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Seeing is (Not) Believing: How Viewing Pornography Shapes the Religious Lives of Young Americans

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Abstract

Pornography has become increasingly accessible in the United States, and particularly for younger Americans. While some research considers how pornography use affects the sexual and psychological health of adolescents and emerging adults, sociologists have given little attention to how viewing pornography may shape young Americans' connection to key social and cultural institutions, like religion. This article examines whether viewing pornography may actually have a secularizing effect, reducing young Americans' personal religiosity over time. To test for this, we use data from three waves of the National Study of Youth and Religion. Fixed-effects regression models show that more frequent pornography viewing diminishes religious service attendance, importance of religious faith, prayer frequency, and perceived closeness to God, while increasing religious doubts. These effects hold regardless of gender. The effects of viewing pornography on importance of faith, closeness to God, and religious doubts are stronger for teenagers compared to emerging adults. In light of the rapidly growing availability and acceptance of pornography for young Americans, our findings suggest that scholars must consider how increasingly pervasive pornography consumption may shape both the religious lives of young adults and also the future landscape of American religion more broadly.

Keywords

pornography; religion; religiosity; youth; young adults; early adulthood

Pornography[1] use has become increasingly pervasive in the United States, owing in large part to the greater privacy and ease of access provided by the Internet (Buzzell 2005; Price et al. 2016; Wright 2013; Wright, Bae, and Funk 2013). Not surprisingly, young Americans in recent years, having grown up with life-long access to the Internet, are more likely to view pornography than young Americans in previous generations (Buzzell 2005; Carroll et al. 2008; Price et al. 2016). One recent study using aggregated General Social Survey (GSS) data shows that 62 percent of men and 36 percent of women ages 18–26 in years 2008–2012

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[1]While the term "pornography" may be difficult to define and freighted with moral undertones, national surveys still use the term and thus we follow suit. Following standard practice, we use the term "pornography" to refer to sexually explicit media (Internet sites, magazines, or movies) intended for sexual arousal.

reported viewing an X-rated movie in the previous year, compared to only 45 percent of men and 28 percent of women of the same ages in years 1973–1980 (Price et al. 2016). As pornography use has become more commonplace for adolescents and young adults over the past few decades, a burgeoning literature has sought to understand the antecedents, correlates, and consequences of viewing pornography over the life course (see reviews in Doring 2009; Peter and Valkenburg 2016; Owens et al. 2012; Short et al. 2012).

Among the more consistent findings in research on pornography use has been that religious commitment or religiosity tends to be negatively associated with viewing pornography. Though data are almost always cross-sectional or otherwise preclude testing for directionality, the general assumption in most studies that consider religious factors is that religiosity serves as the independent variable, diminishing pornography use among young Americans via internalized moral proscriptions and social control (Carroll et al., 2008; Hardy et al. 2013; Peter and Valkenburg 2016; Smith and Denton 2005). While this is certainly true to some extent, research has yet to consider how the causal arrow may also be reversed; that is, whether pornography use may have a secularizing effect, serving to diminish religiosity among adolescents and emerging adults under certain circumstances. The answer to that question is not inconsequential. If pornography use weakens attachment to religion among young Americans, as viewing pornography becomes more common with each generation, it may contribute to rising secularization among younger cohorts. Thus, to the extent that younger generations are increasingly exposed to pornographic materials, and to the extent that viewing pornography has a secularizing effect, these factors may shape the future landscape of American religion itself.

Using data from three waves of the National Study of Youth and Religion (NSYR), we examine the effects of pornography use on a variety of religious outcomes over time. We also consider key moderators. We develop several hypotheses drawn from recent studies of pornography use among American adolescents and emerging adults as well as theoretical insights from the sociology of deviance literature. We test our hypotheses using random and fixed effects regression analyses and find that pornography use diminishes religious service attendance, importance of religious faith, prayer frequency and perceived closeness to God, while increasing religious doubts. Testing for moderating effects reveals that pornography's influence on religion holds regardless of gender, while the effects of viewing pornography on importance of faith, closeness to God, and religious doubts are stronger during early teenage years. Our findings suggest that increasing pornography use among younger Americans may not only shape the religious lives of young adults but may also be a catalyst of rising secularization in the United States more broadly (Hout and Fischer 2014; Voas and Chaves 2016).

Empirical Background and Theoretical Framework

Pornography Use among Young Americans

Determining how many people use pornography and how often they use it has always been a challenge, and has become even more difficult due to technological advances that ensure privacy and ease of access. This is particularly true among some adolescents who appear reluctant to discuss their pornography viewing (Regnerus 2007:173–179; Smith et al.

2011:188–192). Estimates of pornography use often vary considerably by definitions and samples studied (Regnerus et al. 2015; Short et al. 2012). Comparing four different national data sets with different measures of pornography consumption (2008–2012 General Social Survey, 2008 National Study of Youth and Religion, 2012 New Family Structures Survey, and 2014 Relationships in America project), Regnerus et al. (2015) show that around 60–70 percent of men and around 20–30 percent of women ages 18–23 report viewing pornography in the past year. These estimates are comparable to those in the 2006 Portraits of American Life Study, which indicates that 71 percent of men and 36 percent of women ages 18–23 report looking at "pornographic material" in the past year. Further, the 2014 Relationships in America survey, which contains a sample of over 15,000 American adults, reveals that 40 percent of men and 19 percent of women ages 18–23 report intentionally viewing pornography in a given week.

Numerous studies have described the social correlates of pornography viewing among the general public. Researchers consistently show that Americans who view pornography are more likely to be younger, male, politically liberal, sexually permissive, slightly more educated, non-white, and less religious by a variety of different measures (see Buzzell 2005; Doring 2009; Poulsen et al. 2013; Perry 2016a, 2016b, 2016c; Wright 2013; Wright et al. 2013). Comparatively fewer studies have focused on pornography use among American adolescents and emerging adults. Similar to Americans in general, pornography is more often consumed by young Americans who are male, more culturally and sexually permissive, open to risky-behaviors, and—though less consistently than for Americans in general—less religious by various measures (Carroll et al. 2008; Goodson et al. 2001; Grubbs et al. 2015; Hardy et al. 2013; Nelson et al. 2010; Owens et al. 2012; Peter and Valkenburg 2016; Regnerus 2007; Short et al. 2015; Smith and Denton 2005; Smith and Snell 2009). Below, we consider more closely the connection between religion and pornography use among American adolescents and emerging adults specifically.

Religion and Pornography Use among Young Americans

Religious beliefs, practices, and communities have always been important factors to consider in studies of both attitudes toward and consumption of pornography (Grubbs et al. 2015; Lykke and Cohen 2015; Regnerus 2007; Regnerus and Uecker 2011; Sherkat and Ellison 1997; Wright 2013). Religions typically teach that the only morally appropriate place for sexual desires and behavior is monogamous, married, heterosexual relationships. Indeed, all three Abrahamic faiths have explicit commands in their sacred texts to avoid even looking at others lustfully, some even equating this act itself with adultery. Consequently, even as pornography use becomes more culturally accepted in the United States, religious groups still strongly oppose it as a form of fornication that incites sexual desires about persons outside of marriage and encourages solo-masturbation (Diefendorf 2015; Regnerus and Uecker 2011; Sherkat and Ellison 1997). Among the studies that analyze religion's relationship to pornography viewing among American adults, findings consistently show that religiosity is negatively associated with viewing pornography. While virtually all studies are cross-sectional, the general assumption is that religiosity is the independent variable, serving to reduce the occurrence or frequency of pornography use (Maddox et al. 2011;

Perry 2016a, 2016b; Poulsen et al. 2013; Price et al. 2016; Stack et al. 2004; Wright 2013; Wright et al. 2013).

While the research on religiosity and pornography use among adults shows a consistent negative association, studies focusing on young Americans have shown mixed results. On the one hand, some studies do affirm that religious commitment is indeed negatively associated with viewing pornography (e.g., Carroll et al. 2008; Grubbs et al. 2015; Hardy et al. 2013; Nelson et al. 2010; Regnerus 2007; Short et al. 2015; Smith and Denton 2005). Focusing on 13–17 year old Americans in Wave 1 of the NSYR, Regnerus (2007) finds a near linear, negative relationship between monthly Internet pornography use and both worship attendance and religious salience (see also Hardy et al. 2013; Smith and Denton 2005:223; Smith and Snell 2009:272). And in various studies with undergraduates, scholars also find that religiosity is negatively associated with any viewing of pornography (Grubbs et al. 2015; Short et al. 2015) and the frequency of viewing pornography (Carroll et al. 2008; Nelson, Padilla-Walker, and Carrol 2010). Other studies of undergraduates, however, find weak or inconsistent results linking religion and pornography use or frequency (Baltazar et al. 2010), while others report no significant differences in pornography viewing across measures of religiosity (e.g., Abell et al. 2006; Goodson et al. 2001). In accounting for the non-significant relationships, Abell et al. (2006) theorize that young religious Americans (and especially males) might rationalize their pornography use as preferable to sexual promiscuity—a justification that has been echoed elsewhere in qualitative research (e.g., Baltazar et al. 2010:36; Regnerus 2007:177). To be sure, much of the inconsistency in these findings may be attributed to the size and nature of the samples studied, with some undergraduates being recruited from conservative Christian or secular colleges and none of them probability samples.

