

Religious Influences on Sensitive Self-Reported Behaviors: The Product of Social Desirability, Deceit, or Embarrassment?*

Mark D. Regnerus
Jeremy E. Uecker
University of Texas at Austin

Religion appears to exert influence on numerous types of adolescent attitudes and actions. However, some researchers remain skeptical, attributing religious effects to selection processes, social desirability bias in survey responses, or a combination of the two. In this study we evaluate the evidence about social desirability and candidness explanations for apparent religious influences, and analyze data from a nationally representative dataset of American adolescents. Results suggest that while social desirability and embarrassment modestly diminish the likelihood of self-reporting some sensitive behaviors, they are neither associated with religiosity nor do they undermine apparent religious effects. We conclude that religious youth are not systematically at risk of providing unintentionally invalid or intentionally inaccurate self-reports of behaviors that are of a sensitive nature.

Religion, measured in a variety of ways, appears to exert significant direct and indirect influence on a range of personal attitudes and behaviors among American teenagers (Regnerus 2003). The same can be said for religious influences on the emotional and physical health and behaviors of American adults (Sherkat and Ellison 1999). However, some scholars are skeptical about claims of religious influence, and instead attribute them to selection effects, social desirability bias or lack of candidness in survey responses, spurious artifacts, or a combination of these (e.g., Cochran, et al. 1994; Sloan, et al. 1999). Some of the skepticism is more subtle, appearing—as it has for the first author on numerous occasions—in manuscript reviews, especially in submissions to general journals. In this study we review evidence for the association of religiosity with social

*Direct correspondence to: Mark Regnerus, Department of Sociology, University of Texas at Austin, 1 University Station A1700, Austin, TX 78712-0118 (regnerus@prc.utexas.edu). This research uses data from Add Health, a program project designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris, and funded by a grant P01-HD31921 from the National Institute of Child Health and Human Development, with cooperative funding from 17 other agencies. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Persons interested in obtaining data files from Add Health should contact Add Health, Carolina Population Center, 123 W. Franklin Street, Chapel Hill, NC 27516-2524 (www.cpc.unc.edu/addhealth/contract.html).

desirability bias or lack of candidness in survey responses, and evaluate the effect of several possible sources of response bias in mediating religious influences on three sensitive self-reported behaviors among American teenagers. By doing this we engage a fundamental debate about the *real* influence of religion in young people's lives.

Social desirability bias is the tendency of individuals to want to make themselves appear better than they actually are. Social desirability comes in at least two forms: (1) self-deception, or the unconscious tendency to give inaccurate but honestly held descriptions of oneself and one's behavior, and (2) other-deception, or the active tendency to give more favorable self-descriptions to a researcher (Paulhus 1984). Related to these, survey respondents may find themselves embarrassed when asked questions that are particularly sensitive, and may choose to lie to the interviewer rather than admit an action. Or they may "retract" behaviors: a respondent could say that "yes, that is true" of them at one point in time and "no, it's not true" at a later point in time. This may especially affect sensitive self-reports like those concerning sexual experience. Indeed, while more than 10 percent of respondents later contradicted their initial reports of sex in the National Longitudinal Study of Adolescent Health (Add Health), less than one percent of them contradicted simple demographic details about their lives (Rosenbaum 2006). It's clear that there is something to worry about.

However, social desirability bias is not necessarily problematic to a study, especially if all respondents are equally subject to the tendency. But it can bias estimates of religious influence if there are systematic differences among respondents along religious lines. Social scientists would be wise to include indicators of social desirability or survey response candidness in regression models when predicting behaviors and outcomes in populations deemed at risk of giving socially desirable answers. Failure to do so could bias model coefficients, especially those that contain the source of the systematic response bias.

The evidence concerning religion and social desirability bias and candidness is mixed. It is widely held among social scientists (though difficult to document without controversy) that Americans tend to over-report their actual participation in religious worship services, due primarily to other-deception (Hadaway, et al. 1993; Presser and Stinson 1996). While the extent of the problem is unknown, others (e.g., Hout and Greeley 1998; Woodberry 1998) argue that it is overstated. Nevertheless, scholars have noted trends in the association between religiosity and the tendency toward impression management and self-deception (Batson, et al. 1978). A closer review of studies on religion and social desirability bias confirms this, suggesting the average correlation between intrinsic religiosity (practicing religion as an important end in and of itself) and social desirability is 0.15 (Trimble 1997). No association was noted between social desirability and extrinsic religiosity (religion employed as a means to some other end). In their discussion of such studies, Leak and Fish (1989) submit that most measures of social desirability confound the two types, which they label impression

management and self-deception. When distinctive measures of each are employed, as Leak and Fish (1989) do, they document a robust association of each form of social desirability with their measure of intrinsic religiosity, but no relationship with extrinsic religiosity.

