

Adolescents' Exposure to Sexy Media Does Not Hasten the Initiation of Sexual Intercourse

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It is widely believed that exposure to sexy content in the mass media leads teenagers to become sexually active. Although most research linking sexy media exposure to adolescents' sexual behavior is cross-sectional, several recent, well-publicized longitudinal studies purport to find a causal connection, which has alarmed the public and prompted criticism of the entertainment industry for its corrupting influence on youth. One problem in research on media effects on sexual activity, however, is that outcomes that are presumed to result from media exposure may actually be due to factors that differentially predispose adolescents to have different degrees of media exposure and are themselves related to sexual activity. We reanalyzed data from one of these longitudinal studies (Brown et al., 2006) using propensity score matching to control for preexisting differences between adolescents with and without high exposure to sexy media. With such controls for differential selection in place, we found no evidence that the initiation of sexual intercourse is hastened by exposure to sexy media.

Keywords: adolescent, sexuality, mass media, intercourse

American adolescents are bombarded with sexual imagery in television programs, films, and music videos and on the Internet. According to recent analyses, some form of sexual content (including talking about sex, passionate kissing, intimate touching, and explicit sexual intercourse) appears in 70% of all television programs (Kunkel, Eyal, Finnerty, Biely, & Donnerstein, 2005; Roberts, Henriksen, & Foehr, 2009), with sexual talk appearing in 68% of shows (at a rate exceeding four scenes per hour) and sexual behavior in 35% of shows (at a rate of two scenes per hour). Implied sexual intercourse is portrayed in 11% of all television shows. The presence of sexual content is even higher in prime-time shows (six scenes per hour) and higher still in the shows most watched by teenagers (nearly seven scenes per hour). Sexual content on television is thought to have increased substantially over the past decade (Kunkel et al., 2005). Although comparably large-scale systematic analyses of sexual content in media other than television have not been conducted (in part because the sheer number of songs, films, and Internet sites available at any point in time is so large), smaller scale studies of these other media indicate that adolescents' exposure to sexual imagery is even more common in music lyrics than in television programs, and comparable in film and television (see Roberts et al., 2009, for a review).

The high frequency with which entertainment media contain sexual content is of particular interest to those interested in the

health of adolescents, for at least two reasons. First, adolescents are voracious consumers of mass media, with the average teenager exposed to mass media for 6 hr each day; when multitasking is taken into account, this figure increases to 8 hr. Among early adolescents (11–14 years), television accounts for about 40% of this exposure, and film and other prerecorded videos (some of which are prerecorded television programs) account for another 10% or so; among older teenagers (15–18 years), the two media account for about 40% combined (Roberts et al., 2009).

Second, a good deal of adolescents' sexual behavior puts their health at risk (Brown et al., 2006). A substantial portion of adolescents fail to use condoms, exposing themselves to the risks of pregnancy and sexually transmitted infections (STIs). This problem is especially severe among younger teenagers, who, if sexually active, are less likely to practice safe sex than their older counterparts (Sheeran, Abraham, & Orbell, 1999). Despite considerable efforts to educate American teenagers about the dangers of unsafe sex, the United States still has one of the highest rates of teen pregnancy in the world, and in recent years, the rate of teen childbearing in the United States has risen (Kaye, 2009). The United States also has one of the highest rates of STIs in the world (Panchaud, Singh, Feivelson, & Darroch, 2000), with adolescents comprising one of the highest risk groups (Ozer & Irwin, 2009). One analysis estimates that the treatment of new cases of STIs among young adolescents costs American taxpayers \$6.5 billion annually (Chesson, Blandford, Gift, Tao, & Irwin, 2004).

It is widely assumed that adolescents' exposure to sexual content in the mass media influences their sexual activity and may contribute to sexual risk taking. Portrayals of sexual activity in mass media favored by teenagers often show the emotional and social consequences of sexual activity (e.g., guilt, disappointment), but less frequently show adverse physical consequences (e.g., pregnancy, STIs; Roberts et al., 2009). In light of this, and in view of the amount of mass media teenagers are exposed to and the

This article was published Online First August 2, 2010.

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We are grateful to Jane Brown for her willingness to make available for secondary analysis the data on which the findings of this report are based.

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proportion of that exposure that contains sexual content, it is reasonable to think that risky sexual behavior (early sex, unprotected sex, or promiscuous sex) results in part from the impact of mass media on adolescents' attitudes, beliefs, and behavior.

Many studies have documented a correlation between exposure to sexy media and sexual behavior (see Roberts et al., 2009, for a review). These studies, however, are limited in the sorts of causal inferences one can draw from them, because it is eminently plausible that interest in sex leads to exposure to sexy media (referred to as *differential selection*), rather than the reverse (referred to as *socialization*). To address these inferential limitations, several recent studies have examined this issue with longitudinal data, studying the over-time impact of media exposure on sexual activity after taking into account characteristics of adolescents that may predispose them to sexy media exposure (e.g., demographic factors, motives to have sex). Two widely cited studies of this type are those of Collins et al. (2004; see also Chandra et al., 2008), which examined the effects of exposure to televised sexual content, and Brown et al. (2006), which examined the effects of exposure to sexual content in the adolescent's entire media diet (television, music, movies, and magazines). Both studies reported that exposure to sexy media content increases the likelihood of sexual activity and, importantly, hastens the initiation of sexual intercourse.

Traditional methodologies for dealing with differential selection, like those employed by Brown et al. (2006) and Collins et al. (2004), account for selection effects by controlling for any variables that might reflect differences between comparison groups that predate exposure to the putative influence of interest. In general, researchers use either concurrent covariates (e.g., socioeconomic status) or time-lagged controls (in which outcome measures are predicted while controlling for the same variables assessed at an earlier time point) that are theoretically related to the independent variable of interest (e.g., whether and how much an adolescent is exposed to sexy media content). The limitations of these approaches have been acknowledged by many (see Heckman & Hotz, 1989; Winship & Mare, 1992), including the assumption that the distribution of covariates is similar across subpopulations. The primary drawback of using time-lagged controls is that the inclusion of covariates accounts for differences on observed variables but does not take unobserved heterogeneity into account (Apel et al., 2007; Heckman & Hotz, 1989; Paternoster, Bushway, Brame, & Apel, 2003). In many instances, when researchers have reanalyzed data using statistical methods specifically designed to account for unobserved sample heterogeneity, many of the alleged socialization effects disappear; this was recently demonstrated in several studies of the relation between part-time employment and adolescent adjustment (e.g., Apel et al., 2007; Paternoster et al., 2003; but see Monahan, Lee, & Steinberg, in press). In other words, results that might initially have been attributed to the influence of the independent variable on the outcome turn out to be selection effects. In this report, we ask whether this scenario may also apply to the study of sexy media exposure. In particular, we ask whether, once selection effects have been taken into account, exposure to sexy media content does indeed hasten the onset of adolescents' sexual debut.

