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Estimating the Longitudinal Association Between Adolescent Sexual Behavior and Exposure to Sexual Media Content

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Abstract

Purpose—To estimate the association between adolescent sexual behavior and exposure to sexual media content.

Methods—A three wave longitudinal survey sample (N = 506) of 14-16 year olds at baseline is analyzed using growth curves.

Results—Growth trajectories are linear for sexual behavior but not for exposure to sexual media content. The signs of the exposure slopes are not uniformly positive: Hispanic and African-American respondents show declines of exposure to sexual media content over the age range investigated here.

Conclusions—While changes in exposure to sex content are highly associated with changes in sexual behavior among Whites, there is little or no association between changes in these variables among Blacks.

Keywords

adolescent sexual behavior; sexual media content; media effects; growth curves

INTRODUCTION

What children and adolescents see, hear, and read in the media is assumed to influence their social development and behavior. Buhi & Goodson (2007) argue that there is a strong theoretical basis for assuming that sexual content in the media shape adolescents' beliefs, attitudes, norms, and intentions to have sex. The assertion of possible negative media effects on children and youth tends to be corroborated by research studies looking at the association between particular levels or types of media exposure (either experimentally manipulated or naturally occurring) and outcomes such as normative beliefs about sexual activity (Chia & Gunther, 2006), the extent and timing of sexual intercourse (Aubrey, Harrison, Kramer & Yellin, 2003), and a range of other sexual behaviors (Brown, L'Engle, Pardun, Guo, Kenneavy, & Jackson, 2006; L'Engle, Brown & Kenneavy, 2006; Collins, 2005; Somers & Tynan, 2006).

Although this "media effects" literature spans multiple media and multiple outcomes (Escobar-Chaves, Tortolero, Markham, Low, Eitel, & Thickstun, 2005; Ward, 2003; Ward & Friedman, 2006), most research investigating sexual content in the media and sexual behavior focuses on television. Not only do adolescents spend an average of 6 1/2 hours a day watching television (Roberts, Foehr & Rideout, 2005), data suggest that the amount of sex on television (the most comprehensively researched media) is increasing (Kunkel, Cope, & Colvin 1996; Kunkel,

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Cope-Farrar, Biely, & Donnerstein, 2001; Kunkel, Biely, Eyal, Cope-Ferrar, Donnerstein, & Fandrich 2003; Kunkel, Eyal, & Finnerty, 2005, but for an alternative view on the trend over time see Hetsroni, 2007). While the total amount of time spent with television does not seem to be associated with adolescent sexual activity (Brown & Newcomer, 1991; Collins, 2005; Ward, 2003), some research suggests exposure to sexual content on television (e.g., sexually oriented genres; programs with high sex content) is associated with expectations about sex, perceptions of peer sexual behavior, sexually permissive attitudes and sexual initiation (Ashby, Arcari & Edmonson, 2006; Brown et al., 2006; Collins, Elliot & Miu, 2007; Eggermont, 2005; L'Engle, Jackson & Brown, 2006; Pardun, L'Engle & Brown, 2005; Tolman, Kim, Schooler & Sorsoli, 2007; Ward, 2003; Ward & Friedman, 2006).

For example, Brown and Newcomer (1991) found that neither the total number of hours exposed to television nor the total number of hours exposed to sexual content on television were related to sexual behavior. However, 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, Elliot, Berry, Kanouse, Kunkel, Hunter & Miu (2004) used a two wave longitudinal survey of 12-17 years olds and found that watching sex on television (based on a content analysis of 23 television programs) predicted and possibly hastened sexual initiation, while 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, 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 cross-sectional association between sexual content in media other than television (i.e., movies, magazines, newspapers, music, the Internet) and adolescents' (i.e., ages 12-14) 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) were found with exposure to sexual content in movies and music. The longitudinal study of the same sample conducted by Brown et al. (2006) also moved beyond examining the effects of television. The authors estimated the cumulative effects of sexual content exposure from music, movies, television, and magazines on the sexual behavior of White and Black "early adolescents" (ages 12-14) using baseline data collected in 2002 and follow-up data collected in 2004. They found that White youth with higher sexual media consumption were more likely than White youth with lower consumption to have engaged in sexual activity two years later. However, for these 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. For African-American adolescents there was no significant effect of exposure to sexual content on their sexual behavior. In summary, there is some evidence for a causal relationship between sexual behavior and exposure to sexual content across several types of media; however the relationship seems conditional on the race of the respondent. Additionally, how adolescents' exposure to sexual media content changes over time is unknown.

Research Questions

In this paper, we estimate the longitudinal relationship between sexual behavior and exposure to sexual media content using data on sexual behavior and a respondent-based measures of exposure to sexual content in four different media: television, music, magazines, and video games. Our data are unique in this area of research because we followed 14-16 year old adolescents over 3 years and therefore are able to use growth curve modeling to investigate the exposure-behavior relationship. We use growth curve modeling because it constitutes a flexible data analysis strategy that addresses two research issues relevant here: computing associations between change over time in sexual behavior and change over time to exposure

to sexual media content (Cheong, MacKinnon & Khoo, 2003), and identifying gender and ethnicity differences (if any) in this longitudinal process (Barnes, Reifman, Farrell & Dintcheff, 2000; Fergus, Zimmerman, & Caldwell, 2007). The following research questions are considered:

1. What is the change in sexual behavior and exposure to sexual media content by age of the respondent? This research question focuses on changes over time of the two outcome measures and is answered in a growth curve context by estimating the trajectories of sexual behavior and of exposure to sexual content by age.
2. Does the amount of exposure to sexual media content at age 14 influence the trajectory of subsequent sexual behavior? This question is answered in a growth curve context by estimating the correlation between the initial value of exposure (e.g., at age 14) with the slope of change over time in sexual behavior.
3. Does the amount of sexual activity at age 14 influence the trajectory of subsequent exposure to sexual content in the media? This question is answered in a growth curve context by estimating the correlation between the initial value of sexual behavior (e.g., at age 14) with the slope of change over time in exposure to sexual media content.
4. How is the change over time in sexual behavior and change over time in exposure to sexual media content related? This question is answered in a growth curve context by correlating the slope of change in sexual behavior with the slope of change in exposure to sexual media content.
5. Do the initial values, parameter correlations, and trajectories of sexual behavior and exposure to sexual media content differ between gender and/or ethnicity? That is, is there an interaction between the parameter values and gender and/or ethnicity? This question is answered in a growth curve context by predicting the parameters of the growth curves using demographic characteristics of the survey respondents.

