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Developing Respondent Based Multi-Media Measures of Exposure to Sexual Content

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Abstract

Despite the interest in the effects of the media on sexual behavior, there is no single method for assessing exposure to a particular type of media content (e.g., sex). This paper discusses the development of six sexual content exposure measures based on adolescents' own subjective ratings of the sexual content in titles in 4 media (i.e., television, music, magazines, videogames). We assessed the construct and criterion validity of these measures by examining the associations among each of these measures of exposure to sexual content as well as their associations with adolescents' sexual activity. Data were collected in summer 2005 through a web-based survey using a quota sample of 547 youth aged 14–16 from the Philadelphia area. Adolescents rated how often they were exposed to specific television shows, magazine titles, etc. on 4-point never to often scales. They also rated the sexual content of those titles on 4-point no sexual content to a lot of sexual content scales. Sexual behavior was measured using an ordered index of lifetime pre-coital and coital sexual activity. The strength of association between exposure to sexual content and sexual activity varied by medium and measure. Based on our findings, we recommend the use of a multiple media weighted sum measure. This measure produces findings that are consistent with those of similar studies.

Introduction

Understanding the social determinants of adolescent sexual activity is essential to prevent teenage pregnancy and the transmission of sexually transmitted diseases (STDs) including HIV. The media is one of many influences (e.g., parents, peers, schools) that may shape the sexual development of adolescents and contribute to the formation of potentially life-long beliefs and attitudes about sex (Ward & Friedman, 2006). Thus there is much interest in whether, to what extent, and how, sexual content in media affects adolescent sexual development. Despite the interest in media effects on sexual behavior, there is no one recommended method for assessing exposure to a particular type of content, such as sex, in the media. Moreover, most attempts to link media exposure to one or more outcome variables have focused on a single medium. Research on the effects sex content has until recently focused almost exclusively on television, in part because youth spend on average approximately 3–4 hours a day viewing television (Kunkel et al., 2005). Additionally, the amount of television programs with any sexual content has increased from 56% in 1998 to 70% in 2005 (Kunkel et al., 2005). Adolescents, however, do not live in a single media environment and while some are exposed to sexual content on television others may be exposed to sexual content in movies, magazines, music, video games and/or the internet.

The extent to which conclusions can be drawn about the media's influence on adolescent sexual behavior depends largely on how exposure to sexual content in multiple media is conceptualized and measured. In this paper we therefore compare different ways of measuring exposure to sexual content. Using a single data set, we assess how several types of measures designed to capture exposure to sexual content are related to one another and also how they are related to sexual behavior among adolescents.

Measuring Exposure to Sexual Content

Exposure to sexual content is typically operationalized as a function of two variables: the time spent with a specific medium (i.e., exposure) and the amount of sexual content present in that medium. Time spent with a medium is generally a self-reported measure asked in a variety of ways (Potter & Chang, 1990). Most commonly, open-ended questions about time spent (e.g., "How many hours of television do you watch on an average day?" "How many days in the past week did you read a newspaper?") are used to represent estimates of general exposure. The question wording of such measures may also vary, for instance, hours of television on an *average* day compared to a *typical* day, although the effect of such wording on estimates of time spent with media does not appear to be significant (Chernin et al., 2006).

In contrast to estimates of general exposure to a medium, those who have been interested in measuring exposure to a particular type of content (e.g., sex, health, violence, politics) are more likely to provide respondents with a list of titles from a medium (e.g., television shows, magazines, music artists, video games) and ask the respondents to indicate the frequency with which they watch, read, listen to, or play each title. Frequency is generally assessed in this format through the use of ordinal measures (e.g., "How often do you watch *Desperate Housewives*?") with a limited number of response categories (e.g., "every time, a lot, once in while, or never") (Chernin et al., 2006; Huesmann et al., 1984; Potter & Chang, 1990).

While exposure is typically self-reported, the measurement of sexual content in the media is typically based on "objective" sexual content ratings generated through content analysis or the ratings of an independent sample of "judges". Depending on the scope of the analysis, the ratings may be a general assessments of "sexiness" (Aubrey et al., 2003) or they might attempt to capture more specific information, for example sexual talk, behavior (pre-coital and/or coital), and innuendo (Kunkel et al., 1999). Content analysis has been the preferred method for generating ratings of particular media because it attempts to achieve both objectivity and replicability (Krippendorff, 2004; Neuendorf, 2002). According to Slater (2004), the characterization of specific media content that occurs during a content analysis makes possible "more precise theoretical specifications of mechanisms as well as increasing predictive power." Also, representative samples of media allows for more generalizable conclusions.

Researchers typically use one of two methods to make these calculations. The first method multiplies the sex rating (as determined by independent coders) by the adolescents' self-reported frequency of exposure to each title, and then sums or averages the cross-products (Aubrey et al., 2003; Collins et al., 2004; Collins et al., 2007; Huesmann et al., 1984; Potter & Chang, 1990).¹ The second method assesses the proportion of the time spent with a

¹A variation of this method is to include the length of the media title (e.g., in increment of 30 minutes) in the product term (Brown & Newcomer, 1991). How the length of the title is weighted also varies depending upon whether more than one type of media is included in the analysis. If more than one medium is included, recent approaches to "unitizing" the media involve identifying units of analysis within each medium that are assumed to be equivalent such that they will have equal weight across media. Thus for example, a lyric line in a song is assumed to be equivalent to a non-break sequence in a movie or television show (Brown et al., 2006).

particular medium that contains sexual content (Brown & Newcomer, 1991). In one of the first attempts to link exposure to sexual content on television to adolescent sexual behavior, Brown and Newcomer (1991) assessed exposure to television by calculating the frequency of viewing each of N television shows weighted by show length and frequency of presentation. To assess exposure to sex content, they calculated the product of the sex rating of the show's content, the length of the show (e.g., 30 minutes or an hour), and the frequency with which the respondent watched the show. Brown and Newcomer conceptualized this proportion as a measure of motivation to seek out sexual content.

