



**Association of Logic's Hip Hop Song 1-800-273-8255 with  
Lifeline Calls and Suicides in the United States: A Time-  
Series Analysis**

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3 **Title: Association of Logic's Hip Hop Song 1-800-273-8255 with Lifeline Calls and Suicides in the**  
4 **United States: A Time-Series Analysis**  
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13 40160-934882.

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15  
16 Word count: 2,918

## 17 18 19 **Summary box**

### 20 21 **What is already known on this topic**

- 22 • There is now strong evidence that suicides increase after media stories about  
23 suicide. This phenomenon is referred to as the Werther effect.
- 24 • Much less is known about the protective effects of media stories of hope and  
25 recovery in the context of suicidal crises.
- 26 • There is some evidence from randomized controlled trials of a beneficial effect of  
27 media narratives of hope and recovery on suicidal ideation and help-seeking  
28 intentions.
- 29 • A major obstacle to this line of research, however, has been that media events with  
30 a focus on stories of recovery rarely get sufficient public attention to have a  
31 possible effect on behavioral outcomes in the overall population at large. Logic's  
32 Hip Hop Song 1-800-273-8255 was a unique exception to this.

### 33 34 35 **What this study adds**

- 36 • During 34 days of large public exposure to the song, there were 8692 excess calls to  
37 the Lifeline (95% CI: 5234- 12151), which is an increase of 6.0% (95% CI: 3.6%-8.4%,  
38 p<0.001).
  - 39 • During the same period, there was a reduction in suicides by 211 suicides (95% CI: 8  
40 to 414), or 4.7% (95% CI: 0.2%-9.3%, p=0.042). For each additional 41 calls to the  
41 Lifeline, there might have been one fewer suicide.
  - 42 • This study shows for the first time ever, that a media event intended to tell a  
43 "suicide prevention story" has been associated with a reduction in suicides in The  
44 United States, alongside a simultaneous increase in calls to the U.S. National  
45 Suicide Prevention Lifeline.
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## Association of Logic's Hip Hop Song 1-800-273-8255 with Lifeline Calls and Suicides in the United States: A Time-Series Analysis

### Abstract

#### Objective

On April 28, 2017, well-known American hip-hop artist Logic released his song 1-800-273-8255, featuring the United States National Suicide Prevention Lifeline with lyrics depicting a story of hope in a suicidal crisis. The song provides a unique opportunity to assess how a widely-disseminated, potentially protective media story linked to crisis information might influence help-seeking and suicidal behaviours across a population. We aimed to assess changes in daily call volumes to the Lifeline and suicides during periods of large public attention to the song.

#### Design, setting, participants and intervention

For this time series analysis, daily Lifeline calls and suicide data for the total US population were obtained from the Lifeline and the Centers for Disease Control and Prevention (CDC), respectively (January 1, 2010-December 31, 2018). Twitter posts were used as a proxy to estimate the amount of attention the song received. Tweets indicated that the strongest exposure occurred during 34 days associated with specific media events featuring the song, including the song release; the MTV Music Awards 2017, and Grammy Awards 2018. Autoregressive integrated moving average time series models were fitted to the pre-release period to estimate Lifeline calls and suicides. Models were fitted to the full time series with dummy variables for time periods of major media events.

#### Main Outcomes and Measures

Daily Lifeline calls and suicide data before and after the release of the song.

#### Results

Models including a discrete pulse for the 34-day period spanning three events with the strongest public attention (song release, MTV Music Awards, and Grammy Awards) showed an excess of 8692 calls (95% CI: 5234- 12151), an increase of 6.0% (95% CI: 3.6%-8.4%,  $p < 0.001$ ) over the 34-day period. A corresponding model for suicides indicated a reduction during the same period by 211 suicides (95% CI: 8 to 414), or 4.7% (95% CI: 0.2%-9.3%,  $p = 0.042$ ). For each additional 41 calls to the Lifeline, there was one fewer suicide.

#### Conclusions

Logic's song 1-800-273-8255 was associated with a substantial increase in calls to the Lifeline and simultaneous reductions in suicides observed across epochs with the most social media discourse

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3 about the song. The findings suggest that suicide prevention experts should work creatively with  
4 other sectors, such as the music industry, to disseminate impactful positive stories that may help  
5 produce beneficial behavioural outcomes across the population.  
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#### 8 9 Registration

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11 The study was preregistered at [aspredicted.org](https://aspredicted.org) (AsPredicted #62469,  
12 <https://aspredicted.org/blind.php?x=ws4x8x> ).  
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20 Keywords: Logic, hip-hop music, suicide, help-seeking, crisis intervention, suicide prevention,  
21 interrupted time series, Papageno effect, social media, Twitter, media effects, United States  
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25  
26 Disclaimer: The findings and conclusions in this report are those of the authors and do not  
27 necessarily represent the official position of the Centers for Disease Control and Prevention.  
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## Introduction

There is good evidence that repetitive reporting on suicidal acts can trigger further suicides, known as the Werther effect.<sup>1</sup> A recent meta-analysis found that news reporting on suicides by celebrities – often highly repetitive over the following weeks and months<sup>2</sup> – was associated with a 13% increase in suicides.<sup>1</sup>