Not surprisingly, others disagree. A pair of studies found no evidence at all connecting intrinsic religiosity or strength of religious faith with socially desirable response bias (Genia 1996; Plante, et al. 1999). Evidence from the Third National Health and Nutrition Examination Survey (NHANES III) suggests the association between candid survey responses and religious service attendance may actually be the opposite of what we have thought it to be. Non-black men aged 20–59 and black men aged 60 and older who attended religious services regularly were *less* likely than others to misreport their smoking behavior (Gillum 2005). A third study suggests religiosity is positively correlated with impression management, but not self-deception (Gillings and Joseph 1996). One thing is clear: the link between religion and social desirability bias is not very clear at all.

To further complicate matters, some social desirability and candidness measures may actually be confounded by “religious relevance” and thus inappropriate to include as statistical controls alongside religiosity (Watson, et al. 1986). In other words, some measures intend to capture social desirability (such as “I sometimes try to get even rather than forgive and forget”) but may actually measure aspects of religiosity.

Very little is known about how social desirability may vary between religious traditions or affiliations. Indeed, the studies named herein primarily consider forms of religiosity rather than religious groups with which people affiliate. But religious tradition may play a role here, primarily in terms of differential religious applicability. For example, sex is a sphere of human behavior high in religious applicability, especially among evangelical Protestants. Admitting sexual behavior may be more difficult for them than for others. Again, this has not yet been pursued in studies of religion and social desirability.

Despite the disputes, many social scientists consider devoutly religious populations of any stripe to be at an elevated risk of giving more socially desirable answers on surveys (Batson, et al. 1978; Trimble 1997). What the NHANES study suggests, however, is that the assumption may no longer be tenable. How these competing claims extend to adolescent self-reported behavior is altogether unclear. If more devoutly religious individuals are mischaracterizing their real attitudes or behaviors, researchers may be according greater influence to religion than it actually deserves. On the other hand, perhaps religion is altogether unassociated with survey response biases in a younger sample.

Studies that jointly evaluate social desirability and religiosity effects *together* are rare. Disciplinary differences are apparent, since sociological concerns about social desirability tend to focus on self-reports of religious practices like church attendance, while psychological concerns about social desirability tend to focus on personal religiosity and the accumulation of multiple measures. Nevertheless,

whether types of religiosity invoke social desirability or not, there remains little evidence to suggest that social desirability bias can fully *account for* the religious influences frequently noted on human behavior (Regnerus and Smith 2005; Rowatt and Kirkpatrick 2002; Rowatt and Schmitt 2003).

In this study we first assess religious influences on adolescent respondents' social desirability, perceived candidness in answering survey questions, and evident embarrassment during the survey administration. Then we examine several behavioral outcomes that are at a distinct risk of social desirability and candidness concerns among religious youth—self-reported theft, minor delinquency, and virginity status. If devoutly religious adolescents are going to stretch the truth at all, it would likely be with questions about these. Our intention is to distinguish religious influences on these behaviors from any effects of social desirability, candidness (or lack thereof), and embarrassment. These tests should clarify (1) whether religion contributes to social desirability, candidness, and embarrassment, and (2) whether religious influences on adolescent behavior are robust, or if in fact they are diminished by these potential sources of patterned response bias.

DATA, MEASURES, AND ANALYTIC APPROACH

The data for this analysis come from the National Longitudinal Study of Adolescent Health (Add Health), a longitudinal, nationally representative, school-based study of adolescents in grades 7-12.¹ The first wave of in-home interviews was conducted between April and December 1995. The second wave of data collection followed the first by approximately one year. Most of the analyses in this study are based on the sub-sample of Add Health adolescents who completed the first wave of interviews and who have valid weights,² resulting in a study sample of around 18,900 adolescents prior to listwise deletion of missing

¹The Add Health study was funded by the National Institute of Child Health and Human Development (NICHD) and 17 other federal agencies. Fieldwork was conducted by the National Opinion Research Center of the University of Chicago. A stratified sample of 80 high schools was selected with probability proportionate to size. These schools were stratified by region, urban location, school type (public, private, and parochial), ethnic diversity, and enrollment size. Additionally, a feeder school (typically a middle school) for each high school was also identified and selected, yielding a pair of schools in each of the 80 communities. Nearly 80 percent of the schools contacted agreed to participate, and refusals were replaced with another pair of schools. Data were gathered from adolescents themselves, from their parents, siblings, friends, romantic partners, fellow students, and from school administrators. Further details regarding the sample and methods of study can be found in Bearman, et al. (1997).

²The weights account for unequal probability of selection for both schools and individuals within schools. However, 1,821 cases from the first wave of data collection lack these weights, because they were cases that were either added in the field, selected as a pair (e.g., for the twin or sibling sample), or simply lacked a sample flag.

values. Our analysis of virginity status includes data from both waves. It is the only longitudinal component of this study.