While viewing pornography may be inconsistently related to religiosity among young Americans, findings also show that religious young people are especially troubled by their own pornography use. For example, Regnerus's (2007:178) analysis of qualitative interviews from the NSYR indicates that conservative Christian males feel particularly ashamed and hostile toward their own pornography use, even while it is unclear whether their use patterns differ from other adolescents or emerging adults (see also Diefendorf 2015; Smith et al. 2011). Similarly, several quantitative studies of undergraduates find that religiosity, while not necessarily predictive of pornography use, is related to feeling more anxious about the temptation of the Internet, belief that viewing pornography negatively influences one's relationships, and belief that one has an addiction to pornography (Abell et al. 2006; Grubbs et al. 2015). Accounting for this trend, Grubbs et al. (2015:134) explain that because of the "profound guilt" young religious Americans often experience for violating sacred religious values, in the event that they become somewhat regular users of pornography, "harsh reactions and pathological interpretations would be likely."

Several studies of pornography use among young Americans suggest that these "harsh" or "pathological" reactions described by Grubbs et al. (2015) could involve detachment from one's religious group or religion itself. Though based entirely on convenience samples and cross-sectional data, these studies help lay a foundation for theorizing about pornography's effects on the religious lives of young Americans. In their study of 193 undergraduates at a

religious university, Nelson et al. (2010) find that higher levels of religious practice are negatively related to viewing pornography. While acknowledging that religious practice likely discourages pornography use, the authors also theorize about the possibility that young people feel embarrassed or guilty about their pornography use and thus engage in fewer religious activities. Supporting this idea, in their study of undergraduates at a Christian university, Baltazar et al. (2010) report that among students who had used pornography, 43 percent of males and 20 percent of females felt that it worsened their relationship with God/Christ. Further, 20 percent of males and 9 percent of females reported that using pornography caused them to lose interest in spiritual things. Similarly, Short et al. (2015) studied Internet pornography use among 223 male and female undergraduates. The authors report sentiments among the students that viewing Internet pornography hindered their spirituality and relationship with God. They theorize that young people may experience a form of "scrupulosity," a psychological disorder characterized by pathological guilt, often stemming from violations of deeply held religious convictions. Scrupulosity can impair social functioning, causing individuals to withdraw physically and psychologically from loved ones. The authors speculate that religious young people experience feelings of scrupulosity due to their pornography use violating their sacred value of chastity, thus causing them to withdraw from religious practice and beliefs.

Theorizing Pornography's Effect on Religiosity

Sociological theory and research in the area of deviance supports this notion that pornography use may diminish the religiosity of young Americans. Though not unequivocal on the subject, numerous studies suggest that religiosity, through the mechanisms of social control and internalized moral values, serves as a deterrent to participation in various forms of socially "deviant" behavior like binge drinking, smoking marijuana, and criminal activity (see Baier and Wright 2001; Desmond et al. 2013; Ford and Hill 2012; Johnson et al. 2000; Welch et al. 2006). Yet other research shows that there are also reciprocal effects, with deviant behavior potentially leading to declines in personal religiosity. Benda and Corwyn's (1997, 2000) studies of over 1,000 adolescents find that behaviors like binge drinking or illicit drug use predict declining commitment to religious practices and beliefs. Similarly, Matsueda's (1989) earlier panel study of tenth-grade boys shows a negative effect of minor deviant behaviors (e.g., getting in trouble at school or home) on the likelihood of holding conventional moral beliefs. In several longitudinal studies examining the reciprocal effects of religiosity and relational behaviors among young Americans, Thornton and his colleagues (Thornton and Camburn 1989; Thornton et al. 1992) report that while religiosity predicts lower likelihood of non-marital sex and cohabitation, engaging in these behaviors also predicts declines in religious participation over time. And in studies using Add Health panel data, scholars show that adolescents who participate in drug use, binge drinking, theft, or non-marital sexuality show declines in religious service attendance and importance of religious faith in later waves (Regnerus and Smith 2005; Regnerus and Uecker 2006; Uecker et al. 2007).

In accounting for the observed reciprocal effects between deviance and religion, Benda and Corwyn (1997:32) theorize that religiosity is weakened from the "cognitive dissonance" or mental stress that results from failing to reconcile discrepancies between deviant behavior

and one's religious beliefs or identity. They summarize, "To reduce the guilt induced by this dissonance, many adolescents diminish their commitment to religion to become consonant with their behavior." Subsequently, numerous scholars have drawn on cognitive dissonance theory to help explain patterns of religious decline in adolescence and young adulthood (e.g., Hardie, Pearce, and Denton 2016; Regnerus 2007:53–54; Smith and Denton 2005:236; Smith and Snell 2009:84; Uecker et al. 2007:1670, 1684). Smith and Snell (2009:84), for example, observe that emerging adults in their study often reduced the cognitive dissonance they felt from the conflict between their religious teachings and wanting to engage in sexual or party activities by mentally discounting those teachings and distancing themselves from their religious community. They conclude that socially "deviant" behavior in the form of sex, drinking, and drugs, "is often important in forming emerging adults' frequent lack of interest in religious faith and practice."

The reciprocal relationship between deviance and religious commitment described above may apply equally to pornography use and religiosity among young Americans. While the dominant theoretical assumption has been that religiosity serves as the independent variable influencing young people's pornography use, recent research suggests that more frequent pornography consumption, especially for religious persons, is associated with guilt and shame, and some theorize this may diminish one's interest in religious or spiritual activities by creating feelings of scrupulosity that draw individuals away from religious community (Baltazar et al. 2010; Nelson et al. 2010; Short et al. 2015). In light of previous work on youth deviance and religion, it is likely that while greater religiosity diminishes the use of pornography (as it does with other socially "deviant" activities), more frequent pornography viewing could also have a reciprocal dampening effect on religious commitment among young Americans as they seek to reduce the cognitive dissonance resulting from their engagement in religiously proscribed sexual behavior (Regnerus 2007; Smith and Denton 2005; Smith and Snell 2009; Uecker et al. 2007).

Using data from three waves of the NSYR, a nationally representative, longitudinal survey of young Americans, the current study is the first to test whether more frequent pornography viewing may not only be the result of lower levels of religiosity, but may in fact have a secularizing effect, serving to diminish young Americans' attachment to the institution of religion over time. Building on the research described above, our first hypothesis is that:

H1: *Pornography viewing will lead to lower levels of religiosity over time.*

In considering potential moderators, research leads us to two predictions. First, adolescents who are still under the roof of their parents tend to be more religious than emerging adults who have moved out of the home (Uecker et al. 2007). Emerging adults undergo an almost institutionalized period of normative deviance and identity-exploration as they experience greater independence and exposure to different worldviews (Arnett 2000; Rosenfeld 2007). Following the deviance-religiosity theory described above, it would be reasonable to expect that young persons between the ages of 13–17, still in the home and under the moral influence of their parents and religious community, would feel greater guilt and cognitive dissonance associated with their pornography use than emerging adults ages 18–24. Correspondingly, since religious service attendance declines as youth transition from adolescence into young adulthood (Uecker et al. 2007; Smith and Snell 2009), young adults

may also be less embedded within their particular religious community to the extent that they are not hearing sermons or seeing their clergy or fellow believers every week. If they have fewer reminders of their transgressions, they will likely feel less dissonance. Additionally, research on moral transgressions suggest that moral violations get easier over time due to depleted self-regulation and increased moral disengagement (Bandura 1999; Welsh et al. 2015). To the extent that emerging adults have been desensitized to pornography use and their own "transgressions" in this regard, they will likely be less affected by cognitive dissonance than when they were younger. We therefore expect that:

> H2: *Pornography viewing will have a stronger negative effect on religiosity during adolescence than during young adulthood.*

