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Suicide and Life-Threatening BEHAVIOR

ORIGINAL ARTICLE

Cost-effectiveness of media reporting guidelines for the prevention of suicide

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Abstract

Introduction: Media guidelines for the responsible reporting of suicide are a recognized universal suicide prevention intervention. While implemented in numerous countries, including Australia, little is known about whether they are cost-effective. We aimed to determine the cost-effectiveness of *Mindframe*, the national initiative implementing media guidelines in Australia.

Method: We conducted a modelled economic evaluation (5-year time-horizon) incorporating two types of economic analysis: (i) return-on-investment (ROI) comparing estimated cost savings from the intervention to the total intervention cost, and (ii) cost-effectiveness analysis comparing the net intervention costs to health outcomes: suicide deaths prevented and quality-adjusted life-years (QALYs). We also included uncertainty analyses to propagate parameter uncertainty and sensitivity analyses to test the robustness of the model outputs to changes in input parameters and assumptions.

Results: The estimated ROI ratio for the main analysis was 94:1 (95% uncertainty interval [UI]: 37 to 170). The intervention was associated with cost savings of A$596M (95% UI: A$228M to A$1,081M), 139 (95% UI: 55 to 252) suicides prevented and 107 (95% UI: 42 to 192) QALYs gained. The intervention was

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dominant, or cost-saving, compared with no intervention with results being robust to sensitivity analysis but varying based on the conservativeness of the parameters entered.

Conclusion: *Mindframe* was found to be cost-saving, and therefore, worthy of investment and inclusion as part of national suicide prevention strategies.

KEYWORDS

cost-effectiveness, economic evaluation, media guidelines, public health, suicide prevention

INTRODUCTION

Suicide is a major public health problem worldwide with global estimates close to 800,000 deaths by suicide annually (World Health Organization, 2019). In Australia, over 3,000 individuals die by suicide each year (Australian Bureau of Statistics, 2020) and every death has profound impacts on families, friends, and communities grappling with grief, loss, and trauma (Maple et al., 2019). The human and social impacts of suicide are accompanied by substantial economic costs, through direct medical and indirect lost productivity costs, but also broader costs due to pain and suffering experienced by those who have lost a loved one (KPMG, 2013). Recent economic appraisal put the cost of premature death and disability from suicide and self-harm in Australia at 30.5 billion Australian dollars (A$) annually (Productivity Commission, 2020), supporting the urgent need for effective and cost-effective suicide prevention efforts.

Guidelines for the responsible media reporting of suicide are a widely implemented universal suicide prevention intervention targeting whole populations (Zalsman et al., 2016) and are typically incorporated in national suicide prevention strategies (Platt et al., 2019). The intervention has also been integrated into multicomponent suicide prevention initiatives, that seek to deliver multiple evidence-based interventions simultaneously across a region for maximal impact on suicide rates (Baker et al., 2018). International guidelines for media reporting have been developed by the World Health Organization (WHO) and the International Association for Suicide Prevention (IASP) (World Health Organization, 2008; World Health Organization & International Association for Suicide Prevention, 2017), and local guidelines have been developed by government and non-government organizations in many countries (Maloney et al., 2014; Pirkis, Blood, et al., 2006). In Australia, Everymind© has developed and implemented the *Mindframe* initiative, engaging with media professionals and stakeholders (such as journalists, journalism, communication students, and other media sources) to apply evidence-based guidelines for the responsible reporting of suicide, the safe portrayal of mental illness, and more recently, communication around drug and alcohol use (Skehan et al., 2020). The *Mindframe* guidelines, as a key component of the initiative, are one of the earliest examples of national media guidelines worldwide, having been implemented, in some form, within the Australian context for more than two decades. The guidelines encourage journalists to reduce the prominence of reports of suicide, use language that is not sensationalist, and refrain from providing detail about suicide methods. They also recommend providing education about suicide prevention, signposting help-seeking options, and covering stories that focus on how people with lived experience have overcome suicidal thinking (Everymind, 2020).

