

## Supplementary Information for

Adherence to Suicide Reporting Guidelines by News Shared on a Social Networking Platform

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### Supplementary Text: Materials and Methods

#### *News Articles*

News articles about suicide were identified by first selecting English-language links from news domains shared worldwide on Facebook over a one-month period (October 20 to November 19, 2018) that contained the text string 'suicid' in the article headline, summary text, web address (URL), or text written by the person who posted the article. The 1,000 most frequently posted distinct URLs meeting these criteria were selected for further review. Study investigators then classified each of the URLs into three categories, described in detail below: 1) articles discussing the suicide or suicidal behaviors of an individual, 2) articles discussing a homicide-suicide (event where an individual kills another and then kills themselves), and 3) articles that discuss suicide generally (e.g., reporting on statistics, medical research, prevention efforts, risk factors, treatment, or policy, etc.) but do not include mention of an individual suicide story. Articles on physician-assisted suicide, terrorism (suicide-bombing), those using the term metaphorically ("political suicide"), and off-topic articles with only peripheral mention of suicide were excluded. Study investigators discussed areas where categories were unclear and mutually resolved disagreements. Articles that were inaccessible to reviewers because they were not in English, behind a paywall, broken, or had insufficient text content for labeling (e.g., video news stories without transcripts or sufficient surrounding text) were excluded. After filtering for inclusion, 664 articles remained for adherence labeling.

#### *Article Categories for Inclusion and Exclusion*

**Individual story** (included): Article includes mention of an individual's death by suicide, suicide attempt, or suicide ideation. The focus of the article does not have to be explicitly on just reporting a suicide event. For example, an article that focuses on a family member affected by suicide but includes discussion of the suicide event would be included.

**Homicide-suicide** (included): Article discusses a homicide-suicide (event where an individual kills another and then kills themselves).

**General suicide articles** (included): Article does not mention the story of an individual who experienced suicide but does discuss suicide, suicide attempts, or suicide ideation generally. Such articles may focus on reporting on risk factors, treatment, statistics/trends, medical research, or prevention efforts, among others.

**Exclusion criteria:**

- Suicide bombers / bombings
- Deaths where no clear cause is mentioned or suspected; if suicide is described as suspected by police or other individuals then the article was included even if the cause had not been finalized yet.
- Articles about physician-assisted suicide
- Articles that only include peripheral mention of suicide when covering a different topic (e.g., article on alcohol statistics that briefly mentions suicide as a potential cause of death)
- Jokes / humorous articles
- Articles that use the term “suicide” to refer to an unrelated concept (e.g., “political suicide”)
- Articles that are not news: To be included, content should come from a news organization, including non-profit publishers, local news outlets, TV, or radio. Content was excluded if it was written and hosted by an individual, such as a blog post, tweet, YouTube video, or fundraiser (e.g., “Movember” fundraisers). Links to Wikipedia pages, academic journal articles, medical definitions, or other reference pages were also excluded.

*Suicide Reporting Guideline Elements*

As described in the main text of the manuscript, a list of 18 potentially harmful elements and 9 potentially protective elements was evaluated for each article. The rationale for item inclusion is presented in the main body of the manuscript. Furthermore, to allow for future scalability in assessing criteria, we excluded any items that cannot be classified algorithmically with high accuracy (for example, articles mentioning the method of suicide can be identified by automated keyword analysis whereas the degree of to which a suicide death is ‘romanticized’ in an article cannot be easily ascertained in an automated fashion). The elements are listed and described in Table S3 at the end of the SI. Articles were scored for the presence or absence of each element by trained labelers. A “Not Relevant” label was permitted for some elements as described in the codebook; for example, listing the name of a school was only relevant for suicide decedents who were of school age. Where two reviewers could not reach consensus on a single article (or three reviewers in cases where “Not Relevant” was an option), an additional reviewer broke the tie. After reviewing the codebook, reviewers rated three calibration articles—training articles labeled by the paper authors. Reviewers had to get 80% of the labels on the calibration articles correct to label articles in the full dataset.