In contrast to reporting on suicidal behaviours, some other suicide-related narratives appear to have suicide-preventive effects. In particular, media stories of individuals who managed to cope with suicidal crises without dying by suicide have been associated with decreases in subsequent suicides. This finding is referred to as the Papageno effect.<sup>3</sup> Consistent with the Papageno effect, an increasing number of experimental studies suggest that these types of stories can reduce suicidal ideation, particularly in audiences with some risk factors for suicide.<sup>4-6</sup>

It is essential for suicide prevention and educative efforts to harness such positive media potentials in order to educate the general public and high-risk groups about suicide prevention without doing harm to individuals at risk. But a major dilemma for research in this area has been that media stories of hope and recovery receive much less media coverage than stories on fatal suicide, and public exposure to these stories is normally minimal.

On April 28, 2017, the well-known American hip-hop artist Logic released his song *1-800-273-8255*, prominently featuring the number of the United States National Suicide Prevention Lifeline (Lifeline). The narrative of the song is centered around someone calling the 1-800 number for the Lifeline and then telling the counselor that they don't want to live anymore. The accompanying music video, which was released four months later, and has so far received 419 million views on Youtube, depicts a young black man who struggles with discrimination and bullying from various peers and adults for being gay. He prepares for his suicide by firearm, but ultimately, takes his phone and calls the Lifeline, which marks a turning point toward improvement and mastery of his crisis.<sup>7</sup>

The release of the song in April 2017 marked a unique start of a series of events promoting the story of hope and recovery featured in the song, along with the number of the Lifeline. A widely acknowledged performance of the song at the MTV Music Awards in late August 2017 drew 5.4 million viewers, ultimately marked a breakthrough for *1-800-273-8255*.<sup>8</sup> The song which was labelled “Suicide Prevention Anthem” entered the top 10 of the Hot 100 charts in the United States, remaining there for several weeks and reaching as high as #3 in September 2017.<sup>9,10</sup> The song release was also associated with a nearly 10% uptick in online Google searches for the Lifeline in the 28 days after its release.<sup>11</sup>

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3 Logic's song likely represents the broadest and most sustained suicide prevention messaging directly  
4 connected to a story of hope and recovery in any location to date. In order to assess whether the  
5 song impacted actual help-seeking and/or suicides, we conducted a time-series analysis examining  
6 the associations between Logic's song and calls to the Lifeline number as well as daily suicides in the  
7 United States.  
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## 11 **Methods**

### 12 Public attention to Logic's song

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17 There were three distinct events related to Logic's song that garnered strong public attention. These  
18 included (1) the release of the song on April 28, 2017; (2) Logic's performance at the MTV Music  
19 Awards on August 27, 2017; and (3) his performance at the Grammy Awards on January 28, 2018. All  
20 of these events were related to strong public attention to the message of the song, i.e., that help  
21 from the National Suicide Prevention Lifeline is available and effective. In order to obtain estimates  
22 for the time-span of public attention to each of the events as a proxy for the assessment of the  
23 impact period, we used Brandwatch to retrieve all original tweets geolocated to the United States  
24 that contained the search terms *Logic* and *1-800-273-8255*. This approach was similar to previous  
25 studies estimating exposure periods for suicide-related media events.<sup>2</sup>  
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33 This search allowed us to generate an exhaustive data set with all mentions specifically related to  
34 Logic's song, excluding tweets produced by accounts that Twitter considered malicious bots, from  
35 March 1, 2017 to April 30, 2018, covering the entire period before the release and during the song's  
36 presence in the Hot 100 charts. This method gathered 84,968 tweets by 56,282 unique users.  
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41 Figure 1 shows the daily number of tweets posted about Logic's song between March 1, 2017, and  
42 April 30, 2018, including three peaks corresponding to the three above-described events. Two  
43 smaller additional peaks emerged. As evidenced by qualitative assessment of tweets in those  
44 periods, one of the peaks occurred around the video release on August 17, 2017, and the other was  
45 present around media reports about an increase in Lifeline calls due to the song, which was aired on  
46 CBS on October 10, 2017.<sup>12</sup> We downloaded all tweets for the respective time period and modelled  
47 each of the five identified peaks, depending on the duration of the Twitter peak. In Figure 1, we  
48 highlight the estimated impact periods for each of the events, and we present the periods also in  
49 Table 1.  
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### 55 Lifeline calls and suicide data

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58 We obtained calls to the Lifeline across the United States directly from the Lifeline. Call data were  
59 provided as daily aggregates for the period January 1, 2010 to December 31, 2018. National suicide  
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3 data were obtained from the United States Centers for Disease Control and Prevention (CDC),  
4 National Center for Health Statistics (NCHS). Suicide was defined by International Classification of  
5 Diseases, 10th Revision (ICD-10) underlying cause of death codes X60–X84, Y87.0, and U03. Data  
6 were provided as daily aggregates for the time period January 1, 2010 to December 31, 2018.  
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#### 10 Statistical analysis