The primary justification for the *Mindframe* guidelines stems from the notion of suicide "contagion", whereby sensational and prominent media reporting of suicide (especially of high profile or celebrity deaths) has been associated with subsequent suicides within a specified time and place exposed to the reporting (Pirkis & Blood, 2001). This phenomenon, known as the "Werther Effect", is now backed by considerable evidence (Niederkrotenthaler et al., 2020; Pirkis et al., 2018). This includes a recent systematic review and meta-analysis that showed reporting of celebrity suicides was associated with a relative increase of 13% in suicides (rate ratio 1.13, 95% CI 1.08–1.18) in the following 1-2 months, with the additional reporting of the method used in celebrity suicides associated with a 30% relative increase (rate ratio 1.30, 95% CI 1.18–1.44) in suicide deaths by the same method (Niederkrotenthaler et al., 2020). However, not all types of media coverage of suicide have negative impacts. Media content that promotes mastery of suicidal crisis has been associated with lower suicide rates (Niederkrotenthaler et al., 2010) suggesting a protective effect, termed the "Papageno" effect, although this phenomenon has been less researched than the "Werther effect" (Niederkrotenthaler, 2017; Sisask & Värnik, 2012).

Evaluation studies of media reporting guidelines for suicide prevention suggest that such guidelines can be effective in changing media reporting behavior and reducing suicides (Bohanna & Wang, 2012). The majority

of these studies have focused on the immediate impacts of implementing guidelines on journalists' awareness and use of guidelines and the quality of media reports (Bohanna & Wang, 2012). For example, an Australian study by Pirkis et al. (2009) reported a significant improvement in overall quality of Australian news media reporting when measured against the media guidelines over a 5-year period. Additionally, studies have linked guidelines to an impact on actual suicide rates and prevention of imitative suicides (Etzersdorfer & Sonneck, 1998; Michel et al., 2000; Niederkrotenthaler & Sonneck, 2007; Sonneck et al., 1994); however, these studies are very few in number and mostly from one country, Austria.

In addition to understanding the effectiveness of suicide prevention interventions like media guidelines, evidence-based public health is also focused on the cost-effectiveness of these interventions. Scarcity of resources means that policymakers often question whether benefits of interventions can be achieved at an acceptable cost. Economic evaluation involves a comparative analysis of both costs and consequences of alternative courses of action to generate evidence-based information and support resource allocation decisions (Drummond et al., 2015). Within the context of the few economic evaluation studies of suicide prevention interventions (Bustamante Madsen et al., 2018), a previous study investigating the cost-effectiveness of *Mindframe*, is the only study in this area (Mihalopoulos et al. 2011). This study concluded that *Mindframe* was a low-cost intervention and very few suicides would need to be averted to make it cost-effective. While this study was the first to provide some indication of the cost-effectiveness of media guidelines for suicide prevention, it was limited by the evidence available at the time, relying on a single Australian ecological study of adverse media reporting on subsequent deaths by suicide (Pirkis, Burgess, et al., 2006). As additional studies have been conducted in the past decade focused on the relationship between media reporting and suicide (Niederkrotenthaler et al., 2020; Pirkis et al., 2018) and as governments have been increasingly interested in the costs and benefits of suicide prevention action (Productivity Commission, 2020), this additional evidence should be incorporated for more contemporary cost-effectiveness estimates of media guidelines. This study therefore aimed to determine the cost-effectiveness of *Mindframe* for suicide prevention in Australia.

METHOD

This study adhered to the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist (Husereau et al., 2013). The economic model developed for this study used decision tree modeling which extrapolates the cost and effectiveness of competing interventions over time; here being the *Mindframe* intervention and a "do nothing" (or no) intervention with the model representing one-year cycles. The economic model required various inputs including the following: (i) deaths by suicide in Australia in the base year 2018, (ii) relative risk (RR) estimates of media reporting guidelines' effectiveness, (iii) the monetary value (from a societal perspective) associated with preventing deaths by suicide, and (iv) costs of implementing and maintaining the *Mindframe* media reporting guidelines over a 5-year timeframe. Further details of the model are presented below.

Intervention

The target intervention for this study was the *Mindframe* initiative. As noted above, *Mindframe* implements guidelines for responsible media reporting of suicide, as well as related activities of safe media portrayal of mental illness and communication relating to alcohol and drug use (Everymind, 2021). Despite *Mindframe* having a broader focus than suicide reporting alone, we have not disentangled the components from the initiative as a whole. *Mindframe* is funded by the Australian Department of Health.

