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| Abstract | Parents and policy makers are often concerned that sexy media (media depicting or discussing sexual encounters) may promote sexual behavior in youth viewers. There has been some debate among scholars regarding whether such media promote sexual behaviors. It remains unclear to what extent sexy media is a risk factor for increased sexual behavior among youth. The current study employed a meta-analysis of 22 |
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correlational and longitudinal studies of sexy media effects on teen sexual behavior (n = 22,172). Moderator analyses examined methodological and science culture issues such as citation bias. Results indicated the presence only of very weak effects. General media use did not correlate with sexual behaviors ($r = 0.005$), and sexy media use correlated only weakly with sexual behaviors ($r = 0.082$) once other factors had been controlled. Higher effects were seen for studies with citation bias, and lower effects when family environment is controlled. The impact of media on teen sexuality was minimal with effect sizes near to zero.

2  ORIGINAL PAPER

# 3 Does Sexy Media Promote Teen Sex? A Meta-Analytic
# 4 and Methodological Review

5  **Christopher J. Ferguson[1] · Rune K. L. Nielsen[2] ·**
6  **Patrick Markey[3]**

9 AQ1 **Abstract** Parents and policy makers are often concerned that sexy media (media depicting
10 or discussing sexual encounters) may promote sexual behavior in youth viewers. There has
11 been some debate among scholars regarding whether such media promote sexual behav-
12 iors. It remains unclear to what extent sexy media is a risk factor for increased sexual
13 behavior among youth. The current study employed a meta-analysis of 22 correlational and
14 longitudinal studies of sexy media effects on teen sexual behavior (n = 22,172). Moder-
15 ator analyses examined methodological and science culture issues such as citation bias.
16 Results indicated the presence only of very weak effects. General media use did not
17 correlate with sexual behaviors ($r = 0.005$), and sexy media use correlated only weakly
18 with sexual behaviors ($r = 0.082$) once other factors had been controlled. Higher effects
19 were seen for studies with citation bias, and lower effects when family environment is
20 controlled. The impact of media on teen sexuality was minimal with effect sizes near to
21 zero.

22 **Keywords** Mass media · Sexuality · Adolescents · Television
23

## 24 Introduction

25 The experience of everyday life is infused with different types of media, from the media
26 we are involuntarily exposed to in public spaces to the media we actively choose to
27 consume. Sex or sexualized content is a common feature in everything from magazines, to

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28  TV, to streaming services, to radio, to movies, to video games. This raises the question of
29  whether sex in the media has an effect on society at large. Specifically, does exposure to
30  sex in the media, including depictions or discussion of sexual encounters, have an effect on
31  adolescents' sexual behavior? Social learning theory is often used to argue that it does [1].
32  Adolescents, who are supposedly impressionable, see attractive role models have casual
33  sexual encounters without negative consequences and emulate their behavior. This ques-
34  tion is of interest to policymakers, parents, educators, health professionals, adoles-
35  cents themselves, and even the producers and distributers of media.
36      At present, however, the empirical evidence is best characterized as ambiguous. Some
37  studies find effects for only specific populations, but not others [2]; some find effects of
38  certain types of media, but not others [3]; some find effects for some types of sexual
39  content, but not others. Standardized tests do not exist and researchers have not settled on
40  paradigmatic ways to investigation effects. Even the participants of the studies are
41  understood differently across studies, some describe their participants as active agents that
42  navigate their media environment [4]; others conceptualize their respondents as more or
43  less passive subjects who are exposed to media in a non-reciprocal relationship [5].
44  Unsurprisingly perhaps, studies of the effects of sexual media on adolescent sexual
45  behavior arrive at different conclusions. Recently, there was even an exchange between
46  two teams of research, working on the same data set, where one group found a correlation
47  but the other did not. Specifically, Brown and colleagues [4] found a relation between
48  exposure to sex in the media and sexual outcomes for adolescents in a longitudinal survey
49  that used covariate-adjusted regression analysis, however, when Steinberg and Monahan
50  [4] reanalyzed the data, this time using propensity score matching, they found that the
51  previously reported effect disappeared. Steinberg and Monahan argued that their approach
52  better estimated the effect of media by accounting for covariates that predict exposure to
53  media. However, in a comment, Collins, Martino and Elliot [6] counter argued that
54  propensity score approaches do not necessarily provide more accurate data than does the
55  approach of using regression with correlates, which was originally employed. Furthermore,
56  Collins and colleagues reexamined previous data and argued that, overall, the link between
57  media and sexual outcomes persists, even if a propensity score approach is used and that
58  the link warrants caution and appropriate preemptive measures. The present study is pri-
59  marily motivated by this recent exchange and seeks to move beyond the inconsistent
60  findings from this single study by providing the first meta-analytical contribution to the
61  debate.