In general, Add Health researchers made a concerted effort to reduce social desirability bias on their survey. Respondents were asked sensitive questions—including questions about delinquency and sexual behavior—using an audio computer-assisted self-interview (ACASI) technique. Respondents wore headphones (questions were read to respondents *and* appeared on a screen in front of them) and entered their responses to these questions directly into a laptop computer. Neither the interviewer nor anyone else present could hear the questions that were being asked or see the answers keyed in by the respondent. While this reduces social desirability bias resulting from interaction with an interviewer (especially one of a different race or gender than the respondent), social desirability could still be a problem for some respondents who are either self-deceived or conscious that their responses are being recorded and (eventually) analyzed.

Two of the dependent variables are summed indexes of self-reported counts of theft and minor delinquency. Respondents were asked about their level of participation in four different forms of theft over the previous year. Levels for each measure ranged from zero (never) to three (5 or more times). Those activities comprising the theft scale are: theft exceeding \$50, going into a house or building with intent to steal, theft under \$50, and taking something from a store without paying for it. The alpha coefficient of reliability among these is 0.92. The two activities comprising the minor delinquency scale are: painting graffiti or signs on someone else's property or in a public place, and deliberately damaging property that doesn't belong to you. The alpha coefficient of reliability among these is 0.84. Such indices of self-reported delinquent event counts are common in studies of delinquency (Osgood, et al. 1996). The third outcome is the self-reported virginity status of the respondent. The question was posed at both waves of Add Health as follows: "Have you ever had sexual intercourse? When we say sexual intercourse, we mean when a male inserts his penis into a female's vagina." The outcome is coded dichotomously (1=respondent reports that he/she has already had intercourse). These three dependent variables constitute three common, potentially embarrassing actions to which adolescents could admit in the Add Health study.

Social desirability is typically measured as agreement with statements that are, essentially, humanly impossible. Thus, they are intended to pick up on respondents' desires to be thought of in a way that is both ideal, yet improbable. The Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne and Marlowe 1960), for example, includes items that describe desirable but uncommon behaviors, such as: "Before voting I thoroughly investigate the qualifications of all the candidates." It also includes items that allow respondents to deny participation in undesirable but common activities, such as: "I like to gossip at times." The MCSDS items are not available in Add Health, but our strategy for operationalizing social desirability follows the MCSDS approach. Our measure of social desirability is a summed index of three dichotomous variables that, taken togeth-

er, attempt to capture the degree to which individual respondents wish to present themselves in a favorable light. While some researchers frown upon short forms for social desirability scales (Barger 2002), others have found them helpful (Hays, et al. 1989). In our case, Add Health simply did not include more items on the matter, so we made do with what was available.

In Add Health, adolescents who answered “strongly agree” to the statement “you never argue with anyone” were given one point toward three possible points on the social desirability scale. Similarly, one point was given for the same answer to the statement “you never get sad,” and likewise for the statement “you never criticize other people.” Thus, respondents who emphatically agree with such statements are thought to be characterizing themselves in a more positive light than is possible. Higher scores reflect a greater degree of socially desirable responding. The reliability coefficient for this construct is 0.83.³

At the conclusion of the survey, the interviewers were asked to record their impressions of the respondents’ candidness. While interviewer reports are subject to criticisms concerning inter-rater reliability, we believe they provide a *useful* (while certainly far from perfect) measure of respondent candidness and embarrassment. Their ordinal response categories were (1) not candid, (2) somewhat candid, (3) moderately candid, and (4) very candid. Interviewers were also asked to report whether the respondent ever appeared embarrassed about questions during the interview. This is a dichotomous variable (1=yes).⁴ These two comprise measures of *candidness* and *embarrassment*, respectively. They are *not* intended to measure *social desirability*, but rather a separate set of possible data-compromising phenomena.

We consider two distinct measures of religiosity here: church or religious service attendance, which is an ordinal measure that gauges public religiosity, and the importance of religion in the respondent’s life, which is also ordinal.⁵ Attendance categories are: never, less than once a month, once a month or more but less than once a week, and once a week or more. Religious salience categories

³This coefficient was calculated using the average inter-item tetrachoric correlation, which is appropriate for binary data. The alpha coefficient of reliability is typically calculated using Pearson’s *r* correlation, which is appropriate only for continuous measures. When calculated using Pearson’s *r*, the alpha was 0.50, which is not uncommon among short forms of the Marlowe-Crowne scale (Loo and Loewen 2004).

⁴Interviewers who said “yes” were then asked to identify the section of the interview during which the adolescent appeared to be embarrassed. But since various sex-related sections (e.g., contraception, risk motivations, romantic relationships) constituted the overwhelming number of follow-up reports, we are comfortable with the choice of using only the initial embarrassment question.