Linking Exposure to Sexual Content to Sexual Behavior

Most research involving sexual content in the media has focused on television. Evidence is mixed regarding the effects of exposure to television sexual content on sexual behavior. While the amount of time spent with television does not seem to be associated with adolescent sexual activity (Collins et al., 2004; Peterson et al., 1991; Strouse & Buerkel-Rothfuss, 1987; Ward, 2003), there is a growing body of literature that suggests exposure to sexual content on television (e.g., sexually oriented genres) is associated with expectations about sex, perceptions about peer sexual behavior, and permissive attitudes about sex (Ashby et al., 2006; Brown et al., 2006; Brown & Newcomer, 1991; Collins et al., 2007; Pardun et al., 2005; Ward, 2002; Ward & Friedman, 2006).

Brown and Newcomer (1991) found that neither the total number of hours one was exposed to television, nor the total number of hours one was exposed to sexual content on television, were related to sexual behavior. In marked contrast, the greater the proportion of television viewing time that contained sexual content, the more likely it was that an adolescent had engaged in sexual intercourse. Collins and colleagues (2004) found that watching sex on television predicted and possibly hastened sexual initiation. Pardun, L'Engle, & Brown (2005) found that exposure to sex content on television was associated with intentions to have sex, but not with either light sexual activity (e.g., having a crush, dating at least once, being, light and deep kissing) or heavy sexual activity (i.e., breast touching, genital fondling, oral sex, sexual intercourse).

The Pardun, L'Engle and Brown (2005) study was one of the first to examine the association between sexual content in media other than television (i.e., movies, magazines, and music) and adolescents' (ages 14–16) intentions to have sex as well as their actual sexual activity. The strongest associations between exposure to sexual content and intentions to have sex as well as sexual behavior per se were found with exposure to sexual content in movies and music. The longitudinal study by Brown et al. (2006) that examined the effects of cumulative sexual content exposure from music, movies, television, and magazines on the sexual behavior of early adolescents (ages 12–14) found that white youth with higher sexual media consumption were more likely than those with lower consumption to have engaged in sexual activity two years later (Brown et al., 2006). However, the strength of the association was very weak; among white teens, exposure accounted for only 3% of the variance in adolescent sexual behavior when baseline sexual behavior, demographics, and other relevant covariates were taken into account. In addition, among black adolescents there was no significant effect of exposure to sexual content on their sexual behavior.

Using Respondent Based Ratings of Sexual Content

In this paper we compare several ways to assess exposure to sex content in television, magazines, music, and videogames. The exposure measures we calculate are consistent with those previously described. Rather than utilizing independent judgments of sexual content, however, we use respondents' own ratings of the amount of sexual content contained in those media titles to which they have been exposed. This is a departure from using coders

that are hired and trained by researchers to make standardized judgments about sexual content or any media content. However, perceptions of the media content will most likely vary by the message recipient and ultimately affect the interpretation of the messages. In their study on alcohol beverage advertising, Austin et al. (2007) found that trained coders and message recipients differed dramatically on their reports of the frequency with which various types of content (e.g., portrayals of underage drinks) appeared in the advertisements. Their findings underscore how a “receiver-oriented” (p. 108) method in media effects studies has the potential to build on traditional content analytic studies (Austin et al., 2007).

Thus how the adolescents themselves interpret the sexual messages they are seeing may be critical to quantifying the sexual content to which they are exposed. Of course, these ratings are a more “subjective” appraisal of sexual content in the media because respondents, unlike trained coders, are not given extensive training and definitional guidelines to enable them to recognize even the most subtle of sexual messages. Using the respondents’ sexual content ratings recognizes the subjectivity inherent in media sex (Greenberg & D’Alessio, 1985) since sex in the media is more often implied, talked about, and fantasized than explicitly expressed, particularly on television or in the movies. Although probably less nuanced than the ratings from content analysis’ “expert” judges, the adolescents’ ratings provide us with an overall sense for the perceived level of sexual content based on their “real-world” exposure.

Research Questions

Our comparison of measures focuses on three main issues. First, we compare measures created from product terms that are summed to measures in which product terms are averaged. In general, product terms obtained by multiplying exposure by sex content have either been added or averaged to arrive at an exposure to sex content score. Although it appears that this decision has largely been arbitrary, it has important theoretical implications. Assume for example that one person reports viewing 3 television programs, while another person reports viewing 5 television programs, all with high sexual content. On the surface it would appear that the latter person was exposed to more sexual content than the former, but this difference will only be picked up if one sums, rather than averages, the products. We therefore wish to investigate whether summative measures are more or less strongly associated with sexual behavior than are measures of the average amount of sex content to which one is exposed.

RQ 1: How are summed exposure measures and averaged exposure measures related to one another and to sexual behavior among adolescents?

In addition to comparing summed and average estimates of exposure, we are also interested in the necessity of taking “frequency” of exposure into account. That is, should the sexual content of shows to which one has been exposed be weighted by the frequency with which one watches those shows? In contrast, is it sufficient to say that someone was or was not exposed to a particular title or at least one episode of a television series?² Although there seems to be almost universal acceptance of the assumption that the sex content of titles should be weighted by frequency of exposure to those titles, we know of no attempt to test this assumption.

RQ 2: How are weighted exposure measures and unweighted exposure measures related to one another and to sexual behavior among adolescents?

²It is worth noting that if frequency of exposure to a given title is not important, the problems of unitizing to develop cross media measures becomes much less problematic.

Finally, we explore the use of a single measure of exposure to sexual content based on multiple media compared to separate exposure measures related to each medium.

