

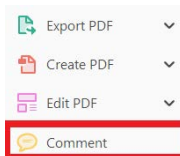
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How to use it:

- Highlight a word or sentence.
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
...age or nutritional conditions, and landmark events are monitored in populations of relatively homogeneous single n of *Saccharomyces*, and is initiated after carbon source [1]. S are referred to as mei n of meiosis-specific g *revisiae* depends on th inducer of meiosis) [3 I functions as a repre repression, the genes *pression*) and *RGR1* at rase II mediator subur osome density [4]. *SIM* irectly or indirectly re

jstaddon Reply X
05/05/2017 15:32 Post

2. Strikethrough (Del) Tool – for deleting text.

 Strikes a red line through text that is to be deleted.


How to use it:

- Highlight a word or sentence.
- Click on .
- The text will be struck out in red.



... experimental data if available. For ORFs to be had to meet all of the following criteria:


1. Small size (35–250 amino acids).
2. Absence of similarity to known proteins.
3. Absence of functional data which could not be the real overlapping gene.
4. Greater than 25% overlap at the N-terminus terminus with another coding feature; over both ends; or ORF containing a tRNA.

3. Commenting Tool – for highlighting a section to be changed to bold or italic or for general comments.

 Use these 2 tools to highlight the text where a comment is then made.


How to use it:

- Click on .
- Click and drag over the text you need to highlight for the comment you will add.
- Click on .
- Click close to the text you just highlighted.
- Type any instructions regarding the text to be altered into the box that appears.


...nformal invariance:  or A: Math. Gen., Vol. 12, N
...lified theory for a matrix. 'ol. 8, 1984, pp. 305–323
...d manuscript, 1984.
...ching fractions for $D_0 \rightarrow K+K$
...lation in D_0 decays' Phys

jstaddon Reply X
This needs to be bold
05/05/2017 15:40 Post

4. Insert Tool – for inserting missing text at specific points in the text.

 Marks an insertion point in the text and opens up a text box where comments can be entered.


How to use it:

- Click on .
- Click at the point in the proof where the comment should be inserted.
- Type the comment into the box that appears.


... Meiosis has a central role in the sexual reproduction of nearly all eukaryotes. *Saccharom* analysis of meiosis, esp by a simple change of n conveniently monitored cells. Sporulation of *Sae* cell, the a/a cell, and is of a fermentable carbon sporulation and are refe [2b]. Transcription of me meiosis, in *S. cerevisiae* activator, *IME1* (inducer of the gene *RME1* funct Rme1p to exert repress of *GAL1* gene expression) and *HGR1* are required [1, 2, 3, 4]. These ge

jstaddon Reply X
Yeast.
05/05/2017 15:57 Post

5. Attach File Tool – for inserting large amounts of text or replacement figures.

 Inserts an icon linking to the attached file in the appropriate place in the text.


How to use it:

- Click on  .
- Click on the proof to where you'd like the attached file to be linked.
- Select the file to be attached from your computer or network.
- Select the colour and type of icon that will appear in the proof. Click OK.


The attachment appears in the right-hand panel.

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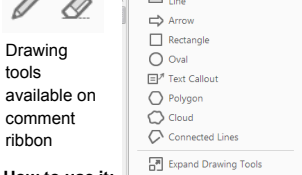
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- Select the stamp you want to use. (The **Approved** stamp is usually available directly in the menu that appears. Others are shown under *Dynamic, Sign Here, Standard Business*).
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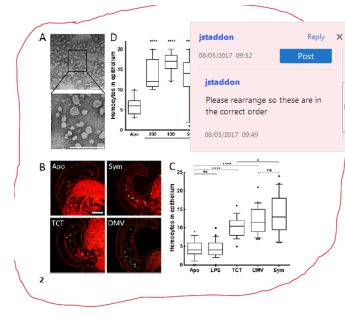


7. Drawing Markups Tools – for drawing shapes, lines, and freeform annotations on proofs and commenting on these marks.

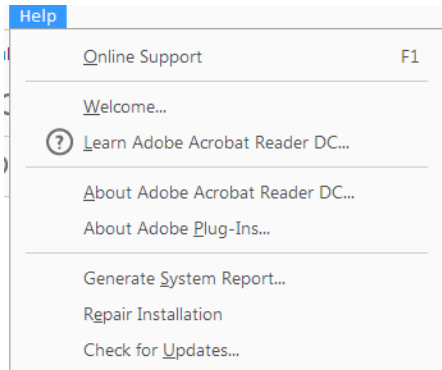
Allows shapes, lines, and freeform annotations to be drawn on proofs and for comments to be made on these marks.