⁵Unfortunately, those who indicated in the first religion section question that they had no religious affiliation were not asked to answer any subsequent religion questions. Rather than lose a considerable number of cases (n~2,000), we follow the typical approach of Add Health data users and assign the lowest value (missing=0) on attendance and religious salience to youth who indicate “no religious affiliation.”

are: not important at all, fairly unimportant, fairly important, and very important. Their separate inclusion appears justified by their unique and varying effects in other studies (Nonnemaker, et al. 2003; Regnerus 2003).

We grouped religious affiliation into eight categories in line with Steensland, et al.'s (2000) classification scheme, including evangelical Protestants, mainline Protestants, black Protestants, Roman Catholics, Jews, Mormons/LDS, the religiously unaffiliated, and a category of "other" religious groups. We paid particular attention to potential collinearity problems between race/ethnicity and affiliation (e.g., black Protestant, Mormon/LDS).⁶

Several demographic variables are also included in the analysis: dichotomous race/ethnicity measures (African American, Hispanic, and Asian, compared with the omitted white category), gender, age (and when assessing delinquency we include its squared term to detect curvilinear relationships), Southern residence, a dichotomous indicator of a biologically intact (two-parent) family, and average parental education (0=no parents with a college degree, 0.5=one has a college degree, 1=both have a college degree). Evidence suggests that each of these is associated with survey candidness and offering socially desirable survey responses (Dudley, et al. 2005; Gillum 2005; Rosenbaum 2006; Siegel, et al. 1998; Upchurch, et al. 2002). The appendix displays summary statistics for all variables.

We proceed as follows: first, we report simple statistics concerning the association between religion, social desirability, and perceived interviewee candidness and embarrassment. We then employ regression models predicting the last three of those as a function of religious affiliation and religiosity, as well as a series of demographic control variables. Next, we predict a series of sensitive self-reported outcomes—*theft, delinquency, virginity status, and logically inconsistent reports of virginity status (i.e., "no" at Wave I and "yes" at Wave II)*—as a product of religion and demographic factors. Finally, we add social desirability, interviewee candidness, and interviewee embarrassment to the models to assess their independent influence and the degree to which they mediate or diminish religious influences. In order to accommodate the multiple design weights that accompany Add Health data, we generated regression models in Stata using its *svy* estimators, which account for the primary sampling unit (the school), the

⁶Some researchers have questioned the validity of Add Health Wave I religious affiliation measures, since response categories were not very detailed and a surprising number of respondents identified with the generic-sounding "Christian Church," which is actually a specific mainline Protestant denomination (Smith, et al. 2002). We experimented with other ways to test for denominational difference. First, we used the "born-again Christian" self-identity to measure conservative Protestantism, but this measure does not capture the religious diversity (e.g., Catholic, mainline Protestant, Jewish) of respondents who are not "born again." Additionally, we created an alternative classification scheme that divided respondents into seven categories: born-again Protestant, other Protestant, Catholic, Jewish, Mormon, "other religion," and no religion. These results with these alternative operationalizations were not appreciably different from the ones presented here.

TABLE 1
 Percentage of Respondents Expressing Social Desirability, Candidness, and Embarrassment, by Religious Categories (n=15,254)

	Gives 1+ socially desirable answer(s)	Is said to be "very" or "moderately" candid during survey	Appears embarrassed during survey
How often do you attend religious services?			
Once a week or more	9.4	86.4	10.4 ^f
Once/month or more but less than once/week	8.8	87.2	9.1
Less than once a month	8.0	87.7	8.7
Never	9.3	85.7	8.5
How important is religion to you?			
Very important	10.4 ^a	85.5 ^d	9.8
Fairly important	7.6	87.8	9.9
Fairly unimportant	6.5	89.0	7.1 ^g
Not important at all	9.8 ^b	85.7	8.2
What religion are you?			
Evangelical Protestant	9.6	87.6	9.7
Black Protestant	13.1 ^c	79.7 ^e	6.6 ^h
Mainline Protestant	6.9	87.7	9.3
Roman Catholic	9.1	87.6	10.8 ⁱ
Mormon (LDS)	3.4	89.9	14.9
Jewish	4.5	95.5	2.6
Other religion	8.6	87.5	10.8
No religion	9.5	85.6	7.5

Note: Statistical significance is derived from Scheffé post hoc multiple comparison tests (two-tailed).

a = significantly different from "fairly important" ($p < .001$) and "fairly unimportant" ($p < .01$)
 b = significantly different from "fairly important" ($p < .05$) and "fairly unimportant" ($p < .05$)
 c = significantly different from evangelical Protestant ($p < .05$), mainline Protestant ($p < .001$), Roman Catholic ($p < .001$), Mormon ($p < .05$), other religion ($p < .01$), and no religion ($p < .05$)

d = significantly different from "fairly important" ($p < .01$) and "fairly unimportant" ($p < .05$)

e = significantly different from evangelical Protestant ($p < .001$), mainline Protestant ($p < .001$), Roman Catholic

($p < .001$), Mormon ($p < .10$), Jewish ($p < .01$), other religion ($p < .001$), and no religion ($p < .001$)

f = significantly different from "never" ($p < .05$)

g = significantly different from "very important" ($p < .10$) and "fairly important" ($p < .05$)

h = significantly different from evangelical Protestant ($p < .10$), Roman Catholic ($p < .001$), and other religion ($p < .05$)

i = significantly different from no religion ($p < .05$)

region, and the unequal probability of being included in the sample (StataCorp 2001).