## 62  Methods

### 63  Selection of Studies

64  Identification of relevant studies involved a search of the PsycINFO, MedLine and Digital
65  Dissertations databases using the search term (Child* OR Adolescen* OR youth)" AND
66  "(Media OR Mass Media OR Television OR Music OR video games)" AND "sex*." In
67  addition, recent reviews of the sexy media literature (e.g. were examined for papers that
68  may have been missed in the literature search. Included studies had to meet the following
69  criteria:

70  (1)  Each study had to measure the influence of some form of media on an outcome
71       related to sexual behavior. Outcomes could include pregnancy, risky sexual

72 behaviors, and initiation of sex. As our analysis was concerned with behavioral
73 outcomes, studies which looked at sexual attitudes or intent to have sex only were
74 not included. Media variables both included general time spent on media, such as
75 watching television, as well as sexy media specifically. General time spent on media
76 was included as a predictor variable given it appeared to be a common predictor
77 variable in many studies, with some claiming effects on sexual behavior. Studies
78 that only considered pornography were not included as our research questions are
79 related to non-pornographic media.
80 (2) Each study had to present statistical outcomes or data that could be meaningfully
81 converted into effect size "*r*".
82 (3) Participants in the study had to be below age 18 at least at time 1 (in longitudinal
83 analyses). Longitudinal analyses that extended into adulthood were included so long
84 as the initial assessment took place during childhood or adolescence.
85 (4) A given sample was included only once in the meta-analyses to maintain
86 independence. Some samples, including longitudinal studies, may produce multiple
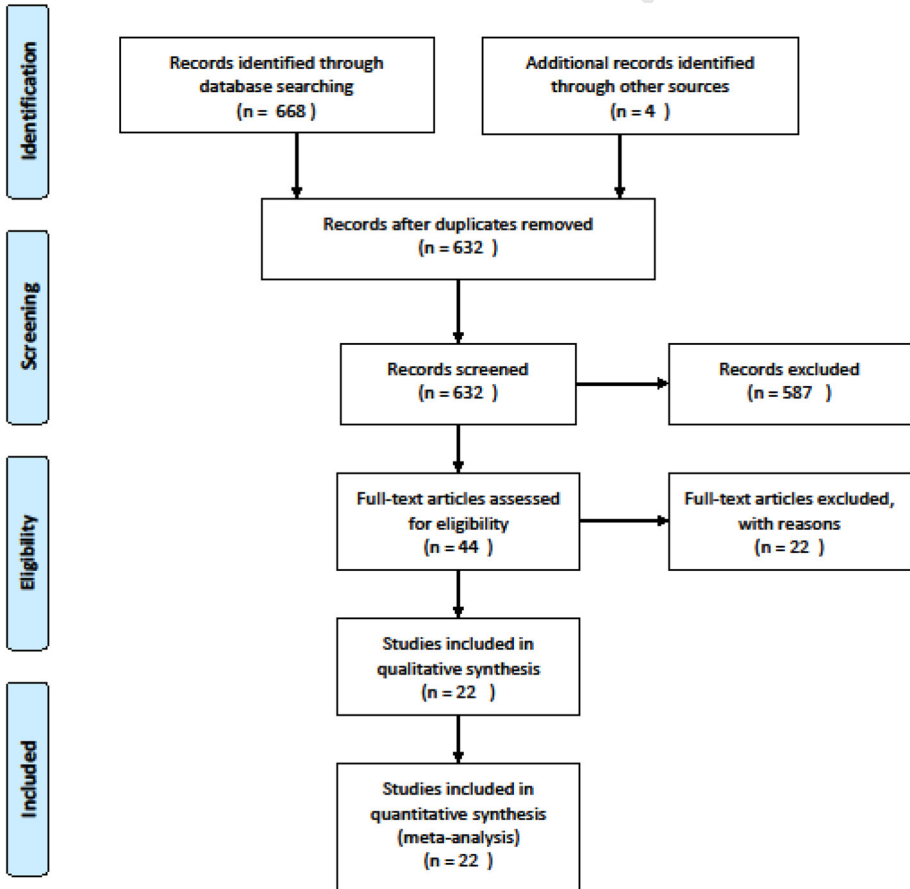