METHODS

The Annenberg Sex and Media Study (ASAMS) is a five-year investigation of the relationship between sex in the media and self-reported sexual behavior in adolescents. It was designed to investigate whether sexual content in the media shapes adolescents' sexual development. In ASAMS, the analytic variables used are guided by the *integrative model of behavioral prediction* (Ajzen & Albarracín, 2007; Fishbein, 2000), which is a combination of the theories of reasoned action, planned behavior, the health belief model, and social cognitive theory.

Study Design and Participants

Data collection took place via a Web-based survey fielded during the spring and summer of 2005, 2006, and 2007. Adolescent respondents were recruited through print and radio advertisements, direct mail, and word of mouth to complete the survey. Recruitment was best achieved for Black respondents (49%) by *Metro* ads (*Metro* is a free newspaper distributed via street corner bins and on the public transportation system in Philadelphia) followed by word of mouth (14%) or an unknown method (14%). White and Hispanic respondents showed a more equal mix of methods. The three best methods for White respondents were *Metro* ads (27%), through respondents earlier recruited (23%), and via direct mail (14%). The three best methods for Hispanic respondents were *Metro* ads (28%), through respondents earlier recruited (23%), and word of mouth (13%).

Respondent eligibility criteria included age at the time of the initial survey (14, 15, or 16) and race/ethnicity (White, African-American, or Hispanic). The sampling strategy was quota-driven with a desire for roughly equal sample sizes in all Race*Age*Gender cells (a 3*3*2

design). In practice, adolescent Hispanic respondents in the Philadelphia metropolitan area were extremely difficult to locate and recruit, so their cell frequencies are low. The survey was launched in April 2005 following a test of the technology and a pre-test of the survey instrument. Incompletion rates (e.g., the number not completing the first survey divided by the number successfully consented) were similar for Black and Hispanic respondents (17% and 19% respectively) and lower for White respondents (6%). There was no difference in incompletion rates by gender (males = 14%, females = 13%).

The 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). Respondents were assigned a password to access the survey, as well as an identification number and personal password to ensure confidentiality and privacy protection. Respondents were compensated $25 dollars upon completion of the survey at each wave, and on average, took one hour to complete the survey. Those respondents who completed all 3 waves of the survey received a bonus of $25. After submitting respondent assent/parental consent forms, 547 adolescents ages 14 to 16 completed the survey at Wave 1 (in 2005). There are a small number of missing values although retention rates over the three waves of data collection were high (87% of the initial sample were successfully recontacted in all waves and 94% of the initial sample participated in at least 2 of 3 waves) and the data set used here is limited to 506 respondents who are present in the data set for at least 2 of the 3 waves of data collection. The respondents are 62% female, 42% African-American, 42% White, 13% Hispanic, and 3% “Other.” For White respondents, the sample sizes in year 1 by age (14, 15, and 16) were 67, 73, and 73 respectively, for Black respondents were 74, 76, and 73 respectively.

Dependent Variable: Sexual Behavior Index Score

The survey collected data for lifetime, more than a year ago, and during the past 12 months on the following *sexual behaviors*: deep kissing (item: Have you ever participated in deep kissing (some people call this “French kissing”)?), touching the breasts of a female partner (item: If you ever have had a female partner, did you touch her breasts?), the respondent having their breasts touched (item: Have you ever had your breasts touched by a partner?), genital touching of the respondent by a partner (item: *Has a partner ever touched your private parts?*), the respondent giving oral sex (item: Have you ever put your mouth on a partner’s private parts (some people cal this “oral sex”)?), the respondent receiving oral sex (item: Has a partner ever put their mouth on your private parts (some people call this “oral sex”)?), the respondent receiving anal sex (item: If you ever had a male partner, has he ever put his penis in your anus (some people call this “anal sex”)?), the respondent giving anal sex (asked of males only, item: Have you ever put your penis in your partner’s anus (some people call this “anal sex”)?), and having vaginal sexual intercourse (item: Have you ever had sexual intercourse (i.e., a penis in the vagina) with a partner of the opposite sex?).

Because the age range is limited, we focus on the *lifetime* items because many of the behaviors are rare or zero using shorter recall periods. We limit the analyses to heterosexual behaviors, so the breasts touched and the receiving anal sex variables are used only with females, and the touching breasts and giving anal sex variables are used only with males. We also drop from the analysis 6 males who have received anal sex because their inclusion reduces the hierarchical nature of the index for males. These respondents did not report any lifetime occurrence of vaginal sex so our heterosexual behavioral index is probably inappropriate for them.

We used Mokken scaling to assess the scalability of the dichotomous sexual behavior items. Mokken scaling is based on difficulty ordering, such that all items after the initial failure are also failed and all items before the initial failure are passed (Ringdal, Ringdal, Kaasa, Bjordal, Wisløff, Sundstrøm & Hjermstad, 1999). If the items scale using this definition, the items are

considered difficulty ordered, and the researcher knows precisely what a "2" (for example) on the index score means. In this instance, a respondent with a "2" performed the first two sexual behavior items and did not perform the last 5. This is the interpretive advantages of difficulty ordering: the value of the summative index indicates which items were passed and which were failed. Scaling sexual behaviors in this way provides researchers with an index reflecting a "sexual behavior hierarchy."