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12 Autoregressive integrated moving average (ARIMA) models to estimate baseline trends in calls and  
13 suicides were fitted to the data up until April 6, 2017. This cut-off was selected to allow for a three-  
14 week preparatory period before the release of the song on April 28. For the selection of models, we  
15 used the SPSS Expert Modeler function, version 26 (IBM), to choose models with the lowest Bayesian  
16 information criterion value, highest stationary  $R^2$  value (the variance attributable to the fitted time-  
17 series model), and, where possible, a not significant Ljung-Box  $Q$  statistic (indicating whether  
18 residuals could be assumed white noise, with stated  $df$ ). The models derived from the baseline data  
19 were subsequently fitted to the full set of data for each series. On the basis of social media data  
20 shown in Figure 1, we investigated a temporary association of Logic's song for each of the five  
21 identified song-related events on calls and suicides, consistent with the period of strong interest to  
22 the song (Table 1). We used dummy variables to model these associations as discrete pulses (binary  
23 variables coded 1 during these periods; and 0 otherwise) and calculated the number of excess calls  
24 and suicides for each event.  
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35 Because of possible confounding due to the release of *13 Reasons Why*, a Netflix show that sparked  
36 strong criticism for violating media recommendations for safe portrayals of suicide,<sup>13,14</sup> and which  
37 was associated with strong public attention immediately after its release on March 31, 2017, we  
38 included a dummy variable to control for this show (coded 1 from the release date to June 30, 2017;  
39 and 0 otherwise).<sup>13</sup> Of note, prior related research found that the show was associated with a  
40 marked increase of 5.5% (95% confidence interval: 5.5%–21.1%) among US 10 to 19 year olds in the  
41 three months after its release.<sup>15</sup>  
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48 As a further step, we repeated the analysis of suicides, taking only those media events with a  
49 significant effect on Lifeline calls as explanatory variables.  
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#### 52 Ethics Statement

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54 Due to the use of publicly available data only, this study was except from ethical review.  
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#### 57 Patient and Public Involvement

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59 We did not involve patients or the public in our work.  
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## Results

Number of tweets, calls to the Lifeline, and suicides are shown in Figure 1, with time periods for the major media events in colour. In total, between March 1 2017 and April 30 2018 there were 84,968 tweets from 56k users. The attention to the song was strongest immediately after Logic's performance at the 2017 MTV Music Awards, with an average of 1,395 daily tweets over a 28-day period. More time-limited peaks were seen after the song release (3,523 tweets per day for a period of three days), and after the 2018 Grammy Awards (1,916 tweets per day for another three-day period). Overall, 66.9% of all tweets about Logic's song between March 2017 and April 2018 were posted in the 34-day high-impact period covering these three media events.

A significant effect on calls was present for the 34-day period covering the three main events (i.e., the song release, MTV Music Awards, and Grammy Awards performances), but not for the two minor events (i.e., the video release and news about the apparent impact of the song on Lifeline calls).

The observed number of calls during the 34-day period exceeded the range of forecasted calls (based on baseline data) for the song release (4.9%, 95% CI: 0.04%-9.7%, 3-day period), the performance at the MTV Music Awards (8.7%, 95% CI: 5.2%-12.3%, 28-day period), and the performance at the Grammy Awards (6.7%, 95% CI: 1.8%-11.5%, 3-day period) (Table 2, A). No significant associations were found for the two smaller spikes in public attention, i.e., the video release and the news coverage on Logic's impact on Lifeline calls. A combined effect across the three main media events indicated an excess of 8692 calls (95% CI: 5234 to 12151), corresponding to an increase of 6.0% (95% CI: 3.6%-8.4%,  $p < 0.001$ ).

The observed number of suicides during the 34-day period was within the range of forecasted values, using the model fit to the baseline data. The estimates for the three individual major media events pointed to a decrease in suicides, but these estimates were not significant (Table 2, B). Combining the data for the three major events into a single variable (song release, and the performances at the MTV Music Awards and the Grammy Awards) yielded an observed number of suicides that was below the range of the model forecasts. Models including a discrete pulse for these events indicated a significant reduction of suicides, amounting to a decrease of 211 suicides (95% CI: 8 to 414). This corresponded to a reduction of 4.7% (95% CI: 0.2 to 9.3%,  $p = 0.042$ ) in the 34-day period.

## Discussion

### Main findings

This interrupted time-series analysis found that Logic's song 1-800-273-8255 was associated with a noticeable increase in calls to the Lifeline (additional 8692 calls, or +6.0%) during the 34-day-period