**Fig. 1** PRISMA flow diagram

87    publications, but only one such study was included in the current analysis. In each
88    case, the most conservative estimates of effect were included.
89  (5)  Studies from 2005 to 2015 were included to allow for an examination of relatively
90    recent research examining relatively current media.

91    The initial search (carried out in March 2015) returned approximately 668 hits, the
92  majority of which were either non-empirical or were with college student samples or
93  otherwise did not meet the inclusion criteria above. Employing the inclusion criteria, the
94  final search netted 22 published papers including among them 42 separate controlled effect
95  size estimates, with total participants n = 22,172. Each article was assessed by two raters,
96  each blinded to the other's ratings for inclusion. Krippendorff's alpha reliability on the
97  inclusion decision was .80, with discrepancies then resolved by consensus of all
98  researchers. This process was completed by May 2015. A PRISMA flow diagram is
99  included as Fig. 1. As these involved different outcomes analyzed separately here, the
100 independence of effect size estimates in the meta-analysis was not compromised. The list
101 of studies is presented in an online table at: http://www.christopherjferguson.com/Book2.
102 xlsx. Details on data extracted from each article are described below under effect size
103 estimates and moderator analyses.

## Effect Size Estimates

105 One issue that has arisen as a potential problem for meta-analyses is the proper extraction
106 of effect size estimates. In order to meet the homogeneity assumption of meta-analysis,
107 most meta-analyses have extracted the equivalent of bivariate "$r$" particularly from cor-
108 relational or longitudinal data. However, this approach risks providing spurious estimates
109 of effects. Bivariate relations between two variables might easily be explained by "third"
110 variables. For instance, boys might be both inclined to watch more sexy media and be
111 inclined toward greater sexual behaviors; a correlation between media and sexual behavior
112 would be little more than a spurious gender effect. Thus it is essential that gender is
113 controlled. Increasingly, scholars have advocated the use of controlled rather than bivariate
114 effect size estimates in meta-analysis [7]; for meta-analyses to rely solely on bivariate
115 $r$ leads to increased risks of misleading causal conclusions coming from these analyses. For
116 a meta-analysis to remain rooted to bivariate $r$, it would be theoretically possible for every
117 single study to conclude that any correlation between media and sexual behavior was
118 reduced to non-significance once other factors were controlled, yet for a meta-analysis of
119 these studies to conclude significant effect existed. In this circumstance, reliance on the
120 bivariate $r$, when examining well-controlled multivariate correlational and longitudinal
121 studies in meta-analysis is problematic.
122    If reliance on bivariate $r$ is problematic, the solution is unclear. Several authors have
123 suggested that betas indeed can be used as effect size estimates in meta-analyses. As
124 Rosenthal and DiMatteo [8] note betas can be used as effect size estimates, with the
125 cautionary note to recall that betas employ multivariate controls as opposed to $r$s. Other
126 authors have echoed this basic view [9, 10].
127 **AQ2**    In the present analysis, only controlled effect sizes (i.e. standardized regression weights)
128 will be considered. The effect size $r$ was used in this analysis both due to the inclusion of
129 numerous longitudinal and correlational effect sizes in the analysis and because $r$ tends to
130 be straightforward as an effect size and easy to interpret. Increasingly, meta-analytic
131 scholars have argued for the superiority of controlled effect sizes rather than bivariate,
132 given the later tend to return spuriously high effects and are no superior in regard to

133   psychometric properties [7, 11, 12]. This is particularly true in cases, such as this, where
134   confounding variables are theoretically likely.