RQ 3: Is more variance in sexual behavior explained by summing exposure to sexual content across media, or by treating each measure of sexual exposure within a given medium as separate independent variables?

Methods

Study Design

Data presented in this paper are part of a larger study called the Annenberg Sex and Media Study (ASAMS). ASAMS has two major components: (1) a three wave web-based longitudinal survey of youth 14–16 years of age at recruitment, and (2) a longitudinal content analysis of five media (television, video games, movies, magazines, and music). Both of these components are based on the Integrative Model of Behavior (Fishbein, 2000). The details of the content analysis will be described in a future publication.

Data used in this analysis were collected in the spring and summer of 2005, which represents the first wave of the three wave longitudinal survey. Adolescents were recruited through print and radio advertisements, direct mail, and word of mouth to complete the survey. Eligibility criteria included age at the time of the survey (14, 15, or 16) and race/ethnicity (White, African-American, or Hispanic). Written parental consent and teen assent were collected for all participants and study protocols were approved by the University of Pennsylvania IRB. The web-based survey was accessible from any computer with internet access. Participants were given the option of taking the survey at the University or an off-site location (e.g. home, school, or community library). The majority of the participants (84.9%) took the survey at home or another off-site location; 15.1% took the survey at the University. Enrolled adolescents were given an id number and personal password to access the survey, and to ensure confidentiality and privacy protection. On average adolescents took one hour to complete the survey and received compensation of \$25 for their time.

Definition of Sexual Content

The survey definition of sexual content was: “In this survey, sexual content is defined as talking about or showing: hooking-up/making out; sexy clothes; nudity; sex (oral, anal, or vaginal); safe sex (condoms, birth control, etc.); sex crimes (rape); homosexuality (gay or lesbian); or anything else sex related.” This definition appeared in each media section in the survey immediately prior to the set of questions that asked respondents to rate the sex content of the media titles.

Use of Media Titles

We presented lists of titles for respondents to assess media exposure and sexual content. The lists were constructed to reflect popular titles for teenagers and/or the general public at the time of the survey. Popular titles were provided by website rankings (including: www.top5s.com/tvweek; www.boxofficemojo.com; www.imdb.com/boxoffice/rentals; www.billboard.com; www.gamerankings.com) and from an audience research company (TRU data), as well as pilot surveys we conducted in the year prior to the launching of the survey. The titles were designed to provide a sense of the depth and breadth of media use, although we recognized that they could not capture all that teens viewed, played or read. To that end, we included opportunities for respondents to write in their “favorite” title for each medium prior to seeing the list, and to write in additional titles they may have used for each medium that were not on the lists provided. Ultimately, the lists and the open ended questions yielded little commonality regarding participants’ exposure to movies or websites.

Lists of movies and internet sites were thus not included, and for the purposes of this paper, we rely on the “favorites” the participants reported to develop exposure measures for these two media. The final survey included lists of 30 television programs, 30 music artists, 20 magazine titles, and 15 videogames.

Measures

Survey Measures of Media Exposure and Sexual Content—Using an ordinal measure of exposure on a 4-point scale (never, rarely, sometimes, often), adolescents indicated how frequently, within the last 12 months, they watched each show, listened to each artist, read each magazine, and played each videogame. They were also asked to indicate their favorite title in each media. Next the respondents were asked to assess the sexual content of those same titles. In answer to the question, “How would you rate the sexual content of the following...,” adolescents rated the sexual content of the all media titles, including their favorites, on a 4-point scale with the following responses: “no sexual content,” “a little sexual content,” “some sexual content,” and “a lot of sexual content.” Only the sexual content of the media titles to which they were exposed were used to develop estimates of exposure to sexual content.

Developing Sexual Content Exposure Measures—Our measures of adolescents’ exposure to sexual content are organized into 4 groups of measures: (a) unweighted exposure, (b) weighted exposure, (c) proportional exposure, and (d) favorite titles. These groups are generally consistent with the different approaches to calculating sexual content exposure that were reviewed earlier. For the first two types of measures we create two scores: those based on *average* ratings and those based on the *sum* of the ratings.

Example Calculations of Sexual Content Exposure Measures: Television Shows—We use the following data to illustrate how we calculated the sexual content exposure measures. For our example we will consider only exposure to sex content on television, but the same procedures are followed to create measures of exposure to sex content in music, magazines, and videogames. For illustrative purposes, assume that our hypothetical respondent reported viewing only 4 of the 30 possible shows. The respondent’s exposure and sex content rating of these 4 shows are as follows.

	Exposure (0–3)	Sexual Content Rating (0–3)
<i>Desperate Housewives</i>	3 (often)	3 (a lot)
<i>The O.C.</i>	3 (often)	0 (none)
<i>The Simpsons</i>	2 (sometimes)	2 (some)
<i>Girlfriends</i>	1 (rarely)	2 (some)

- a. *Average and Summed Unweighted Exposure (Sex content of all titles used).* The unweighted exposure measures consider the sex content ratings for all titles that were watched at least rarely. In the example, only the titles that were watched (at some level) are shown, and the *summed* unweighted exposure measure equals seven ($7=3+0+2+2$); when this sum is divided by the number of shows the respondent reported viewing (4), it results in an *averaged* unweighted exposure score of 1.75 (or $7/4$).
- b. *Average and Summed Weighted Exposure (Sex content of all titles used weighted by frequency of use).* Our adolescent watched *Desperate Housewives* “often” (3) and rated it as having “a lot” (3) of sexual content, resulting in a score for this title of 9 (3×3). She also watched *The OC*, for which she received a score of 0 (3×0), as well as *The Simpsons* and *Girlfriends* (with scores of 4 and 2, respectively).