To do this, we reanalyzed the data used by Brown et al. in their 2006 report using propensity score matching in order to better

control for possible selection effects. (We also requested data from the principal investigator of the Collins et al., 2004, study, but we were informed that the data were not available for reanalysis; R. L. Collins, personal communication, June 10, 2009). Propensity score matching (Rosenbaum & Rubin, 1983) creates balance between treatment and control groups (e.g., youth who are exposed to sexy media content and youth who are not) by matching participants on a number of covariates that may affect group membership. The assumption behind this approach is that individuals have an underlying propensity to be in one group or another, and matching them based on preexisting characteristics provides a way of statistically controlling the variation in these characteristics, thereby minimizing the selection effects problem. This approach has several advantages, including smaller bias in estimates when models are misspecified (Drake, 1993) and a relaxation of the assumption of linearity that is required in linear regression models (Hill, Waldfogel, Brooks-Gunn, & Han, 2005).

Because missing data can impact the accuracy of propensity score matching (some individuals' propensity score would be based on a different number of covariates than others), it is best to use full data available on all variables on which subjects are being matched. One way of meeting this requirement is to exclude participants with any missing data (i.e., listwise deletion), but this is not a suitable solution in the present case, because doing so would likely bias the sample toward better functioning adolescents, as adolescents with academic or behavioral problems (who are also more likely to be sexually active) are less likely to provide complete data in surveys of youth. Instead of excluding subjects with missing data, we employed multiple imputation (MI) in the present study to limit biases in our analyses. This approach accommodates many patterns of missing data and reflects uncertainty when inputting missing values (Little & Rubin, 2002; Rubin, 1987), which ultimately allows for the inclusion of a larger and more representative sample in the analyses.

Reanalyzing the Brown et al. (2006) data has several advantages over collecting new data. First, one strength of the Brown et al. study is that the researchers' measure of exposure to sexy media content included multiple media (television, music, movies, and magazines), providing a more comprehensive measure of exposure than that in other studies. Second, because Brown et al. found significant effects of media exposure, we know that their sample is large enough to provide adequate statistical power. Although one can never formally accept the hypothesis that two groups do not differ, failure to reject the null hypothesis when one has adequate power to do so permits one to make a stronger case for the absence of an effect. Finally, because we employ the same measures and sample as did Brown et al., any differences between the results of our analyses and theirs cannot be attributed to differences in the data or survey participants.

Method

The data for the present analyses were generously provided to us by the first author and principal investigator of the original study. Data were sent as an SPSS data file. Our description of the sample, procedures, and measures draws from the Brown et al. (2006) publication.

Participants and Procedures

Participants were 1,017 adolescents from 14 middle schools in three public school districts in the southeastern United States that included urban, suburban, and rural populations. Two middle schools from the school districts declined participation in the study; these schools had similar race and gender profiles as the 14 schools that participated. In the fall of 2001, brief informational sessions were conducted at each school that invited seventh- and eighth-grade students to participate in a study of media use and health behaviors. The Brown (2006) report did not provide further information about participant recruitment, but a different report on the study indicates that all students were invited to participate and that the participants were representative of the population from which they were recruited (L'Engle, Pardun, & Brown, 2004). Eighty-one percent of enrolled students ($N = 5,029$) provided valid contact information and were subsequently mailed a comprehensive media questionnaire and parental consent form. Sixty-five percent ($N = 3,261$) returned the completed survey and provided parental consent.

Of this sample of 3,261 youth, 1,200 adolescents were selected for additional questions pertaining to sexy media use and health behaviors. Youth were selected at random from four strata, based on self-reported gender and race (Black male, Black female, White male, White female) to provide equal proportions of boys and girls and of Black and White youth. After parental consent and adolescent assent were collected, these youth were interviewed in their homes with the Audio Computer-Assisted Self-Interview (ACASI) system in the spring and summer of 2002. The ACASI system allows participants to answer questions by touching the screen on a laptop computer while hearing questions through headphones and is especially effective at encouraging honest reporting on sensitive subjects, such as sexual behavior and drug use. One thousand seventy adolescents (90% of the randomized subsample) completed the ACASI interview. By design, the sample was evenly divided between boys and girls (50% male) and between Black and White youth (52% Black). One third of the sample were from low-socioeconomic-status families (32% received free or reduced-price meals at school), and parental education, coded on a 5-point scale, ranged from *less than high school completion* to *graduate education* ($M = 3.88$, $SD = 1.34$). No other demographic information was reported; although not specified in previous publications, we assume that all participants were English-speaking.

Follow-up interviews were completed 2 years later. Ninety-five percent ($N = 1,017$) of the baseline sample completed the follow-up ACASI survey. Of the 57 respondents lost to follow-up, six were due to adolescent refusals, seven were due to parent refusals, and the remaining 44 had moved out of the study area. There were no differences in age, race, gender, or sexual experience at baseline between respondents who completed the follow-up survey and those who did not. Protocols and measures used in this study were reviewed and approved by the institutional review board of the original investigators' university (see L'Engle et al., 2004, for additional information).

Because we were interested in whether the debut of sexual intercourse was influenced by exposure to sexy media content, the sample for our analysis was limited to youth who were virgins at baseline. This is somewhat different from the original analyses of the data, in which prior sexual activity was controlled for while

predicting subsequent sexual activity. The limitation of the original analytic approach is that in some cases, sexual debut (the main outcome of interest in both the original and present analysis) would have occurred prior to sexy media exposure, making it impossible to discern whether the exposure influenced sexual debut or whether the sexual debut led to differences in exposure. In the present analysis, we excluded students who were nonvirgins at baseline. This resulted in dropping 129 cases (13%) from the analyses (82 boys and 47 girls; 20 White and 109 Black). There were too few cases of adolescents who were nonvirgins at baseline to conduct separate analyses of the impact of sexy media exposure on continued sexual activity.

Our final analytic sample was limited to the 888 youth (471 White and 417 Black) who were virgins at the baseline interview. In line with past research on predictors of sexual activity (see Steinberg, 2011, for a summary), youth who reported having already had sexual intercourse at baseline were more likely to be male, $\chi^2(1,017) = 10.18$, $p < .01$; Black, $\chi^2(1,017) = 63.56$, $p < .01$; and older, $t(172.12) = 7.28$, $p < .01$ (equal variances not assumed). They were also more likely to receive free or reduced lunch at school, $\chi^2(1,017) = 39.44$, $p < .01$, and to have less educated parents, $t(172.12) = 6.52$, $p < .01$ (equal variances not assumed).

Power analyses were conducted to ensure that the sample was large enough to detect small effects. As noted earlier, one of the advantages of reusing existing data is that one can draw on the prior analyses to estimate expected effect sizes. Based on effect sizes presented by Brown et al. (2006), our analysis indicated that a sample of size of 117 would provide sufficient power (.90) to detect significant effects. Our analytic sample was substantially larger than this, indicating that we had sufficient power to detect an effect of media exposure on the initiation of sexual intercourse, should such an effect actually exist.

Measures

Sexy media exposure. Sexy media exposure was computed as the overall proportion of sexual content in adolescents' media exposure across four types of media (television, music, movie, and magazines) over a 1-month period at baseline. At the baseline interview, youth reported their frequency of using a variety of media, including television, movies viewed at home and in theaters, music, and magazines. In addition, respondents were provided with an extensive list of specific media offerings, or vehicles, for each of the four types of media and instructed to circle all that they used regularly. The vehicle lists included specific television shows, movies, music artists, and magazines (e.g., *The Simpsons*, *Titanic*, *Ludacris*, and *Sports Illustrated*) and were developed from published lists of media used by teens (e.g., Nielsen reports and Billboard Top 100 Music Artists) that were pilot-tested with students living in the study area.