RESULTS

Table 1 displays frequencies from the social desirability index and the candidness and embarrassment questions, split by levels of the two religiosity measures and religious affiliation.

No notable connection appears between social desirability and self-reports of religious service attendance. Indeed, there is little to report about attendance and all three variables here. There is not much to suggest about religious salience, either. Adolescents who report that religion is “very important” or “not important at all” appear slightly more likely to give socially desirable answers. These two groups are also slightly less likely to be candid, according to the interviewer.

There are more noteworthy stories with religious affiliation. Mormon and Jewish youth are clearly the least likely to give socially desirable answers on the survey. Black Protestants are the most likely to do so: 13.1 percent of them gave at least one such response, followed by 9.6 percent of evangelical Protestant youth. Indeed, black Protestants are four times as likely as Mormon respondents are to do this. Black Protestants are also least candid in the assessment of the interviewer, a finding that may be more about race than about religion (Dudley, et al. 2005). Jewish youth are the most candid, as well as the least likely to appear embarrassed during the survey. While less than three in 100 Jewish respondents appeared embarrassed, more than one in seven Mormon youth did so, perhaps due to the high religious applicability of sensitive topics like sex in the LDS church. At face value, then, religious affiliation—a measure typically neglected in previous studies of religion and social desirability—may be more subject to such biases than religiosity measures.

Table 2 displays estimated odds ratios from a series of nested (or hierarchical) ordered logit and logistic regression models predicting social desirability, candidness, and embarrassment as a function of religion and demographic characteristics. We begin with simple religiosity models. Among the three outcomes, only social desirability appears to significantly vary by religious salience (and only at the $p < .10$ level of significance). Attendance displays no notable associations with any outcome. With the addition of religious affiliation variables, the salience effect on social desirability strengthens slightly and reaches a higher level of statistical significance ($p < .05$). It is nearly null (back to $p < .10$) with the addition of demographic effects. Nevertheless, no religion variable is very effective in predicting much *variance* in social desirability. Compared with evangelical Protestants, black Protestants appear more likely to give socially desirable survey responses, while mainline Protestants and Mormons are less likely to do so. Indeed, the odds of Mormons giving socially desirable responses are one-third

TABLE 2
 Odds Ratios from Ordered Logit and Logistic Regression of Religious and Demographic Effects
 on Social Desirability, Candidness, and Embarrassment (Standard Errors in Parentheses, n = 15,254)

Effect	Social Desirability	Candidness	Embarrassment
<i>Religion Variables</i>			
Religious service attendance	0.969 (.04)	1.004 (.03)	1.011 (.03)
Importance of religion	1.084+ (.05)	1.016 (.03)	1.058 (.05)
Black Protestant	1.405** (.18)	0.593*** (.07)	1.033 (.08)
Mainline Protestant	0.718** (.09)	1.001 (.10)	0.640* (.14)
Roman Catholic	0.979 (.12)	1.046 (.13)	0.958 (.14)
Mormon/LDS	0.335+ (.21)	1.318 (.26)	1.132 (.17)
Jewish	0.479 (.35)	1.823* (.58)	1.585 (.51)
Other religion	0.899 (.15)	2.207** (.92)	1.703 (.21)
No religion	1.326 (.27)	0.976 (.12)	0.257+ (.19)
<i>Demographic Variables</i>			
Female	0.646*** (.06)	1.098 (.06)	0.923 (.07)
Age	0.929* (.03)	1.051* (.03)	0.859*** (.02)
Lives in the South	1.117 (.13)	0.794 (.11)	0.962 (.16)
African American	2.939*** (.32)	0.539*** (.08)	0.706 (.15)
Asian American	1.904** (.42)	0.844 (.11)	1.084 (.23)
Latino	1.649*** (.20)	0.662** (.08)	1.171 (.26)
Bio-intact, two-parent family	0.909 (.08)	1.025 (.05)	1.097 (.08)
Parents' average education	0.454*** (.06)	1.159+ (.09)	0.878 (.11)
<i>Model Fit Statistics</i>			
-2 log likelihood	12253.5	34666.1	9292.0
Pseudo R-square	0.001	0.000	0.001
	12222.4	34535.3	9265.9
	0.003	0.004	0.003

+ p < .10 * p < .05 ** p < .01 *** p < .001

that of evangelical Protestants. These relationships diminish little with the inclusion of demographic variables (which are responsible for a *much greater share* of the predicted variation than religion). Female, white, and older adolescents—as well as children of more educated parents—appear much less likely to offer socially desirable survey answers.