Thus her *summed* weighted exposure score for television equals 15 ($9+0+4+2$), and her *average* weighted exposure score is 3.75, or $(15/4)$.

- c. *Proportional Exposure (Proportion of titles used that contain “a lot” of sexual content)*. The numerator in the proportional exposure measure was the number of titles for each media rated by the respondent as having “a lot” of sexual content. The denominator was the total number of media specific titles to which an adolescent was exposed. Note this measure is based on counts of shows, which is different from the proportional exposure measured by Brown & Newcomer (1991) that calculates the proportion of hours spent watching sexual content. In the example, our adolescent rated only *Desperate Housewives* as having “a lot” of sexual content. Her proportional sex rating measure would therefore be calculated using a numerator of 1, and a denominator of 4, resulting in a ratio of 0.25 indicating that 25% of the shows watched contained high sexual content.
- d. *Favorite Titles*. Sexual content exposure as measured by favorite titles is simply the sexual content rating of their favorite title, thus no calculations were necessary. The designation of “most favorite show” implies a certain salience and familiarity with the show that assumes exposure, although the extent of exposure is unknown.

Multiple Media Measures: For each of the six exposure measures described above (i.e., unweighted exposure (summed and average), weighted exposure (summed and average), proportional exposure, favorite titles), the scores for television, music, magazines, and videogames were added to create a cumulative multiple media exposure measure for each respondent. Since we also had sex content ratings of favorite titles for movies and the internet, the cumulative multiple media exposure measure based on favorite titles considered 6 rather than 4 media.

Sexual Behavior Scale—We used a scale of sexual activity to examine the association between our sexual content exposure measures and sexual behavior (Hennessy et al., 2007). The sexual behavior scale was based on lifetime sexual experience for 7 behaviors. Respondents were asked to indicate if they had ever engaged in the following sexual behaviors: deep kissing, touching a female partner’s breasts or having one’s breast’s touched by a male partner, having one’s “private parts” touched, giving oral sex, receiving oral sex, vaginal intercourse, and anal intercourse (giving and receiving, when applicable). These dichotomous lifetime experiences were scaled using Mokken procedures (Ringdal et al., 1999). The resulting scale ordered the behaviors from least to most difficult into a progression of sexual activity that occurs in the following sequence: kissing, touching breasts (for females, having breast touched), genital touching, receiving oral sex, vaginal intercourse, giving oral sex, and giving anal sex (for females, receiving anal sex). The mean score on the sexual behavior scale in this sample was similar for males ($M=2.75$, $SD=2.25$) and females ($M=2.74$, $SD=2.22$), suggesting that on average most respondents have at least kissed and touched their partners breasts or had their breasts touched by a partner; a score of 3 represents genital touching.

Analysis

Assessing Construct Validity of the Sexual Content Exposure Measures by Media Type—Construct validity is the extent to which measures of a particular construct measure what they are supposed to measure (Schutt, 2004). One aspect of construct validity is convergent validity, which is how well measures of the same construct correlate with each other. We assess the convergent validity of the sexual content measures using correlations among the measures.

Assessing Criterion Validity of the Sexual Content Exposure Measures by Media Type—Criterion validity is the strength with which the measures of interest (e.g., sexual content exposure) are associated with other behaviors (e.g., sexual activity) in a way that is consistent with previous research and/or strong theoretical reasoning. For validation purposes, we correlated our exposure to sexual content measures with scores on the sexual behavior scale described earlier.

Regression Analyses of Sexual Behavior with Sexual Content Exposure Measures—We conducted regression analyses to determine if our multiple media measure explains at least as much variance as a model using media specific measures (i.e., measures of exposure to sexual content in television, in music, in magazines, and in videogames).

Results

Sample Description

Five hundred forty seven adolescents successfully completed the survey after submitting parental consent and participant assent forms. The sample was 59.6% female, 42.8% African-American, 41.2% White, 13.4% Hispanic, and 2.8% other. The mean participant age was 15 years ($SD=0.81$) and slightly more than one-third (34.9%) of respondents' mothers graduated from college. The means and standard deviations for all of the sexual content exposure measures are shown in Table 1.

Construct Validity of Sexual Content Exposure Measures

Table 2 presents the correlations among all versions of the sexual content exposure measures within a given medium. Although numerous comparisons are possible, we summarize 3 areas relevant to the construct validity of the measures. First we assessed the correlations between the corresponding pairs of summed and averaged measures (e.g. correlation between weighted exposure averaged and weighted exposure summed) for all types of media. High correlations would be evidence that the summed and averaged measures were not very different from one another and were measuring the same underlying aspect of exposure; low correlations would indicate that summing versus averaging may make a difference in estimating exposure to sexual content. At the same time, we looked at the correlations between corresponding pairs of weighted and unweighted measures (e.g., correlation between weighted and unweighted sums). Once again, high correlations would indicate that weighting makes little difference while low correlations would suggest that weighting may be capturing a different aspect of the measure of exposure to sexual content than what is captured when one does not weight.

Perhaps the first thing to notice in Table 2 is that the pattern of correlations is very different for television and music than for magazines and video games. Generally speaking, whether one adds or averages, weights or does not weight, seems to make relatively little difference for measures of exposure to sexual content on TV or in music. In contrast, these distinctions do seem to become important when one assesses exposure to sexual content in magazines and video games. For example, while the correlation between weighted summed and weighted average measures for TV and music are .87 and .81 respectively, the corresponding correlations for magazines and video games are .60 and .68. Similarly, while the correlations between weighted and unweighted sums are .96 and .94 for TV and music respectively, the corresponding correlations are .68 and .62 for magazines and video games.