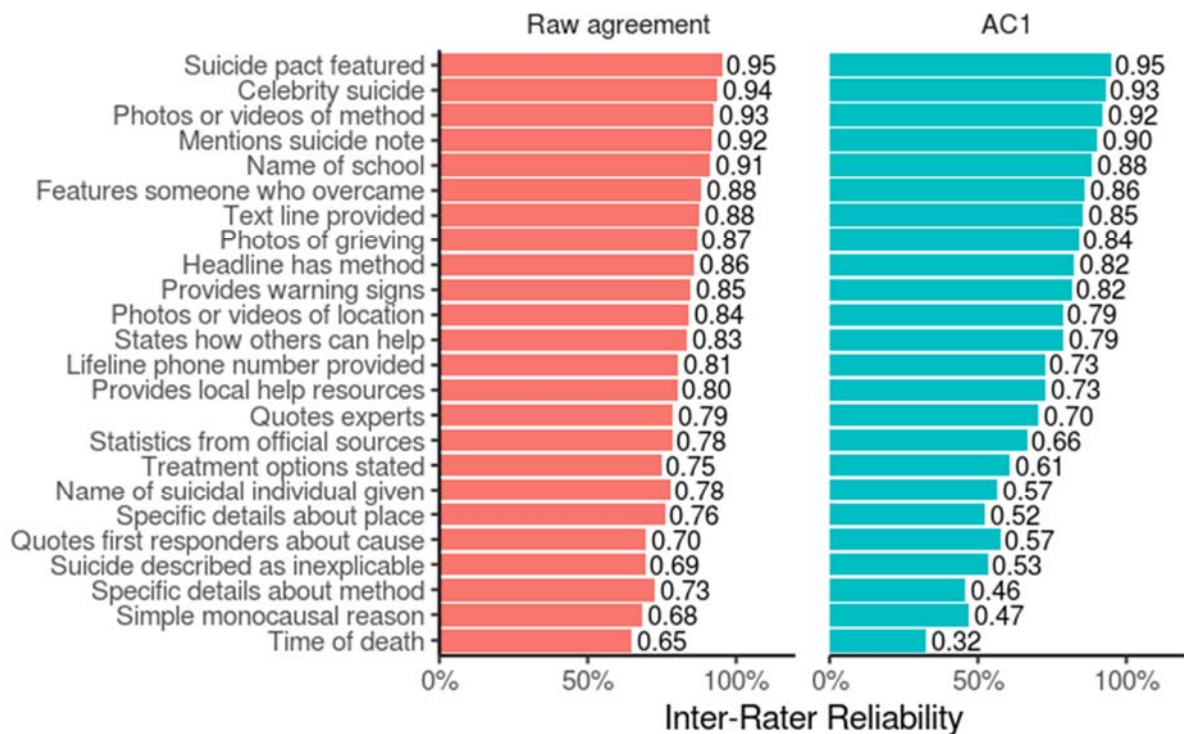
Three elements were labeled semi-automatically using regular expressions followed by review from one of the paper authors: (1) Whether ‘suicid’ appeared in the article headline, (2) Whether ‘sensational’ terms were present (limited to the terms ‘epidemic’ and ‘skyrocketing’ based on these terms being explicitly mentioned by suicide reporting guidelines and to aid future scalability), and (3) Whether non-recommended terms were present (e.g., “successful suicide,” see Table S3 for the complete list). One of the paper authors reviewed surrounding text in all cases where these regular expressions matched article text and manually adjusted false positive cases (e.g., an article using the term “epidemic” to describe opioid prevalence, not a “suicide epidemic”).