Whites are also more candid than adolescents of other races/ethnicities. Prior to the addition of demographic variables (including race), black Protestants appear less candid *and* less embarrassed than evangelical Protestants (implying a simple racial effect, per Model 3). Jewish respondents, on the other hand, are both more candid *and* slightly less embarrassed than evangelical Protestant youth. Nevertheless, each of these outcomes has considerable unexplained variance. To suggest that religion is to blame for a good deal of social desirability, lack of candidness, or embarrassment among survey respondents is simply untrue.

Table 3 presents results from negative binomial and logistic regression models predicting three sensitive self-reports—theft, minor delinquency, and virginity status.⁷ While each model contains a set of demographic controls, the first model includes religion measures and the second adds our three variables of interest—social desirability, survey candidness, and embarrassment about survey questions. The most important result to note here is that the inclusion of these three variables does little to alter (or mediate) the influence of religious salience and religious service attendance on any of the three sensitive self-report outcomes. Religious salience remains a robust predictor of a diminished likelihood of reporting theft, minor delinquency, or loss of virginity. Attendance only predicts a diminished likelihood of loss of virginity, yet it too is unaffected by the addition of the three survey response variables.

A pattern of giving socially desirable survey responses corresponds with fewer self-reported thefts and incidences of minor delinquency. Survey embarrassment is associated with reporting fewer thefts, less delinquency, and a stronger likelihood of reporting virginity. The odds of self-reporting non-virginity for respondents who appeared embarrassed are only 60 percent as high as those who did not appear embarrassed. Being more candid on surveys corresponds positively with a slightly elevated likelihood of self-reporting sexual experience. Interestingly, although religious affiliation makes no apparent difference for theft or minor delinquency (with the exception of Catholics for the delinquency outcome), it does for virginity status. Here, when controlling for religiosity, evangelical Protestants appear more likely to report virginity loss than all other religious traditions (except black Protestants, a phenomenon noted and detailed elsewhere [Regnerus 2007]). The effects of the series of religious affiliation variables also

⁷We use negative binomial regression in the theft and minor delinquency models because it is the most appropriate model estimator for predicting rare count outcomes (and ones where the variance exceeds the mean).

TABLE 3
 Results from Negative Binomial and Logistic Regression Models Predicting Three Sensitive Self-Reported Behaviors
 as a Function of Religion, Social Desirability, Candidness, and Embarrassment
 (Standard Errors in Parentheses, n=15,182)

Effect	Theft		Minor Delinquency		Has Had Sex ^a	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Religious service attendance	-0.011 (.03)	-0.013 (.03)	0.019 (.03)	0.018 (.03)	0.819*** (.02)	0.819*** (.02)
Importance of religion	-0.293*** (.04)	-0.289*** (.04)	-0.287*** (.04)	-0.278*** (.04)	0.772*** (.03)	0.775*** (.03)
Black Protestant	-0.190 (.13)	-0.216+ (.12)	0.036 (.18)	0.039 (.18)	1.281+ (.18)	1.275+ (.18)
Mainline Protestant	0.053 (.09)	0.034 (.09)	0.108 (.10)	0.097 (.09)	0.756** (.07)	0.756** (.07)
Roman Catholic	0.096 (.08)	0.076 (.08)	0.233* (.09)	0.226* (.09)	0.695** (.07)	0.697** (.07)
Mormon/LDS	0.381 (.23)	0.341 (.23)	0.204 (.31)	0.210 (.33)	0.295** (.11)	0.301** (.11)
Jewish	-0.035 (.28)	-0.025 (.30)	0.341+ (.20)	0.335 (.20)	0.476** (.13)	0.460** (.12)
Other religion	0.088 (.10)	0.079 (.10)	0.072 (.13)	0.063 (.13)	0.711* (.09)	0.712* (.09)
No religion	-0.290* (.13)	-0.296* (.13)	-0.269* (.13)	-0.273* (.13)	0.511*** (.08)	0.514*** (.08)
Social desirability index		-0.335*** (.08)		-0.241** (.08)		0.983 (.07)
Candid on survey		0.035 (.03)		-0.011 (.03)		1.039+ (.04)
Embarrassed during survey		-0.176* (.09)		-0.218+ (.12)		0.607*** (.06)
<i>Model Fit Statistics</i>						
-2 log likelihood	37573.0	37499.8	24635.1	24589.7	17754.2	17686.4
Pseudo R-square	0.015	0.017	0.030	0.031	0.182	0.186

Note: All models include controls for adolescent's gender, age (and age-squared, for the theft- and minor delinquency models), region of residence, race/ethnicity, family structure, and parents' average level of highest education.