Next we looked at different pairs of exposure measures within each medium to determine if there is a pattern as to which measures were most highly correlated. These correlations would identify those measures that are most similar to one another, and would allow us to

determine if those combinations are consistent across different media. The favorite titles measures consistently had the lowest correlations with the other 5 exposure measures, with correlations ranging from 0.16 to 0.47 with a mean of 0.30³. Similarly, the proportion measure also had relatively low correlations with the other 4 exposure measures.

To summarize briefly, based on our correlational analyses, it appears that at least with respect to assessing exposure to sex content in magazines and video games, the decision to weight (or not weight) and the decision to add or average do lead to somewhat different estimates of exposure. In addition, it appears that measures of sex content exposure based on proportions and favorites may be rather poor measures or they may be tapping somewhat different aspects of exposure to sex content.

Criterion Validity of Sexual Content Exposure Measures

To assess criterion validity we correlated the measures of exposure to sexual content with scores obtained on the sexual behavior scale. The correlation coefficients are presented in Table 3. Once again the pattern of correlations for TV and music are different from those for magazines and video games. For example, consistent with the finding that adding and averaging and weighting or not weighting seem to have relatively little influence on measures of exposure to sex content on TV or in music, the four measures of exposure to sex on TV and the four measures of exposure to sex in music that contrast adding, averaging, weighting and not weighting (i.e., weighted sum, weighted average, unweighted sum, unweighted average) are about equally predictive of adolescent sexual behavior. For example with respect to TV, the four correlations are either .12 or .13 (all significant at the .01 level). Similarly with respect to music, the four correlations range between .15 and .18. In marked contrast, for magazines and video games (where both weighting and adding versus averaging made a difference), the weighted sum has the highest correlation with adolescent sexual behavior while the unweighted average clearly has the lowest correlation. More specifically, while the weighted sum measure of exposure to sex in magazines is correlated .16 ($p < .01$) with sexual behavior, the other correlations are .12 ($p < .01$), .11 ($p < .01$), and $-.02$ (ns) for the weighted average, the unweighted sum and the unweighted average respectively. Similarly, for video games, the four correlations are .11 ($p < .01$), .06 (ns), .05 (ns) and .01 (ns). Indeed, among these four measures, only the weighted sum is significantly related to sexual behavior with respect to all four media. Note that the proportional measure and the favorite measure of exposure to sex content are almost always among the poorest predictors of adolescent sexual behavior.

To summarize briefly, within television and music, the unweighted and weighted summed and averaged measures were highly intercorrelated and were all correlated with sexual behavior at comparable levels. However, the weighted and summed measures for magazines and for videogames performed better than the unweighted or averaged measures. It appears that, across all media, a weighted sum is the measure of exposure to sexual content that is most likely to have the strongest associations with adolescent sexual behavior.

Since the weighted sum is only moderately correlated with proportional or favorite measures, we tested media-specific multiple regression models that included the weighted summed measure, the proportion measure and the favorite measure as predictors of sexual behavior. We did this to ensure that we were not losing additional explanatory power if these measures were discarded as potential ways of measuring exposure to sex content. Analyses showed that, with respect to each of the 4 media, neither the proportion measures

³The mean correlation is a simple mean and is not based on r to z transformations.

nor the favorite titles measures were significantly associated with sexual behavior while controlling for the weighted sum (result not presented here).

Testing the utility of a multiple media measure of exposure to sexual content

—As can be seen in Table 2, the intercorrelations among the multiple media measures of exposure are more similar to those for TV and music than for those involving magazines and video games. Thus, for example, unweighted and weighted summed and averaged multiple media measures tend to be highly correlated with one another. Perhaps more important, as can be seen in Table 3, although the differences are small, the best single multiple media correlate of sexual behavior is the weighted sum exposure measure. This is also consistent with the findings based on individual media. It is interesting to note that this correlation ($r = .21, p < .001$) is higher than any of the correlations linking behavior to the individual media weighted sum measures. The critical question, however, is whether this single weighted sum measure of exposure to sexual content in multiple media can account for as much or more variance in sexual behavior than can be accounted for by considering the four media specific exposure measures that are also based on weighted sums.

To answer this question we first regressed our sexual behavior measure on the multiple media weighted sum exposure measure. Next, the model was adjusted for age, sex, and race. In the second model, sexual behavior was regressed on the weighted sum sexual content exposure measures for each medium (i.e., television, music, magazines, and videogames). The second model was also then adjusted for age, sex, and race.

Results from the regression analysis are presented in Table 4. As shown, the amount of variance explained by both the multiple media measure and the four media-specific measures is approximately 4% ($p < .01$). The association of sexual content exposure remains significant in the multiple media model after adjusting for relevant demographic characteristics, but in the media-specific model, in which exposure to sex content in music, magazines and videogames were all significantly related to sexual behavior prior to adjusting for demographics, only the association with magazines persists after controlling for age, sex and race.

Discussion

We compared 6 ways of measuring sexual content exposure based on *adolescents'* sexual content ratings for several media. Using these measures we aimed to answer the following research questions: *How are summed exposure measures and averaged exposure measures related to one another and to sexual behavior among adolescents?*, *How are weighted exposure measures and unweighted exposure measures related to one another and to sexual behavior among adolescents?*; and *Is more variance in sexual behavior explained by summing exposure to sexual content across media, or by treating each measure of sexual exposure within a given medium as separate independent variables?*

Summed versus Averaged Measures

Previous research either summed or averaged estimates of sexual content exposure without empirical justification for using one method over the other. Conceptually, the summing of sexual content exposure across titles within a specific media takes into account the breadth of one's media consumption; summing uses all the available information regarding the extent of viewing or listening (e.g., 5 shows versus 2 shows) rather than generating an average over all titles. Since summed measures offer a stronger conceptual justification, and empirical evidence suggests that summed measures of exposure have more consistent and robust relationships with our sexual behavior outcome measure across all media, we propose

that exposure measures which sum sexual content across titles are more appropriate for estimating sexual content exposure.