*Inter-rater reliability*

To calculate inter-rater reliability, labels were collapsed into binary decisions: “yes” versus “not yes” (which included “no” and “not relevant” labels, where applicable). Two statistics are reported for each item in Figure S1: (1) ‘Raw agreement’: The percent of cases where the first two reviewers agreed on the label, and (2) Gwet’s AC1 inter-rater reliability statistic. The three items that were labeled using regular expressions and manual review by a single person (‘suicide in headline’, ‘non-recommended terminology’ and ‘sensational terms’) were excluded from inter-rater reliability calculations. Reliability was high for most items, such as whether the article mentioned a suicide pact or reported on the death of a celebrity, but was lower for more ambiguous items, such as whether the death was attributed to a single cause. All items were included in subsequent analyses.

Figure S1.

*Inter-Rater Reliability Statistics for Raw Agreement and Gwet's AC1 Agreement Statistic.*



#### *Article Scores*

Articles were scored by summing the number of protective items and subtracting the number of harmful items. Scores could theoretically range from -18 (all harmful elements, no protective) to 9 (all protective elements, no harmful).

#### *Publication Characteristics*

To examine predictors of publications more closely adhering to the suicide reporting guidelines, for U.S. articles we classified each publication into various media categories. First, we classified the publication as national or local. Local publications were defined as those where the publisher explicitly serves a city or other local populace; some local publications are read widely outside of their cities of origin and we therefore classified both the New York Times and Washington Post as national publications even though such publications originated with a particular city focus. Secondly, building on previously developed classification schemes, we coded articles as authored by legacy or digital-native news publications. Legacy publications are defined as those which originated in a traditional format (print, television, radio) and now also may have online content. Digital-native publications are those which began publishing in an online format as their initial or primary mode of communication. A small number of publications from non-governmental organizations, universities, or other non-traditional communication entities were coded as "other." Thirdly, we classified both legacy and digital-native media outlets by their primary communication modality (print vs. television/radio).

#### *Article Engagement*

To assess the relationship between an article's adherence to the suicide reporting guidelines and reader engagement, we collected counts of the following activities:

- Reshares: How many times someone clicked the “Share” button on a post of that article and published a “reshare” of that article.
- Likes: How many times someone clicked the “Like” button on a post of that article
- Comments: How many times someone commented on a post of that article
- Love, Haha, Wow, Sorry, Anger: Separate counts of times that someone clicked one of these ‘Reactions’ to the article (28).

Engagement variables were counted for 60 days beginning on the date the article was posted.

#### *Statistical Analysis*

To assess article engagement, we coded engagement as binary variables indicating whether an article received a given engagement response (i.e., 1 for the presence of one or more likes, 0 for the absence of a like). Table S1 reports the results of the logistic regression models, which assess the association between article score and the odds of various engagement metrics. Models control for the number of times an article was posted (logged base 2), article category (individual suicide, homicide-suicide, or general information), publisher distribution, and country. Publisher distribution is a variable which measures the number of distinct people worldwide who posted any article (not just those about suicide or in English) from that publisher’s domain to Facebook during the focal month.

Table S1.