Intervention effectiveness

Only a few studies have evaluated reductions in suicide following the implementation of guidelines; therefore, we extrapolated from studies of increases in suicides following the kind of reporting that *Mindframe* is designed to avert. Intervention effectiveness was based on the most recent systematic review and meta-analysis of the impact of media reporting on suicide (Niederkrotenthaler et al., 2020). Twenty studies were included in the main analysis that investigated the association between media reporting of celebrity suicides and subsequent suicides in the general population. The pooled estimate from this meta-analysis suggested a 13% relative increase in suicide risk in the 28-day period (range 7–60 days) after media reporting of a celebrity suicide death (rate ratio (RR) 1.13, 95% confidence interval (CI): 1.08 to 1.18) (Niederkrotenthaler et al., 2020). Our economic model assumed that one celebrity suicide would occur annually (a conservative estimate based on unpublished data of Western celebrity suicides and their prominence in the Australian media 2016-2020) (Hill, 2022) and with responsible media reporting the associated 13% relative increase in suicide risk would not occur in one 28-day period annually. The comparator was "do nothing" or a no investment scenario that assumed no guidelines existed in Australia.

Monetary savings

To estimate the monetary value associated with preventing a death by suicide, this study used two methods: (i) value of a statistical life and (ii) total cost estimates associated with a suicide death. The first method (presented in the base case) used the value of statistical life (VSL), or the notional monetary value that society is willing to pay to reduce the risk of death, valued at A$4.5 million (representing the average value based on a healthy person living for another 40 years) and A$0.2 million for the value of a statistical life year (both measured in 2018 A$) (Department of Prime Minister and Cabinet, 2014). The second method used cost estimates from a 2013 report by KPMG, which placed the total cost of each suicide in Australia at A$806,545 (males) or A$421,123 (females) (both measured in 2018 A$) (KPMG, 2013). These costs were weighted by the proportion of suicide deaths attributed to males and females in the Australian population in 2018. We conservatively did not include cost savings associated with effects of media guidelines on non-fatal suicide attempts.

Intervention costs

The intervention costs of *Mindframe* over 5 years were provided by Everymind and are presented in Table 1. The costs are inclusive of staffing and non-staffing costs associated with continual update and implementation of the guidelines for reporting suicide and mental ill-health. For example, the *Mindframe* team reviews and updates the guidelines regularly, delivers training to build the skills of media professionals, students (journalism and public relations), and the suicide prevention sector to apply the guidelines, provides real-time support to media and those working with the media on stories and critical incidents and supports organizations to embed the guidelines into media codes of practice, and national and regional suicide prevention planning. The total grant funding for *Mindframe* was used in this analysis, with the 5-year intervention costs estimated at A$6,726,472 (without discounting) or 6,321,808 (with 3% discount applied every year after 2018) (measured in 2018 A$).

Cost-effectiveness models

There were 3,138 suicides in 2018 and 3,318 suicides in 2019 in Australia (Australian Bureau of Statistics, 2020), or approximately 245 and 259 suicides during a 28-day period in each year, respectively. Assuming equal risk both to suicide across the population and susceptibility to media reporting of a celebrity death, then applying a relative risk reduction of ~0.88 (i.e., the inverse RR of 1.13 and rounded here to 2 decimal points), representing the effect of media reporting guidelines, the number of suicides would be 217 and 229 in 2018 and 2019, respectively. We examined the cost-effectiveness of *Mindframe* for preventing suicide in Australia over five years. The number of annual deaths by suicide after 2019 was assumed equal to the number reported in 2019.

TABLE 1 Input parameters and uncertainty ranges for health benefit and costing analysis of media reporting guidelines for suicide prevention

Parameter	Value and uncertainty range	Uncertainty distribution	Source(s)
Intervention effect sizes			
Rate ratio without the intervention (media reporting for suicides)	1.13 (95% CI: 1.08–1.18)	Lognormal	Meta-analysis (Niederkrotenthaler et al., 2020)
Follow up duration(days)	28 (95% CI: 7–60)	Pert	Meta-analysis (Niederkrotenthaler et al., 2020)
Costing Analysis			
Unit cost uncertainty	±20%	Pert	Expert opinion (Mihalopoulos et al., 2011; Vos et al., 2010)
Intervention costs (without discounting)	Year 1: A$1,242,034 Year 2: A$1,264,800 Year 3: A$1,287,984 Year 4: A$1,452,514 Year 5: A$1,479,139	N/A	Mindframe cost
Benefit analysis			
Utility scores	0.81 (95% CI: 0.81–0.82)		Australian population norms (Hawthorne et al., 2013)

We designated 2018 as the reference year (with an annual discount rate of 3% applied to all costs and health outcomes). All costs were expressed in 2018 A$ and converted to 2018 prices using the most recent relevant health price deflators (Australian Institute of Health and Welfare, 2020).