Unweighted and Weighted Exposure Measures

Studies in the realm of sexual content exposure tend to weight sex content ratings by the frequency of exposure based primarily on the assumption that the more often a particular title was seen, listened to, etc., the more sexual content to which one would be exposed. Intuitively one might think there is a difference between merely being exposed and being exposed rarely as compared to often, but the findings are not all that consistent. Although weighted measures are clearly better than unweighted measures with respect to assessing exposure to sexual content in magazines and videogames, this does not seem to be the case with respect to exposure to sexual content in TV programs and in music. Moreover, the correlation coefficient of the multiple media summed unweighted exposure measure with sexual behavior ($r=0.19$) was only slightly less than that of the weighted summed exposure correlation with sexual behavior ($r=0.21$), and the difference is not statistically significant. Nevertheless we would recommend the use of weighted summative measure of exposure whenever possible, since this measure has the highest predictive validity across all media. The finding that unweighted and weighted exposure measures are not much different in certain media seems counterintuitive to current thinking about exposure estimates of content-specific media. It is possible that the frequently used ordinal measure of exposure (i.e., How often do you watch the following? Never, Rarely, Sometimes, Often) may be too crude to properly estimate differences in exposure. This would suggest that in instances when it is not possible to collect information on frequency of exposure using ordinal measures, simple exposure (unweighted) may yield comparable estimates of sexual content exposure depending on the medium of interest. The proportion measure, at least as operationalized in this analysis, avoids the potential problem of using an insensitive ordinal frequency measure, but unfortunately, it did not consistently show meaningful associations with sexual behavior across all media. The weakest approach of all the measures presented here, however, were measures of exposure to sexual content using ratings from adolescents' favorite media titles.

Multiple media measure versus media-specific measures

The regressions model using the multiple media measure was more parsimonious and explained the same amount of variance in sexual behavior as the model containing the four media-specific exposure measures. Although using media-specific estimates of sexual content exposure offers the advantage of learning which media are most strongly associated with sexual behavior, it does not take into account the fact that while some people may be exposed to sexual content in one medium, others are exposed in another. Using a single multiple media measure attempts to capture the entire media environment and envisions exposure to sexual content as a cumulative phenomenon. For better or worse, it treats the media as somewhat interchangeable in that adolescents with equivalent estimates of sexual content exposure, but in different media, may receive the same multiple media exposure estimate.

Limitations

There are several limitations to this analysis. First, since data were collected from a quota sample of primarily urban youth from the greater Philadelphia area, generalizability of our findings is limited. In addition, although the media titles were carefully and purposefully sampled to accommodate differences in media use patterns and tastes, the universe of titles was limited to 30 television programs, 30 music artists, 20 magazine titles, and 15 videogames. Whereas previous research indicates a relationship between sexual content exposure in movies and sexual behavior, our measures did not include exposure to movies or

to internet sites. Thus it is possible that adolescents were exposed to sexual content in media other than those captured in our survey. For example, the television program titles did not include paid cable programming that tends to be more sexually explicit than network shows. If this were the case, however, the correlations presented here would actually be underestimating the association between sexual content exposure and behavior.

Although used to assess predictive (i.e., criterion) validity, the correlations presented here do not imply causality. They are however of the same magnitude and in the same direction (i.e., positive) as recent longitudinal studies (Brown et al., 2006; Collins et al., 2004) that model sexual content exposure as a predictor of sexual behavior. For example, our best measure of exposure to sexual content in the media (i.e., our weighted sum multi-media measure) accounts for 4% of the variance in sexual behavior. Although this association is highly statistically significant, one must question its practical significance. Perhaps more important, the theoretical justification for a reciprocal relationship between exposure and behavior, or one that operates in the reverse direction (i.e., sexual behavior predicting sexual content exposure) is equally, if not more, plausible (Bleakley et al., 2007; Brown & Newcomer, 1991; Slater, 2004).

Future research on the measurement of sexual content exposure should also compare the measures of exposure based on adolescents' "subjective" ratings of the amount of sex content in a given title to measures based on "objective" content analysis ratings. This comparison will serve at least two purposes. First, it will allow researchers to determine if survey data is a valid substitute for assessing sexual content exposure in the absence of a content analysis. What aspects of a content analysis, if any, do the subjective ratings duplicate? Do the subjective ratings tell us anything that the content analysis might not capture? Second, a comparison is a next step in the validation process for both the objective and subjective exposure measures.

Conclusion

Our conclusions on the most appropriate way to measure sexual content exposure are largely theoretically driven. For each medium we considered (i.e., television, music, magazines, and videogames), a weighted exposure measure that sums across titles is recommended, and we also recommend summing these media specific measures to arrive at a measure of exposure to sexual content across multiple media. These weighted sum measures demonstrate convergent validity with other measures of sexual content exposure that use adolescent ratings, and from a criterion validity perspective, these weighted sum measures show statistically significant associations with sexual behavior that are consistent with previous research that used content analysis generated sexual content exposure estimates.

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References

- Ashby SL, Arcari CM, Edmonson B. Television viewing and risk of sexual initiation by young adolescents. *Archives of Pediatric and Adolescent Medicine* 2006;160:375–380.
- Aubrey JS, Harrison K, Kramer L, Yellin J. Variety versus timing: Gender differences in college students' sexual expectations as predicted by exposure to sexually oriented television. *Communication Research* 2003;30(4):432–460.