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3 of substantial public attention to the song. During the same time period, there was some evidence of  
4 a reduction in suicides, amounting to 211 suicides (-4.7%). Put differently, for each additional 41 calls  
5 to the Lifeline, there might have been one fewer suicide simultaneously.  
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9 These findings are consistent with the Papageno effect,<sup>3</sup> and of strong relevance to suicide  
10 prevention. Media campaigns for suicide prevention have received a groundswell of support  
11 internationally, but evaluations are scarce and often limited in terms of scope.<sup>16</sup> The present finding  
12 of a substantial increase in actual help-seeking and a simultaneous suggested decrease in suicides  
13 during the period of high public attention to Logic's song make a clear case for the real-world  
14 effectiveness of this particular intervention. Different from other media stories of hope and recovery,  
15 Logic's song left a more sustainable and stronger footprint on social media. Previous peaks in calls to  
16 the Lifeline were generally related to harmful media events, such as celebrity suicides.<sup>17</sup> These events  
17 were often associated with increases in suicides,<sup>1,18</sup> suggesting that both increases in calls to the  
18 Lifeline and increases in suicides reflect some considerable distress in the community from these  
19 media events. Patterns for Logic's song, in contrast and consistent with the song's narrative, resulted  
20 in an increase in help-seeking and may have resulted in a decrease in suicides. These findings provide  
21 an important and novel proof-of-concept showing that it is possible to effectively promote help  
22 seeking in the absence of negative news, and potentially also reduce suicides with such prevention-  
23 focused campaigning.  
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27 The amount of exposure generated by such campaigns appears crucial in efforts to yield effects on  
28 actual behaviours, including help-seeking and suicides. Public attention for Logic's song, as reflected  
29 in tweets volume, was longer as compared to other prevention events. For example, based on query  
30 terms used for the World Suicide Prevention Day 2020<sup>19</sup> in the United States, the 2020 World  
31 Suicide Prevention Day resulted in a total of approximately 94,000 tweets from 58,000 users,  
32 including more than 30,000 on September 10, 2020, alone. This means that the overall social media  
33 attention was comparable in total magnitude (i.e., there were 85 thousand tweets from 56 thousand  
34 users related to Logic's song), but the attention to World Suicide Prevention Day was more  
35 concentrated on a single day, as compared to Logic's song, which was highlighted repeatedly over  
36 several specific media events. This amount of attention was, however, still considerably smaller  
37 compared to some harmful media events in the recent past. For example, in the three months after  
38 the release of *13 Reasons Why*, a TV show which violated recommendations for safe portrayals of  
39 suicide,<sup>13,14</sup> and was associated with an increase in teenage suicides, there were tweets from 870,056  
40 individual users – a number more than 15 times larger than for Logic's song.<sup>15</sup> This means that,  
41 although Logic's song sets an important, extraordinary example for impactful suicide prevention  
42 messaging, exposure is still considerably stronger for some putatively harmful media events.  
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### Strengths and limitations

A strength of this study was the length of the time series, with daily data from more than 17 years, to model expected suicide counts. Time-series models can provide accurate estimates without measuring exogenous variables, and it is possible to control for autocorrelation and seasonal changes in calls and suicide. The structure of the time series, including trends, temporal fluctuations, and seasonality, were adjusted for in the ARIMA models. A further strength of this study includes the use of daily data, with a resulting precise modelling in accordance with time periods with strong social media attention to Logic's song, as indicated by the quantity of tweets about the song. The approach of estimating exposure based on social media data was taken because it allows for a more objective approach than estimating exposure times in the absence of any supporting data. The approach is consistent with studies indicating that public attention to social media discourse in terms of tweets is short-lived, with lifespans of a tweet normally not more than a few hours.<sup>20</sup>

The main limitation of the study was that it was based on ecological data. Thus, it was not possible to ascertain whether those calling the Lifeline or not dying by suicide had actually been exposed to Logic's song and related media events. Further, only total daily call and suicide data were available, without any stratified data for various demographic groups, e.g., by gender, age or location of residence. Particularly for suicides, age-stratified or gender-stratified data would have resulted in very small numbers on some days. Other limitations include that, in total, 66.9% of all tweets about Logic's song posted between March 2017 and April 2018 were posted in the 34-day high-impact period, as defined for this study, suggesting that the bulk of attention was indeed covered by the selected period. The present approach, however, does mean that we were unable to assess any longer-term effects beyond the periods of strong public interest. Further, the different peaks identified were dissimilar not only in terms of duration, but also in terms of the maximum numbers of tweets on a given day. The present impact periods have been modelled as discrete pulses, consistent with the assumption that visible, large changes in attention might be most likely to impact on behavioural outcomes, such as help-seeking and suicide, rather than the overall number of tweets. This is consistent with research evidence suggesting that other media data, such as those from Google Trends, struggle to predict general suicide trends,<sup>21</sup> whereas sudden strong changes in Google search behaviours, as seen during major events, such as the release of *13 Reasons Why* or the Covid-19 pandemic, do appear to be useful in estimating suicide trends.<sup>22,23</sup> Future studies are needed to assess how long any effects of suicide prevention campaigns are, and what absolute amount of attention, as reflected in social media, is necessary to yield an effect.

### Conclusions

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3 Our analysis suggests that Logic's song 1-800-273-8255 was associated with a noticeable increase in  
4 calls to the Lifeline, and might have contributed to a reduction in suicides during these times of  
5 peaking social-media discourse about the song. For each additional 41 calls to the Lifeline, there  
6 might have been one fewer suicide simultaneously. The latter outcome is worth underscoring – that  
7 a widely disseminated song and video may have saved more than 200 lives. The implications of these  
8 findings are potentially far-reaching and should be considered by those planning future suicide  
9 prevention campaigns. They highlight the potential population health benefits of working creatively  
10 with other sectors, such as the music and entertainment industry, in order to promote impactful  
11 stories of help-seeking that resonate with broad audiences, leave a visible footprint on social media,  
12 and help create behavioural impacts to increase help-seeking and prevent suicide.  
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25  
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28

