and limitations

To the best of our knowledge, this is the first study to analyse Portuguese mortality numbers following mediatized suicide cases, and it covers cases of both unknown individuals and celebrities over a period of 25 years. We used national mortality data and a method of time-series modelling used in prior studies on this matter. We also graded the data by suicide method, sex, and age group.

However, our study has several limitations. An important one is that, given its ecological nature, we cannot be sure whether the individuals who died by suicide were exposed to media content about the analysed suicide cases. Our study, like others before it, is based on the idea that a large part of the Portuguese population had been exposed to media reports about the selected suicides, but we cannot assure that these deaths were attributable to media reporting. We cannot exclude the possibility of there being other reasons, unrelated to news media reporting, for the observed rises in suicide numbers. Although we took into account other major events during the analysed time periods, such as the peak of the COVID-19 pandemic in the case of Pedro Lima and the transition from ICD-9 to ICD-10 in the case of Cândida Branca Flor, we did not control seasonality.

Another limitation is the lack of daily suicide counts, and the availability of monthly data only, as some of the suicides captured within the first month considered for analysis after the selected suicide cases would have occurred before them, except in the case of Pedro Lima, where, instead, some of the following suicides could have occurred in the last days of the month of his death (considered in the control period). We included the month of the suicide occurrence in the evaluation period for all the cases, except for Pedro Lima's suicide, which was the only one registered during the second half of the month (20 June 2020). Nevertheless, we conducted a monthly analysis on the expected suicides versus the observed suicides for a total of 10 months in each case (5 months before and 5 months after each suicide, including the month of the occurrence).

This paper also did not analyse the media coverage of the suicides, although mention is made of some of the results of a forthcoming study focusing specifically on the quality of suicide reporting in Portugal.

5. Conclusions

This study extends the previous literature on the association between suicide reporting and subsequent rises in suicide rates, especially when involving celebrities, a relation that had never been investigated in Portugal. We found evidence of an increase in total, male, and same age group suicides after the death of actor Pedro Lima, and a rise in total, female, same age group, and same method (poisoning) suicides following the death of singer Cândida Branca Flor. Therefore, the Werther Effect appears to occur in some cases of mediatized suicides in Portugal, even if these results should be considered amid several contextual factors. More research would be important to investigate the effect on suicide rates of media reporting in Portugal.

We hope this study will encourage Portuguese media professionals to continuously improve the news coverage of suicide in Portugal. The more informed and aware of mental health and suicide issues the population is, the better it will be prepared to play an active role in suicide prevention.

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Data availability statement

The data used in the study was acquired through the National Institute of Statistics (INE) on our request. Data will be made available on request.

Institutional review board statement

Not applicable.

CRediT authorship contribution statement

Eudora Ribeiro: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Project administration, Writing – original draft. **António Granado:** Formal analysis, Funding acquisition, Investigation, Supervision, Validation, Writing – review & editing. **João Gomes:** Formal analysis, Investigation, Methodology, Software, Writing – review & editing. **Filipe Ramos:** Formal analysis, Investigation, Methodology, Software, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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