Item sets are evaluated for difficulty-ordered unidimensionality using Loevinger's *H* coefficient (Ringdal et al. 1999); a value of .5 or more indicates a strong scale (Mokken, 1971, p. 185). For each year, the items scaled well: *H* for males was 0.75 in year 1, 0.70 in year 2, and 0.77 in year 3; H for years 1 to 3 for females was 0.83, 0.84, and 0.83 respectively. Average sexual behavior index scores by study wave were 2.71 (*SD* = 2.23), 3.62 (*SD* = 2.26), and 4.46 (*SD* = 2.17) for years 1, 2, and 3 respectively. The ordering of the behaviors across genders was: deep kissing, touching breasts/breasts touched, genital touching, receiving oral sex, vaginal sex, giving oral sex, and receiving/giving anal sex. However, for males in year 2, the order of receiving oral sex (45%) and reporting vaginal sex (44%) is reversed (by 1%) compared with Year 1. In year 3 the order for males is identical to year 1. For females, the order of the behaviors is consistent across all three data collection years. More detail on difficulty-ordering as applied to these data can be found in Hennessy, Bleakley, Fishbein & Jordan (2008).

Dependent Variable: Exposure to Media Sexual Content

Our measure of exposure to media sexual content was calculated based on 2 types of variables: the respondents' self reported exposure to selected media titles in 4 media (television, music, magazines, and videogames) and the respondents' rating of sexual content in each of the media titles. The lists were constructed to reflect popular titles for teenagers and/or the general public at the time of the baseline survey and were updated for years 2 and 3. 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. In year 1 of the study, the survey included lists of 30 television programs, 30 music artists, 20 magazine titles, and 15 videogames. In year 2 of the study the list included 75 television titles, 50 music artists, 30 magazines, 40 movies, and 40 videogames, and in year 3 of the study the list included 74 television shows, 39 music artists, 32 magazines, 43 movies, and 45 videogames. For this analysis, however, movies are not included in the all media sexual content exposure measures to maintain comparability across time.

Self-reports, rather than the results of content analysis, were used because only self-report measures were collected during all three years of the survey. However, the correlations between exposure measures based on respondents own sex content ratings (as used here) and those based on the content analysis sex content ratings (for years 1 and 2, there was no content analysis of year 3 titles) were positively correlated (r = .75 in year 1 and r = .77 in year 2). In addition, the correlations between the exposure measure based upon self-reported sexual content and the sexual behavior index were very similar to the correlations between the exposure measure based upon the content analytic ratings of sex content and the sexual behavior index: The year 1 correlation between the sexual behavior index and the respondent-based exposure measure was .20 ($p < .01$) while the year 1 correlation between the sexual behavior index and the content-analysis-based exposure measure was .23 ($p < .01$).

Using an ordinal measure of exposure on a 4-point scale (never, rarely, sometimes, often) respondents indicated how frequently within the last 12 months they watched each show, listened to each artist, read each magazine, and played each videogame. Next, the respondents were asked to assess the sexual content of those same titles based on the following definition of sexual content: "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 for which respondents were asked to rate the sex content of the media 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 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." Another response option, "I don't know/I don't watch this show," was also included since respondents were asked to rate the sexual content of each title even if they indicated earlier that they had never been exposed to that particular media title. However, only the sexual content of the media titles to which they were exposed are included in our measure of exposure to sexual media content.

To calculate the sexual content exposure measure, the cross product of the exposure measure and the sexual content rating for each title was summed within each type of media, resulting in sex content exposure measures specific to television, music, magazines, and videogames. The total media sexual content exposure measure was created by summing the 4 media specific measures. For the exposure measure in the current analysis, the square root transformation was imposed on the total measure to better approximate a normal distribution and then this variable was transformed into Z scores. The latter adjustment is necessary because otherwise there could be larger values in later years purely due to the fact that more media titles were evaluated in years 2 and 3. Thus, for all three waves of the study, average exposure scores were 0 with a standard deviation of 1 (note that this transformation does not imply that exposure scores by *age group* all have identical means, see Figure 1 below). Pearson correlations between total sexual content exposure in year 1 and year 2 was $r = 0.61$ ($p < .05$) and for year 2 and year 3 was $r = .68$ ($p < .05$). Additional validity information of for the exposure to sexual content in the media measure is available elsewhere (Bleakley, Fishbein, Hennessy, Jordan, Chernin & Stevens, 2008).

What are Growth Curves?

Growth curve analysis is a statistical method for measuring change over time in an outcome variable (Curran & Hussong, 2002; Karney & Bradbury, 1995). It assumes that change is a continuous process, so estimating the slope of change over time in the dependent variable is the primary research question (Curran & Muthen, 1999). Non-time dependent variables (e.g., gender, experimental status, and race/ethnicity) can be included as predictors for statistical adjustment purposes or to investigate interactions between change over time and these fixed characteristics.

The Unconditional Equation

Growth curves typically have two different forms: unconditional and conditional. The unconditional equation predicts an individual respondent's values of the two outcome variables (e.g., the respondent's sexual behavior score or the respondent's exposure to sexual media content) as a function of time. This equation assumes that the dependent outcome variables are a function of two parameters: (1) the initial value of sexual behavior or exposure to sexual media content at the youngest age and (2) the slope of change over time. In equation form, the unconditional growth model is:

$$\text{Outcome}_{it}=\eta_{i0}+\eta_{i1}(\text{Time Metric})_t+\text{error}_{it}. \quad (1)$$

The "i" subscript reflects individual observations, the Time Metric is the time scale, the $\boldsymbol{\eta}_{i0}$ is the value of the latent intercept when the Time Metric is zero, the $\boldsymbol{\eta}_{i1}$ is the regression coefficient indicating the latent slope of time for each individual, and the "t" subscript represents the ordering of the observations. Thus, the error term defines the individual (e.g., "within subject") measurement errors of the outcomes for each observation. This formulation of the growth curve model is used to address research question numbers 1 through 4.