How to use it:

- Click on one of the shapes in the **Drawing Markups** section.
- Click on the proof at the relevant point and draw the selected shape with the cursor.
- To add a comment to the drawn shape, right-click on shape and select **Open Pop-up Note**.
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12	AUTHOR: Please suggest whether the term “non-significant” can be changed to “nonsignificant” as per the dictionary in the sentence “The overall effect size was near zero ($r = .034$ with correction for publication bias) and non-significant.”	
13	AUTHOR: Please suggest whether the term “pre-post” can be changed to “before and after” in the sentence “It may be worth examining better ways to analyze pre-post aggregate data based on raw number of suicides”.	
14	AUTHOR: Please check the hierarchy of heading levels.	
15	AUTHOR: Please provide the volume number, page range for reference Thompson et al. (2018).	

13 Reasons Why Not: A Methodological and Meta-Analytic Review of Evidence Regarding Suicide Contagion by Fictional Media

CHRISTOPHER J. FERGUSON, XXX

For decades, policymakers and suicide prevention advocates have questioned whether exposure to media with suicide themes, whether television, movies, or music, could increase suicide risk among youth. To date, no clear picture has emerged, with data inconsistent. Two broad forms of data consider the issue, namely society-level aggregate data, and data from smaller correlational and experimental studies. The current article examined the evidence for suicide contagion by fictional media with a methodological and meta-analytic review. Results suggest that current data do not support the theory that suicide contagion by fictional media occurs. It is recommended that individuals exercise caution in public statements linking suicide-themed fictional media to suicide contagion as data may not be able to support such claims.

In the summer of 2017, the release of the popular and critically praised television show *13 Reasons Why* caused significant public consternation. The television show portrays the suicide and aftermath of a teenage girl who documents her motives for the suicide in a series of messages to other teens. Many members of the mental health and suicide prevention community criticized the show for allegedly glorifying suicide and increasing suicide risk among teen viewers. The Society for the Prevention of Teen Suicide (2017) released a statement claiming, “Unfortunately, the media tends to glamorize and sensationalize suicide.” The National Association of School Psychologists (2017) released a statement noting, “We do not recommend that vulnerable youth, especially those who have any degree of suicide ideation,


watch this series. Its powerful storytelling may lead impressionable viewers to romanticize the choices made by the characters and/or develop revenge fantasies.” Numerous other clinicians, educators, and suicide prevention advocates followed suit, expressing concerns about the show (Figure 1).

Concerns about *13 Reasons Why* mirror historical apprehensions regarding the potential impact of suicide-themed media on youth. A family brought a lawsuit against performer Ozzy Osbourne in the 1980s, claiming his song *Suicide Solution* (which did not, in fact, advocate suicide) contributed to their son’s suicide. The lawsuit was dismissed in 1988 (History.com, 2018). Other 1980s rock and metal bands such as *Judas Priest* also faced lawsuits or controversy related to alleged suicide-themed lyrics (Rohter, 1990). All these

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An early version of these analyses was presented at the American Psychological Association’s Technology, Mind and Society conference in April, 2018.