Second, research shows that the frequencies, experiences, and effects of viewing pornography differ by gender. Males tend to view pornography with greater frequency than females (Maddox et al. 2011; Perry 2016a, 2016b; Poulsen et al. 2013; Regnerus et al. 2015; Wright 2013; Wright et al. 2013), while young women in general tend to be more religious than young men in virtually every category (Pearce and Denton 2011; Smith and Denton 2005). Use patterns of pornography also differ across gender. Males are more likely to view pornography alone for the purposes of masturbation whereas females are more likely to view pornography within the context of a romantic relationship (Maddox et al. 2011; Poulsen et al. 2013). On the one hand, it is possible that young women who view pornography, being more strongly tied to religion than young men, may be more affected by guilt and dissonance, and thus, their pornography use would more strongly affect their religiosity. Alternatively, however, because young males are already less strongly tied to religion than females, they could more easily disengage from religion than females due to guilt. Moreover, young males tend to consume pornography more habitually than females for whom pornography use may be more of an isolated event (Regnerus et al. 2015). Young males, then, potentially viewing their pornography use as more of a habitual "sin" may be more gripped by religious guilt and cognitive dissonance than young females. This helps explain why Baltazar et al. (2010) find that over twice as many males as females felt their pornography use had weakened their relationship with God/Christ or lowered their interest in spiritual things. In light of these arguments, we expect that:

> H3: *Pornography viewing will have a stronger negative effect on religiosity for males than for females.*

Methods

Data

Data from the first three waves of the National Study of Youth and Religion (NSYR) are used for analyses. The NSYR, collected between 2003 and 2008, is a nationally representative telephone survey of 3,290 English and Spanish-speaking youth and one of their parents. The sampling frame was created using a random-digit-dial (RDD) method to generate telephone numbers representative of all households in the United States. A non-representative oversample of 80 Jewish households was also surveyed, bringing the total sample to 3,370 pairs of youth and their parents. Comparisons to U.S. Census data and other nationally representative data sets show that the individuals within the NSYR reflect the

broader population characteristics of 13–17 year-olds (National Study of Youth and Religion 2008).

Eligible households for participation in the Wave 1 survey contained at least one teenager between the ages of 13 and 17 who resided in the household at least half of the year. Respondents are between the ages of 16 and 21 in Wave 2 and 18 and 24 in Wave 3. Approximately 78 percent of the original respondents completed the Wave 2 survey. Of all the original, eligible respondents, 68 percent participated in all three survey waves. The primary source of attrition between waves was the inability to locate respondents; this accounted for slightly more than 50 percent of all attrition. For more information on the NSYR, its design, and the collection procedures, see youthandreligion.nd.edu and National Study of Youth and Religion (2008).

All respondents with at least two waves of complete data on the variables of interest are included in our analyses. Thus, we exclude those with only one complete wave of data (N = 485), those missing on the static baseline measures (N = 216), and those present in each wave but missing on variables of interest (N = 24). We also exclude the non-representative Jewish oversample (N = 80) and individuals with inconsistent gender reports (N = 4). After these restrictions, our analytic sample contains 2,561 individuals. Of these, 654 individuals contribute two observations while the remaining 1,907 individuals contribute three observations for a total of 7,029 person-wave observations. There are approximately equal numbers of observations within our two age groups of interest, with 3,602 observations among 13–17 year-olds and 3,427 observations among 18–24 year-olds.

Dependent Variables

Because religiosity is a multidimensional construct (see Pearce and Denton 2011:11–20), we conduct our analyses on five different religious outcomes: service attendance, importance of religion to daily life, prayer frequency, closeness to God, and religious doubts. All five of these outcomes are measured identically at each wave. Religious service attendance ranges from 0 (never) to 6 (more than once per week). The importance of one's religious faith ranges from 0 (not important at all) to 4 (extremely important). Frequency of prayer ranges from 0 (never) to 6 (many times per day). Closeness to God ranges from 0 (extremely distant) to 5 (extremely close). Finally, one's number of religious doubts ranges from 0 (no doubts) to 4 (not religious). For closeness to God and religious doubts, those identifying as not religious are coded as 0 and 4, respectively, because they were not asked those questions. See the Appendix for the full coding of these variables.

Pornography Viewing

Pornography viewing follows responses to the question: "About how many, if any, X-rated pornographic movies, videos, or cable programs have you watched in the last year?" While the wording of the question may exclude certain media forms like magazines, this exclusion is not particularly limiting as most pornography is consumed online, especially among younger cohorts (Buzzell 2005). This question is also asked identically for all three waves. Responses range from a low value of 0 to a high of 300, with 47 unique responses. For our analyses here, we have top-coded this variable to range from 0 to "5 or more." However, as a

robustness check, we conducted separate analyses with five alternative coding schemes and the substantive findings remain the same (see Appendix).

Control Variables

Past research has identified numerous sociodemographic variables that associate with religious outcomes among young Americans. These include age, gender, race, region, parental income, and denominational affiliation (Hardie et al. 2016; Pearce and Denton 2011; Smith and Denton 2005; Smith and Snell 2009; Uecker et al. 2007). Therefore, the following controls variables are used in analyses: age (18 or older = 1), gender (female = 1), race (from baseline - white as reference), region (south = 1), parental income (measured in categories of $10,000 with less than $10,000 = 1 and more than $100,000 = 11), and religious affiliation (conservative Protestant – reference, mainline Protestant, black Protestant, Catholic, other, and unaffiliated). Religious affiliation follows a modified version of the RELTRAD classification scheme (Steensland et al. 2000). To adjust for the possibility that a parent's presence could increase religious outcomes (such as service attendance and prayer) while simultaneously reducing pornography use (through oversight at home or the sharing of a computer or television), we also include a control for whether or not there is a parent or parent figure in the home (yes = 1).

Analytic Strategy

We begin with a general model for panel data

$$y_{it}=\mu_t+\beta x_{it}+\gamma z_i+v_i+\varepsilon_{it}$$

where y_{it} is the dependent variable at time t for individual i, μ_t is the intercept at time t, βx_{it} is the vector of all time-varying coefficients, γz_i is the vector of all time-constant coefficients, v_i is the individual-specific error term that is time-invariant, and ε_{it} is the idiosyncratic error term that is time-varying. From this point, we estimate two common longitudinal models: random and fixed effects regression. The difference between these models is how they handle the constant and unobserved individual-specific effects, denoted above as v_i (Allison 2009; Halaby 2004; Vaisey and Miles 2014). Random effects models treat v_i as a random variable and assume that it is uncorrelated with all other variables in the model. If this assumption is met, these models will produce unbiased and consistent parameter estimates (Halaby 2004; Hausman 1978). If this assumption is unmet, however, these models will produce *biased* and *inconsistent* parameter estimates. Unfortunately, the assumption that any unobserved heterogeneity is uncorrelated with the explanatory variables is often unwarranted in social research (Vaisey and Miles 2014). Allison (2009) expresses similar sentiments regarding non-experimental data and suggests that sacrificing efficiency in order to reduce bias (i.e., choosing fixed effects over random effects) is usually a good trade-off.

The benefit of fixed effects models is that they treat v_i as a fixed set of parameters that can be estimated or removed from the equation (Allison 2009). This allows the unobserved variables, captured in v_i, to have any association with the observed predictors (Allison 2009;

Hausman 1978; see also Vaisey and Miles 2014 for a simulation of the effects of unobserved heterogeneity on different models). In other words, time-invariant predictors not captured by the model that might be associated with the outcomes, such as individual preferences, family background, and innate abilities, are effectively controlled for because individuals serve as their own references (Allison 2009; Vaisey and Miles 2014). Practically, this is accomplished by using only within-person variation to estimate the coefficients; as a result, these models assess the net changes of predictor variables on a particular outcome, but they cannot estimate the effects of variables that do not change over time (Allison 2009; Halaby 2004; Vaisey and Miles 2014). These models also produce unbiased and consistent parameter estimates, but they are less efficient than random effects models (Allison 2009; Halaby 2004; Hausman 1978).

The equation for a fixed effects model follows from removing the vector for time-constant terms, γz_i, from the general model presented above. We then have

$$y_{it}=\mu_t+\beta x_{it}+v_i+\varepsilon_{it}$$

This model can be estimated in at least two ways. The first is with OLS regression that contains a dummy variable for every respondent (the "fixed effect," v_i, in the equation above). The second is by mean differencing (also known as time-demeaning), which produces the same point estimates for β and can be written as:

$$y_{it}-\overline{y}_i=(\mu_t-\overline{\mu})+\beta(x_{it}-\overline{x}_i)+(\varepsilon_{it}-\overline{\varepsilon}_i)$$

This equation is simply derived from subtracting the means of y_{it}, μ_t, x_{it}, v_i, and ε_{it} from the first equation. Note that the individual effect, v_i, is no longer part of the equation. Because it is static, subtracting $\bar{v}_i$ from v_i equals zero.

We estimate both random and fixed effects models here and compare them with a Hausman test (Halaby 2004; Hausman 1978), finding evidence against the random effects models in favor of fixed effects.[2] Accordingly, our results below focus predominately on the fixed effects models but we show both for comparison. We build all models in a step-wise manner for each of the five outcome variables. In the first step, each model is estimated with pornography viewing as the focal independent variable and the full set of control variables. The second model adds two interaction terms: one between pornography viewing and age and one between pornography viewing and gender. The former of these interaction terms tests whether the effect of pornography viewing differs by age groups and the latter tests whether the effect differs by gender. Thus, the second model is the full model for all dependent variables. Lastly, we calculate the coefficients of pornography viewing for each combination of age group and gender using the fixed effects estimates. These coefficients are then tested for statistical significance and graphed.