On the basis of reports of youth from the media survey, any specific media content (e.g., specific television show, music album, movie, or magazine) that was endorsed by at least 10% of the sample was analyzed for sexual content. Each media type was divided into units: Each paragraph, headline, and photograph in a magazine; each lyric line in a song; each nonbreak sequence (averaging 4.4 s) in a television show; and each nonbreak sequence (averaging 6.4 s) in a movie was treated as a unit. Because of

differences in the duration of each type of media and variation in the media formats, the unit of analysis was selected to be small enough to carry equal weight in each of the four media. Subsequently, trained research assistants analyzed each specific media piece for portrayals or references to pubertal development, romantic relationships, body exposure or nudity, sexual innuendo, touching and kissing, and sexual intercourse (Scott's π for intercoder reliability across all four media = .79). Approximately 28,000 sexual units (12% of 236,000 total units were identified as containing sexual content.

From the index of exposure to media containing sexual content, the proportion of the adolescent's exposure to sexy media units out of the total units (both sexual and nonsexual) reported by the adolescent was computed. On the basis of this score, the investigators calculated the average frequency of using each of the four media types by weighting the frequency of use for each medium. Television and music use frequency were each calculated by averaging responses to questions about use during the school week, on weekends during the school year, and during the summer; magazine use was assessed with one item; and movie viewing was assessed by averaging the frequency of viewing movies in the theater and at home. Because the average adolescent reported watching television 30 days in a typical month, listening to music 30 days, reading magazines 4 days, and watching movies 2 days, weights of 0.45 each for television and music, 0.07 for magazines, and 0.03 for movies were used to compute the average frequency of using all four media.

The final measure of sexy media exposure was computed by multiplying the proportion of sexual content across all the media that the adolescent reported using by the average frequency of using all four media (for additional details about the construction of the original measure, see Pardun, L'Engle, & Brown, 2005). In both the original and present analyses, individuals were divided into quintiles reflecting degree of sexual media exposure, determined separately for Black and White youth.

Sexual intercourse. At both the baseline and follow-up interview, youth were asked whether they had ever had sex ("yes" or "no"). If they answered "yes," they were asked to report the specific month and year of their first sexual intercourse, and this date, along with the adolescent's date of birth, was used to compute a continuous measure of age (in months) at first intercourse. A small number of respondents reported their age at first intercourse (rather than the date), and this age was converted to months for purposes of analysis.

Control variables. A number of variables were used to match individuals who had different levels of exposure to sexy media on factors that conceivably influence both their exposure to sexy media and their sexual activity. Generally speaking, the more potentially relevant variables used in creating a propensity score, the more confidence one can have in successfully controlling for differential selection. All control variables were assessed at the baseline interview. The covariates used in the present analyses were identical to those used in the original analyses reported by Brown et al. (2006).

Adolescents reported on a number of demographic variables at baseline. Youth reported their gender and their date of birth, used to calculate age. Socioeconomic status was operationalized as whether or not a youth received free or discounted lunch at school ("yes" or "no"). Parental education was operationalized as the

level of education attained by the more educated of the youth's parents (1 = *less than high school*, 5 = *graduate school*).

A number of variables that could theoretically contribute to both a youth's exposure to sexy media and his or her sexual activity were also included in analyses. Youth reported on their pubertal status relative to same-sex peers (1 = *much earlier*, 5 = *much later*) and their most recent grades ("mostly As," "As and Bs," "mostly Bs," etc.). School connectedness was assessed by four items ("How happy are you to be at your school?" and "How much do you feel your teachers care about you?" both scored on a 5-point scale from *not at all* to *extremely*; "Since school started this year, how often have you had trouble getting along with your teachers?" and "Since school started this year, how often have you had trouble getting along with other students?" both scored on a 5-point scale from *never* to *every day*). Religious service attendance ("How often do you attend religious services?" scored on a 5-point scale from *never* to *four or more times a month*) and religious beliefs ("How important would you say religion is in your life?" scored on a 4-point scale from *not at all important* to *very important*) were also assessed. Quality of relationship with mother was assessed by the question "How would you describe your relationship with your mother or female guardian?" scored on a 5-point scale from *poor* to *excellent*. Hands-on parenting was assessed by a count of eight items reflecting the degree to which parents were involved in the youth's activities (e.g., monitoring TV, restrictions on music or CDs the youth can buy, setting curfew on weekends). Youth reported on their parents' approval of their sexual activity ("How would [X] feel about you having sex?"), on a 5-point scale from *strongly disapprove* to *strongly approve*. Finally, youth reported on their number of sexually active friends.

Plan of Analyses

The goal of the present study was to examine how exposure to sexy media impacts sexual debut, controlling for any propensity that a youth may have to be exposed to sexy media. First, we used MI to account for missing data. Next, we calculated the propensity for exposure to sexy media based on the 12 covariates used in the original analyses. Finally, we presented a series of Cox regressions that mimicked the original Brown et al. (2006) analyses: (a) using an unconditional analysis (i.e., without covariates), (b) using conditional models that control for the aforementioned covariates, and (c) after matching on adolescents' propensity for sexy media exposure (using two matching techniques, as discussed subsequently).

Imputation of missing data. In the current sample, the amount of missing data varied across each construct from 0.2% to 11.5% among White youth and from 1.1% to 12.3% among Black youth. Traditionally, researchers have used a number of strategies, either independently or jointly, to deal with missing data, including complete casewise analysis (i.e., listwise deletion), available case analysis (i.e., pairwise deletion), the use of dummy variables as indicators of missing data, and nonresponse weighting. Although Brown et al. (2006) did not report how they handled missing data, our replication of their analyses revealed that they had used listwise deletion.

Another technique, MI, has become increasingly popular for dealing with missing data. MI is an analytic technique that fills in missing data with predicted values based on the available data,

replacing missing values based on all other information available in the study (Rubin, 1987; Schafer, 1997). In contrast to single imputation techniques, which impute one value for missing data, MI inputs several values for each missing value (with variability due to both sampling error and model uncertainty), creating several completed data sets. Within each data set, a different possibility is imputed for each missing value, reflecting the range of possibilities for that missing value (e.g., imputed scores on the school connectedness can range from 0 to 5) and the likely possibilities of the missing value given all other available data. Subsequently, substantive analyses are performed on each completed data set, and effects are aggregated across data sets to create one final estimate of parameters (Rubin, 1987).

One of the strengths of MI is that it accommodates many different patterns of missing data and reflects uncertainty about the missing values. In addition, the assumptions of MI are plausible. MI is rooted in the missing-at-random assumption, which assumes that two people have the same probability of having missing data on a given variable only if they have the same values for all other (available) data (Little & Rubin, 2002). Because dropping individuals with missing data from analyses can theoretically lead to bias, incorporating all available data allows for a larger sample size and increases the generalizability of the findings. Finally, when paired with propensity score matching, MI allows for propensity scores to be based on the full data for each individual. Failure to use MI would mean that for some individuals, a propensity score would be based on a different number of covariates than for others. Accordingly, the first step in the present analyses was to use MI to construct 10 imputed data sets, separately for White and Black youth.