The Conditional Equation

One important implication of the growth curve approach is that because the intercept ($\boldsymbol{\eta}_{i0}$) and slope ($\boldsymbol{\eta}_{i1}$) parameters of the equation vary across individuals (note the respondent specific subscripts on the intercept and slope parameters in equation (1) above, something that never occurs in "ordinary" regression), they can be treated as dependent variables in auxiliary equations that predict the initial value and slope of the outcome. Known as a "conditional growth model," the auxiliary equations predict the parameters (e.g., the intercept and slope) of the individual equation (Bollen & Curran, 2006, p. 9). Here we use gender and ethnicity as predictors to address research question number 5.

For all analyses we estimate the unconditional and conditional models simultaneously — a "parallel process" growth model (Cheong, MacKinnon & Khoo, 2003). This type of growth model allows for the estimation of the correlation between *changes* in sexual behavior and *changes* in exposure to sexual media content, as well as the correlations between the parameters of each equation.

Defining the Time Variable

Although the ASAMS project collected data for three years, this longitudinal structure (i.e., wave of the study) is not appropriate because the planned variability in respondent's age at the beginning of the study confounds wave of study with age of respondent. That is, in each of the three waves of the study, respondents of three different ages are arbitrarily combined in a way that is not meaningful because "wave of the study" is a logistical feature of the data collection process: the *age of the respondent* is the primary developmental predictor (Bollen & Curran, 2006, pp. 79-81; Singer & Willett, 2003, p. 139). Confounding study wave and age of the respondent could easily have negative consequences since sexual behavior, at least, is positively related to age. Thus, to unconfound the respondent's age with the study wave, we reorganize the data into an "accelerated cohort" design (Duncan, Duncan, Strycker, Li, & Alpert, 1999, Chapter 6; Raudenbush & Chan, 1992) so that age of the respondent is the longitudinal variable of interest. The result is five years of data ranging from 14 years olds in the first wave of the study to 18 year olds in the last wave, even though no respondent has more than three observations in the data set as a whole.

Statistical Analysis

Structural equation modeling using Mplus (Muthén & Muthén, 1998-2007) was used to estimate both the unconditional and the conditional growth models. Because Mplus uses an advanced form of maximum likelihood estimation (Enders & Bandalos, 2001), it can analyze data sets that have missing values, which is important here because the restructuring of the data when an accelerated growth design is used automatically generates missing values when respondents are not observed at all the chronological ages observed in the sample. We also find that the SEM approach to growth curve analysis is easier to implement when more than one growth curve needs to be estimated at the same time, as is the case here when we look at

the associations between changes in exposure to sexual media content and changes in sexual behavior.

RESULTS

Descriptive Statistics on Exposure Score and Sexual Behavior Index

Figure 1 uses bar charts to show the average of the sexual behavior index and the exposure to sexual media content score for the entire sample, by gender, and by race. For the total sample, the average sex behavior score increases with age, and the trend is similar for exposure with values less than the mean for ages 14-15 and higher than the mean for ages 16 through 18. Subgroup results are displayed in the bottom section of Figure 1; because of small Hispanic (N = 64) and "Other" (N = 15) sample sizes, we show only the results for White and Black respondents. For both males and females and Blacks and Whites, average sex scores increase with age. While average exposure to sex content scores also increase with age for White and male respondents, the average exposure scores are relatively constant for females and Black respondents.

The Pearson correlations between the sex score and sex content exposure are only modest and they vary as a function of age-group. More specifically, the correlations decline with age of the respondent: For fourteen year olds, the correlation is .26 (N = 167, $p < .05$, CI = .12 to 0.40), for fifteen year olds it is .18 (N = 330, $p < .05$, CI = 0.08 to 0.29), for sixteen year olds it is .15 (N = 490, $p < .05$, CI = 0.08 to 0.25), for seventeen year olds it is .10 (N = 319, $p > .05$, CI = -0.04 to 0.18), and for eighteen year olds it is .11 (N = 148, $p > .05$, CI = -0.06 to 0.26).

Growth Curve Results: Estimating the Best Fitting Time Metric

Analyses of the unconditional models (not shown) with a time metric free to vary (Biesanz, Deeb-Sossa, Papadakis, Bollen & Curran, 2004) shows that a linear model for age is an excellent fitting time metric for the sexual index outcome. Thus, for this equation the time metric is defined as *Age minus 14* or 0 through 4 (e.g., 14-14 = 0; 15-14 =1; 16-14 =2, etc.). This metric makes the intercept term the predicted sex index score for fourteen year olds. Because the metric is linear, the change from 14 to 16 is twice as large as the change from 14 to 15, and the change from 14 to 18 is four times as large. However, the best fitting time metric for exposure was non-linear and a good fitting metric suggested by analyses allowing the time metric to vary is 0, 1, 1.5, 2, 2.25. Here, the change from 14 to 16 is only 1.5 times as large as the change from 14 to 15, and the change from 14 to 18 is only 2.25 times as large as the change from 14 to 15. In this non-linear case, if the slope of exposure over time is positive, this time metric produces a positive slope that flattens with increasing age, but if the slope of exposure over time is negative, a negative slope that flattens with increasing age is estimated.