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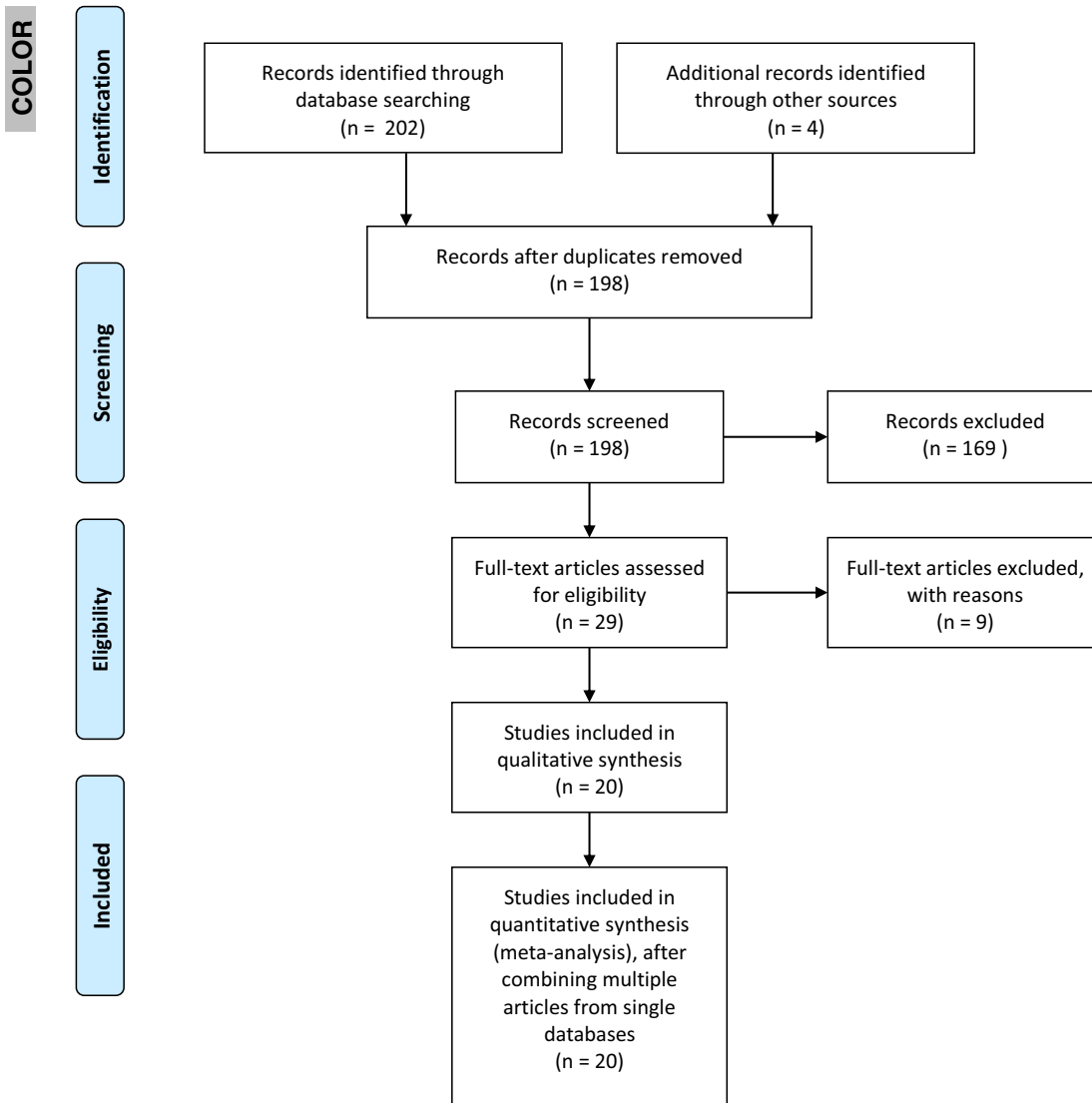


Figure 1. PRISMA Flow Diagram.

phenomena appear related to the Werther Effect, named after the lead character of Goethe's 1774 novel that was thought to have provoked a series of copycat suicides throughout Europe (Hittner, 2005).

Nonetheless, the majority of these societal-level concerns have progressed mainly through speculation. For instance, most of the public statements by professional groups, advocacy groups and individual counselors, educators, and advocates were not

connected to a larger base of empirical data. This leaves open the question as to the degree that concerns about suicide contagion by fictional media are connected to peer-reviewed data.