^aOdds ratios

+ p < .10 * p < .05 ** p < .01 *** p < .001 (two-tailed tests)

vary little with the addition of the survey response variables. All changes in model fit in Table 3 are significant (at $p < .001$ level).

Table 4 displays odds ratios from logistic regression models predicting logically inconsistent—and perhaps deceptive—reports of first intercourse (i.e., telling the interviewer that you have already had sex at Time 1, but saying at Time 2 that you have not yet had sex). Model 1 includes the three survey response variables and demographic controls. Social desirability and candidness

TABLE 4
Odds Ratios from Logistic Regression Models Predicting Logically Inconsistent Reports of First Intercourse (Standard Errors in Parentheses, $n=11,282$)

Effect	Model 1	Model 2	Model 3
Religious service attendance		1.033 (.08)	1.037 (.08)
Importance of religion		0.918 (.12)	0.917 (.12)
Black Protestant		0.888 (.31)	0.901 (.31)
Mainline Protestant		0.824 (.23)	0.832 (.23)
Roman Catholic		0.953 (.25)	0.953 (.25)
Mormon/LDS		0.157+ (.16)	0.157+ (.16)
Jewish		1.201 (1.2)	1.227 (1.2)
Other religion		0.832 (.28)	0.835 (.27)
No religion		1.341 (.54)	1.339 (.54)
Social desirability index	1.363** (.15)		1.230+ (.14)
Candid on survey	0.795** (.06)		0.874+ (.06)
Embarrassed during survey	1.104 (.30)		1.261 (.33)
<i>Model Fit Statistics</i>			
-2 log likelihood	3564.1	3503.0	3494.4
Pseudo R-square	0.023	0.039	0.042

Notes: Model 1 includes controls for age and gender. Models 2-3 include controls for adolescent's gender, age, region of residence, race/ethnicity, family structure, and parents' average level of highest education.

+ $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests)

are each significant: an increase in the number of socially desirable responses given corresponds with a 36 percent increase in the odds of giving a logically inconsistent report about virginity status, and being candid is associated with a 20 percent reduction in the odds of doing the same. There are no strong independent direct effects from religion, per the second model, and when religion measures are combined with the three survey response variables in model 3, the modest social desirability and candidness effects are diminished (but do not entirely disappear). The change in model fit between the second and third model is significant (at $p < .05$ level). The story about inconsistent virginity reports is primarily in the demographic controls (not shown), especially race and gender.

CONCLUSIONS

The results of our study suggest that more devoutly religious youth are *not* uniquely likely to give unintentionally invalid or intentionally inaccurate self-reports of behaviors that are of a sensitive nature. Adolescent religiosity appears (1) only weakly related to patterns of social desirability, candidness or dishonesty, and embarrassment at survey questions, and (2) altogether unaffected by each of these in its direct influence on three sensitive self-reported behaviors. The first model in each modeling sequence in Table 2 was designed to give every opportunity for religiosity to reveal itself as a predictor of biased survey response patterns. Yet personal religious salience was only mildly associated with social desirability bias and not at all with perceived candidness or embarrassment. The association with religious salience, while hardly robust, accords with several previous studies of intrinsic religiosity's stronger connection (than extrinsic forms) with social desirability (Batson, et al. 1978; Leak and Fish 1989; Trimble 1997).

On the other hand, the strong direct effect of religious salience on theft, minor delinquency, and virginity status was immune to the addition of the survey response pattern variables. Social desirability bias and concerns about candidness and embarrassment do nothing to mitigate independent religiosity effects or make conclusions about religious influences suspect in the least.

Religious affiliations, however, appear differentially related to these survey response patterns. Mormons and mainline Protestants appear to give fewer socially desirable responses, while Jewish adolescents appear most candid and least embarrassed by survey questions.⁸ A racial effect appears to drive black Protestants' greater likelihood of offering socially desirable survey responses; the independent

⁸It is worth noting the inverse association between Mormons and socially desirable response bias. While not strong (due likely to the small number of Mormons in the sample), it affirms the validity of the measures, since Mormon youth might be popularly thought to be prone (in general) to less arguing or criticizing. However, they are least likely among all religious adolescents to suggest that they entirely avoid these, or never get sad. Perhaps they are simply the *most* aware of such forms of human frailty.

effect of being a black Protestant on theft, delinquency, and sex are unaltered by the response bias measures.