[2]We conducted Hausman tests in Stata using the hausman command. A large test statistic is evidence against the null hypothesis (and focal random effects assumption) of independent individual effects (v_i) and in favor of the fixed effects models (Halaby 2004; Hausman 1978). All of our test statistics were sufficiently large ($p < .001$) and thus we opt for the fixed effects models.

Results

Table 1 presents descriptive statistics of all variables in the analyses. Overall, the average amount of pornographic programs viewed in the past year is 1.25. The younger age group averages .92 programs and the older age group averages 1.60. The majority of the sample is moderately religious yet maintains some doubts about religion. The younger age group has slightly higher levels of religious attendance, importance of faith, prayer frequency, and closeness to God than the older age group. They also have fewer religious doubts and are less likely to be religiously unaffiliated. All of these religious differences between the groups are statistically significant.

Approximately half of the sample, 51 percent, is female, and the average age is 15.45 for the younger age group and 19.61 for the older age group. Religious affiliations are about equal across the sample, with conservative Protestants representing the largest group for both the younger and older portions of the sample. The biggest difference between age groups is the percentage of religiously unaffiliated individuals. For 13–17 year-olds, only 13 percent are religiously unaffiliated; for 18–24 year-olds, 23 percent are unaffiliated. Finally, about 69 percent of the respondents are white, while 16 percent are black, 10 percent are Hispanic, and 5 percent identify with another racial group.

Table 2 displays the random effects regression estimates for all five dependent variables. Each Model 1 shows that all outcomes are negatively related to pornography viewing. Two interaction terms are added to Model 1 and presented in Model 2. These models show that there are no interactions between pornography viewing and age (18 or older) for attendance, importance of faith, prayer frequency, or closeness to God. However, there is a negative and statistically significant interaction effect between pornography viewing and age for religious doubts. That is, the effect of pornography viewing on religious doubts is weaker for those who are 18 or older. There are no interactions between pornography viewing and gender across all models, so there does not appear to be a different effect of pornography viewing for males and females. Because the fixed effects models are preferred to the random effects models for our analyses, we expound upon these relationships further in the next section and present these here mainly for comparison.

Table 3 presents the fixed effects regression estimates for all five dependent variables. Model 1, containing the full set of control variables but no interaction terms, shows that the coefficients for pornography viewing are statistically significant and related to each outcome. In every case, increases in pornography viewing are associated with lower levels of religiosity and more religious doubts. It should be noted here that the coefficients for religious doubts are in different directions than those for other outcomes because more religious doubting is equated with less religiosity. To assess whether this relationship weakens for individuals over 18 years old, we look to the interaction terms included in each Model 2. For service attendance and prayer frequency, there are no statistically significant interactions between pornography viewing and age. However, there are significant interaction effects between pornography viewing and age for importance of faith, closeness to God, and religious doubts. All three of these interaction effects show that the effect of pornography on the respective outcomes is mitigated for those over 18 years old. Across the

range of dependent variables, there are no significant interactions between pornography viewing and gender. That is, the effect of viewing pornography on religious outcomes does not appear to vary by gender.

Even though an age threshold attenuates the relationships between pornography viewing and three of our dependent variables, the question remains: does age attenuate the relationships enough such that they become statistically insignificant? Or, is there still a negative effect of viewing pornography on these outcomes for the older age group, albeit a smaller one than for 13–17 year-olds? To discern the answer, we first calculate individual coefficients for each age and gender combination using each Model 2 of the fixed effects estimates. These individual estimates and their corresponding levels of significance are presented in Figure 1.

Figure 1 graphs the fixed effects regression estimates for the impact of pornography viewing on each dependent variable. Each bar on the graph represents a combination of age and gender. Across all five dependent variables, increases in pornography viewing are negatively related to religiosity for males and females less than 18 years old. For males 18 or older, these relationships decrease in magnitude but only one of them loses statistical significance; pornography viewing is no longer related to increases in religious doubts. For females 18 or older, these relationships also decrease in magnitude, but this time four of them lose significance. In fact, pornography viewing is *only* related to religious service attendance for females over 18. Because Table 3 does not show any interaction effects between pornography use and gender, however, it appears that age effects are primarily responsible for the diminished effect of pornography viewing on religious outcomes. Yet, it is noteworthy that pornography viewing is negatively associated with importance of faith, prayer frequency, and closeness to God for males over 18 but not for females over 18. Upon inspection, the coefficients for the interaction terms between pornography viewing and being female, presented in Table 3, are in the expected direction but statistically insignificant. Thus, it looks like the non-significant interaction effects mitigate the effect of pornography just enough to push the total coefficients for females over 18 to statistical insignificance.

It is also important to note here that the effect sizes for all groups are rather small in magnitude. Increasing pornography viewing from zero to five or more times a year, regardless of age and gender combination, is associated with less than a unit change in any of our dependent variables. As a specific example, males under 18 are predicted to experience a .40 decrease (−.080*5) in service attendance if their pornography viewing changes from never to five or more times per year. For some males, this might be enough to decrease their attendance from “weekly” to “2–3 times a month,” or from “many times a year” to “a few times a year.” However, since some of the response options contain ranges of values, changes in attendance might not always equate with changes in responses categories. A more exact measure of attendance would help inference in this regard. In sum, our findings of statistical significance do not necessarily mean that *large* changes are happening for most people. Instead, it appears that the relationships are statistically strong but modest in size.[3]

[3]In supplementary analyses, we tested whether the effect of pornography viewing varied by denominational affiliation by reducing the six categories of affiliation to a dummy variable for each and interacting them independently with pornography viewing. We then

Robustness checks

To ensure that our main findings related to pornography viewing are not sensitive to alternative coding of this variable, we repeated our analyses using five additional specifications. These include 1) the unaltered variable ranging from 0–300, with 47 unique responses, 2) a version with values from 0–10 unaltered but clustered by categories of 10 after that, 3) an approximation of a scale from "never," to "more than once a week," 4) a version top-coded at "ten or more," and 5) a dichotomous measure to distinguish those who haven't watched any pornography from those who have. For the most part, our results and substantive conclusions are the same regardless of how we code pornography viewing. Only the unaltered variable, with 47 unique responses on a scale to 300, produces modest differences. However, we are least confident in this specification due to the large amount of empty cells and near-empty cells during model estimation. Tables with full descriptions of these alternative coding schemes, and how they correspond to our results, are presented in the Appendix. We also conducted our primary analyses with individuals who had full data across all three waves (N = 1,907) as opposed to those with at least two waves of full data (N = 2,561), and with multiple imputation to recover the missing observations.[4] The results are virtually identical to the findings presented here (available upon request).

Finally, we re-estimated our main models including a measure for guilt and social desirability bias. The former of these, guilt, is one of our key theoretical mechanisms while the other, social desirability bias, may lead individuals to over-report religiosity and under-report pornography viewing, which could create a spurious relationship between the two. Unfortunately, the NSYR has limited measures for both of these that are present in all three waves.[5] Inclusion of these variables did not affect our results nor substantive conclusions,

repeated the analyses, rotating the denomination serving as the comparison group (results available upon request). We suspected that religious affiliation may moderate the relationship between pornography use and adolescent religiosity. In light of cognitive dissonance theory, we anticipated that respondents from more conservative traditions would experience stronger dissonance between pornography use and their religious teachings, and consequently, would evidence a stronger negative effect of viewing pornography on religious outcomes. Ultimately, the findings were inconsistent and rather inconclusive. For conservative Protestants, for example, the effect of viewing pornography was stronger than others only for religious doubts. Moreover, for black Protestants, the effect of pornography viewing was actually *weaker* on outcomes of closeness to God and religious doubts. This can be understood in light of previous work suggesting black Protestants are more likely to dissociate sexual behavior from religious practice (Regnerus 2007). We found no differences when mainline Protestants, Catholics, and those from other religions served as the comparison group. We also ran the analyses for each religious affiliation separately (for those people who did not change affiliation throughout the three waves). Again, the results were inconsistent. Pornography viewing was associated with less religiosity on three outcomes for conservative Protestants, one outcome for mainline Protestants, and two outcomes for Catholics. There were no associations between pornography viewing and any outcomes for black Protestants, those with "other" affiliations, and unaffiliated individuals. Unfortunately, our sample sizes for some of these groups are rather small (three groups have between 107–119 people and 303–320 observations), and limiting the analyses to people who do not change affiliation over time may introduce selection concerns.