Calculation of propensity scores. Within each of the 10 imputed data sets, logistic regression was used to predict membership in one of five sexy media exposure groups (derived by dividing the sample into quintiles based on their exposure scores). The predicted probability of group membership, based on the covariates, is then used as an index of an individual's propensity for that degree of sexy media exposure. In the present study, 12 variables were used to create propensity scores: four demographic factors (age, race, socioeconomic status, and parental education) and the eight other covariates measured at baseline (pubertal status, grades, school connectedness, religious service attendance, religious beliefs, quality of maternal relationship, hands-on parenting, and parental attitudes toward the adolescent's sexual activity) that Brown et al. (2006) used in their analysis. Because school connectedness was a composite measure, each of the four items from that scale was used in building the propensity scores.

After calculating each adolescent's propensity to belong to one of the media exposure groups, we used nearest neighbor matching to create balance across the sexual media exposure groups based on the predicted probability of membership. We then made four sets of matched comparisons to examine whether adolescents' sexual activity varied as a function of sexy media exposure: highest media exposure compared with low media exposure (Quintile 5 compared with Quintiles 1 and 2), high media exposure compared with low media exposure (Quintile 4 compared with Quintiles 1 and 2), low media exposure compared with high media exposure (Quintile 2 compared with Quintiles 4 and 5), and lowest media exposure compared with high media exposure (Quintile 1 compared with Quintiles 4 and 5). These comparisons permitted us

to assess the ostensible effects not only of extremely high sexy media exposure (e.g., that experienced by those in the highest quintile) but of media exposure that was simply higher than average (e.g., that experienced by those in the second-highest quintile).

Although there are several methods of matching propensity scores, we used two of the most common approaches: nearest neighbor matching with replacement and nearest neighbor matching without replacement. Because the choice of matching strategy can impact the quality of matches, many researchers use more than one strategy to match data and examine effects that are significant across both types of matching (see Hill et al., 2005, for an example). In matching without replacement, individuals in the control group are matched only one time to those in the treatment group (in the present analyses, we use *treatment* to refer to the group of individuals with the indicated level of sexy media exposure and *control* to refer to the comparison group). Matching without replacement utilizes as many cases as possible from both treatment and control groups, but does so at the risk of not always providing the best overall matches. In contrast, matching with replacement allows for individuals in the control group to be matched more than once. That is, one control case could be matched to multiple treatment cases based on the closeness of their propensity scores. Thus, matching with replacement ensures the closest possible matches (Dehejia & Wahba, 2002), but does so at the cost of reducing sample size (because some control cases may not be used at all). For each of our comparisons, we matched treatments to controls twice: once using matching without replacement and once using matching with replacement. This resulted in treatment and control groups that are balanced with respect to their initial propensity (based on the 12 covariates) to be in either group. One of the benefits of using the quintiles as the unit of analyses, as was done in the original Brown et al. (2006) analysis, is that it allows for a smaller treatment group (e.g., those with highest sexy media exposure; by definition, just one fifth of the sample) and a larger control group (e.g., those with lower sexy media exposure; two fifths of the sample). This ensures a large pool of control youth to provide the closest matches for youth in the treatment group.

An important step in the use of propensity score matching is to test how well the matching worked, by examining differences between treatment and control groups with respect to the covariates pre- and postmatching, something that is not ordinarily done when standard multiple regression with covariates is employed. After determining that the matching strategy has been successful, the primary research question of interest can then be posed. Accordingly, we first examined the success of our matching using *t* tests comparing treatment and control groups and, if successful, used these matched groups to examine the effect of sexy media exposure on age of sexual debut. Because our primary goal was to replicate the findings of Brown et al. (2006) with and without controlling for differential selection, we employed statistical methods that are identical to those originally reported. First, we examined the unconditional effect of sexual media exposure on age at sexual debut using Cox regressions without covariates. Second, we examined the effect of sexual media exposure while controlling for the previously mentioned covariates, as did Brown et al. Finally, we matched individuals across categories of sexual media exposure using propensity scores and examined the impact of sexy media exposure after matching. Conducting the analyses in this

Table 1
Significance of Differences Among Black Youth Comparing Two Lowest Sexy Media Exposure Groups and Groups With Above-Average Exposure Before and After Matching

Covariate	Quintile 1 versus Quintiles 4, 5										Quintile 2 versus Quintiles 4, 5													
	Prematching					Postmatching					Prematching					Postmatching								
	%	M	SD	%	SD	%	M	SD	%	SD	%	M	SD	%	M	SD	%	M	SD	%	M	SD		
Gender (male)	68**			68**		68			52**		52			52				52			52			
Treated	31			44		70			31		43			43				43			54			
Control																								
SES (receiving free/reduced lunch)	34**			34*		34			54		54			54				54			54			
Treated	61			50		28			61		54			54				54			50			
Control																								
Age		13.44	0.72**		13.44	0.72		13.44	0.72		13.44	0.72		13.70	0.70		13.70	0.70		13.70	0.70		13.70	0.70
Treated		13.76	0.71		13.59	0.65		13.40	0.59		13.76	0.71		13.70	0.70		13.70	0.70		13.70	0.70		13.70	0.64
Control																								
Parental education		3.67	1.08**		3.67	1.08		3.67	1.08		3.28	1.23		3.28	1.23		3.28	1.23		3.28	1.23		3.28	1.23
Treated		3.17	1.2		3.42	1.14		3.62	1.02		3.17	1.21		3.32	1.18		3.29	1.24		3.29	1.24		3.29	1.24
Control																								
Quality of maternal relationship		4.35	0.87		4.35	0.87		4.35	0.87		4.08	0.94		4.08	0.94		4.08	0.94		4.08	0.94		4.08	0.94
Treated		4.07	1.05		4.20	0.97		4.47	0.82		4.07	1.05		4.04	1.05		3.99	1.04		3.99	1.04		3.99	1.04
Control																								
Hands-on parenting		5.17	1.69**		5.17	1.69		5.17	1.69		4.64	1.43		4.64	1.43		4.64	1.43		4.64	1.43		4.64	1.43
Treated		4.51	1.60		4.86	1.53		5.13	1.47		4.51	1.60		4.60	1.60		4.25	1.74		4.25	1.74		4.25	1.74
Control																								
Parent view on sex		4.57	0.83		4.57	0.83		4.57	0.83		4.54	0.84		4.54	0.84		4.54	0.84		4.54	0.84		4.54	0.84
Treated		4.57	0.75		4.58	0.78		4.23	1.15		4.57	0.75		4.59	0.72		4.58	0.70		4.58	0.70		4.58	0.70
Control																								
Religious attendance		4.21	1.19**		4.21	1.19		4.21	1.19		4.02	0.36		4.02	0.36		4.02	0.36		4.02	0.36		4.02	0.36
Treated		3.78	1.38		3.94	1.21		4.24	1.00		3.78	1.38		3.94	1.29		3.88	1.31		3.88	1.31		3.88	1.31
Control																								
Religious beliefs		3.76	0.53		3.76	0.53		3.76	0.53		3.65	0.67		3.65	0.67		3.65	0.67		3.65	0.67		3.65	0.67
Treated		3.68	0.67		3.77	0.49		3.68	0.53		3.68	0.67		3.65	0.68		3.50	0.76		3.50	0.76		3.50	0.76
Control																								
Happy in school		3.72	0.88		3.72	0.88		3.72	0.88		3.63	0.69		3.63	0.69		3.63	0.69		3.63	0.69		3.63	0.69
Treated		3.78	0.85		3.77	0.82		3.64	0.80		3.78	0.85		3.66	0.83		3.65	0.86		3.65	0.86		3.65	0.86
Control																								
Feel that teacher cares		3.99	0.88		3.99	0.88		3.99	0.88		3.93	0.98		3.93	0.98		3.93	0.98		3.93	0.98		3.93	0.98
Treated		4.09	0.92		4.10	0.88		4.22	0.90		4.09	0.92		3.96	0.94		3.91	1.01		3.91	1.01		3.91	1.01
Control																								
Trouble with teacher		3.94	0.93		3.94	0.93		3.94	0.93		3.72	0.91		3.72	0.91		3.72	0.91		3.72	0.91		3.72	0.91
Treated		3.68	1.03		3.82	0.99		3.68	0.89		3.68	1.03		3.61	0.109		3.50	1.15		3.50	1.15		3.50	1.15
Control																								