Our primary analysis adopted a return-on-investment (ROI) framework, which compared the monetary value associated with preventing suicides by the intervention to the intervention costs. This ratio is technically a benefit-cost ratio and has been used in previous ROI studies published by the National Mental Health Commission in Australia (Mihalopoulos et al., 2019) and Public Health England (McDaid et al., 2017). Interventions with ROI ratios greater than one are deemed cost-effective.

Our secondary analysis was a cost-effectiveness analysis (CEA) that was reported as an incremental cost-effectiveness ratio (ICER) which comprised the difference in costs between the intervention and no intervention, divided by the difference in reduction of suicide cases. We also presented a cost-utility analysis where the ICER was reported as the difference in costs divided by the difference in quality-adjusted life-years (QALYs) between the intervention and no intervention. The utility score used to estimate QALYs for the population was sourced from Australian population utility score norms and valued at 0.81 (95% CI 0.81–0.82) (Hawthorne et al., 2013). This value is for the general population and assumes utility scores are uniform across the population and not impacted by suicide risk.

Uncertainty and sensitivity analyses

We conducted uncertainty analyses alongside the cost-effectiveness model to propagate parameter uncertainty (i.e., sampling error) from the input parameters to the final model outputs. We used Monte Carlo simulation with 3,000 iterations. Estimates of incremental costs, suicides, ROI ratios, and ICERs were estimated with accompanying 95% uncertainty intervals (95% UI). Uncertainty iterations were represented on a cost-effectiveness plane. Table 1 presents the uncertainty parameters.

We also conducted a series of sensitivity analyses (SAs) to test the robustness of the model outputs to changes in the following input parameters/assumptions:

- SA1: We used the value of a statistical life year (i.e., 1-year value) over 5 years rather than the value of a statistical life (i.e., 40-year lifetime value) to estimate the financial value society places on reducing the risk of death.
- SA2: We used the cost-saving associated with preventing a suicide sourced from KPMG.
- SA3a: We conducted a threshold analysis where we reduced the monetary value associated with suicide prevented until the intervention was not cost-saving.
- SA3b: We conducted a threshold analysis where we reduced the number of suicides prevented by media reporting guidelines until the intervention was not cost-saving (reflecting reduced effectiveness of media reporting guidelines on suicide deaths).

RESULTS

Cost-effectiveness and monetary savings of media reporting guidelines for suicides

The total intervention cost for media reporting guidelines for suicides in Australia over a 5-year period was estimated at A$6.3M (95% UI: $5.5M to $7.2M). The intervention produced corresponding monetary savings of A$596M (95% UI: $228M to $1,081M) over five years. The primary analysis, comparing the intervention cost in relation to monetary savings associated with a suicide prevented, produced an estimated ROI ratio of 94:1 (95% UI: 37 to 170) (i.e., the monetary value savings were 94 times that of the intervention costs) The secondary analysis indicated that the intervention was associated with a reduction of 139 (95% UI: 55 to 252) suicides and a gain of 107 (95% UI: 42 to 192) QALYs over a 5-year period (Table 2). The intervention was dominant or cost-saving (i.e., producing monetary savings over the intervention cost) compared with no intervention.

Uncertainty and sensitivity analyses

Figure 1 shows the results of the uncertainty analysis. The cost-effectiveness plane demonstrates that the likelihood of the intervention being cost-saving is 100% over 5 years regardless of whether the benefits were reductions of suicides or QALYs gained.

In SA1, where monetary saving was estimated by the value of a statistical life year over 5 years, the ROI reduced to 4 (95% UI: 2 to 7). In SA2, where cost savings associated with health care and productivity loss were used, the ROI reduced to 13 (95% UI: 5 to 24). In SA3a, the threshold analysis indicated that if the monetary saving associated with a suicide was over A$45,631 and other parameters were not changed, the intervention would be cost-saving. In SA3b, the threshold analysis demonstrated that 2 to 32 suicides needed to be averted within five years, subject to the monetary value of a suicide prevented (from A$ 0.2M to 4.6M), for the intervention to remain cost-saving. Table 3 presents further details of SAs 1 and 2.