[4]We do not include in the imputations the non-representative Jewish oversample (N=80) or the individuals with inconsistent gender reports (N=4). Therefore, our sample for imputation is 3,286 people. We use the ICE and MIM packages in Stata to create 50 imputations and estimate our models. We had data missing for 22 percent of all individuals and for 29 percent of person-wave observations. Thus, we chose 50 imputations to be conservative while following the rule of thumb that imputations should at least equal the fraction of missing information (White, Royston, and Wood 2011). We also follow the advice of von Hippel (2007) and use our dependent variables in the imputation models but drop those observations for which the dependent variables were imputed during estimation. Finally, we do not include in our models the individuals for whom entire waves were imputed, as this often provides no benefit to the estimates and may increase standard errors (Young and Johnson 2015). Therefore, our imputation models include 2,762 unique individuals and 7,646 person-wave observations. Each person contributes at least two observations to the models and the average is 2.768 observations out of a possible 3. We also compared these estimates to imputations with all cases and observations retained, including those with full missing waves and dependent variables imputed. The results were substantively the same. Imputation results are available from the authors upon request.

[5]Regarding guilt, we used the question, "In the last year, how often, if ever, have you found yourself feeling guilty about things in your life?" Responses ranged from "rarely or never" to "very often." For social desirability bias, we created an index following past

and because they only loosely approximate concepts we would like to have better measures of, we have left them out of the analyses presented here.

Discussion and Conclusion

As pornography use becomes more pervasive in the U.S., sociologists have sought to understand its potential consequences for various individual and social outcomes. While a number of studies have considered pornography's impact on adolescent development as well as romantic relationships and marriage, comparatively few studies have considered the link between pornography use and religion, and most that do begin with religion as the independent variable. Building on theoretical insights from research on deviance and religiosity, our study employed a large, nationally representative longitudinal survey of young Americans to consider the effects of pornography use on religiosity over time, and how these effects are potentially moderated by age and gender. Our analyses show that pornography viewing is significantly related to all five religious outcomes of interest. Specifically, increases in pornography viewing are negatively related to religious service attendance, importance of faith, prayer frequency, and closeness to God, while positively related to religious doubts. All of these relationships hold at high levels of statistical significance for the full sample and support our first hypothesis.

Tests for interaction effects show that the effect of pornography viewing does indeed vary by age for the three subjective religiosity dimensions: importance of faith, closeness to God, and religious doubts. In these cases, the negative effect of pornography use is most pronounced for 13–17 year-olds and weakens for those 18 and over. In contrast, the effect of pornography viewing does not appear to vary by age for the two measures of religious practice, attendance or prayer frequency, and thus our second hypothesis is only partially supported. These differences suggest that it is the internal, subjective religious life of adolescents that is more strongly affected by their pornography use compared to young adults. Religious practice, on the other hand, appears to decline evenly for both age groups. These findings would support our earlier reasoning that adolescents, still in the home and under the moral influence of their parents and religious community, would experience greater internalized guilt and cognitive dissonance associated with their pornography use. This would more strongly affect their subjective religiosity, whereas emerging adults may have become desensitized over time to this guilt and dissonance.

Lastly, across all outcomes, no significant interactions surfaced between pornography viewing and gender. Thus, we do not find support for our third hypothesis. One explanation for the lack of differences found here could be differences in processes; while the religious lives of both males and females, in general, seem to be influenced by pornography use, this does not necessarily mean the mechanisms are the same. Religiosity (including proneness to religious guilt) and pornography use-patterns tend to differ across genders, and the data may unfortunately mask the interplay of these differences.

examples (Regnerus and Uecker 2006; Uecker et al. 2007) and combined measures for which certain responses could indicate an overly positive characterization of oneself. We used responses from the following three questions: "In general, how much do you feel…1) very sad or depressed, 2) alone and misunderstood, and 3) invisible because people don't pay attention to you?" People who never felt these things were coded as 1 and their scores were averaged.

For discussing the implications of this research, several data limitations are worth mentioning. First, adherents of minority religions in the United States are not well represented; only about 13 percent of individuals in our sample identify with a religion outside of Protestantism or Catholicism. Therefore, caution should be exercised when attempting to generalize these findings to those outside of the Christian traditions. Second, while our analytic strategy provides evidence that pornography viewing negatively influences religious outcomes, our models cannot eliminate the possibility of reverse causality because both variables are measured at the same time (Vaisey and Miles 2014). It is likely that pornography use and religion are reciprocally related, but most studies to this point have assumed that the causal arrow flows from religion to pornography use (e.g., Carroll et al. 2008; Grubbs et al. 2015; Regnerus 2007; Perry 2016a, 2016b; Smith and Denton 2005). The present study reverses this arrow and adds support to the existing literature that the relationship goes the opposite way as well. Related to this last point, quantitative data are limited in their ability to flesh out specific mechanisms connecting pornography use to religious decline among young Americans. Future research would ideally make use of qualitative interviews in order to draw out these processes at work. While the 2003 NSYR did include in-depth qualitative interviews of young Americans that asked specifically about pornography use, researchers using these data explain that young people were reticent about their pornography viewing with in-person interviewers and often did not divulge much information (Regnerus 2007; Smith et al. 2011; Smith and Denton 2005). Future work in this area may successfully utilize more unobtrusive methods, perhaps where respondents can write in answers to open-ended questions using computer-assisted interviewing technology.

These limitations notwithstanding, our study contributes to sociological knowledge on both pornography use and religion in the United States in two key ways. First, previous work on the effects of pornography on adolescents or emerging adults have often been therapeutic or criminological, focusing on outcomes such as sexual attitudes and behaviors (including romantic relationships), mental health, or tendencies toward deviance (see reviews in Carroll et al. 2008; Doring 2009; Owens et al. 2012; Peter and Valkenburg 2016). Our study is the first to establish how young Americans' use of pornographic material, and the moral stigma it carries for religious persons, can shape their connection to a dominant social and cultural institution in religion. Findings overwhelmingly affirmed that pornography use was related to a decline in our five religious outcomes over time. Importantly, our outcomes included measures for corporate religious practice (religious service attendance), private religious practice (prayer), commitment (importance of faith), belief (doubts), and even subjective religious feelings (closeness to God), which suggests that pornography use may not only diminish participation in social aspects of religious life, but also private and affective dimensions as well, and particularly for adolescents.

While our theoretical framework interprets pornography's effect on religiosity in terms of cognitive dissonance or feelings of scrupulosity distancing young Americans from religious beliefs and community, pornography use may also diminish religiosity through other mechanisms. For example, in supplemental analyses (available upon request), we tested whether viewing pornography would also be related to closeness to parents. Indeed, it was, which could suggest that pornography is distancing adolescents and young adults from

religion partially through affecting their relationship with their parents. Of course, there is the possibility here for reciprocal influences. Smith and Denton (2005:226–227) consider network closure—the dense network and oversight of people who care about and encourage youth—to be a major contributing factor leading to positive relational outcomes for religious adolescents. If pornography distances them from the socializing influence of religious community, this may hold consequences in terms of family closeness as well (see also Pearce and Axinn 1998).

Lastly, our findings may portend the future shape and character of American religion. To the extent that younger generations are consuming pornographic materials earlier and with greater frequency (Buzzell 2005; Carroll et al. 2008; Price et al. 2016), and to the extent that pornography use has a secularizing effect on religion and particularly among adolescent Americans as our results show, the growth of pornography use may contribute to the decline of American religion itself. That is, if pornography use weakens attachment to religion among adolescents and emerging adults, as more young Americans are exposed to pornography at younger ages and in larger amounts, it is likely to be accompanied by a corresponding decline in both corporate and personal religiosity among these Americans. Indeed, this mechanism may help account for the consecutive declines in worship attendance and religious belief among U.S. cohorts identified by Voas and Chaves (2016). Certainly, we cannot argue that pornography use is solely, or even primarily, the driver of rising secularization among younger Americans. That emerging pattern stems from a variety of demographic and cultural trends (Hout and Fischer 2014), which we contend includes rising pornography use. Speculatively, however, we propose that as adolescents and emerging adults grow up with greater access to sexually explicit media and fewer broad cultural constraints to prevent their consumption of this material, religious belief and practice may seem increasingly at odds with dominant cultural consumption patterns of young people (including pornography use). When faced with the alternatives of either rejecting the sexual behaviors common within emerging adult culture or compartmentalizing and living with the dissonance, Smith and Snell (2009:84) predict, “Not very many emerging adults can or will do any of these things, so most of them will resolve the cognitive dissonance by simply distancing from religion.”