#### 29 **Conflict of Interest Disclosures**

30  
31 TN, BT and MG have received funds from Vibrant Emotional Health for an evaluation of a suicide-  
32 related media campaign unrelated to the intervention reported in this study.  
33

#### 34 **Contributorship statement**

35  
36 TN, UT, and SS had full access to all of the data in the study and take responsibility for the integrity of  
37 the data and the accuracy of the data analysis. Study Concept and design: TN, UT. Acquisition,  
38 analysis, or interpretation of data: SS, MG, JD, SM, MV, MS, FG, MJS, BT, UT, TN. MJStrauss. Drafting  
39 of the manuscript: TN. Critical revision of the manuscript for important intellectual content: All  
40 Authors. Statistical analysis: TN, UT.  
41  
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#### 43 **Role of the funding sources**

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45 The funding sources had no role in the design and conduct of the study; collection, management,  
46 analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and  
47 decision to submit the manuscript for publication.  
48

#### 49 **Transparency statement**

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51 The lead author affirms that the manuscript is an honest, accurate, and transparent account of the  
52 study being reported; that no important aspects of the study have been omitted; and that any  
53 discrepancies from the study as originally planned (and, if relevant, registered) have been explained.  
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6 party material where-ever it may be located; and, vi) licence any third party to do any or all of the  
7 above.  
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#### 10 **Dissemination declaration**

11 Dissemination to study participants or patient organizations is not possible/applicable.  
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#### 14 **Data Sharing Statement**

15 All data relevant to the study are obtainable upon reasonable request from Vibrant Emotional Health  
16 (Lifeline call data), and from the Centers for Disease Control (CDC) (suicide data). Restrictions might  
17 apply.  
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#### 23 **Patient and Public Involvement statement**

24 The study findings will be disseminated via conference presentations, press releases and social  
25 media. The authors will also disseminate findings to media-organizations and press councils as well  
26 as national and international health organizations that have been instrumental in the development  
27 of media recommendations for suicide reporting. The wider public will be informed via media and in  
28 lectures and seminars on suicide prevention that target the broader public. The way how the findings  
29 will be used to the benefit of the community will be discussed in interdisciplinary groups involved in  
30 media portrayals of suicides, which includes media professionals, the interested public, individuals  
31 with personal experience of suicidal ideation, suicide attempts, bereavement from suicide, as well as  
32 mental health professionals.  
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## References

1. Niederkrotenthaler T, Braun M, Pirkis J, Till B, Stack S, Sinyor M, Tran US, Voracek M, Cheng Q, Arendt F, Scherr S, Yip PSF, Spittal MJ. Association between suicide reporting in the media and suicide: Systematic review and meta-analysis. *BMJ*. 2020;368:m575. doi:10.1136/bmj.m575
2. Niederkrotenthaler T, Till B, Garcia D. Celebrity suicide on Twitter: Activity, content and network analysis related to the death of Swedish DJ Tim Bergling alias Avicii. *J Affect Disord*. 2019;245:848-855. doi: 10.1016/j.jad.2018.11.071
3. Niederkrotenthaler T, Voracek M, Herberth A, Till B, Strauss M, Etzersdorfer E, Eisenwort B, Sonneck G. Role of media reports in completed and prevented suicide—Werther v. Papageno effects. *Br J Psychiatry*. 2010;197(3):234–243. doi:10.1192/bjp.bp.109.074633
4. Niederkrotenthaler T, Till B. Effects of awareness material featuring individuals with experience of depression and suicidal thoughts on an audience with depressive symptoms: Randomized controlled trial. *J Behav Ther Exp Psychiatry*. 2020;66:101515. doi:10.1016/j.jbtep.2019.101515
5. Niederkrotenthaler T, Till B. Effects of suicide awareness materials on individuals with recent suicidal ideation or attempt: online randomized controlled trial. *Br J Psychiatry*. 2019;217(6):693-700. doi:10.1192/bjp.2019.259
6. Till B, Tran U, Voracek M, Niederkrotenthaler T. Papageno vs. Werther effect online: Randomized controlled trial of beneficial and harmful impacts of educative suicide prevention websites. *Br J Psychiatry*. 2017;211(2):109-115. doi:10.1192/bjp.bp.115.177394
7. Wikipedia. *1-800-273-8255 (song)*. Accessed June 24, 2021. [https://en.wikipedia.org/wiki/1-800-273-8255\\_\(song\)](https://en.wikipedia.org/wiki/1-800-273-8255_(song))
8. Moniuszko SM. Logic's MTV VMAs performance of '1-800' was an emotional triumph with a powerful message. *USA Today*. Accessed June 24, 2021. <https://eu.usatoday.com/story/life/entertainthis/2017/08/27/logics-mtv-vmas-performance-1-800-emotional-triumph-powerful-message/606928001/>
9. Billboard. *The hot 100 charts*. Published November 12, 2012. Accessed June 24, 2021. <https://www.billboard.com/charts/hot-100>
10. Butler B. The story behind Logic's powerful suicide prevention anthem '1-800-273-8255'. *Washington Post*. Published August 28, 2017. Accessed June 25, 2021. [https://www.washingtonpost.com/news/arts-and-entertainment/wp/2017/08/28/the-story-behind-logics-powerful-suicide-prevention-anthem-1-800-273-8255/?noredirect=on&utm\\_term=.548714f54d25](https://www.washingtonpost.com/news/arts-and-entertainment/wp/2017/08/28/the-story-behind-logics-powerful-suicide-prevention-anthem-1-800-273-8255/?noredirect=on&utm_term=.548714f54d25)
11. Torgeson T, Swayze C, Sanghera S, Cooper C, Beaman J, Hartwell M, Vassar M. Public awareness of the National Suicide Prevention Lifeline following the release of a hip-hop song. *BMJ Evid Based Med* (in press, DOI: dx.doi.org/10.1136/bmjebm-2020-111509).
12. Vibrant. *Logic's song is saving the lives of those contemplating suicide*. Published October 17, 2017. Accessed June 24, 2021. <https://www.vibrant.org/logics-song-saving-lives-contemplating-suicide>
13. World Health Organization. Preventing Suicide. A Resource for Media Professionals: Update 2017. Geneva, Switzerland: WHO; 2017.
14. National Action Alliance for Suicide Prevention. National recommendations for depicting suicide. <http://www.suicideinscripts.org>. Accessed July 20, 2021.
15. Niederkrotenthaler T, Stack S, Till B, Sinyor M, Pirkis J, Garcia D, Rockett IRH, Tran U. Association of increased youth suicides in the United States with the release of 13 Reasons Why. *JAMA Psychiatry*. 2019;76(9):933-940. doi:10.1001/jamapsychiatry.2019.0922
16. Pirkis J, Rossetto A, Nicholas A, Ftanou M, Robinson J, Reavley N. Suicide prevention media campaigns: A systematic literature review. *Health Commun*. 2019;34(4):402-414. doi:10.1080/10410236.2017.1405484