135   In some cases studies presented more than one effect size relevant to a single construct
136   (for example, using two or more separate measures of sexual behavior) in these cases they
137   were aggregated for an average effect size. Similarly, in some cases, a single dataset may
138   have produced several publications considering the same outcome for the same time-point
139   for the same sample. Unless the data represented different time-points (i.e. correlational
140   and longitudinal data in separate publications), datasets were included only once in the
141   meta-analysis. Some manuscripts presented multiple competing statistical models with
142   different effect size estimates, particularly for multivariate analyses. When this occurred,
143   the most conservative model was used as the effect size estimate for the controlled
144   analyses. Given the question of how much variance remains for media effects, once other
145   factors are well-controlled, this approach was viewed as valuable.

146   Although it was not common, in several articles, results were reported as non-significant
147   without an effect size reported or data sufficient to calculate an effect size. When this
148   occurred, attempts were made to contact the original authors for relevant data. If such data
149   were no longer available, or authors did not respond null effects were entered as zero, so as
150   not to spuriously exclude null effects from the analysis. Authors were also contacted for
151   additional analyses for papers with atypical statistical analyses that did not allow for easy
152   interpretation or effect size extraction. Such requests were typically for straightforward
153   linear regression results, to keep effect sizes homogeneous in origin. For two papers by the
154   same research group [13, 14], authors did not respond to requests for more data and these
155   papers were subsequently dropped from analyses. One dataset underwent an unusual
156   exchange of debate regarding effect sizes [2, 4] in which differing analyses resulted in
157   somewhat different results. A further dataset [1] appeared to have potential issues with
158   multicollinearity. In this study, total television and sexy television were both included in
159   regression models despite being highly correlated. Results indicated sizeable coefficients in
160   opposing directions related to the outcome variable a "bouncing beta" phenomenon that
161   can sometimes indicate multicollinearity. The authors graciously reran analyses on request
162   with media variables in separate regression models rather than together. Upon reanalysis,
163   neither sexy television viewing nor total television viewing were significant predictors of
164   the outcome variable (pregnancy) appearing to confirm a multicollinearity problem.
165   Consistent with our policies we included the most conservative results from this exchange.
166   Effect size estimates for included studies are provided online at: http://www.
167   christopherjferguson.com/Book2.xlsx. All effect size estimates are weighted for sample
168   size.

169   Several moderators were also examined for potential quality issues that might influence
170   effect sizes. Effect sizes were coded for whether they controlled for family or peer
171   influences. Studies were also coded for citation bias, or the tendency to fail to cite studies
172   disagreeing with the position of the authors. This was given a binary code. Studies were
173   given credit so long as they acknowledged even a single source discrepant with their own
174   view. If no such sources were cited, the article was coded as having citation bias. This
175   approach is similar to that used in other areas of study identifying important cultural issues
176   within science that may influence the reporting of results [15].

## Analysis

The Comprehensive Meta-Analysis (CMA) software program was used to fit both random and fixed effects models. Hunter and Schmidt [16] argue that random effects models are appropriate when population parameters may vary across studies, as is likely here. As such, only random effects will be reported. Because few studies considered specific outcomes such as pregnancy, outcomes were clustered into two broad groups, initiation of sex (the age of first intercourse) and general sexual behaviors (including frequency of sexual behaviors, risky sexual behaviors and pregnancy).

All results discussed below were coded such that positive effect sizes represent associations with negative outcomes. Thus a positive effect size between media and initiation of sexual behavior, for instance, would represent an indication that media *harmed* sexual initiation by resulting in earlier initiation. This was done to represent negative effects consistently across effect sizes. The potential for publication bias was assessed using the tandem procedure [17]. This procedure is an empirically demonstrated, conservative estimating procedure for assessing publication bias, with low Type I error rates.