Much of this depends on the mechanism connecting pornography and religion, however. If pornography use contributes to declining religiosity among young Americans through cognitive dissonance and scrupulosity, as we propose, then as pornography use becomes more pervasive and accepted in the Western world, or as religious moral values decline overall, then young religious Americans could feel less dissonance between their values and pornography use, thereby leaving their religious commitments unaffected. Yet this is unlikely to happen among the larger, more traditional religious groups for whom sexual morality is a key marker of identity (Regnerus 2007; Sherkat and Ellison 1997). While our data provide only a small window of time in the lives of these young Americans, future research in this area would ideally seek to incorporate broader contextual factors and to connect pornography use with religiosity over the life course to isolate and discern the reciprocal impact of both over time. Our study affirms that more work needs to be done to understand the social causes behind the growing secularization among younger Americans, and particularly the role of religiously-deviant, though increasingly common and normative,

behaviors like pornography use along with other behaviors that have been found to weaken adolescent attachment to religion like premarital sex, drinking, or drug use.

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APPENDIX. Coding of outcome variables

Religious attendance (0 – 6)

0: Never

1: Few times a year

2: Many times a year

3: Once a month

4: 2–3 times a month

5: Once a week

6: More than once a week

Importance of religious faith (0–4)

0: Not important at all

1: Not very important

2: Somewhat important

3: Very important

4: Extremely important

Frequency of prayer (0–6)

0: Never

1: Less than once a month

2: 1–2 times per month

3: Once a week

4: Few times per week

5: Once a day

6: Many times per day

Closeness to God (0–5)

0: Extremely distant (non-religious are coded in this category)

1: Very distant

2: Somewhat distant

3: Somewhat close

4: Very close

5: Extremely close

Religious doubts (0–4)

0: No doubts

1: A few doubts

2: Some doubts

3: Many doubts

4: Not religious

Table A

Various Coding Schemes (A–F) for Pornography Viewing and Respective Response Frequencies (N = 2,561; Person-wave Observations = 7,029)

A	Freq.	A (Cont.)	Freq.	B	Freq.	C	Freq.	D	Freq.	E	Freq.	F	Freq.
0	4,288	30	46	0	4,288	Never (0)	4,288	0	4,288	0	4,288	Has not viewed porn (0)	4,288
1	521	35	5	1	521	Few times a year (1–9)	2,134	1	521	1	521	Has viewed porn (1+)	2,741
2	631	40	10	2	631	About once a month (10–14)	232	2	631	2	631		
3	374	45	3	3	374	More than once a month (15–39)	209	3	374	3	374		
4	188	50	61	4	188	About once a week (40–60)	81	4	188	4	188		
5	296	55	2	5	296	More than once a week (61+)	85	5	296	5+	1,027		
6	66	60	5	6	66			6	66				
7	27	65	1	7	27			7	27				

A	Freq.	A (Cont.)	Freq.	B	Freq.	C	Freq.	D	Freq.	E	Freq.	F	Freq.
8	26	70	4	8	26			8	26				
9	5	75	3	9	5			9	5				
10	206	80	2	10	206			10+	607				
12	21	84	1	11–20	167								
13	3	90	1	21–30	63								
14	2	93	1	31–40	15								
15	36	95	1	41–50	64								
16	1	100	39	51+	92								
17	1	104	1										
18	1	150	4										
20	102	165	1										
23	1	180	1										
24	1	200	5										
25	13	250	1										
26	1	300	19										
27	1												

Notes. The original question was asked in the following way: “About how many, if any, X-rated, pornographic movies, videos, or cable programs have you watched in the last year?” The coding scheme “A” contains all of the unaltered, original responses. Schemes B–F are various ways of condensing the responses into meaningful categories. Due to small cell counts, such collapsing is necessary to avoid or minimize empty cells during model estimation. As a matter of robustness, fixed effects models with coding schemes A, B, C, D, and F were created and compared to models using coding scheme E, which is the coding scheme we use for our primarily analyses throughout the paper.

Our variations of the different coding schemes show, in the tables below, that our results and general conclusions are predominately the same regardless of what scheme we use. However, we do think some schemes are more useful and meaningful than others, so we offer a few thoughts on this matter here.

Coding scheme A has a large number of empty cells and near-empty cells, and responses tend to be heaped at multiples of five or ten. This concerns us regarding the stability of regression estimates and the sizes of standard errors. We are also hesitant to believe that many meaningful differences happen between values of 26 and 27, for example, or between 93 and 95. Coding scheme B has far fewer cells with low counts, which builds on a shortcoming of scheme A, but there are still only a few respondents between the values of 6 and 9. There are also only 15 respondents in the range from 31–40. After top-coding this version at “51 or more,” we retain 92 individuals who fall into this top category. Coding scheme C is attractive because it mirrors so many other survey measures that approximate behaviors on a yearly time scale. However, the “rarely” category batches together 6 of the 10 largest response categories – about 30% of the sample. This concerns us because we believe there are meaningful differences in this cluster that are now obscured. Coding scheme D is identical to B except that the top-coding now takes place at “10 or more.” Therefore, we still worry about the low cell counts between the values of 6 and 9, but the other categories are all reasonable sizes. Coding scheme E, the one we use in the paper, has no small cell counts. Unfortunately, the cost of doing this is to lose variation for individuals in the top-coded category. However, if there are few meaningful differences for pornography viewing after this point, this variable may be the most efficient among our options. Finally, coding scheme F is simply a dichotomous measure of having viewed porn at all. It provides us with the largest cell counts, of course, but also with the least variation within the “has viewed porn” category.

Comparing R^2 values across identical models with these different coding schemes (Table B for random effects and Table C for fixed effects, but focusing on Table C here because fixed effects is the preferred model in the paper), we see that coding scheme A produces the lowest R^2 values more than any other coding scheme. While we acknowledge how small these differences are, they may suggest that our hesitation about empty cells above is warranted. Coding scheme E produces the highest R^2 values more than any other coding scheme. Again, these are small differences, but they could suggest that the stability of estimates produced by coding scheme E makes it the most practical choice among our options. This, indeed, is our opinion.

Table B

Comparison of Focal Random Effects Estimates (Unstandardized Coefficients) Resulting from Different Coding Schemes of Pornography Viewing (N = 2,561; Person-wave Observations = 7,029)[1]

	Service Attendance						*Importance of Faith*						*Prayer Frequency*					
Variables	***A***	***B***	***C***	***D***	***E***	***F***	***A***	***B***	***C***	***D***	***E***	***F***	***A***	***B***	***C***	***D***	***E***	***F***
Porn viewing	−.004**	−.054***	−.191***	−.065***	−0.114***	−.373***	.000	−.028***	−.089***	−.036***	−0.069***	−.234***	.002	−.030**	−.098*	−.042***	−0.089***	−.306***
18 or older	−.515***	−.489***	−.479***	−.489***	−0.471***	−.458***	−.040†	−.032	−.025	−.034	−.033	−.027	−.098*	−.077†	−.072	−.074†	−0.071	−.062
Female	.075	.007	.026	.000	−.026	.005	.186***	.145***	.149***	.137***	0.113**	.106**	.562***	.494***	.503***	.477***	0.435***	.429***
Porn *18 or older	.001	.009	.018	.011	.010	−.007	−.002	.004	.001	.007	.014	.019	−.004	−.004	−.025	−.003	.002	−.035
Porn *female	−.006†	−.016	−.123*	−.016	−.023	−.162†	−.002	−.007	−.033	−.004	.005	.040	.000	.005	−.002	.011	.034	.130
R^2	.356	.363	.365	.363	.366	.368	.333	.338	.338	.338	.340	.341	.251	.254	.254	.255	.256	.257
	Closeness to God						*Religious Doubts*											
Variables	*A*	*B*	*C*	*D*	*E*	*F*	*A*	*B*	*C*	*D*	*E*	*F*						
Porn viewing	−.003**	−.035***	−.127***	−.043***	−0.076***	−.232***	.001	.031***	.115***	.041***	0.081***	.308***						
18 or older	−.139***	−.130***	−.127***	−.132***	−0.137***	−.131***	.006	.013	.015	.019	.021	.023						
Female	.171***	.119**	.116**	.113**	0.100*	.105*	−.113***	−.084*	−.081*	−.077*	−0.054	−.034						
Porn *18 or older	.001	.009	.025	.012	0.024†	.045	.000	−.016*	−.056*	−.022*	−0.039**	−.126*						
Porn *female	.000	.010	.030	.014	.020	.061	.000	.007	.026	.006	.005	−.026						
R^2	.251	.254	.254	.254	.255	.254	.536	.539	.540	.540	.542	.542						

Notes. For readability and comparison, shading distinguishes coefficients that are not statistically significant, marginally significant ($p < .1$, light shading), and significant ($p < .05$, medium shading).

[1]Models A–F are identical except for the coding of the pornography variable (and thus the interaction terms). Coding for the pornography variable in each respective model is outlined below. All models replicate "Model 2" from the tables in the paper. That is, they are the full models that contain our interaction terms of interest and control variables for religious affiliation, race, residence, whether or not there is a parent in the home, and parental income at baseline.

Model A. Porn viewing is kept in its original form, with the number of usages ranging from 0–300 (47 unique responses).