Studies on suicide contagion by fictional media can be conceptualized as coming from two distinct evidence bases, each with their benefits and pitfalls. The first of these are population aggregate studies. These typically involved pre/post analyses of suicide

1 rates in a municipality before and after a
2 particular television show with suicide themes
3 is viewed within the community. The second
4 are more traditional psychological studies,
5 most of which may be survey based, asking
6 participants about their history viewing cer-
7 tain shows or listening to certain songs and
8 correlating these with surveys of mood or sui-
9 cidal thoughts. Some studies may employ
10 short-term experiments to examine how ran-
11 domized exposure to different media influ-
12 ences mood or suicide acceptance. In the
13 following section, each of these forms of stud-
14 ies is briefly reviewed.

Aggregate designs

8 As noted above, aggregate designs
19 examine suicide rates pre/post the airing of a
20 particularly popular suicide-themed televi-
21 sion show. Such research designs appear to
22 have been particularly popular during 1980s
23 when the limited availability of multiple
24 channels likely made it more realistic to iso-
25 late single television shows. Such designs have
26 obvious appeal as they appear to be able to
27 examine the direct impacts of a particular
28 show. They also avoid demand characteristics
29 that may be common for survey-based
30 research.

31 That said, such designs have significant
32 limitations. First, particularly in an environ-
33 ment in which pressure to publish findings is
34 prevalent, false-positive results could reify
35 ecological fallacies. Simkin, Hawton, White-
36 head, Fagg, and Eagle (1995) note that such
37 studies cannot affirm that suicide victims
38 actually had seen the show in question and
39 that this is an assumption. Unsound method-
40 ologies might accidentally create false-posi-
41 tive results based on fairly random
42 fluctuations in suicide rates. Second, the
43 description of analyses in many of the older
44 studies is arguably vague. For example, Gould
45 and Shaffer (1986) appear to use independent
46 sample *t* tests (as well as Mann–Whitney *U*
47 alternatives) to assess before/after differences,
48 treating time blocks rather than individuals as
49 the unit of analysis. This statistical analytic
50 approach could create a higher amount of

unreliability in the analyses, which may
explain why effect sizes in this field tend to be
particularly heterogeneous.

9 As noted results for this type of analysis
are highly divergent. Some studies appear to
document fairly strong suicide contagion
effects (e.g. Gould & Shaffer, 1986; Stack,
Gundlach, & Reeves, 1994), whereas others
have claimed no effects for fictional media
suicide contagion (Phillips & Paight, 1987;
Simkin et al., 1995). Thus, a consistent body
of evidence does not appear to emerge from
this group of studies. Interestingly, after the
mid-90s, this type of study appears to have
declined altogether, perhaps related to
increased difficulties in isolating the effect of
single media examples, given increased diver-
sification of the media environment.

Traditional psychology studies

More traditional studies examine lim-
ited samples of individuals, often by conduct-
ing surveys of media use and suicidal thoughts
or depression. Although the topic matter
lends itself well to survey-based research,
some experiments may consider short-term
impact on milder variables such as positive
beliefs about suicide or mood (Till et al.,
2011). Such studies may naturally vary quite
widely in quality. As one major issue, the pair-
ing of questions related to media to questions
related to mood or suicide may lead to
hypothesis guessing/demand characteristics
and false-positive results. It is possible, partic-
ularly in correlational studies, that bivariate
correlations may be a poor index of actual
effect sizes due to potential third variables. In
most cases, theoretically important third vari-
ables may explain any bivariate correlation
between two variables and, as such, theoretic-
ally derived multivariate analyses are often
perceived as more valuable than are bivariate
analyses (Furuya-Kanamori & Doi, 2016;
Savage & Yancey, 2008). For example, it may
be possible that females harbor more suicidal
thoughts and greater depression and are also
more drawn to storylines such as those in *13*
Reasons Why. Thus, controlling for gender
effects would be critical. Other variables

related to personality, such as neuroticism, family environment, and even genetics (e.g. Schwartz & Beaver, 2016), could be important to consider.

As with aggregate studies, evidence from traditional psychological studies appears to be mixed. Some studies do show correlations between suicide-themed media and increased suicide risk or decreased mood (Martin, Clarke, & Pearce, 1993; Stack, Kral, & Borowski, 2014). However, other studies have not replicated this effect (Lacourse, Claes, & Villeneuve, 2001; Till et al., 2011). Thus, as with aggregate data, a descriptive look at the evidence base does not reveal a consistent set of evidence for effects, one way or another.