DISCUSSION

Guidelines for the responsible reporting of suicide are considered an effective population-level intervention for suicide prevention and this study adds further evidence that they are also cost-effective, at least for the Australian population. We found that *Mindframe* within the Australian context is cost-saving when compared to a "do nothing" scenario over a 5-year time-horizon. The ROI analysis resulted in positive ratios, regardless of different assumptions or inputs tested, suggesting that for every dollar invested, there were between A$4 (95% UI: 2–7) and A$94 (95% UI: 35–169) returned. The ICER was dominant, or cost-saving, when comparing relative costs to suicides prevented or QALYs gained, and this finding was consistent in a series of sensitivity analyses. This included a threshold analysis which demonstrated that even if far fewer suicide deaths were averted by *Mindframe* (i.e., 2–32 suicides instead of 139 suicides over the 5 years presented in the base-case analysis) it remained cost-saving, suggesting it does not need to be 100% effective at reducing the magnitude of suicides as we assumed in our base case analysis. This study extends the previous threshold analysis (Mihalopoulos et al., 2011), by involving a full economic evaluation with consideration of the incremental costs and benefits of alternative courses of action based on the most recent evidence of effectiveness and contemporary cost estimates.

The findings of our study are likely to be generalizable to other high-income countries that have implemented media guidelines for reporting of suicide, given that the contents of these guidelines are quite similar (Pirkis et al., 2016; Pirkis, Blood, et al., 2006). However, further work is required to determine whether the findings can be generalized to low- and middle-income countries, many of which currently may not have locally adapted guidelines. Recent studies emerging from Southeast Asian countries, including India, suggest further efforts are required to support the implementation and uptake of media guidelines and subsequently improve the quality of media reporting on suicide (Arafat et al., 2020; Armstrong et al., 2018; Armstrong et al., 2020). Understanding the unique perspectives and experiences of local media professionals as well as building collaboration between suicide prevention experts and the media industry have been identified as important first steps for guidelines to become an effective suicide prevention strategy (Armstrong et al., 2020; Sinyor et al., 2018).

TABLE 2 Cost-effectiveness summary for media reporting guidelines

Output parameter	5 years (mean, 95% CI)
Intervention costs (A$) 95% UI	6.3 million 5.5–7.2 million
Cost offsets (A$)[a] 95% UI	-596 million -1,081 to -228 million
Net costs[a]	- 589 million -1,074 to -222 million
Suicides prevented 95% UI	139 55–252
QALY gained 95% UI	107 42 to 192
ROI ratio 95% UI	94 37–170
ICER (A$ per suicide prevented) 95% UI	Dominant[b] (dominant[b] to dominant[b])
ICER (A$ per QALY gained) 95% UI	Dominant (dominant[b] to dominant[b])

Abbreviations: A$, Australian dollars; ICER, incremental cost-effectiveness ratio; ROI, return-on-investment, UI, Uncertainty Interval; QALY, quality-adjusted life-years.

[a]Negative costs denote cost savings (positive costs denote an expense).

[b]A dominant ICER signifies that the intervention is both cost-saving and produces greater health impacts when compared to the comparator.

Limitations

The study has certain limitations. In our economic model, we assumed the effectiveness of the guidelines was equal in magnitude to pooled estimates presented in the meta-analysis by Niederkrotenthaler et al., 2020, which reported

TABLE 3 Scenario analysis results

Scenario analyses	ROI ratio (mean 95% UI) *A$ saving per A$ invested*	ICER (mean 95% UI) *A$ per prevented suicide*	ICER (mean 95% UI) *A$ per QALY gained*
Baseline Model	94 (37 to 170)	Dominant (Dominant to dominant)	Dominant (Dominant to dominant)
SA1 Cost-saving estimated by the value of a statistical life year	4 (2 to 7)	Dominant (Dominant to dominant)	Dominant (Dominant to dominant)
SA2 Cost-saving sourced from KPMG estimate	13 (5 to 24)	Dominant (Dominant to dominant)	Dominant (Dominant to dominant)

Abbreviations: 95% UI; 95% uncertainty interval; A$, Australian dollars; ICER, incremental cost-effectiveness ratio.