Model B. Porn viewing is unaltered for responses of 0–10 and is then clustered into 11–20, 21–30, 31–40, 41–50, and 51+.

Model C. Porn viewing is transformed into categories of "never (0)," "few times a year (1–9)," "about once a month (10–14)," "more than once a month (15–39)," "about once a week (40–60)," and "more than once a week (61+)."

Model D. Porn viewing is unaltered for responses 0–9 and is top-coded at "10 or more."

Model E. Porn viewing is unaltered for responses 0–4 and is top-coded at "5 or more."

Model F. Porn viewing is transformed to be dichotomous with 0 = "Has not viewed porn" and 1 = "Has viewed porn."

† p<.1;

* p<.05;

p<.01;
*** p<.001

Table C

Comparison of Focal Fixed Effects Estimates (Unstandardized Coefficients) Resulting from Different Coding Schemes of Pornography Viewing (N = 2,561; Person-wave Observations = 7,029)[1]

	Service Attendance						*Importance of Faith*						*Prayer Frequency*					
Variables	***A***	***B***	***C***	***D***	***E***	***F***	***A***	***B***	***C***	***D***	***E***	***F***	***A***	***B***	***C***	***D***	***E***	***F***
Porn viewing	−.003 †	−.041 ***	−.131 **	−.048 ***	−0.080 ***	−.183 *	.000	−.028 ***	−.082 **	−.035 ***	−0.063 ***	−.175 ***	.004	−.025 †	−.071	−.037 **	−0.078 ***	−.244 **
18 or older	−.584 ***	−.574 ***	−.563 ***	−.578 ***	−0.572 ***	−.570 ***	−.088 ***	−.097 ***	−.091 ***	−.100 ***	−0.104 ***	−.100 ***	−.147 ***	−.148 ***	−.143 **	−.149 ***	−0.157 ***	−.157 **
Porn * 18 or older	.000	.008	.009	.011	.014	.023	.000	.014 †	.032	.018 *	0.031 *	.070	−.005	.004	−.001	.008	.022	.051
Porn * female	−.005 †	.000	−.078	.000	.001	−.183 †	−.001	−.003	−.020	−.001	.007	.017	−.001	.001	−.017	.007	.024	.076
R^2 (OLS)	.754	.754	.755	.754	.754	.754	.776	.777	.777	.777	.778	.777	.743	.744	.744	.744	.744	.744
Adjusted R^2	.612	.612	.613	.612	.612	.612	.646	.648	.648	.649	.649	.648	.595	.596	.596	.596	.597	.596
Within R^2	.238	.240	.241	.239	.240	.240	.093	.098	.097	.099	.100	.097	.069	.070	.070	.071	.072	.071

	Closeness to God						*Religious Doubts*					
Variables	*A*	*B*	*C*	*D*	*E*	*F*	*A*	*B*	*C*	*D*	*E*	*F*
Porn viewing	−.004 ***	−.039 ***	−.141 ***	−.046 ***	−0.078 ***	−.219 ***	.000	.019 *	.075 *	.026 *	0.058 ***	.222 ***
18 or older	−.185 ***	−.193 ***	−.193 ***	−.199 ***	−0.210 ***	−.210 ***	.048 †	.068 *	.076 *	.074 *	0.078 *	.089 **
Porn * 18 or older	.003 *	.020 **	.064 *	.026 **	0.046 ***	.126 *	−.001	−.018 *	−.070 *	−.024 *	−0.042 **	−.158 **
Porn * female	.001	.015	.052	.018	.021	.051	−.003	−.004	−.022	−.006	−.006	−.049
R^2 (OLS)	.730	.731	.731	.731	.731	.731	.786	.786	.786	.786	.787	.787
Adjusted R^2	.574	.576	.576	.576	.576	.575	.662	.663	.663	.663	.664	.664
Within R^2	.090	.094	.094	.094	.095	.092	.374	.375	.375	.375	.377	.377

Notes. For readability and comparison, shading distinguishes coefficients that are not statistically significant, marginally significant ($p < .1$, light shading), and significant ($p < .05$, medium shading).

[1]Models A–F are identical except for the coding of the pornography variable (and thus the interaction terms). Coding for the pornography variable in each respective model is outlined below. All models replicate "Model 2" from the tables in the paper. That is, they are the full models that contain our interaction terms of interest and control variables for religious affiliation, race, residence, whether or not there is a parent in the home, and parental income at baseline.

Model A. Porn viewing is kept in its original form, with the number of usages ranging from 0–300 (47 unique responses).

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Model D. Porn viewing is unaltered for responses 0–9 and is top-coded at "10 or more."

Model E. Porn viewing is unaltered for responses 0–4 and is top-coded at "5 or more."

Model F. Porn viewing is transformed to be dichotomous with 0 = "Has not viewed porn" and 1 = "Has viewed porn."

† p<.1; * p<.05; ** p<.01; *** p<.001

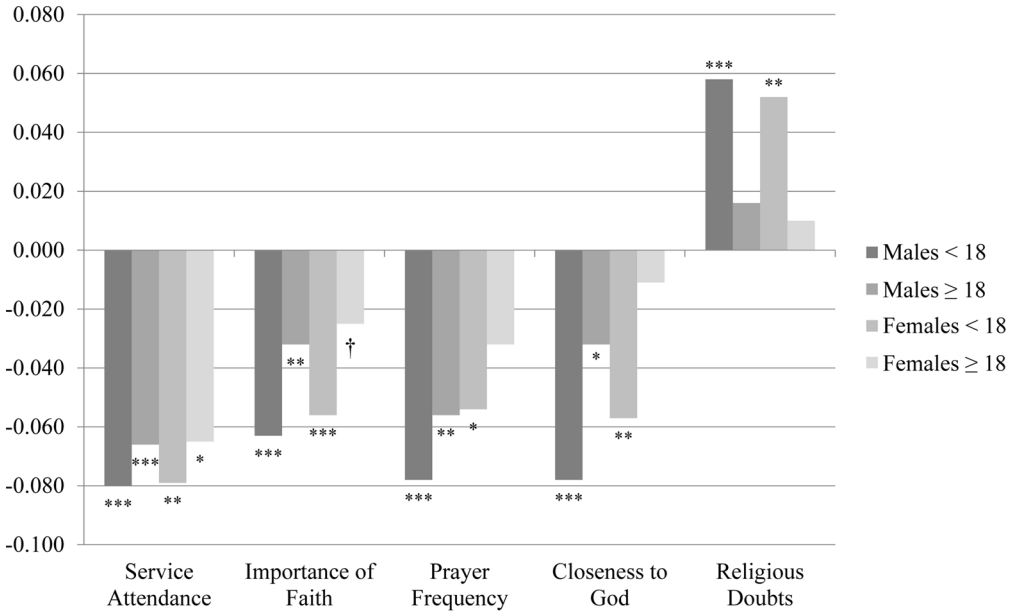

Figure 1.

Fixed Effects Regression Coefficient Estimates for the Impact of Pornography Viewing on Religious Outcomes by Age and Gender

†p<.1 *p<.05 **p<.01 ***p<.001

Table 1

Descriptive Statistics for All Variables

		Full Sample N = 7,029		Ages 13–17 N = 3,602		Ages 18–24 N = 3,427	
Variables	**Range**	**Mean or %**	**SD**	**Mean or %**	**SD**	**Mean or %**	**SD**
Pornography viewing	0–5	1.25	1.85	0.92***	1.63	1.60	2.00
Religious attendance	0–6	2.64	2.22	3.09***	2.22	2.17	2.13
Importance of faith	0–4	2.34	1.21	2.42***	1.16	2.24	1.26
Prayer frequency	0–6	3.12	2.04	3.26***	2.00	2.98	2.07
Closeness to God	0–5	2.83	1.32	2.96***	1.29	2.69	1.35
Doubts about faith	0–4	1.47	1.57	1.34***	1.49	1.61	1.65
Age	13–24	17.48	2.49	15.45***	1.36	19.61	1.37
Religious affiliation							
Conservative Protestant		30%		32%**		28%	
Mainline Protestant		10%		10%		10%	
Black Protestant		9%		10%***		7%	
Catholic		21%		23%***		18%	
Other		13%		12%†		14%	
Unaffiliated		18%		13%***		23%	
Gender (Female)		51%		50%		52%	
Race[1]							
White		69%		68%		70%	
Black non-Hispanic		16%		16%		16%	
Hispanic		10%		10%		9%	
Other		5%		5%		5%	
Lives in the south		42%		42%		42%	
Parent in the home		82%		100%[2]***		64%	
Parental income[1]	1–11	6.11	2.88	6.06	2.87	6.16	2.89

Notes. Observations reported are person-wave observations.

[1] Responses measured at baseline.

[2] 11 observations in this age group (.31%) do not have a parent at home.