## Association Between Article Score and Reader Engagement

Variable	Social Engagement Metric							
	love OR (95% CI)	reshare OR (95% CI)	like OR (95% CI)	comment OR (95% CI)	haha OR (95% CI)	wow OR (95% CI)	sorry OR (95% CI)	anger OR (95% CI)
Score	1.20 (1.13 - 1.26)	1.19 (1.10 - 1.27)	1.05 (0.98 - 1.12)	1.00 (0.93 - 1.06)	0.97 (0.90 - 1.05)	0.96 (0.89 - 1.02)	0.94 (0.87 - 1.01)	0.93 (0.87 - 0.99)
Number of times article posted	1.89 (1.75 - 2.02)	2.03 (1.88 - 2.18)	2.45 (2.24 - 2.66)	2.46 (2.27 - 2.66)	2.05 (1.90 - 2.19)	2.07 (1.92 - 2.22)	2.41 (2.23 - 2.60)	1.84 (1.71 - 1.97)
Publisher distribution	1.03 (0.96 - 1.10)	0.90 (0.82 - 0.99)	1.01 (0.94 - 1.09)	1.01 (0.94 - 1.08)	0.98 (0.90 - 1.06)	1.03 (0.96 - 1.09)	0.98 (0.91 - 1.05)	0.96 (0.89 - 1.02)
Category								
General (reference)	-	-	-	-	-	-	-	-
Individual	1.65 (1.15 - 2.15)	1.30 (0.71 - 1.88)	1.18 (0.61 - 1.76)	1.39 (0.85 - 1.93)	0.87 (0.28 - 1.46)	1.18 (0.68 - 1.68)	1.27 (0.75 - 1.79)	0.79 (0.29 - 1.29)
Murder-suicide	1.78 (1.04 - 2.51)	0.71 (-0.29 - 1.71)	0.95 (0.17 - 1.73)	1.45 (0.70 - 2.20)	1.68 (0.88 - 2.48)	1.63 (0.92 - 2.33)	1.71 (0.97 - 2.46)	0.60 (-0.11 - 1.31)
Country								
Other (reference)	-	-	-	-	-	-	-	-
Australia	1.27 (-0.01 - 2.56)	0.51 (-1.22 - 2.24)	4.00 (2.60 - 5.39)	3.91 (2.62 - 5.20)	1.13 (-0.38 - 2.64)	2.02 (0.80 - 3.25)	4.12 (2.88 - 5.36)	1.60 (0.25 - 2.94)
Canada	0.92 (-0.27 - 2.11)	1.90 (0.50 - 3.31)	1.35 (0.25 - 2.44)	1.36 (0.28 - 2.43)	0.72 (-0.67 - 2.11)	1.61 (0.51 - 2.72)	1.19 (0.12 - 2.27)	1.55 (0.36 - 2.75)
India	0.17 (-2.08 - 2.43)	0.00 (-)	11.73 (9.54 - 13.92)	1.08 (-0.20 - 2.36)	0.60 (-1.18 - 2.38)	1.84 (0.56 - 3.12)	2.39 (1.05 - 3.72)	1.9 (0.54 - 3.27)
United Kingdom	1.07 (0.04 - 2.10)	1.59 (0.34 - 2.85)	1.95 (1.00 - 2.90)	2.60 (1.65 - 3.55)	1.16 (0.05 - 2.27)	2.29 (1.34 - 3.24)	3.04 (2.09 - 3.98)	3.33 (2.31 - 4.35)
United States	1.47 (0.52 - 2.41)	0.71 (-0.49 - 1.90)	1.73 (0.91 - 2.55)	1.70 (0.88 - 2.52)	0.92 (-0.09 - 1.93)	2.15 (1.29 - 3.01)	1.79 (0.97 - 2.62)	2.07 (1.13 - 3.01)

Note: OR = Odds Ratio; CI = Confidence Interval; Number of times article posted and publisher distribution are entered as  $\log_2(x)$  and  $\log_2(x+1)$ , respectively, given non-normal distributions.

To understand publisher characteristics which may influence adherence to the suicide reporting guidelines, for U.S. articles we examined differences in safe-reporting score between legacy vs. digital-native publishers, print vs. television/radio outlets, and national vs. local publishers. Table S2 reports the results of a linear regression model to explore associations between article score and publisher characteristics (national vs. local publishers, print vs. television/radio outlets, and legacy vs. digital-native publishers). Models also control for publisher distribution as described above.

**Table S2.**

**Association between publisher characteristics and article score.**

<b>Variable</b>	<b><math>\beta</math></b>	<b>p-value</b>
<b>Publisher scope</b>		
Local (reference)	-	-
National	1.93	<0.001
<b>Main publisher format</b>		
Television/radio (reference)	-	-
Print	0.63	0.077
<b>Publisher type</b>		
Digital-native (reference)	-	-
Legacy	0.13	0.743
<b>Publisher distribution</b>	-0.18	0.004

Note: Publisher distribution is entered as  $\log_2(x+1)$  given non-normal distributions.