## Results

Results for all studies on the main outcome variables, initiation of sexual behavior and general sexual behavior are presented in Table 1. Results indicated generally weak evidence for media effects on teen sexual behavior. Results were slightly larger for initiation of sex as opposed to general sexual behaviors but none broke a minimal level of $r = 0.10$ to emerge from trivial effects.

Moderator effects are presented in Table 2. Perhaps the most significant is the comparison between total media use time variables and those which considered sexy media specifically. As might be expected, outcomes for sexy media were higher than for total media time, which was near zero in effect size. Yet the effect size for sexy media was also very small, within the trivial range. Results were slightly higher for boys than for girls. Controlling for family environment and peer influences also resulted in reduced effect sizes. Further, studies which were balanced in their literature review tended to produce effect sizes no different from zero. Larger, although still very small, effect sizes were seen in studies which engaged in citation bias, suggesting that researcher expectancy effects can influence effect sizes in this research field.

No evidence for publication bias was seen among controlled effect sizes in this field.

**Table 1** Meta-analytic results all sexy media exposure studies on outcome variables, controlled effect sizes

| Effect sizes | $K$ | $r+$ | 95 % C.I. | Homogeneity test | $\tau2$ | Publication bias? |
|---|---|---|---|---|---|---|
| Initiation of sex | 16 | 0.079 | (0.039, 0.118) | $X^2$ (15) = 86.78, $p < 0.001$ | 0.005 | No |
| Sexual behavior | 22 | 0.037 | (0.000, 0.073) | $X^2$ (21) = 86.63, $p < 0.001$ | 0.006 | No |

**Table 2** Moderator analysis for categorical moderators of sexy media effects for all outcomes with controlled effect sizes

| Effect sizes | $k$ | $r_+$ | 95 % C.I. | Homogeneity test | $\tau^2$ | Publication bias? |
|---|---|---|---|---|---|---|
| Gender | | | | | | |
| Boys | 10 | 0.075 | (0.020, 0.130) | $X^2 (9) = 32.95,$ $p < 0.001$ | 0.006 | No |
| Girls | 10 | 0.024 | (−0.029, 0.076) | $X^2 (9) = 32.69,$ $p < 0.001$ | 0.005 | No |
| Family environment controlled | | | | | | |
| Yes | 29 | 0.045 | (0.013, 0.076) | $X^2 (28) = 157.28,$ $p < 0.001$ | 0.006 | No |
| No | 9 | 0.088 | (0.041, 0.134) | $X^2 (8) = 21.65,$ $p < 0.001$ | 0.003 | No |
| Peer influences controlled | | | | | | |
| Yes | 10 | 0.047 | (−0.019, 0.114) | $X^2 (9) = 80.10,$ $p < 0.001$ | 0.010 | No |
| No | 28 | 0.056 | (0.029, 0.084) | $X^2 (27) = 99.34,$ $p < 0.001$ | 0.004 | No |
| Independent variable | | | | | | |
| Hours total exposure | 13 | 0.005 | (−0.039, 0.049) | $X^2 (12) = 54.76,$ $p < 0.001$ | 0.005 | No |
| Sexy media | 25 | 0.082 | (0.050, 0.113) | $X^2 (24) = 102.78,$ $p < 0.001$ | 0.005 | No |
| Citation bias | | | | | | |
| No | 8 | 0.007 | (−0.064, 0.079) | $X^2 (7) = 27.96,$ $p < 0.001$ | 0.008 | No |
| Yes | 30 | 0.067 | (0.039, 0.095) | $X^2 (29) = 135.85,$ $p < 0.001$ | 0.004 | No |

## Discussion

Whether sexy media do or do not contribute to sexual behaviors among youth remains a controversial issue. Results from the current meta-analysis suggests that, with other factors such as family environment or peer influences controlled, evidence for an association between media and sexual behavior is minimal. Total media viewing had a relationship with sexual behavior that was no different from zero, whereas sexy media specifically had a near-zero relationship with sexual behavior, with very small effects. Given these findings it is not possible to support the hypothesis that sexy media contributes to either the initiation of sex among youth, nor to sexual behaviors more generally.