- Austin EW, Pinkleton BE, Hust SJT, Miller ACR. The locus of message meaning: Differences between trained coders and untrained message recipients in the analysis of alcoholic beverage advertising. *Communication Methods and Measures* 2007;1(2):91–111.
- Bleakley A, Hennessy M, Fishbein M, Jordan A. It works both ways: The relationship between sexual content in the media and adolescent sexual behavior. *Media Psychology*. 2007 under review.
- Brown JD, L'Engle KL, Pardun CJ, Guo G, Kenneavy K, Jackson C. Sexy media matter: Exposure to sexual content in music, movies, television, and magazines predicts back and white adolescents' sexual behavior. *Pediatrics* 2006;117(4):1018–1027. [PubMed: 16585295]
- Brown JD, Newcomer SF. Television viewing and adolescents' sexual behavior. *Journal of Homosexuality* 1991;21:77–91. [PubMed: 1856474]
- Chernin, A.; Fishbein, M.; Bleakley, A.; Davis, E.; Stevens, R. Test-retest reliability of four measures of media exposure. Presented at the International Communication Association Conference; June 2006; 2006.
- Collins RL, Elliot MN, Berry SH, Kanouse DE, Kunkel D, Hunter SB, Miu A. Watching sex on television predicts adolescent initiation of sexual behavior. *Pediatrics* 2004;114(3):e280–e289. [PubMed: 15342887]
- Collins, RL.; Elliot, MN.; Miu, A. Linking media content to media effects: The RAND television and adolescent sexuality (TAS) study. In: Jordan, A.; Fishbein, M., editors. *Advancing the Science of Content Analysis*. 2007. Forthcoming
- Fishbein M. The role of theory in HIV prevention. *AIDS Care* 2000;12(3):273–278. [PubMed: 10928203]
- Greenberg BS, D'Alessio D. Quantity and quality of sex in the soaps. *Journal of Broadcasting and Media* 1985;29(3):309–321.
- Hennessy, M.; Bleakley, A.; Fishbein, M.; Jordan, A. *AIDS and Behavior*. 2007. Validating a sexual behavior index using psychosocial theory and social trait correlates. Forthcoming
- Huesmann LR, Lagerspetz K, Eron LD. Intervening variables in the TV violence-aggression relation: Evidence from two countries. *Developmental Psychology* 1984;20:746–775.
- Krippendorff, K. *Content analysis: An introduction to its methodology*. 2. Thousand Oaks: Sage Publications; 2004.
- Kunkel D, Cope KM, Biely E. Sexual messages on television: Comparison findings from three studies. *Journal of Sex Research* 1999;36(3):230–236.
- Kunkel, D.; Eyal, K.; Finnerty, K.; Biely, E.; Donnerstein, E. *Sex on TV 2005: A Kaiser Family Foundation Report*. 2005.
- Neuendorf, KA. *The content analysis guidebook*. Thousand Oaks: Sage Publications; 2002.
- Pardun CJ, L'Engle KL, Brown JD. Linking exposures to outcomes: Early adolescents' consumption of sexual content in six media. *Mass Communication & Society* 2005;8(2):75–91.
- Peterson, JL.; Moore, KA.; Furstenberg, FF. Television viewing and early initiation of sexual intercourse: is there a link?. In: Wolf, MA.; Kielwasser, AP., editors. *Gay people, sex, and the media*. Binghamton, NY: Haworth Press; 1991. p. 93–118.
- Potter WJ, Chang IC. Television exposure measures and the cultivation hypothesis. *Journal of Broadcasting and Media* 1990;34(3):313–333.
- Ringdal K, Ringdal G, Kaasa S, Bjordal K, Wisløff Sundstrom, Hjermstad M. Assessing the consistency of psychometric properties of the HRQoL scales within the EORTC QLQ-C30 across populations by means of the Mokken scaling model. *Quality of Life Research* 1999;8:25–43. [PubMed: 10457736]
- Schutt, RK. *Investigating the Social World: The Process and Practice of Research*. 4. London: Pine Forge Press; 2004.
- Slater MD. Operationalizing and analyzing exposure: The foundation of media effects research. *Journalism and Mass Communication Quarterly* 2004;81(1):168–183.
- Strouse JS, Buerkel-Rothfuss NL. Media exposure and the sexual attitudes and behaviors of college students. *Journal of Sex Education and Therapy* 1987;13(2):43–51. [PubMed: 12143703]

- Ward LM. Does television exposure affect emerging adults' attitudes and assumptions about sexual relationships? Correlational and experimental confirmation. *Journal of Youth and Adolescence* 2002;31:1–15.
- Ward LM. Understanding the role of entertainment media in the sexual socialization of American youth: A review of empirical research. *Developmental Review* 2003;23:347–388.
- Ward LM, Friedman K. Using TV as a guide: Associations between television viewing and adolescents' sexual attitudes and behavior. *Journal of Research on Adolescence* 2006;16(1):133–156.

Table 1

Sexual Content Exposure Based on Individual Respondent Ratings (n=547)

Media	Television		Music Artists		Magazines		Videogames		Movies		Internet		Cross media	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Unweighted Exposure ^a	0.59	0.40	1.26	0.62	0.16	0.29	0.15	0.37	-	-	-	-	2.17	1.07
Weighted Exposure ^b	1.24	0.91	2.70	1.59	1.31	1.42	1.20	1.55	-	-	-	-	6.45	3.59
Proportional ^c	0.08	0.11	0.17	0.18	0.04	0.12	0.11	0.21	-	-	-	-	0.40	0.40
Favorite Titles ^d	2.16	1.22	2.01	1.33	1.49	1.19	0.98	1.16	1.83	1.36	1.23	1.16	9.72	4.23
Unweighted Summed Exposure ^e	10.06	9.45	24.88	16.09	0.72	0.71	0.56	0.70	-	-	-	-	36.22	22.58
Weighted Summed Exposure ^f	21.05	21.14	55.11	41.25	9.77	13.10	7.68	10.78	-	-	-	-	93.60	63.62

^aUnweighted exposure measures are average sex content ratings of the titles the adolescent reported being exposed to, regardless of how often.