(table continues)

Table 1 (continued)

Covariate	Quintile 1 versus Quintiles 4, 5						Quintile 2 versus Quintiles 4, 5					
	Prematching			Postmatching			Prematching			Postmatching		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Trouble with other students												
Treated		4.06	0.87		4.06	0.87		4.06	0.87		3.93	0.98
Control		3.89	0.92		4.02	0.85		3.69	1.01		3.91	0.91
Grades												
Treated		4.93	1.45**		4.93	1.45		4.93	1.45		4.72	0.16
Control		4.45	1.57		4.65	1.50		4.33	1.35		4.68	1.53
Pubertal development												
Treated		2.93	0.88		2.93	0.88		2.93	0.88		3.02	1.08
Control		3.00	0.92		2.94	0.92		2.97	1.27		2.92	0.94
Friends' sexual activity												
Treated		1.91	0.91**		1.91	0.91		1.91	0.91		2.15	1.01
Control		2.20	0.92		2.02	0.86		1.99	0.86		2.20	0.95

Note. Quintile 1 versus Quintiles 4, 5: Prematching Ns ranged from 244 to 247 across imputed data sets; postmatching Ns ranged from 186 to 178 across imputed data sets. Quintile 2 versus Quintiles 4, 5: Prematching Ns ranged from 231 to 239 across imputed data sets; postmatching Ns ranged from 158 to 170 across imputed data sets. Quintile 1 = lowest exposure; Quintile 5 = highest exposure; SES = socioeconomic status.

* $p < .05$. ** $p < .01$.

order allows for an examination of whether and to what extent effects change as increasingly stringent controls for differential selection are implemented. To be consistent with the original Brown et al. analysis, we separately examined all effects among Black and White youth. Moreover, to allow greater specificity in the findings, we made comparisons across various categories of sexual media exposure (i.e., comparing the highest quintile to the lowest two quintiles of sexy media exposure). All analyses were conducted across multiply imputed data sets and aggregated according to Rubin's rules (Rubin, 1987).

Results

Propensity Score Matching

Using SAS software (PROC MI; SAS Institute, 2004), we first used MI to create 10 complete data sets. The range of imputed values on each variable was constrained to the possible values for that data set. Within each of these 10 data sets, we next estimated propensity scores for high sexy media exposure for White and Black youth separately. When selection effects are very strong, the range of propensity scores can vary substantially across different levels of treatment. In the present study, the ranges of propensity scores across the five quintiles were highly (although not perfectly) congruent, indicating that it was possible to derive optimal matches between treatment and control individuals.

We used *t* tests postimputation to test for overall differences between the sexy media exposure groups on the covariates of interest both before and after matching (see Tables 1 and 2 for Black youth; see Tables 3 and 4 for White youth). Consistent with the notion that adolescents differentially select their degree of exposure to sexy media, there are a number of significant differences between the sexy media exposure groups with respect to demographics and other covariates measured at baseline; these differences are somewhat more pronounced among White than among Black youth. Importantly, because the sexy media exposure groups are already different at baseline on these important characteristics, all of which are known to influence adolescents' sexual activity, it is imperative to account for adolescents' propensity to be exposed to sexy media before investigating how sexy media exposure impacts their sexual debut.

Next, we tested how well the propensity score matching accounted for differential selection into sexy media exposure (see Tables 1–4). After aggregating effects across our imputed data sets, once individuals were matched across levels of sexy media exposure on propensity scores, independent *t* tests revealed that all preexisting differences were accounted for among Black youth. Among White youth, virtually all preexisting differences were eliminated. In general, matching with replacement was more successful in creating balance among treatment and control groups, consistent with the idea that matching with replacement provides closer matches. Accordingly, we next estimated the effect of sexy media exposure on the age of sexual debut, separately among White and Black youth.

Impact of Sexy Media Exposure on the Initiation of Sexual Intercourse

Cox regressions were used to estimate the effect of sexy media exposure on age at first intercourse among individuals in each of

Table 2
Significance of Differences Among Black Youth Comparing Two Highest Sexy Media Exposure Groups and Groups With Below-Average Exposure Before and After Matching

Covariate	Quintile 4 versus Quintiles 1, 2						Quintile 5 versus Quintiles 1, 2					
	Prematching			Postmatching			Prematching			Postmatching		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Gender (male)												
Treated	34**			34			27**			27		
Control	61			34			61			33		
SES (receiving free/reduced lunch)												
Treated	62**			62			60**			60		
Control	44			55			44			57		
Age												
Treated	13.71	0.63**		13.71	0.63		13.81	0.72**		13.81	0.72	
Control	13.35	0.72		13.67	0.73		13.35	0.72		13.79	0.76	
Parental education												
Treated	3.25	1.19		3.25	1.19		3.09	1.22**		3.09	1.22	
Control	3.48	1.66		3.28	1.15		3.48	1.57		3.20	1.15	
Quality of maternal relationship												
Treated	4.16	0.97		4.16	0.97		3.98	1.13		3.98	1.13	
Control	4.22	0.91		4.15	0.98		4.22	0.91		4.03	1.01	
Hands-on parenting												
Treated	4.68	1.53		4.68	1.53		4.33	1.64**		4.33	1.64	
Control	4.92	1.59		4.76	1.56		4.92	1.59		4.51	1.60	
Parent view on sex												
Treated	4.59	0.76		4.59	0.76		4.54	0.74		4.54	0.74	
Control	4.55	0.83		4.63	0.81		4.55	0.83		4.57	0.85	
Religious attendance												
Treated	3.71	1.42		3.71	1.42		3.85	1.33		3.85	1.33	
Control	4.12	1.27		3.88	1.40		4.12	1.27		3.88	1.40	
Religious beliefs												
Treated	3.60	0.77		3.60	0.77		3.76	0.53		3.76	0.53	
Control	3.71	0.60		3.61	0.72		3.71	0.60		3.76	0.56	
Happy in school												
Treated	3.96	0.82		3.96	0.82		3.59	0.84		3.59	0.84	
Control	3.68	0.80		3.88	0.72		3.68	0.80		3.63	0.77	
Feel that teacher cares												
Treated	4.18	0.91		4.18	0.91		3.99	0.92		3.99	0.92	
Control	3.96	0.93		4.11	0.89		3.96	0.93		4.03	0.94	
Trouble with teacher												
Treated	3.69	0.99		3.69	0.99		3.67	1.08		3.67	1.08	
Control	3.83	0.93		3.74	0.94		3.83	0.93		3.61	1.00	
Trouble with other students												
Treated	3.87	1.01		3.87	1.01		3.92	0.82		.92	0.82	
Control	4.00	0.93		3.97	0.94		4.00	0.93		3.89	0.94	
Grades												
Treated	4.45	1.62		4.45	1.62**		4.44	1.51		4.44	1.51	
Control	4.83	1.52		4.56	1.64		4.83	1.52		4.59	1.63	