The current study

Given that individual studies demonstrate considerable heterogeneity in regard to the degree that they provide evidence for suicide contagion by fictional media, it may be worth examining the issue from a meta-analytic perspective. Although meta-analysis does not necessarily negate heterogeneity between studies, it can sometimes provide a sense for the trajectory of a field as well as whether some methodological factors may influence effect sizes. To date, this field appears not to have been subjected to meta-analytic review. Therefore, the current article will provide a methodological and meta-analytic summary of the field of fictional media suicide contagion to date.

METHODS

Selection of studies

Identification of relevant studies involved a search of the PsycINFO, MedLine, and Digital Dissertations databases using the search terms (“film* OR movie* OR television OR music”) AND (suicide) AND (Youth OR adolescent* OR child*) as subject searches. In addition, recent reviews of the fictional media suicide contagion literature were examined for

articles that may have been missed in the literature search. Included studies had to meet the following criteria:

- 1 Each study had to measure the influence of some form of media on an outcome related to suicide behavior, suicide ideation, or depressed mood. Media variables generally involved suicide-themed television and movies as well as heavy metal music with suicide themes. General time spent on media was not included as a predictor variable given such studies had the potential to underestimate effects if media exposure did not capture suicide themes in media specifically.
- 2 Each study had to present statistical outcomes or data that could be meaningfully converted into effect size “*r*.”
- 3 A given sample was included only once in the meta-analyses to maintain independence. Some samples, including longitudinal studies, may produce multiple publications, but only one such study was included in the current analysis. In each case, the most conservative estimates of effect were included.

The initial search (carried out in September 2017) returned approximately 202 hits, the majority of which were either non-empirical, considered general media use rather than media suicide specifically or otherwise did not meet the inclusion criteria above. Employing the inclusion criteria, the final search netted 20 published papers. However, it is worth noting that two papers utilized the same sample, however, with different forms of media, namely television versus heavy metal (Till, Tran, Voracek, & Niederkrotenthaler, 2016; Till, Tran, Voracek, Sonneck, & Niederkrotenthaler, 2014). When calculating overall effect sizes, this sample was not included twice to maintain independence. Total participants $n = 12,912$. The list of studies along with effect size estimates is presented in an online table at: <http://www.christopherjferguson.com/Suic>

1 ideContagion.xlsx. Details on data extracted
 2 from each article are described below under
 3 effect size estimates and moderator analyses.

4 *Effect size estimates*

5
 6
 7 In line with recent innovations related
 8 to meta-analyses of multivariate analyses, the
 9 current paper makes use of effect sizes in the
 10 metric of r which are based upon multivariate
 11 analyses resulting in standardized regression
 12 coefficients (betas). Many meta-analyses in
 13 prior years had relied upon bivariate r in the
 14 hopes that using r rather than betas would
 15 result in more homogeneous analyses. How-
 16 ever, due to the fact that most studies vary
 17 widely in measurement, analytics, and sam-
 18 ple, recent analyses have revealed that bivar-
 19 ate r s are no more homogeneous than are
 20 betas (Ferguson, 2015; Furuya-Kanamori &
 21 Doi, 2016), thus removing the primary argu-
 22 ment for meta-analyses relying on r . By con-
 23 trast, reasons for a preference for betas in
 24 meta-analysis are numerous, primarily given
 25 the concern that bivariate r may return spur-
 26 iously high effect size estimates that do not
 27 reflect real correlations once important fac-
 28 tors are controlled (Pratt et al., 2010; Savage
 29 & Yancey, 2008). Use of betas makes more
 30 sense theoretically, given that most multivar-
 31 iate analyses include theoretically relevant
 32 controls. As such, this study employs betas as
 33 effect size estimates.

34 In cases where articles presented more
 35 than one effect size estimate, they were aggre-
 36 gated for an average effect size. Some manu-
 37 scripts presented multiple competing
 38 statistical models with different effect size
 39 estimates, particularly for multivariate analy-
 40 ses. When this occurred, the most conserva-
 41 tive model was used as the effect size estimate
 42 for the controlled analyses. Given the ques-
 43 tion of how much variance remains for media
 44 effects once other factors are well-controlled,
 45 this approach was viewed as valuable.