**Table S3. Code categories and definitions for suicide reporting elements evaluated.**

<b>Reporting Element</b>	<b>Definition</b>
<b><u>Headline</u></b>	
Word "suicide" used in headline	Does the headline include the word "suicide" or "suicidal"?
Method of suicide or suicide attempt mentioned in headline	Does the headline mention method of suicide/attempt? Select 'Yes' if: The article headline includes mention of overdose, hanging, shooting, cutting, etc.
<b><u>Photos/Videos</u></b>	
Photos/videos of the location of suicide/suicide attempt	Does the article include photos/videos of the location of death/suicide attempt? Select 'Yes' if: If the article includes a photo of the location of the death or attempt (e.g., the school, house, bedroom, bridge, train, etc. where individual died/attempted suicide)
Photos/videos of the method of suicide/suicide attempt	Does the article include photos/videos of the method of death/attempt? Select 'Yes' if: Article includes photos/videos of knife, pills, gun, rope, etc.
Include photos/videos of grieving family, friends, memorials, or funerals	Does the article include photos/videos of grieving family, friends, memorials, or funerals? Select 'Yes' if: Article includes photos/videos of grieving family, friends, memorials, or funerals.
<b><u>Suicide Description</u></b>	
Describes suicide as inexplicable or without warning	Does the article describe suicide as inexplicable or without warning?
Reports that the event was caused by a single event or cause	Does the article report that the event was caused by a single event or cause? Select 'Yes' if: The article describes a single event or cause of suicide. Reporting that suicide is caused by a single event or cause (e.g., a job loss, divorce, etc) can provide an overly simplistic understanding of suicide.

Mention of a suicide note	Does the article mention a suicide note?
Quoting police or first responders about the causes of suicide	Does the article quote police or first responders (e.g., EMTs, firefighters) about the causes of suicide? Articles should quote suicide prevention experts. Articles may quote first responders about other topics.
Use of non-recommended suicide terminology	Does the article use specific non-recommended suicide terminology?: "commit[ted] suicide", "successful suicide", "failed suicide", "failed [suicide] attempt"
Reports on a suicide pact	Does the article report on a suicide pact? Select 'Yes' if: The article discusses an agreement or arrangement between two or more individuals to die by suicide (whether separately or together).
Reports on a celebrity suicide	Does the article report on a celebrity suicide? Select 'Yes' if: The article reports on the death or suicide attempt of a person with national-level public fame due to personal characteristics, position, or other factors, including wealth, sports, music, entertainment role, political, or job position.
Sensationalized language in headline or body	Does the article body or headline contain sensationalized language? Select 'Yes' if: The article contains the words "epidemic" or "skyrocketing" to describe suicide trends.
<b><u>Suicide Details</u></b>	
Name of suicidal/deceased individual given	Does the article or headline give the name of suicidal/deceased individual?
Name of school given	Does the article or headline give the name of a school that was the school of attendance of decedent or person attempting suicide? Select 'Yes' if: The individual who died or attempted suicide was a student AND the school was named. Select 'Not Relevant' if: The individual was not a student.
Time of death/attempt given	Does the article or headline give the time of death/attempt? Select 'Yes' if: Time or location of suicide attempt/death is mentioned. For time, select yes if any temporal information less than a day is present (e.g., "overdosed late at night" or "died at 3pm").
Place of death/attempt given	Does the article or headline give the place of death/attempt? Select 'Yes' if: a specific place is given (e.g., home, school, work, bridge, train, etc).