(table continues)

Table 2 (continued)

Covariate	Quintile 4 versus Quintiles 1, 2						Quintile 5 versus Quintiles 1, 2					
	Prematching			Postmatching			Prematching			Postmatching		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Pubertal development												
Treated		2.90	0.89		2.90	0.89		3.10	0.94		3.10	0.94
Control		2.97	0.98		2.82	1.01		2.97	0.98		3.04	1.04
Friends' sexual activity												
Treated		2.15	0.90		2.15	0.90		2.26	0.93**		2.26	0.93
Control		2.02	0.96		2.16	0.97		2.02	0.96		2.11	0.97

Note. Quintile 4 versus Quintiles 1, 2; Prematching *N*s ranged from 249 to 258 across imputed data sets; postmatching *N*s ranged from 158 to 164 across imputed data sets. Quintile 5 versus Quintiles 1, 2; Prematching *N*s ranged from 244 to 251 across imputed data sets; postmatching *N*s ranged from 144 to 154 across imputed data sets. Quintile 1 = lowest exposure; Quintile 5 = highest exposure; SES = socioeconomic status. ** $p < .01$ (significant differences between comparison groups).

the five quintiles of sexy media exposure (Mplus software; Muthén & Muthén, 2007). For each of the comparisons, four models were tested, all aggregating effects across the 10 data sets. Model 1 is an unconditional model that tested the impact of sexy media exposure on age of sexual debut with no covariates. Model 2 estimates the impact of sexy media exposure on age of sexual debut, but includes the same covariates used by Brown et al. (2006). In Models 3 and 4, we examined the impact of sexy media exposure once individuals in the sample with different levels of exposure had been matched with propensity scores. Model 3 presents these results using matching without replacement; Model 4 presents the results using matching with replacement.

We first turn to the results for Black youth. Without any covariates in the model (Model 1), it appears that sexy media exposure is linked to earlier debut of sexual activity among adolescents who experience the highest levels of exposure (see Table 5). Conversely, those who experience the lowest levels of sexy media exposure report a later sexual debut. However, as indicated in Model 2, once covariates are taken into account, there are no longer significant effects of sexy media exposure on age of sexual debut. This is identical to the pattern of findings reported by Brown et al. (2006), namely, that once factors likely related to differential selection are introduced, there is no impact of sexy media exposure on age of sexual debut among Black youth. Not surprisingly, once individuals have been matched on the basis of their propensity for their respective level of sexy media exposure, there also is no relation between sexy media exposure and age of first intercourse among Black youth (Models 3 and 4 in Table 5).

Among White youth, unconditional models also indicate that greater exposure to sexy media appears to be associated with a younger age of sexual debut and that less exposure to sexy media is associated with an older age at first intercourse (see Table 6, Model 1). Model 2 introduced covariates, and still shows significant effects of exposure to sexy media on age of sexual debut (see Table 6). These analyses replicate the original findings, which Brown et al. (2006) interpreted as evidence for the accelerating impact of sexy media exposure on age at first intercourse. However, once we matched individuals on their propensity to be exposed to sexy media, there were no longer any significant effects of exposure on age of first intercourse (Models 3 and 4 for matching with and without replacement, respectively; see Table 6). That is, once differential selection is accounted for, there is no evidence that sexy media exposure hastens adolescents' sexual debut.

Discussion

Adults' concerns about the potential adverse impact of adolescents' exposure to sexual content on television, in movies, in magazines, and in music lyrics is understandable, given the amount of sexual content these mass media present, the amount of time teenagers spend exposed to them, and the continuing high rates of unwanted pregnancy and STIs among American youth. Many scientists, professionals, and health care practitioners have alerted parents to the potential dangers of exposure to sexy media and have called on the entertainment industry to change its behavior, citing studies that show a significant relationship between sexy media exposure and adolescents' sexual behavior (e.g., American Academy of Pediatrics, 2006). These studies, in turn, draw con-

Table 3
Significance of Differences Among White Youth Comparing Two Lowest Sexy Media Exposure Groups and Groups With Above-Average Exposure Before and After Matching

Covariate	Quintile 1 versus Quintiles 4, 5						Quintile 2 versus Quintiles 4, 5					
	Prematching			Postmatching			Prematching			Postmatching		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Gender (male)	73**			73**			72**			72**		
Treated	25	13.53	0.61**	36	13.53	0.61	25	13.64	0.65	38	13.64	0.65
Control		13.74	0.68		13.43	0.75		13.74	0.68		13.65	0.70
SES (receiving free/reduced lunch)	7*			7			3*			4		
Treated	14			8			14			7		
Control												
Age												
Treated		13.53	0.61**		13.53	0.61		13.64	0.65		13.64	0.65
Control		13.74	0.68		13.43	0.75		13.74	0.68		13.65	0.70
Parental education												
Treated		4.38	0.81**		4.38	0.81		4.30	0.94**		4.30	0.94
Control		3.67	1.22		4.27	0.75		3.67	1.22		4.02	1.07
Quality of maternal relationship												
Treated		4.38	0.82		4.38	0.82		4.26	0.91		4.26	0.91
Control		4.24	0.98		4.43	0.82		4.24	0.98		4.24	0.94
Hands-on parenting												
Treated		5.30	1.54**		5.30	1.54		5.20	1.65		5.20	1.65
Control		4.74	1.64		5.04	1.46		4.74	1.64		4.91	1.74
Parent view on sex												
Treated		4.77	0.54		4.77	0.54		4.79	0.46		4.79	0.46
Control		4.70	0.68		4.71	0.71		4.70	0.68		4.73	0.64
Religious attendance												
Treated		3.42	1.58		3.42	1.58		3.35	1.55		3.35	1.55**
Control		3.59	1.54		3.61	1.56		3.59	1.54		3.56	1.57
Religious beliefs												
Treated		2.98	1.01**		2.98	1.01		2.82	1.08**		2.82	1.08**
Control		3.28	0.90		3.29	0.86		3.28	0.90		3.14	0.94
Happy in school												
Treated		3.68	0.90		3.68	0.90		3.78	0.87		3.78	0.87
Control		3.89	0.82		3.96	0.87		3.89	0.82		3.83	0.86
Feel that teacher cares												
Treated		3.97	0.92		3.97	0.92		4.04	0.78		4.04	0.78
Control		4.00	0.92		4.14	0.90		4.00	0.92		4.01	0.94
Trouble with teacher												
Treated		4.21	0.76**		4.21	0.76		4.11	0.78		4.11	0.78
Control		4.02	0.87		4.19	0.66		4.02	0.87		4.02	0.86
Trouble with other students												
Treated		3.89	0.94		3.89	0.94		3.90	0.75		3.90	0.75
Control		3.96	0.66		4.03	0.66		3.96	0.66		3.95	0.71
Grades												
Treated		6.05	1.22**		6.05	1.22		5.95	1.33		5.95	1.33
Control		5.68	1.38		6.00	1.15		5.68	1.38		5.83	1.28