46 Several moderators were considered as
 47 potentially important for the current article.
 48 Study year was considered as a moderator, as
 49 was the type of study (aggregate or traditional
 50 research study). Whether traditional research

studies controlled for third variables was also
 coded as was the apparent presence
 absence of demand characteristics as evidence
 by explicit attempts to reduce them. Studies
 were also coded for whether they consider
 TV/movies or heavy metal music as media
 predictors.

Analysis

The Comprehensive Meta-Analysis
 (CMA) software program was used to fit ran-
 dom effects models. The potential for publi-
 cation bias was assessed using the Tandem
 Procedure which looks for concordance
 among several funnel-plot-related tests for
 bias. This procedure is an empirically demon-
 strated, conservative estimating procedure for
 assessing publication bias, with low Type I
 error rates.

RESULTS

Overall results of the meta-analysis
 are presented in Table 1. As indicated,
 overall results did not support a relation-
 ship between fictional media portrayals of
 suicide and suicide behaviors, thoughts or
 depressed mood among consumers. The
 overall effect size was near zero ($r = .034$
 with correction for publication bias) and
 non-significant. Slightly more evidence was
 found among aggregate studies ($r = .101$)
 than among traditional studies ($r = .019$)
 although this was tempered by the poten-
 tial for publication bias which would
 reduce the effect sizes, with estimated cor-
 rection to $r = .077$ for aggregate studies. In
 this case, the Tandem Procedure returned
 inconclusive results. As the Tandem Proce-
 dure tends to be quite conservative in
 detecting publication bias, high potential
 for publication bias is likely and the lower
 estimate may be better to use.

The estimate for bivariate effects was
 much higher ($r = .234$) than for better con-
 trolled effect sizes ($r = -.018$), although the
 bivariate effects likewise appeared to be
 inflated by publication bias ($r = .049$ when

TABLE 1
Effect Size Estimates For Outcomes Related to Fictional Media and Suicide-Related Outcomes

Predictor	k	<i>r</i>	<i>r_x</i>	<i>p</i> -value	95% C.I.	<i>I</i> ²	PBias
All studies	23	.060	.034	.104	−0.038, 0.105	90.87	Yes
Aggregate studies	9	.101	.077	.016	−0.013, 0.165	81.93	Prob
Traditional studies	15	.019		.694	−0.076, 0.114	89.96	No
Bivariate	8	.234	.049	.001	−0.081, 0.177	82.74	Yes
Controlled	16	−.018		.673	−0.102, 0.066	92.73	No
TV/Movies	14	.020		.691	−0.078, 0.117	94.16	No
Heavy Metal	10	.099	.023	.015	−0.063, 0.107	65.50	Yes

controlled for publication bias). These results highlight the critical value in considering controlled rather than bivariate effects when examining media impacts.

Lastly, effects were slightly higher for heavy metal music ($r = .099$) than for television/movies ($r = .020$). However, heavy metal research likewise appeared to be impacted by publication bias with effect sizes greatly reduced when this was considered ($r = .023$).

Meta-regression also revealed a declining trend for effect sizes across study years ($Q(1) = 63.76, p < .001$). This indicates that evidence for effects has gotten weaker in more recent studies.

In all cases, between-study heterogeneity was quite large. Indeed, effect sizes vary considerably in the field. Thus, although meta-analytic results can confirm lack of clear evidence for effects, cautious should be used in interpreting aggregated effect sizes as “true” population effect sizes.

DISCUSSION

Whether fictional media depicting suicides contribute to youth or adult suicides or depression continues to be hotly debated in the public. As the controversy over *13 Reasons Why* demonstrated, concerns persist that fictional media suicides may prompt imitative behaviors among media consumers. The current meta-analysis examined the existing research in this field for potential evidence.

Overall, results suggested that the current research evidence cannot support the belief that fictional media with suicide themes lead to a suicide contagion among viewers. Although some inter-study heterogeneity existed, better controlled effect sizes suggest that the impact of suicide-themed fictional media on viewer suicide contagion is minimal. Likewise, meta-regression revealed declining effect sizes across study year, suggesting that evidence has weakened over time. This may reflect the “decline effect” in which initial research results prove difficult to replicate over time.