17. Ramchand R, Cohen E, Draper J, Schoenbaum M, Reidenberg D, Colpe L, Reed J, Pearson J. Increases in demand for crisis and other suicide prevention services after a celebrity suicide. *Psychiatr Serv*. 2019;70(8):728–731. doi:10.1176/appi.ps.201900007
18. Fink DS, Santaella-Tenorio J, Keyes K. Increase in suicides in the months after the death of Robin Williams in the US. *PLoS One*. 2018;13(2):e0191405. doi:10.1371/journal.pone.0191405
19. International Association for Suicide Prevention. *World Suicide Prevention Day 2020. Impact report*. Accessed June 24, 2021. <https://www.iasp.info/wspd2020/>
20. Bray P. *When is my Tweet's prime of life? (A brief statistical interlude.)* Published November 12, 2012. Accessed June 24, 2021. <https://moz.com/blog/when-is-my-tweets-prime-of-life>
21. Tran US, Andel R, Niederkrotenthaler T, Till B, Ajdacic-Gross V, Voracek M. Low validity of Google Trends for behavioral forecasting of national suicide rates. *PLoS One*. 2017;12(8):e0183149. doi:10.1371/journal.pone.0183149
22. Ayers JW, Althouse BM, Leas EC, Dredze M, Allem JP. Internet searches for suicide following the release of 13 Reasons Why. *JAMA Intern Med*. 2017;177(10):1527-1529. doi:10.1001/jamainternmed.2017.3333
23. Sinyor M, Spittal MJ, Niederkrotenthaler T. Changes in suicide and resilience related Google searches during the early stages of the COVID-19 pandemic. *Can J Psychiatry*. 2020;65(10):741-743. doi:10.1177/0706743720933426.

**Table 1. Media events related to Logic's song 1-800-273-8255**

Event	Date	Period Public Attention / Exposure	Tweets (n)	Tweets / day in impact period (mean, standard deviation)
Song release	April 28, 2017	April 28 to April 30, 2017 (3 days)	3,523	1,174.3 (1,089.9)
Video release	August 17, 2017	August 17 to 21, 2017 (5 days)	5,147	1,029.4 (754.6)
MTV Music Awards	August 27, 2017 (evening; end 11pm)	August 28 to September 24, 2017 (28 days)	39,050	1,394.6 (1,920.3)
News on Impact of Song	October 10, 2017	October 10 to 15, 2017 (6 days)	3,373	562.2 (515.0)
Grammy Awards	January 28, 2018 (evening; end 11pm)	January 29 to January 31, 2018 (3 days)	5,747	1,915.7 (2,570.7)
13 Reasons Why	March 31, 2017	March 31 to June 30, 2017 (92 days)	1,673,655	18,191.9 (24,124.3)



Table 2

**A. ARIMA Model Fit and Excess Calls to the National Suicide Prevention Lifeline During Media Events Related to Logic's song.**