(table continues)

Table 3 (continued)

Covariate	Quintile 1 versus Quintiles 4, 5						Quintile 2 versus Quintiles 4, 5					
	Prematching			Postmatching			Prematching			Postmatching		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Pubertal development												
Treated		2.72	0.83**		2.72	0.83		2.72	0.83		3.05	0.82
Control		3.07	0.88		3.87	0.83		2.73	0.78		3.15	0.83
Friends' sexual activity												
Treated		1.26	0.51**		1.26	0.51		1.26	0.51		1.31	0.50**
Control		1.67	0.74		1.37	0.54		1.23	0.43		1.44	0.58

Note. Quintile 1 versus Quintiles 4, 5; Prematching Ns ranged from 277 to 284 across imputed data sets; postmatching Ns ranged from 186 to 196 across imputed data sets. Quintile 2 versus Quintiles 4, 5; Prematching Ns ranged from 275 to 282 across imputed data sets; postmatching Ns ranged from 182 to 194 across imputed data sets. Quintile 1 = lowest exposure; Quintile 5 = highest exposure; SES = socioeconomic status.

* $p < .05$ (significant differences between comparison groups). ** $p < .01$ (significant differences between comparison groups).

siderable media attention and generate substantial public interest. According to the website of the American Academy of Pediatrics, “the recognized leader among medical organizations on the issue of media effects on health” (Rich, 2005, p. 329), the Collins et al. (2004) study of sexy media exposure and adolescent sexual activity was one of the 10 most frequently read articles in *Pediatrics*, the association’s journal, 5 years after the article’s initial publication (American Academy of Pediatrics, 2009).

The authors of these studies make strong assertions that imply a causal relationship, as was the case in the specific study whose data are reanalyzed in this report. Although Brown et al. (2006) were admirably cautious in the concluding paragraphs of their article (e.g., “All of the possible alternative explanations for early sexual behavior were not included in this analysis,” p. 1026), the title of their article (“Sexy Media Matter: Exposure to Sexual Content in Music, Movies, Television, and Magazines Predicts Black and White Adolescents’ Sexual Behavior”) implies a causal link between media exposure and sexual activity (e.g., that the former predicts the latter) as does the article’s abstract: “Exposure to sexual content in music, movies, television, and magazines *accelerates* [emphasis added] white adolescents’ sexual activity and increases their risk of engaging in early sexual intercourse” (p. 1018). Collins et al. (2004), who used a statistical approach that is similar to that employed by Brown et al. and is characterized by the same limitations on the drawing of causal conclusions (but who declined to make their data available for reanalysis), nevertheless write in their abstract that “watching sex on TV predicts and may *hasten* [emphasis added] adolescent sexual initiation” and go so far as to suggest ways that parents might “*reduce the effects* [emphasis added] of sexual content” on their adolescent children (p. e280).

The present analyses suggest that parents may have less to worry about than these studies suggest. In our reanalysis of the data used by Brown et al. (2006), we found that using a more stringent approach to accounting for differential selection undoes any apparent effect of sexy media exposure on adolescents’ initiation of sexual intercourse. That is, we found no accelerating or hastening effect of exposure to sexy media content on sexual debut once steps were taken to ensure that adolescents with and without high media exposure were matched on their propensity to be exposed to media with sexual content. We note, however, that our analyses focused only on the impact of sexy media exposure on the initiation of intercourse and not on the impact of media exposure on already sexually active teenagers, a question we could not address because the study included too few adolescents who were nonvirgins at baseline. We share with many health care practitioners and health educators their concerns over the high rate of unsafe sex among American adolescents. Whether exposure to sexy media impacts condom use or other safe-sex practices among sexually active adolescents remains a question for future research.

Although one can never formally accept the null hypothesis—here, proving that sexy media exposure has no impact—our analysis of the same data set used by Brown et al. (2006) gives us added confidence that our failure to replicate their findings is not due to a lack of statistical power or to the use of different measures. And although we dropped a small number of subjects from our analyses who were included in the original analyses (and whom we dropped because they were already sexually experienced at baseline), our failure to replicate the Brown et al. findings is not due to this, because we were able to replicate their earlier findings

Table 4
Significance of Differences Among White Youth Comparing Two Highest Sex Media Exposure Groups and Groups With Below-Average Exposure Before and After Matching

Covariate	Quintile 4 versus Quintiles 1, 2						Quintile 5 versus Quintiles 1, 2					
	Prematching			Postmatching			Prematching			Postmatching		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Gender (male)												
Treated	33**	13.73	0.69**	33	13.73	0.69	17**	13.75	0.68**	17**	13.75	0.68
Control	73	13.58	0.63	47	13.64	0.69	73	13.58	0.63	43	13.59	0.70
SES (receiving free/reduced lunch)												
Treated	13*	3.81	1.19	13	3.81	1.19	15*	3.52	1.23**	15	3.52	1.23
Control	5	4.34	0.88	6	4.10	1.07	5	4.34	0.88	9	4.11	1.04
Age												
Treated		13.73	0.69**		13.73	0.69		13.75	0.68**		13.75	0.68
Control		13.58	0.63		13.64	0.69		13.58	0.63		13.59	0.70
Parental education												
Treated		3.81	1.19		3.81	1.19		3.52	1.23**		3.52	1.23
Control		4.34	0.88		4.10	1.07		4.34	0.88		4.11	1.04
Quality of maternal relationship												
Treated		4.40	0.85		4.40	0.85		4.07	1.08**		4.07	1.08
Control		4.32	0.87		4.40	0.83		4.32	0.87		4.34	0.88
Hands-on parenting												
Treated		4.80	1.61		4.80	1.61		4.68	1.68**		4.68	1.68
Control		5.25	1.54		5.00	1.41		5.25	1.54		5.08	1.60
Parent view on sex												
Treated		4.71	0.71		4.71	0.71		4.69	0.65		4.69	0.65
Control		4.78	0.50		4.74	0.55		4.78	0.50		4.72	0.58
Religious attendance												
Treated		3.67	1.54		3.67	1.54		3.51	1.55		3.51	1.55
Control		3.38	1.56		3.58	1.54		3.38	1.56		3.49	1.54
Religious beliefs												
Treated		3.22	0.93**		3.22	0.93		3.34	0.87**		3.34	0.87
Control		2.90	1.05		3.15	0.99		2.90	1.05		3.19	0.97
Happy in school												
Treated		3.81	0.83		3.81	0.83		3.97	0.80**		3.97	0.80
Control		3.73	0.88		3.86	0.90		3.73	0.88		3.93	0.86
Feel that teacher cares												
Treated		3.96	0.88		3.96	0.88		4.04	0.95		4.04	0.95
Control		4.00	0.86		4.07	0.82		4.00	0.86		4.11	0.81
Trouble with teacher												
Treated		3.95	0.90		3.95	0.90		4.09	0.83		4.09	0.83
Control		4.16	0.77		4.16	0.78		4.16	0.77		4.22	0.72
Trouble with other students												
Treated		4.00	0.72		4.00	0.72		3.93	0.60		3.93	0.60
Control		3.90	0.85		3.97	0.87		3.90	0.85		3.92	0.81
Grades												
Treated		5.76	1.37		5.76	1.37		5.61	1.38**		5.61	1.38
Control		6.00	1.28		5.86	1.45		6.00	1.28		5.97	1.41