It is important to note that issues of publication bias appeared to be common in the field. Although uncorrected effect sizes were nonetheless weak, even these may be exacerbated by publication bias. Thus, as with other media effects fields, the issue of suicide contagion would likely benefit from a renewed emphasis on preregistered studies that reduce the potential for researcher expectancy effects, as well as a commitment to publishing null studies where they exist.

One methodological issue was difficult to examine, as it was nearly universal. This was the potential for demand characteristics in traditional psychology studies (both correlational and experimental). Although demand characteristics did not appear to result in high effect sizes among most studies in this area, it remains possible that some individual studies might be influenced by demand characteristics. There are likely straightforward ways to

1 reduce demand characteristics in traditional
2 studies, such as through the use of distrac-
3 tor items, surveys, or procedures to make
4 hypothesis guessing more difficult for par-
5 ticipants. Attention to demand characteris-
6 tics on other areas of media effects appears
7 to result in reduced effect sizes (e.g.
8 Whyte, Newman, & Voss, 2016). Thus, it
9 should be something to consider here.

10 The role of aggregate studies as evi-
11 dence appears to be more complex. From
12 an examination of these studies, details
13 were often a bit unclear on how data were
14 analyzed and whether the most appropriate
15 data analytic tools were employed. Time
16 points were typically used as units of analy-
17 ses, which would appear to leave studies
18 poorly powered and unreliable as number
19 of time points was typically too few for
20 time series analyses. It may be worth exam-
21 **13** ining better ways to analyze pre-post
22 aggregate data based on raw number of
23 suicides. Such data may also be particularly
24 prone to a combination of ecological fal-
25 lacy and publication bias. It may be that
26 there are some incidents in which suicides
27 appear to rise after one show, but do not
28 after another, or even appear to decline (in-
29 deed, the full record of aggregate studies
30 supports this pattern.) However, studies
31 that find an effect may be more exciting
32 and more publishable, potentially distorting
33 the academic record (which did, in fact,
34 appear to have some potential issues with
35 publication bias.)

36 These data from heavy metal music are
37 also interesting in light of debates regarding
38 the impact of such music going back to 1980s.
39 Current evidence suggests that the negative
40 impacts of heavy metal music on listeners are
41 minimal. Although the effect sizes were
42 slightly higher than for other forms of media,
43 this was reduced once publication bias was
44 considered. This finding appears to comport
45 reasonably well with other recent evidence
46 suggesting heavy metal music is not harmful
47 to or may even be beneficial to fans of this
48 genre (e.g. Sharman & Dingle, 2015; Thomp-
49 son, Geeves, & Olson, 2018).
50

Results from this study also critically
highlight the importance of using con-
trolled, theoretically relevant, multivariate
analyses when examining media effects. An
overreliance on bivariate correlations can
result in a significant overestimation and
misinterpretation of media effects. Analyses,
including those in meta-analysis, should
focus on controlled effect sizes rather than
bivariate.

Limitations

As with any study, this one has limita-
tions. First, a meta-analysis is only as good
as the studies included within it. As noted
above, the aggregate studies, in particular,
may not always have been designed or ana-
lyzed in the best possible way and this could
influence results from some studies. Related,
demand characteristics were present in
almost all traditional studies. Second,
although this meta-analysis attempts to cor-
rect for publication bias, such attempts
could over or underestimate the amount of
actual publication bias. Nonetheless, the
adjustment estimates are likely closer to the
population effect sizes than are the raw
effect sizes which more clearly may be the
product of publication bias. Third, the cur-
rent meta-analysis did not include unpub-
lished studies. However, as unpublished
studies are not indexed, finding such studies
can be a fraught process and may increase,
rather than decrease bias in some circum-
stances.

Concluding statements

At present, evidence is not able to sup-
port the contention that fictional depictions
of suicide lead to suicide contagion in viewers.
Until such time as more sophisticated studies
with fewer demand characteristics and pre-
registered designs become available, it is sug-
gested that newsmakers and advocates refrain
from making causal attributions regarding
suicide-themed shows such as *13 Reasons Why*
or heavy metal music.

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