While adolescents' survey response patterns do nothing to alter religious effects, there is evidence to suggest that such response patterns do affect the sensitive self-reports themselves. Social desirability predicted diminished reports of theft and minor delinquency, while appearing embarrassed during the survey corresponded with a nearly 40 percent decline in the odds of reporting having already had sex. A modest positive association between social desirability and logically inconsistent virginity reports nearly disappeared after controlling for a series of religious variables. However, given their collective influence on model fit, even these effects are not strong ones. The inclusion of these variables does significantly increase model fit ($p < .05$), despite the small amount of variance they explain. Of course, the model without these variables does not explain much variance to begin with. It does not take much to improve upon it significantly.

To be sure, nobody is claiming that religion is the *only* factor influencing behavior and life outcomes. On many life outcomes its influence is modest or not present at all. The evidence presented here simply suggests that researchers are justified in claiming that religious influences on sensitive self-reported adolescent behaviors are *not explicable* by accounting for social desirability bias, candidness or honesty, and embarrassment with survey questions. They are what they are: religious influences.

Additionally, we only evaluate attendance and religious salience—solitary measures of public and private religiosity, respectively. These are distinct from measures of intrinsic and extrinsic religiosity, which not only involve ways of being religious but also motives *for* being religious. Most research on religion and social desirability bias has concerned intrinsic and extrinsic religiosity, though (see Trimble's [1997] meta-analysis). The use of religiosity indexes or factors might also reveal closer connections with social desirability. However, given the modest associations in even the simplest models, we suspect the results would not change much.

Finally, while the models predicting the sensitive self-reported behaviors include several religious variables, there are models of religious influence that are more complex than we test here. There are contingencies and variations such as contextual effects or threshold effects that are evaluated elsewhere (e.g., Regnerus and Elder 2003; Stark 1996) that may shed light on where and when—if at all—response bias occurs. While we attempt to capture a range of sensitive self-reported behaviors, there are obviously others that are not evaluated here. Finally, we would do well not to generalize from adolescent outcomes to studies of adults, since social desirability processes, embarrassment, and candidness may work in entirely different fashions and magnitudes in studies of adults.

In reality, there are other indicators of social desirability bias that we were not able to test here. Perhaps improved or an expanded array of measures (such

as in an adolescent version of the MCSDS) would reveal stronger associations with both religiosity and potentially embarrassing self-reported behaviors. But given how transparent the results here are, it is doubtful that better measurement (while always optimal) would significantly change our findings. In the future, efforts to measure social desirability well should be made in large-scale social science data collection projects, recognizing that survey space is at a premium and multiple measures are often difficult to accommodate. Two distinct approaches merit some consideration. First, and most obvious, would be using an optimal short form of the Marlowe-Crowne Scale. Some of the measures, however, may not fit a particular research sample (like inquiring about “always driving the speed limit” among youth and urban populations). Second, matched pair reports—such as collecting data from a parent and an adolescent (for example, on whether the latter gets good grades in school)—provide a different way to evaluate the candidness of particular survey respondents.

We want to conclude with a reminder that measuring social desirability and candidness well are only part of an optimal approach to establishing their efficacy in accounting for religious effects. To be useful, such measures must clearly reduce the estimated effect of religion on a variety of human behaviors in our statistical models. Consistently documenting this would suggest that we are indeed overestimating religious influence. But as a starting point, this study notes only modest associations between social desirability and religiosity, and finds no ability of social desirability to account for religious effects on adolescent outcomes.

APPENDIX

Descriptive Statistics for All Variables (n~16,246)

Variables	Range	Mean	SD
Religious service attendance	1-4	2.74	1.20
Importance of religion	1-4	3.06	1.05
Evangelical Protestant	0,1	0.15	0.36
Black Protestant	0,1	0.14	0.35
Mainline Protestant	0,1	0.22	0.42
Roman Catholic	0,1	0.26	0.44
Mormon/LDS	0,1	0.01	0.10
Jewish	0,1	0.01	0.08
Other religion	0,1	0.08	0.28
No religion	0,1	0.12	0.33
Social desirability	0-3	0.12	0.42
Candidness	1-4	3.34	0.81
Embarrassed during survey	0,1	0.08	0.27
Logically inconsistent report of first intercourse	0,1	0.03	0.16
Theft (# of events in past year)	0-12	0.88	1.86

APPENDIX continued
Descriptive Statistics for All Variables (n~16,246)

Variables	Range	Mean	SD
Minor delinquency (# of events in past year)	0-6	0.39	1.95
Has already had sexual intercourse (Wave I)	0,1	0.39	0.49
Has already had sexual intercourse (Wave II, n=11,835)	0,1	0.44	0.50
Female	0,1	0.50	0.50
Age	12-19	15.55	1.70
Lives in the South	0,1	0.37	0.48
White/Caucasian	0,1	0.57	0.50
African American	0,1	0.22	0.41
Asian American	0,1	0.06	0.23
Latino	0,1	0.15	0.36
Biologically intact, two-parent family (0=intact, 1=not intact)	0,1	0.52	0.50
Average parental education	0-1	0.25	0.38

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