^bWeighted exposure measures were created by averaging the product terms of the ordinal exposure measure and the sexual content rating for each title.

^cProportional measures have a numerator that is the number of titles for each media rated as having “a lot” of sexual content and a denominator that is the total number of media specific titles exposed to.

^dFavorite title measures are the sexual content ratings of their favorite title.

^eUnweighted summed exposure are summed sex content ratings of the titles the adolescent reported being exposed to, regardless of how often.

^fWeighted summed exposure were created summing the product terms of the ordinal exposure measure and the sexual content rating for each title.

Table 2

Inter-Item Correlations (Pearson Coefficients) for Sexual Content Exposure Measures by Medium (n=547)

	Television Shows	Music Artists	Magazines	Videogames	Cross media
<i>Unweighted Exposure^d correlated with</i>					
Weighted Exposure ^b	0.93	0.89	0.49	0.59	0.83
Proportional ^c	0.56	0.78	0.39	0.52	0.71
Favorite Titles ^d	0.23	0.33	0.18	0.16	0.36
Unweighted Summed Exposure ^e	0.87	0.81	0.60	0.68	0.74
Weighted Summed Exposure ^f	0.83	0.74	0.06 ns	0.11	0.68
<i>Weighted Exposure correlated with</i>					
Proportional Exposure	0.55	0.70	0.56	0.77	0.74
Favorite Titles	0.21	0.37	0.47	0.39	0.39
Unweighted Summed Exposure	0.83	0.83	0.86	0.85	0.69
Weighted Summed Exposure	0.88	0.89	0.77	0.75	0.80
<i>Proportional Exposure correlated with</i>					
Favorite Titles	0.25	0.24	0.26	0.29	0.32
Unweighted Summed Exposure	0.37	0.66	0.56	0.78	0.50
Weighted Summed Exposure	0.36	0.62	0.39	0.59	0.54
<i>Favorite Titles correlated with</i>					
Unweighted Summed Exposure	0.19	0.30	0.47	0.35	0.25
Weighted Summed Exposure	0.17	0.31	0.38	0.40	0.27
<i>Unweighted Summed Exposure correlated with</i>					
Weighted Summed Exposure	0.96	0.94	0.68	0.62	0.93

^aUnweighted exposure measures are average sex content ratings of the titles the adolescent reported being exposed to, regardless of how often.

^bWeighted exposure measures were created by averaging the product terms of the ordinal exposure measure and the sexual content rating for each title.

^cProportional measures have a numerator that is the number of titles for each media rated as having "a lot" of sexual content and a denominator that is the total number of media specific titles exposed to.

^dFavorite title measures are the sexual content ratings of their favorite title.

^eUnweighted summed exposure are summed sex content ratings of the titles the adolescent reported being exposed to, regardless of how often.

^fWeighted summed exposure were created summing the product terms of the ordinal exposure measure and the sexual content rating for each title.

Table 3

Pearson Correlations of Sexual Content Exposure Measures with Sexual Behavior (n=547)

Correlation with Sexual Behavior Scale	
TELEVISION	R
Unweighted Exposure ^a	0.13**
Weighted Exposure ^b	0.12**
Proportional ^c	0.10*
Favorite Titles ^d	0.04
Unweighted Summed Exposure ^e	0.13**
Weighted Summed Exposure ^f	0.13**
MUSIC ARTISTS	
Unweighted Exposure	0.15**
Weighted Exposure	0.17**
Proportional	0.08
Favorite Titles	0.12**
Unweighted Summed Exposure	0.18**
Weighted Summed Exposure	0.17**
MAGAZINES	
Unweighted Exposure	-0.02
Weighted Exposure	0.12**
Proportional	0.10*
Favorite Titles	0.04
Unweighted Summed Exposure	0.11**
Weighted Summed Exposure	0.16**
VIDEOGAMES	
Unweighted Exposure	0.01
Weighted Exposure	0.06
Proportional	0.07
Favorite Titles	0.01
Unweighted Summed Exposure	0.05
Weighted Summed Exposure	0.11*
CROSS MEDIA	
Unweighted Exposure	0.13**
Weighted Exposure	0.18**
Proportional	0.13**
Favorite Titles	0.12**
Unweighted Summed Exposure	0.19**
Weighted Summed Exposure	0.21**

^a **Unweighted exposure measures** are average sex content ratings of the titles the adolescent reported being exposed to, regardless of how often.

^b **Weighted exposure measures** were created by averaging the product terms of the ordinal exposure measure and the sexual content rating for each title.

^c **Proportional measures** have a numerator that is the number of titles for each media rated as having “a lot” of sexual content and a denominator that is the total number of media specific titles exposed to.

^d **Favorite title measures** are the sexual content ratings of their favorite title.

^e **Unweighted summed exposure** are summed sex content ratings of the titles the adolescent reported being exposed to, regardless of how often.

^f **Weighted summed exposure** were created summing the product terms of the ordinal exposure measure and the sexual content rating for each title.

*
p<.05,

**
p<.01.

Table 4
Regression Analyses Results for Summed Sexual Content Exposures Measures on Sexual Behavior (n=547)

Measure	Unadjusted			Adjusted ^I		
	b	SE	AR ²	b	SE	AR ²
Weighted Summed Exposure						
Model 1: Multiple media	0.007	0.001**	0.041	0.006	0.001**	0.116
Model 2: Individual media			0.043			0.118
Television	0.003	0.005		0.004	0.005	
Music Artists	0.006	0.003*		0.003	0.003	
Magazines	0.019	0.008*		0.018	0.008**	
Videogames	0.018	0.009*		0.016	0.009	

^I Note: Adjusted models controlled for age, race, and sex. Age and race were treated as dummy variables.

* p<.05,

** p<.01.