Unconditional Growth Curve Results

Table 1 presents the results of the unconditional growth curve analysis. The fit of the model is good. The sexual index results show a predicted equation of 1.82 + .89(Time). The 1.82 is the predicted value of the sex index for 14 year olds and the slope of .89 indicates an increase of almost one sexual index unit per age increment for the sample as a whole. The negative correlation between the intercept and the slope indicates that the higher the initial value of the sex index, the lower the slope of change, that is, the slower the increase in sexual behavior by age. This is a reasonable result given the ceiling effects of an index that goes from 0 to 7. The intercept and slope have significant variation, so there are between subject differences in these parameters that might be explained by respondent characteristics

The unconditional equation for exposure to sexual content is -.041 + .025 (Time) indicating lower than average exposure for 14 year olds compared with older respondents and a positive increase in exposure to sexual content over time, although neither the intercept nor the slope is significantly different from zero. However, both parameters have significant variation which suggests that the respondents are variable over time and the unconditional average results may not necessarily be representative of certain subgroups. The negative correlation between the intercept and slope for exposure to sexual media content indicates that higher the initial value of exposure, the slower the increase in exposure to sexual content over time.

Research questions 2, 3, and 4 are answered by the intercept/slope correlations across the two equations. The correlation for initial value of exposure predicting the slope of sexual behavior is -.14 ($p > .05$) and the correlation between the initial value of sexual behavior with the slope of exposure to sexual media content is -.21 ($p < .05$). For the sample as a whole then, although the initial value of exposure does not predict changes in sexual behavior, the initial value of sexual behavior does predict change in exposure, with higher initial values of sexual behavior being associated with slower increases in exposure to sexual content over time. Finally, the correlation between the two slope values is .09, which is positive but not discernable from zero. For the sample as a whole, changes in exposure to sex content and changes in sexual behavior are essentially unrelated. However, the conditional analysis, presented below, presents a very different picture of the complex relationship between sexual behavior and exposure to sexual media content.

Respondent Characteristics and the Association between Sexual Behavior and Exposure to Sexual Media Content: Conditional Growth Curve Results

Examining respondent differences in the growth curves of sexual behavior and exposure to sexual media can be done using a variety of approaches. To address research question 5 in a comprehensive manner, we first predict the parameters of the sexual index and exposure to sexual media content equations by gender (i.e., male) and race/ethnicity of the respondent. The results are shown in Table 2. Given the predictors, the simple growth equations refer to *White females.* For sexual behavior the slope of change over time appears to be a constant (about .9) for all respondents because all the conditional slope effects are not significant. Only the average level of the sexual behavior index (i.e., the intercept equation) differentiates between respondents, with Black and Hispanic respondents at a significantly higher level of sexual activity than Whites at the earliest age. As was the case with the unconditional results, the intercept/slope correlation for sexual behavior is negative.

This conditional model for exposure to sexual content in the media indicates that there are both initial level (e.g., intercept) and slope differences as a function of gender and ethnicity. With respect to the intercept, females at 14 are exposed to significantly more sex content than are males and Black and Hispanic respondents at 14 are exposed to significantly more sex content than are Whites. In addition, the increase in exposure over time (i.e., the slope of the exposure equation) is significantly lower for Black and Hispanic respondents than for Whites. There is no difference between the slope of change in exposure for males and females.

In sum, the conditional model results shown in Table 2 demonstrates differences in intercepts between Whites vs. Blacks and Hispanic respondents in both sexual behavior and exposure to sexual content as well as differences in intercepts of exposure for males vs. females. In addition, although there are no significant differences in slopes of sexual behavior as a function of gender or race/ethnicity, there are differences in the slopes of exposure for Whites vs. Blacks and Hispanics.

Using the conditional results, we can reconstruct the estimated averages (“fixed effects”) for specific gender and ethnicity groups. Because of the small sample size for Hispanics, we restrict

the examples to only White and Black respondents. Figure 2 plots the estimated trajectories of sexual behavior (on the left axis) and exposure to sexual media content (on the right axis) for males and females by ethnicity. For the sexual behavior index, we already know that none of the slopes are significantly different from each other but the intercepts for Black adolescents are different from White adolescents. The results for exposure to sexual media content are more complicated. Black adolescents (of either gender) have essentially a flat slope as a function of age while White respondents (of either gender) show a positive change with age. White respondents have the lowest initial values of exposure to sex content at age 14 and show increases with age. This increase is especially marked for White males.

The differential slope patterns suggest that all the correlations between the slope and intercept of the exposure equation and the slope and intercept of the sex behavior equation are different for White and Black respondents. To focus on these exposure/sexual behavior associations, the unconditional analyses estimated separately for White and Black respondents are shown in Table 3. It shows very similar results for the two groups for the sex equation slope (about one sexual index score increase per year) but different initial averages at age 14 (about one sexual unit score higher for Black respondents than for White respondents). But the correlations between the parameters of the two equations are different for the two groups. The correlation between changes in exposure and changes in sexual behavior, although not quite statistically significant, is positive for White respondents ($r = .46$, $p = .064$) but essentially zero for Black respondents ($r = .03$, $p = .85$). In fact, for Black respondents only the intercept/intercept correlation ($r = .26$) is significant across the two outcomes: this shows that being at a higher value on the sex score at 14 is related to a higher value of exposure at the same age. In contrast, all the parameters are significant or near significant for White respondents. That is, among Whites, the higher the initial level of exposure to sex content, the slower the growth in sexual behavior over time. Similarly, the higher the initial level of sexual behavior, the slower the growth in exposure to sexual content over time. In addition, and similar to Black respondents, the intercept/intercept correlation is positive and significant ($r = .42$). Of course, the correlations reflect the group-specific patterns of the slopes and intercepts for the two outcomes that were displayed in the graphs of Figure 2: because the slope of change over time in exposure for Blacks is essentially zero, this slope parameter must display low correlations with all the parameters of the sex behavior equation.