Dummy variable	Raw association		Adjusted for 13RW		Excess calls n (95% CI)	% Increase (95% CI)
	Estimate (SE)	<i>P</i>	Estimate (SE)	<i>p</i>		
Release	<b>191.59 (96.69)</b>	<b>.048</b>	<b>190.63 (96.46)</b>	<b>.048</b>	<b>571.89 (4.71, 1139.07)</b>	<b>4.86 (0.04, 9.69)</b>
MTV Music Awards	<b>373.34 (77.97)</b>	<b>&lt;.001</b>	<b>376.48 (77.89)</b>	<b>&lt;.001</b>	<b>10541.44 (6266.84, 14816.04)</b>	<b>8.73 (5.19, 12.27)</b>
Grammy Awards	<b>263.16 (95.51)</b>	<b>.006</b>	<b>263.01 (96.51)</b>	<b>.006</b>	<b>783.09 (215.61, 1350.57)</b>	<b>6.65 (1.83, 11.47)</b>
Video release	76.29 (92.46)	.41	76.85 (92.46)	.41	384.25 (-521.86, 1290.36)	2.13 (-2.90, 7.17)
News Impact	97.48 (90.82)	.28	98.17 (90.85)	.28	589.02 (-479.38, 1657.42)	2.25 (-1.83, 6.34)
<b>Logic main events</b>	<b>256.65 (51.81)</b>	<b>&lt;.001</b>	<b>255.66 (51.90)</b>	<b>&lt;.001</b>	<b>8692.44 (5233.82, 12151.06)</b>	<b>6.03 (3.63, 8.42)</b>

Note: ARIMA = Autoregressive Integrated Moving Average; 13RW= 13 Reasons Why; SE = Standard Error. The pre-April 7, 2017 (Jan 1, 2010 to April 6, 2017) data were checked for additive and innovative outliers and level shifts, which were integrated when necessary. An ARIMA(1,1,2)(1,0,1) model, stationary  $R^2 = .61$ , Box-Ljung  $Q = 42.99$ ,  $df = 13$ ,  $p < .001$ , was fitted to the data. There were 24 outliers in total, with some of them related to specific events, others to possible technical anomalies in call registration. In spite of modelling these, the Box-Ljung statistic remained significant. This was most likely related to a continuous, but slight increase in variance over time (heteroscedasticity); nonetheless, the increase in variance was relatively small and the time-series model used was well-adjusted for the outliers in these time-series data.

**B. ARIMA Model Fit and Excess Number of Suicides During Media Events Related to Logic's song.**

Dummy variable	Raw association		Adjusted for 13RW		Excess suicides n (95% CI)	% Decrease (95% CI)
	Estimate (SE)	<i>p</i>	Estimate (SE)	<i>p</i>		
Release	-10.62 (7.53)	.16	-10.99 (7.54)	.15	-32.97 (-77.31, 11.37)	-9.26 (-21.72, 3.19)
MTV Music Awards	-4.12 (3.72)	.27	-4.02 (3.71)	.28	-112.56 (-316.16, 91.04)	-3.02 (-8.47, 2.44)
Grammy Awards	-10.22 (7.54)	.18	-10.19 (7.54)	.18	-30.57 (-74.91, 13.77)	-7.98 (-19.56, 3.60)
Video release	7.90 (6.17)	.20	8.00 (6.16)	.20	40.00 (-20.37, 100.37)	5.65 (-2.88, 14.18)
News Impact	8.27 (5.76)	.15	8.29 (5.75)	.15	49.74 (-17.88, 117.36)	6.07 (-2.18, 14.33)
<b>Logic main events</b>	<b>-6.23 (3.06)</b>	<b>.042</b>	<b>-6.21 (3.05)</b>	<b>.042</b>	<b>-211.14 (-414.39, -7.89)</b>	<b>-4.72 (-9.27, -0.18)</b>