Method of suicide or suicide attempt mentioned in body of article	Is the method of suicide or suicide attempt mentioned in body of article? Select 'Yes' if: The method or weapon is included in the body of the article (e.g., shooting, cutting, overdose, hanging, etc.)
<b><u>Protective Elements</u></b>	
Contact information for a suicide prevention hotline provided	Does the article provide contact information for a suicide prevention hotline? Select 'Yes' if: The article includes contact info for Suicide Prevention Lifeline ( <a href="https://suicidepreventionlifeline.org/">https://suicidepreventionlifeline.org/</a> ) [1-800-273-TALK (8255)] in U.S. or other relevant hotline numbers such as for other countries.
Contact information for suicide prevention text line provided	Does the article provide contact information for Crisis Text Line? Select 'Yes' if: The article says to text 741741 in U.S. (e.g., a term like "TALK" or "CONNECT" or "START" or some other phrase) or includes another text line for articles from other countries.
Provides any local resources for treatment, information, or assistance	Does the article provide any local resources for treatment, information, or assistance? Select 'Yes' if: The article includes information about local community support groups, local mental health treatment options, etc.
Encourages individual help seeking or mentions treatment options	Does the article encourage individual help-seeking or mention treatment options? Select 'Yes' if: The article encourages individual help-seeking or mentions treatment options. May include: <ul style="list-style-type: none"> <li>• Indicating that suicidal thoughts and behaviors can be reduced with proper treatment and support.</li> <li>• Encourage talking to a friend or a mental health/medical professional.</li> <li>• Mention of clinical treatments (counseling, medical treatment, etc).</li> <li>• Provides information on general wellbeing (sleep/rest, physical activity, healthy eating, etc).</li> </ul>
Provides any information for others (family, friends, bystanders) on what to do to help someone showing warning signs	Does the article provide any information for others (family, friends, bystanders) on what to do to help someone showing warning signs? Select 'Yes' if: The article provides this information AND it is targeted at friends, bystanders, family members, or others in a potential support network for the individual at risk. It may include advice such as: <ul style="list-style-type: none"> <li>• Do not leave the person alone</li> <li>• Remove any objects that could be used in a suicide attempt</li> <li>• Call the U.S. National Suicide Prevention Lifeline at 800-273-TALK (8255)</li> <li>• Take the person to an emergency room or seek help from a medical or mental health professional.</li> </ul>

List of suicide warning signs provided	<p>Does the article provide a list of suicide warning signs? Select 'Yes' if: The article includes suicide warning signs. May include any of the following or similar:</p> <ul style="list-style-type: none"> <li>• Talking about wanting to die</li> <li>• Looking for a way to kill oneself</li> <li>• Talking about feeling hopeless or having no purpose</li> <li>• Talking about feeling trapped or in unbearable pain</li> <li>• Talking about being a burden to others</li> <li>• Increasing the use of alcohol or drugs</li> <li>• Acting anxious, agitated or recklessly</li> <li>• Sleeping too little or too much</li> <li>• Withdrawing or feeling isolated</li> <li>• Showing rage or talking about seeking revenge</li> <li>• Displaying extreme mood swings</li> </ul>
Quotes a suicide prevention expert on causes and treatments	<p>Does the article quote a suicide prevention expert on causes and treatments? Quotes on causes or treatment should be from a mental health expert rather than lay individuals or first responders to a scene (police, fire, EMTs). Select 'Yes' if: Any quotes on causes and treatments come from mental health experts.</p>
Reports statistical information from official sources (if statistics are included)	<p>Does the article report statistical information from official sources (if statistics are included)? Select 'Yes' if: Article includes statistics on trends, magnitude of the problem (e.g., the number of deaths annually in the U.S.), or causes of suicide/mental illness, and they come from official sources such as government organizations (e.g., CDC, NIH, SAMHSA, WHO), healthcare providers, insurance organizations, or published academic research. Select 'Not-Relevant' if no statistics are provided.</p>
Includes a story or information about someone who overcame a suicidal or mental health crisis	<p>Does the article include a story or information about someone who overcame a suicidal or mental health crisis? Select 'Yes' if: The article includes a story or information about someone who overcame a suicidal or mental health crisis.</p>