DISCUSSION

Our results imply that the association between sexual behavior and exposure to sexual media content is a complicated one. First, the growth trajectories for exposure are not linear. In addition, the signs of the exposure slopes are not uniformly positive; Black and Hispanic respondents show declines of exposure to sexual media content over the age range investigated here. Both non-linearities and negative slopes in one group and positive slopes in another group attenuate the overall correlation between the slope of change of sexual behavior and the slope of change for exposure to sexual media content. Thus, for the sample as a whole the correlation between changes in sexual behavior and changes in exposure to sexual media content over time is .09. However, the differential slopes for exposure suggest that the group specific correlations between exposure to sexual media content and sexual behavior are different for White versus Black respondents.

The idea that media effects are different for adolescents of different racial/ethnic groups is not a new one. Empirical evidence from Brown et al. (2006) suggests that White adolescents are more affected by sexual content in the media than are their Black counterparts. Our analysis is consistent with their findings in that the correlation between changes in exposure and changes in sexual behavior was much higher for White respondents than for Black respondents.

For both sexual behavior and exposure to sexual media content there are pre-existing ethnic and gender differences between respondents even at the earliest ages we investigated. Results from O'Sullivan, Cheng, Harris, & Brooks-Gunn (2007) are consistent with our findings that show that the average Black and Hispanic respondent (of either gender) is more than one sexual index unit higher than other respondents at age 14. In addition, given that Blacks use more media than Whites, the initial differences between Black and White respondents on exposure to sexual media content is not unusual. Hispanics and Blacks are higher in average exposure to sexual media content than Whites and others, and, in this case, there is also a gender effect: Females at age 14 have higher exposure to sexual content than do males at the same age. We know of no other study that uses longitudinal data to track exposure to sexual media content over time for different race/ethnic groups, so it is impossible to determine how typical these results are.

One implication of both of these findings (as well as the declining cross sectional correlations between the sexual behavior index and exposure to sexual content in the media) is that the current sample may be "too old" to fully capture the association between exposure to sexual media content and sexual behavior. That is, at age 14 Hispanic and Black respondents already differ from White respondents with respect to both exposure to sexual content and sexual behavior. Because the sex index is a cumulative index with a zero start point, at some age all the respondents were at a zero value, so it is not possible for their slopes over time to be parallel. Thus, what we observe here is a case where the respondents have already diverged in average value by age 14. For exposure to sexual content, we do not know *a priori* that all the respondents started at the same value, but here too we observe pre-existing differences between respondents at the earliest age in the sample.

The current method of measuring exposure to sexual media content can easily be applied to a younger population, but the same is probably not true of the sex behavior scale, for both behavioral and ethical reasons. What will be necessary is a "sex behavior scale" calibrated to a younger age population, a scale that would have fewer "sex items" and more items addressing romantic relationships and "pre-coital" behaviors. For example, Jakobsen (1997) reported on a nationally representative Norwegian sample of adolescents from 13-16 years of age. His focus was on difficulty scaling of the non-coital behaviors "going steady," "kissing," "French kissing," "light petting," and "heavy petting." O'Sullivan et al. (2007) investigated social, romantic, and sexual behaviors for adolescents as young as 12 years old and used behavioral report items like "met partner's parents", "thought of themselves and partner as a couple", and "exchanged gifts". O'Donnell, Stueve, Wilson-Simmons, Dash, Agronick & JeanBaptiste (2006) collected data from 6th graders (median age was 11) and included such pre-coital sexual items as "Have you ever held hands with a boy or girl?" and "Have you ever kissed or hugged a boy or girl for a long time?" It is likely that items like these would have to be included as part of a "sexual behavior index" for younger respondents, especially because Pardun, L'Engle and Brown found that 25% of their "sexual content" exposure items in six media consisted of relationship related content issues such as romantic crushes, dating, marriage, and divorce (Pardun, L'Engle and Brown, 2005, p. 86).

There are limitations to our findings. First, due to the sampling strategy the generalizability of these findings is limited to only those youth enrolled in the study. However, the findings are consistent with data from more representative samples. Also, small sample sizes of Hispanics and other racial/ethnic groups result in unstable estimates within these groups. One other conclusion is also important to note. These results suggest that it is unlikely that there will be some single summary statistic like a correlation or slope measure that will answer the question "What is the relationship between adolescent sexual behavior and exposure to sexual media content?" Different functional forms combined with combinations of slope and intercept differences across groups for both outcomes make any sort of summary measure difficult to

defend. In order to understand the complicated relationships between exposure to sexual media content and adolescent sexual behavior it will be necessary to consider larger and more heterogeneous longitudinal samples of younger adolescents.

Finally, the analysis here does not address the causal direction of behavior and exposure because the association among the slopes and intercepts of the sexual index and sexual content exposure curves are contemporaneous. Causal direction in this area of research is inherently ambiguous although other analyses of these data suggest that the sexual behavior-exposure to sexual media relationship operates non-recursively (Bleakley, Hennessy, Fishbein & Jordan, 2008) in which exposure causes behavior and behavior causes exposure (Slater, 2007). Investigating the simultaneous nature of the relationship between sexual behavior and exposure to sexual media content is another research problem that warrants more detailed investigation.

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Biography

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Amy Jordan is ddirector of the Media and the Developing Child sector of the Annenberg Public Policy Center of the University of Pennsylvania, where she oversees research on children's media policy. Her studies have examined the implementation and public reception of the educational television mandate known as the Three-Hour Rule, the V-Chip legislation, the American Academy of Pediatrics' media use recommendations and the industry's efforts to self-regulate food marketing to children. Dr. Jordan is the recipient of the International Communication Association's Best Applied/Policy Research Award and the National Communication Association's Stanley L. Saxon Applied Research Award.