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3 Note: ARIMA = Autoregressive Integrated Moving Average; 13RW= 13 Reasons Why; SE = Standard  
4 Error. The pre-April 7, 2017 (Jan 1, 2010 to April 6, 2017) data were checked for additive and  
5 innovative outliers and level shifts, which were integrated when necessary. An ARIMA(1,0,3)(1,0,1)  
6 model, stationary  $R^2 = .45$ , Box-Ljung  $Q = 13.37$ ,  $df = 13$ ,  $p = .427$ , was fitted to the data.  
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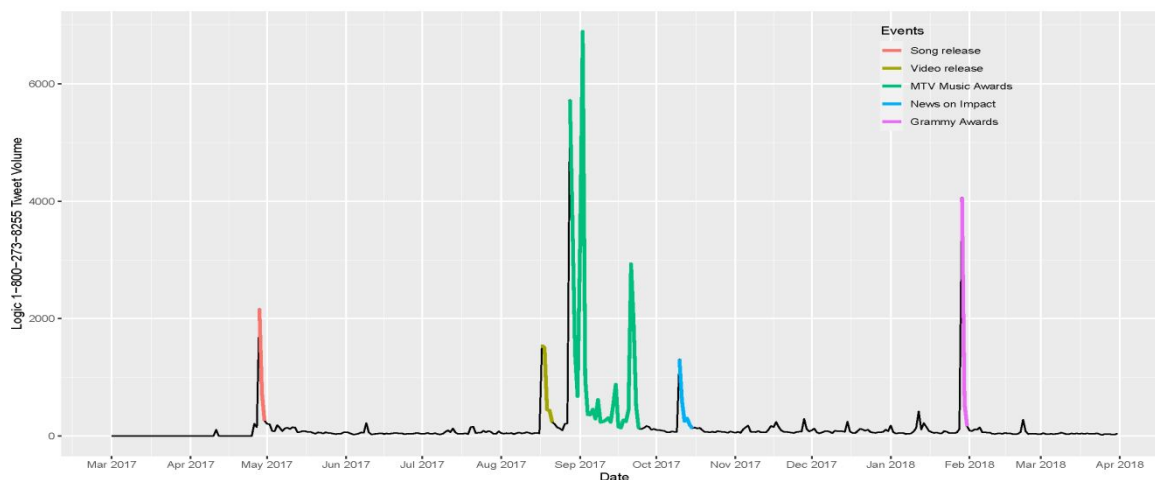
8 Source of Suicide Data: Centers for Disease Control and Prevention, suicide defined by International  
9 Classification of Diseases, 10th Revision (ICD-10) underlying cause of death codes X60–X84, Y87.0,  
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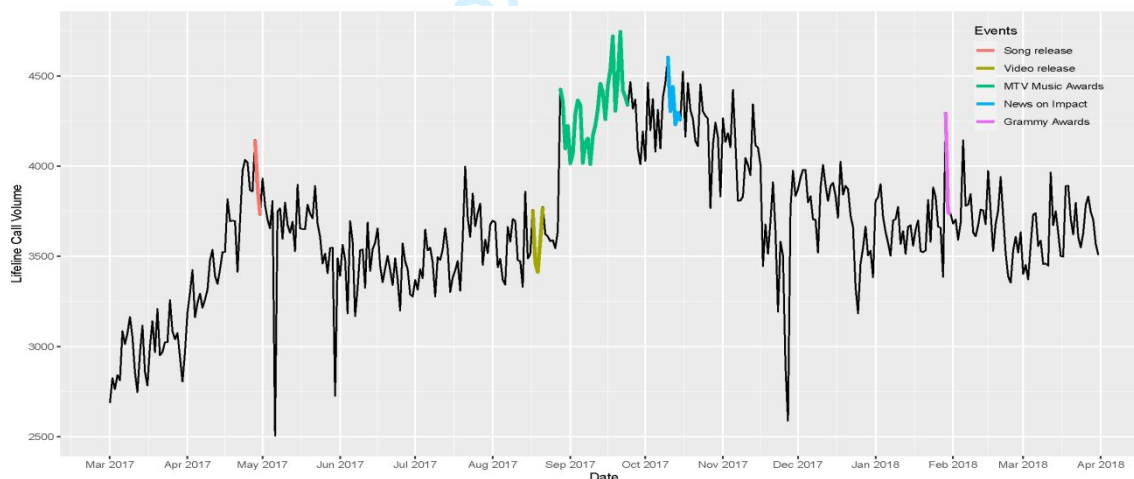
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Figure 1: Daily number of (A) Tweets including Logic and 1-800-273-8255, (B) calls to the National Suicide Prevention Lifeline, and (C) suicides -- United States, March 2017 to April 2018

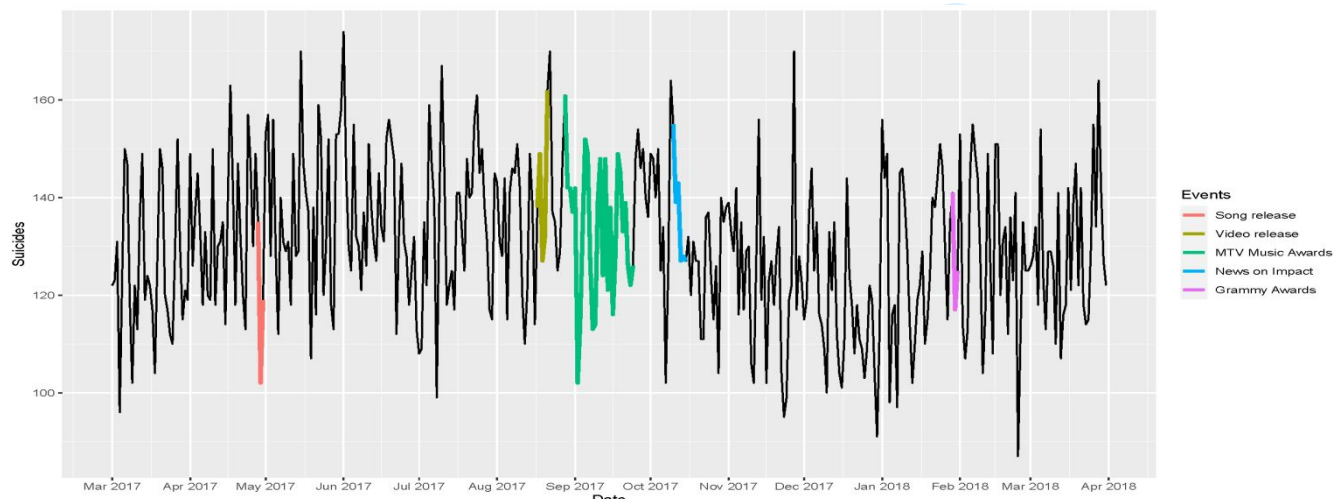
(A)



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Source of Suicide Data: Centers for Disease Control and Prevention, suicide defined by International Classification of Diseases, 10th Revision (ICD-10) underlying cause of death codes X60–X84, Y87.0, and U03.

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