† p<.1;

* p<.05;

** p<.01;

*** p<.001 (two-tailed tests)

Table 2

Random Effects Regression Estimates Predicting Religious Characteristics by Pornography Viewing (N = 2,561; Person-wave Observations = 7,029)

	Service Attendance				Importance of Faith				Prayer Frequency				Closeness to God				Religious Doubts			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
Variable	**B**	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**
Pornography viewing	−.116 ***	(.012)	−.114 ***	(.019)	−.059 ***	(.007)	−.069 ***	(.011)	−.076 ***	(.012)	−.089 ***	(.020)	−.055 ***	(.008)	−.076 ***	(.013)	.059 ***	(.008)	.081 ***	(.014)
18 or older	−.458 ***	(.041)	−.471 ***	(.049)	−.016	(.022)	−.033	(.025)	−.071 †	(.039)	−.071	(.045)	−.109 ***	(.026)	−.137 ***	(.030)	−.027	(.027)	.021	(.030)
Gender (Female =1)	−.051	(.057)	−.026	(.066)	.117 ***	(.033)	.113 **	(.037)	.472 ***	(.059)	.435 ***	(.065)	.120 **	(.037)	.100 *	(.041)	−.047	(.032)	−.054	(.036)
Pornography viewing *18 or older			.010	(.021)			.014	(.011)			.002	(.020)			.024 †	(.013)			−.039 **	(.014)
Pornography viewing *female			−.023	(.026)			.005	(.014)			.034	(.024)			.020	(.017)			.005	(.016)
Religious affiliation																				
Conservative Protestant																				
Mainline Protestant	−.592 ***	(.084)	−.594 ***	(.084)	−.274 ***	(.047)	−.274 ***	(.047)	−.344 ***	(.082)	−.342 ***	(.082)	−.068	(.050)	−.067	(.050)	.006	(.055)	.006	(.055)
Black Protestant	−.431 ***	(.116)	−.430 ***	(.116)	−.314 ***	(.057)	−.313 ***	(.057)	−.450 ***	(.110)	−.451 ***	(.110)	−.236 ***	(.068)	−.234 ***	(.068)	.044	(.076)	.041	(.076)
Catholic	−1.026 ***	(.080)	−1.028 ***	(.080)	−.483 ***	(.041)	−.483 ***	(.041)	−.692 ***	(.073)	−.690 ***	(.073)	−.236 ***	(.046)	−.235 ***	(.046)	.079	(.049)	0.080 †	(.049)
Other	−1.084 ***	(.089)	−1.085 ***	(.089)	−.293 ***	(.044)	−.293 ***	(.044)	−.593 ***	(.078)	−.592 ***	(.078)	−.321 ***	(.051)	−.319 ***	(.051)	.113 *	(.053)	.112 *	(.053)
Unaffiliated	−3.069 ***	(.057)	−3.070 ***	(.057)	−1.373 ***	(.043)	−1.374 ***	(.043)	−1.966 ***	(.073)	−1.967 ***	(.073)	−1.295 ***	(.051)	−1.295 ***	(.051)	2.856 ***	(.037)	2.856 ***	(.037)
Race																				
White																				
Black non-Hispanic	.110	(.097)	.112	(.097)	.558 ***	(.051)	.558 ***	(.051)	.742 ***	(.099)	.739 ***	(.099)	.559 ***	(.062)	.557 ***	(.062)	−.091	(.057)	−.092	(.057)
Hispanic	.260 **	(.095)	.262 **	(.095)	.203 ***	(.051)	.202 ***	(.052)	.247 *	(.100)	.245 *	(.100)	.234 ***	(.059)	.233 ***	(.059)	−.082	(.054)	−.082	(.054)
Other	.048	(.126)	.048	(.126)	.037	(.076)	.037	(.076)	.362 **	(.127)	.362 **	(.127)	.086	(.095)	.087	(.095)	.095	(.073)	.095	(.073)
Lives in the south	.178 **	(.056)	.177 **	(.056)	.253 ***	(.031)	.253 ***	(.031)	.360 ***	(.055)	.360 ***	(.055)	.212 ***	(.037)	.212 ***	(.037)	−.118 ***	(.032)	−.118 ***	(.032)
Parent in the home	.397 ***	(.054)	.397 ***	(.054)	.055 †	(.030)	.055 †	(.030)	.081 †	(.049)	0.081 †	(.049)	.026	(.035)	.027	(.035)	.047	(.034)	.047	(.034)
Parental income	.051 ***	(.010)	.050 ***	(.010)	−.021 ***	(.006)	−.021 ***	(.006)	−.030 **	(.010)	−.030 **	(.010)	−.021 **	(.007)	−.021 **	(.007)	−.015 **	(.006)	−.015 **	(.006)
Constant	3.258		3.252		2.654		2.665		3.452		3.471		3.136		3.161		1.021		1.001	
Rho	.357		.356		.433		.432		.436		.435		.410		.410		.256		.257	
R^2	.366		.366		.341		.340		.256		.256		.255		.255		.541		.542	

Notes. Table values are unstandardized regression coefficients with robust standard errors in parentheses.

† p<.1;

* p<.05;
** p<.01;
*** p<.001

Table 3

Fixed Effects Regression Estimates Predicting Religious Characteristics by Pornography Viewing (N = 2,561; Person-wave Observations = 7,029)

	Service Attendance				Importance of Faith				Prayer Frequency				Closeness to God				Religious Doubts			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
Variable	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Pornography viewing	−.072 ***	(.015)	−.080 ***	(.023)	−.042 ***	(.008)	−.063 ***	(.013)	−.056 ***	(.014)	−.078 ***	(.022)	−.043 ***	(.009)	−.078 ***	(.015)	.030 **	(.010)	.058 ***	(.017)
18 or older	−.555 ***	(.043)	−.572 ***	(.051)	−.067 **	(.023)	−.104 ***	(.026)	−.131 **	(.040)	−.157 ***	(.046)	−.155 ***	(.027)	−.210 ***	(.032)	.027	(.029)	.078 *	(.032)
Pornography viewing * 18 or older			.014	(.023)			.031 *	(.012)			.022	(.021)			.046 ***	(.014)			−.042 **	(.015)
Pornography viewing * female			.001	(.032)			.007	(.016)			.024	(.029)			.021	(.019)			−.006	(.021)
Religious affiliation																				
Conservative Protestant																				
Mainline Protestant	−.239 *	(.109)	−.239 *	(.109)	−.080	(.057)	−.079	(.057)	.026	(.100)	.028	(.100)	.161 *	(.068)	.163 *	(.068)	−.077	(.076)	−.078	(.076)
Black Protestant	−.225	(.146)	−.224	(.146)	−.124 †	(.067)	−.120 †	(.067)	−.244 †	(.131)	−.242 †	(.131)	−.115	(.082)	−.110	(.082)	−.043	(.098)	−.048	(.098)
Catholic	−.801 ***	(.126)	−.802 ***	(.125)	−.214 **	(.065)	−.215 **	(.065)	−.217 †	(.116)	−.216 †	(.116)	−.005	(.076)	−.006	(.076)	−.080	(.086)	−.080	(.085)
Other	−.829 ***	(.102)	−.827 ***	(.102)	−.094 †	(.050)	−.091 †	(.050)	−.327 ***	(.091)	−.323 ***	(.091)	−.153 *	(.060)	−.147 *	(.060)	.019	(.069)	.014	(.069)
Unaffiliated	−2.108 ***	(.096)	−2.108 ***	(.096)	−.783 ***	(.057)	−.782 ***	(.057)	−1.116 ***	(.101)	−1.115 ***	(.101)	−.748 ***	(.066)	−.747 ***	(.066)	2.375 ***	(.069)	2.373 ***	(.069)
Lives in the south	.345 *	(.146)	.343 *	(.146)	.157 *	(.073)	.153 *	(.073)	.263 *	(.115)	.261 *	(.115)	.120	(.091)	.115	(.091)	−.060	(.084)	−.054	(.084)
Parent in the home	.475 ***	(.058)	.475 ***	(.058)	.073 *	(.031)	.072 *	(.031)	.148 **	(.052)	.148 **	(.052)	.041	(.038)	.040	(.038)	.033	(.039)	.033	(.039)
Constant	3.154		3.162		2.509		2.528		3.327		3.342		3.022		3.051		1.028		1.001	
Rho	.535		.535		.613		.614		.595		.594		.573		.574		.452		.452	
R^2 (OLS)	.754		.754		.777		.778		.744		.744		.731		.731		.786		.787	
Adjusted R^2	.613		.612		.649		.649		.597		.597		.575		.576		.663		.664	
Within R^2	.240		.240		.099		.100		.071		.072		.092		.095		.376		.377	

Notes. Table values are unstandardized regression coefficients with robust standard errors in parentheses.

† p<.1;

* p<.05;

** p<.01;

*** p<.001