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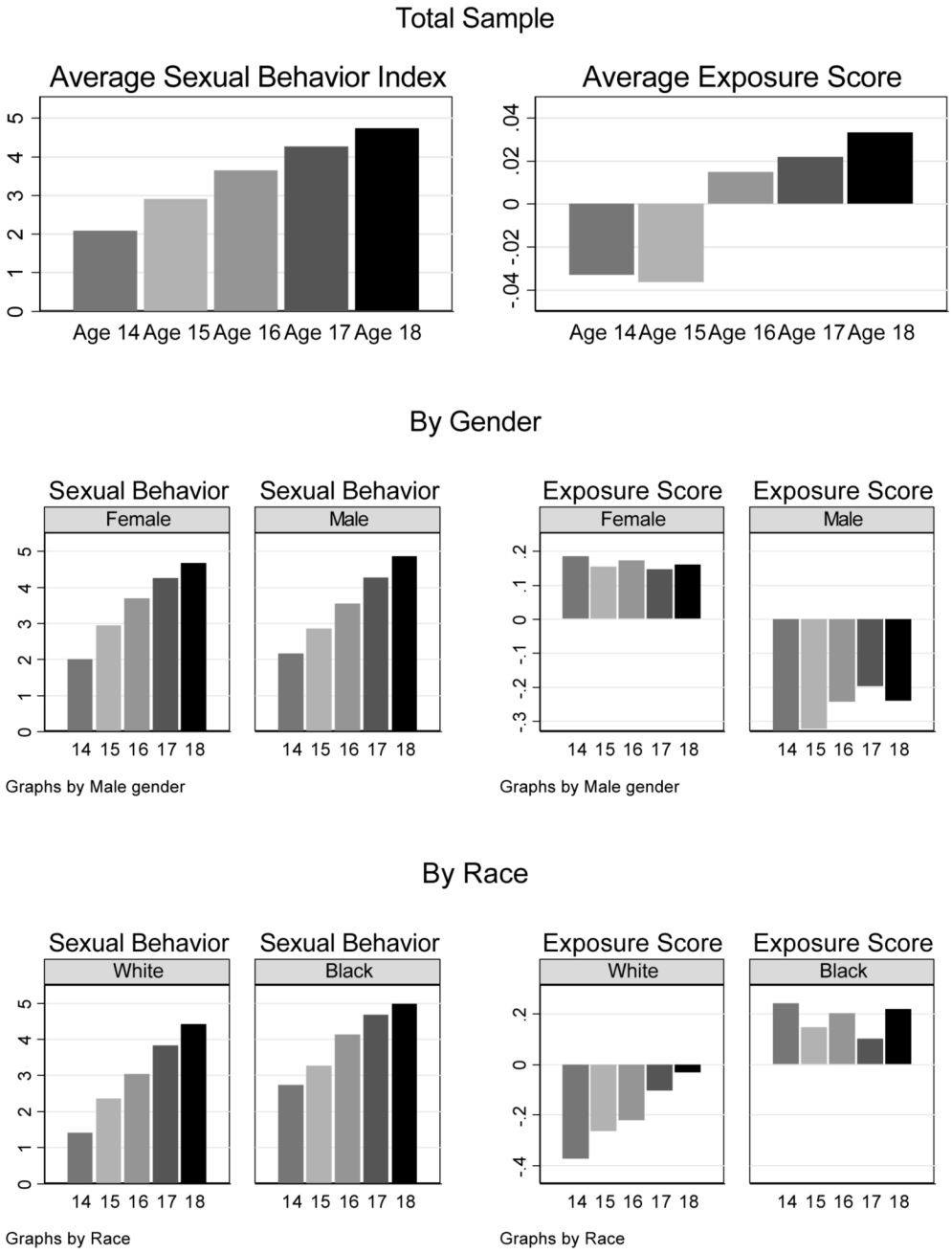