(table continues)

Table 4 (continued)

Covariate	Quintile 4 versus Quintiles 1, 2						Quintile 5 versus Quintiles 1, 2					
	Prematching			Postmatching			Prematching			Postmatching		
	%	M	SD	%	M	SD	%	M	SD	%	M	SD
Pubertal development												
Treated		2.85	0.81		2.85	0.81		3.30	0.90**		3.30	0.90
Control		2.88	0.84		2.90	0.92		2.88	0.84		.99	0.95
Friends' sexual activity												
Treated		1.54	0.68**		.54	0.68		1.80	0.78**		1.80	0.78
Control		1.29	0.51		1.41	0.58		1.29	0.51		1.47	0.59**

Note. Quintile 4 versus Quintiles 1, 2; Prematching Ns ranged from 282 to 286 across imputed data sets; postmatching Ns ranged from 182 to 192 across imputed data sets. Quintile 5 versus Quintiles 1, 2; Prematching Ns ranged from 278 to 282 across imputed data sets; postmatching Ns ranged from 176 to 186 across imputed data sets. Quintile 1 = lowest exposure; Quintile 5 = highest exposure; SES = socioeconomic status.

* $p < .05$ (significant differences between comparison groups). ** $p < .01$ (significant differences between comparison groups).

Table 5

Cox Regressions of Sexy Media Exposure on Age of Sexual Debut Among Black Youth

Quintile	Model 1 (unconditional)			Model 2 (conditional) ^a			Model 3 (matched without replacement)			Model 4 (matched with replacement)		
	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI
1 versus 4, 5	0.348	0.176*	[0.003, 0.693]	0.052	0.211	[-0.362, 0.466]	-0.005	0.256	[-0.507, 0.497]	-0.325	0.282	[-0.877, 0.228]
2 versus 4, 5	0.096	0.187	[-0.271, 0.462]	0.170	0.192	[-0.206, 0.546]	-0.035	0.283	[-0.590, 0.520]	0.086	0.450	[-0.796, 0.968]
4 versus 1, 2	-0.140	0.150	[-0.434, 0.154]	0.091	0.162	[-0.227, 0.409]	0.133	0.301	[-0.457, 0.722]	0.252	0.427	[-0.585, 1.089]
5 versus 1, 2	-0.337	0.170*	[-0.670, -0.003]	-0.241	0.182	[-0.598, 0.116]	-0.002	0.287	[-0.565, 0.560]	-0.138	0.455	[-1.030, 0.754]

Note. Quintile 1 versus Quintiles 4, 5; Prematching Ns ranged from 244 to 247 across imputed data sets; postmatching Ns ranged from 186 to 178 across imputed data sets. Quintile 2 versus Quintiles 4, 5; Prematching Ns ranged from 231 to 239 across imputed data sets; postmatching Ns ranged from 158 to 170 across imputed data sets. Quintile 4 versus Quintiles 1, 2; Prematching Ns ranged from 249 to 258 across imputed data sets; postmatching Ns ranged from 158 to 164 across imputed data sets. Quintile 5 versus Quintiles 1, 2; Prematching Ns ranged from 244 to 251 across imputed data sets; postmatching Ns ranged from 144 to 154 across imputed data sets. CI = confidence interval.

^a Adjusted for gender, socioeconomic status, parental education, pubertal timing, quality of parent-child relationship, parenting style, parental views toward sex, religiousness, religious attendance, school connectedness, grades, and peer sexual activity.

* $p < .05$.

Table 6
Cox Regressions of Sexy Media Exposure on Age of Sexual Debut Among White Youth

Quintile	Model 1 (unconditional)			Model 2 (conditional) ^a			Model 3 (matched without replacement)			Model 4 (matched with replacement)		
	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI
1 versus 4, 5	0.474	0.147**	[0.186, 0.762]	0.357	0.192 [†]	[-0.010, 0.733]	0.308	0.194	[-0.072, 0.688]	0.013	0.480	[-0.923, 0.953]
2 versus 4, 5	0.351	0.134**	[0.088, 0.614]	0.456	0.192**	[0.080, 0.832]	0.320	0.191	[-0.054, 0.694]	0.396	0.395	[-0.378, 1.170]
4 versus 1, 2	-0.360	0.144**	[-0.642, -0.078]	-0.416	0.177*	[-0.763, -0.070]	-0.253	0.218	[-0.680, 0.174]	-0.255	0.357	[-0.955, 0.445]
5 versus 1, 2	-0.442	0.144**	[-0.724, -0.160]	-0.404	0.207 [†]	[-0.810, 0.001]	-0.330	0.207	[-0.736, 0.076]	-0.064	0.667	[-1.371, 1.240]

Note. Quintile 1 versus Quintiles 4, 5; Prematching Ns ranged from 277 to 284 across imputed data sets; postmatching Ns ranged from 186 to 196 across imputed data sets. Quintile 2 versus Quintiles 4, 5; Prematching Ns ranged from 275 to 282 across imputed data sets; postmatching Ns ranged from 182 to 194 across imputed data sets. Quintile 4 versus Quintiles 1, 2; Prematching Ns ranged from 282 to 286 across imputed data sets; postmatching Ns ranged from 182 to 192 across imputed data sets. Quintile 5 versus Quintiles 1, 2; Prematching Ns ranged from 278 to 282 across imputed data sets; postmatching Ns ranged from 176 to 186 across imputed data sets. CI = confidence interval.

^a Adjusted for gender, socioeconomic status, parental education, pubertal timing, quality of parent-child relationship, parenting style, parental views toward sex, religiousness, religious attendance, school connectedness, grades, and peer sexual activity.

[†] $p = .06$. * $p < .05$. ** $p < .01$.

with this slightly reduced sample. Rather, the difference between the findings is entirely attributable to our employing a more stringent method to control for differences between adolescents who do and do not expose themselves to sexy media content. Whether comparable reanalyses of data from other studies, employing different measures and samples but more conservative controls for differential selection, would yield similar conclusions awaits further study and the willingness of other researchers to make their data available for secondary analysis.

Most developmental scientists agree that it is important to distinguish between sexual activity that is initiated prior to age 16, which does not have negative correlates, and sexual activity that begins later in development (Steinberg, 2011). Because precocious sexual activity may be associated with problematic functioning, and because younger adolescents are less likely to practice safe sex than their older peers, it is important to understand the factors that predict early sexual activity. Some factors, such as parental permissiveness, parent-adolescent conflict, and having sexually active friends are well-established risk factors for early sexual debut. Others, such as exposure to sexy media, are factors often believed to influence adolescents to start having sex but that, on closer inspection, may not actually have this effect. It is easy to point our collective finger at the entertainment industry, but it is likely that the most important influences on adolescents' sexual behavior may be closer to home than to Hollywood.

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Received October 10, 2009

Revision received June 3, 2010

Accepted June 21, 2010 ■