Why media has so little impact on youth behavior in this realm may not be too difficult to understand. A considerable amount of sexuality is undoubtedly genetically and maturationally hard-wired. With the onset of puberty, motivation toward sexual behavior is normative. However, in a culture in which delay of sexuality is a moral obligation particularly for youth, that culture may begin to view youth sexuality as non-normative and search for outside influences that may "corrupt" youth into sexual behaviors. This does not

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224 mean that socialization is unimportant for youth sexual development. Parents and peers
225 both play important roles in developing moral values around sexuality. However, parents'
226 frustrations at youth ignoring these moral messages (messages the parents themselves may
227 have ignored when they were youth) highlight the limits of socialization. To the extent that
228 peer encouragement toward sexual behavior has greater success, this may have less to do
229 with the persuasiveness of peers, and more with encouraging messages fitting better with
230 biological drives than abstinence messages that conflict with them. This discussion is not
231 intended to minimalize peer and parent socialization influences, which are likely the
232 strongest socialization influences on teen sexual behavior. In comparison to parents and
233 peers, media messages may be too distal to have much influence. In aggression research,
234 the Catalyst Model [18] notes that peer and parent influences, in combination with
235 genetics, may drive the development of aggressive personalities in early years. Media, by
236 contrast, is viewed as too distal to be influencing. The same may be said for sexy media
237 and sexual development.

238 Although the current study did not directly examine this issue, it is possible that media
239 may have some influence on youth who are deprived of other socialization influences. That
240 is to say, when parental and peer directives are minimal, media may become the only
241 source of information on sexuality. Thus, our results don't exclude the possibility of this at-
242 risk situation. No studies we came across addressed this potential in a meaningful way and
243 it may be a fruitful avenue for further research. At the same time it is important to
244 recognize that recent research has suggested that parental input regarding sexual behavior
245 appears to have minimal impact, particularly for boys [19]. It is possible that social inputs
246 on sexual behavior among teens may be minimal overall.

247 It is worth noting that our analyses considered sexual behavior as outcomes. It is
248 possible that sexy media use may still have an influence on sexual attitudes. However,
249 whether or not this is so, media effects do not seem to carry over into behavior.

250 In reviewing the research in this field it was apparent that several serious issues limit the
251 validity of many studies. First, there is an issue of demand characteristics. Many studies
252 closely pair questions about media with questions about sexuality. In such designs it may
253 be possible for youth to hypothesis guess, producing spurious results. Further, few studies
254 included a manipulation check for mischievous or unreliable responding. Mischievous
255 responding, in which participants endorse extreme questions to be whimsical, is known to
256 produce spurious correlations [20]. Without such checks, the validity of any observed
257 correlations is unknown. These problems were so widespread in this research field it was
258 difficult to systematically test for their influence in meta-analysis due to low variance.

259 In conclusion, we echo the concerns of Steinberg and Monahan that proclaiming links
260 between sexy media and youth sexual behavior are premature. Highlighting media effects,
261 particularly based on weak data, does come with some risks. For instance, media effects
262 often get considerable public attention, yet attention to the wrong issue can distract society
263 from more pressing and important issues related to teen sexuality that can actually be
264 helpful. These may include encouraging parents to discuss sexuality with their teens,
265 proper sex-ed programs in schools, and examining ways peer networks can be used to
266 promote safe sex. At present it may be best for practitioners to highlight that the impact of
267 sexy media on youth sexual behavior is minimal and to encourage parents to speak directly
268 to their children about sex. The encouraging message from our results is that media are
269 unlikely to thwart parental efforts to socialize children should parents take the initiative.

273 **Compliance with Ethical Standards**

274 **Conflict of Interest** All authors declare they have no conflicts of interest to report.

275 **Ethical approval** This article does not contain any studies with human participants or animals performed
276 by any of the authors.
277

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