Figure 1.
Sexual Behavior Index and Exposure Score

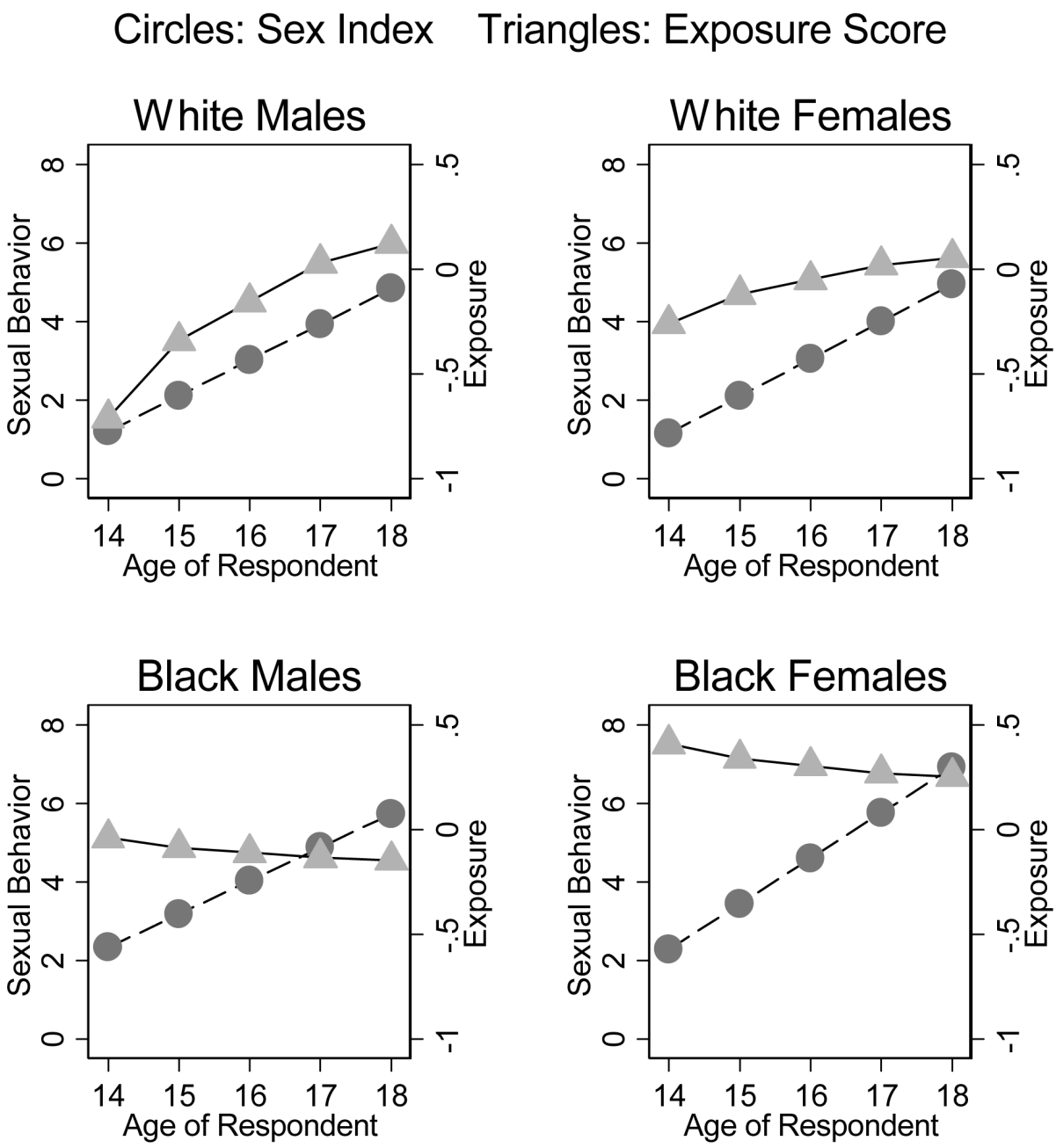

Figure 2.
Developmental Trajectories

Table 1

Results for Unconditional Parallel Process Growth Mode of Sex Score Index and Exposure to Sexual Media Content (N = 506)

	Unconditional Parallel Process Model	
	Sex Score Index	**Exposure to Sexual Media Content**
Growth Equation	***1.82*** + ***.89*** (Time)	-.041 + .025 (Time)
Intercept Variance	***5.35***	***.95***
Slope Variance	***.34***	***.21***
Slope/Intercept Correlation	***-.49***	***-.61***
Correlations Between Across Equation Parameters	*r* between intercept of exposure and slope of sexual behavior = -.14 *r* between intercept of sexual behavior and slope of exposure = ***-.21*** *r* between slope of sexual behavior with slope of exposure = .09	
Fix Indices	χ^2 = 93.52, *df* = 37, *p* < .05 TLI =.97, RMSEA = .055 (0.041 0.069)	

Notes: N = 506. Statistically significant entries are bold, italic. Time metric for sex index is 0, 1, 2, 3, 4. Time metric for exposure is 0, 1, 1.5, 2, 2.25.

Table 2

Results for Conditional Parallel Process Growth Mode of Sex Score Index and Exposure to Sexual Media Content (N = 505)

	Conditional Parallel Process Model	
Growth Equation	***1.15*** + ***.95***(Time)	***-.26*** + ***.14***(Time)
Equation for Intercept	***1.13*** (Black) + ***1.50*** (Hispanic) -.26 (Other Race) + .05 (Male)	***.67*** (Black) + ***.85*** (Hispanic) + .34 (Other Race) - ***.45*** (Male)
Equation for Slope	-.06 (Black) -.21 (Hispanic) +.21 (Other race) -.04 (Male)	***-.21*** (Black) ***-.32*** (Hispanic) -.19 (Other race) + .02 (Male)
R^2 Intercept	***.07***	***.18***
R^2 Slope	.02	.07
Error Variance	***.73***	***.32***
Fit Indices	χ^2 = 131.35, *df* = 61, *p* < .05 TLI = .95, RMSEA = .048 (0.036 0.059)	

Notes: One respondent is missing the race classification. Default conditional growth equation applies to white females. Statistically significant entries are bold, italic. Time metric for sex index is 0, 1, 2, 3, 4. Time metric for exposure is 0, 1, 1.5, 2, 2.25.

Table 3

Results for Unconditional Parallel Process Growth Model of Sex Score Index and Exposure to Sexual Media Content for White and Black Respondents Separately

	Unconditional Parallel Process Model			
	Sex Score Index		**Exposure to Sexual Media Content**	
	White Respondents	**Black Respondents**	**White Respondents**	**Black Respondents**
Growth Equation	***1.17*** + ***.94***(Time)	***2.29*** + ***.88*** (Time)	***-.44*** + ***.16***(Time)	***.21*** - .04(Time)
Intercept Variance	***3.53***	***5.79***	***1.0***	***.62***
Slope Variance	***.24***	***.36***	***.11***	***.22***
Slope/Intercept Correlation	-.18	***-.66***	***-.58***	***-.60***
Correlations Between Across Equation Parameters	White Respondents: *r* between intercept of exposure and slope of sex: ***-.32*** *r* between intercept of sex and slope of exposure = ***-.47*** *r* between intercept of sex and intercept of exposure = ***.42*** *r* between slope of sex and slope of exposure = .46 Black Respondents: *r* between intercept of exposure and slope of sex: -.05 *r* between intercept of sex and slope of exposure = -.19 *r* between intercept of sex and intercept of exposure = ***.26*** *r* between slope of sex and slope of exposure = .03			
Fix Indices	White Respondents: χ^2 = 70.5, *df* = 37 , *p* < .05. TLI =.96, RMSEA = .065 (0.04 .09), N = 213. Black Respondents χ^2 = 69.6, *df* = 37 , *p* < .05. TLI =.95, RMSEA = .064 (0.04 .09), N = 213.			

Notes: Statistically significant entries are bold, italic. Time metric for sex index is 0, 1, 2, 3, 4. Time metric for exposure is 0, 1, 1.5, 2, 2.25.