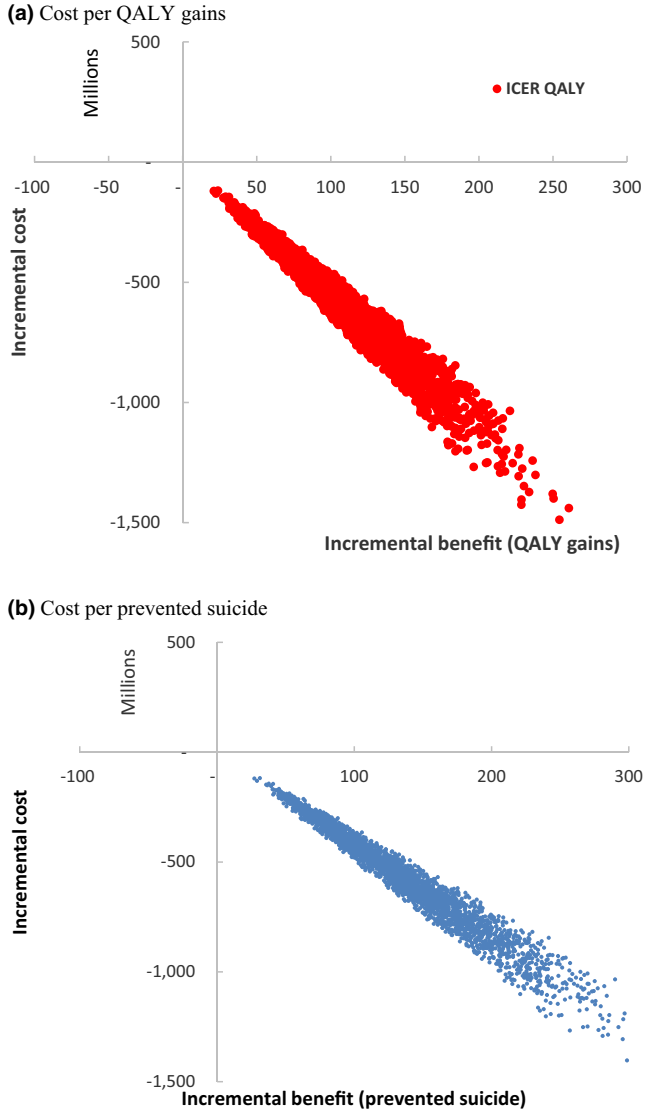


FIGURE 1 Cost-effectiveness plane of media reporting guidelines for suicides (a) Cost per QALY gains (b) Cost per prevented suicide

on the relationship between media reporting of suicides and subsequent suicides (with particular emphasis on celebrity suicides). We did this in the absence of pooled estimates for the preventive effect of media guidelines on population-level suicide rates and no additional ecological studies from Australia since Pirkis, Blood, et al. (2006). We used the estimate of the impact of media reporting of celebrity suicides on subsequent suicide deaths and not media reporting of suicides by non-celebrities which was also reported in Niederkrotenthaler et al. (2020) due to the strength of the association of the former being far greater than the latter. We conservatively assumed that only one celebrity suicide would occur annually in our base case analysis based on unpublished data collected by a co-author which found an average of 7.4 prominent Western suicides in the Australian media between 2016 and 2020 or 1.2 suicides over the same period if only including those suicides cited in 50 or more news articles (Hill, 2022). We also assumed that the guidelines would be 100% effective in preventing the 13% increase in suicides. However, we tested this assumption in our threshold analysis which indicated that the intervention would be cost-saving even if only 2 to 32 suicides were prevented by media guidelines over 5 years subject to the monetary value associated with a suicide. Estimates from the meta-analysis by Niederkrotenthaler et al. (2020) are also subject to limitations which include quality of the original study designs, high levels of study heterogeneity, and potential publication bias.

We used the VSL in our economic analysis to estimate the monetary value associated with preventing a death by suicide. The use of the VSL for cost-effectiveness analysis of health-related programs has been criticized for potential overestimation of cost savings (Le et al., 2021; Mihalopoulos et al., 2021). However, we conservatively used the lowest value of VSL compared with the median VSL of A$7.3M reported in a recent systematic review to update VSL estimates in Australia (Ananthapavan et al., 2021). Furthermore, by testing different assumptions to the value attached to the VSL, as well as using an alternative method for assigning the monetary savings to a suicide prevented, we were able to demonstrate consistent findings regardless of changes to these input parameters. Another limitation relates to our choice of utility value, the Australian population norm value, for calculation of QALYs. This value may not adequately reflect the disproportionate risk of suicide or the varying susceptibility to the influence of media reporting on celebrity suicides across the population. However, changing the utility value for the population would reduce the QALY gains but it would not change the conclusion of the study; that media guidelines for the responsible reporting of suicide are cost-saving.

CONCLUSION

This study provides current evidence that national media guidelines, exemplified by *Mindframe* in the Australian context, lead to substantial cost savings in comparison with the absence of guidelines. This supports the ongoing investment in the implementation of these guidelines as a universal, population-level suicide prevention strategy.

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CONFLICT OF INTEREST

Jaelea Skehan and Tina Fox are employed by Everymind. Everymind receives funding from the Australian Government to implement the Mindframe guidelines.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author, Dr Long Khanh-Dao Le, upon reasonable request.

ETHICS STATEMENT

Ethics approval was not required for this research, as it did not involve human subjects.

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