Selection Effects and Social Desirability Bias in Studies of Religious Influences

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TITLE

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ABSTRACT

At face value, religion appears to exert influence on the attitudes and actions of many people. However, some researchers are more skeptical about religious influences, choosing to attribute them to selection effects, social desirability bias in survey responses, or a combination of the two. They suggest scholars should pay more attention to what underlies religiosity than what effects it may have. We consider in this study the implications of selection effects and social desirability bias for studies of religious influences. Examining research evidence as well as our own analyses of national longitudinal survey data of American adolescents, our results suggest that two common measures of religiosity – religious service attendance and self-reported religious salience – are indeed subject to selection processes. However, this does not appear to alter their independent effects on a variety of outcomes. There is also evidence for a strategic inclination to be more religious, but this too fails to mitigate religious influences. Little evidence of social desirability bias is noted. More considerable evidence is found for reciprocal effects; that is, the likelihood that outcomes and behaviors may alter religiosity as much or more than it alters them.

INTRODUCTION

Religion, measured in a variety of ways, appears to exert significant direct and indirect influence on a range of personal attitudes and behaviors. Researchers have documented psychosocial influences of religion on the emotional and physical health and behaviors of American adolescents and adults (Ellison 1991b; Sherkat and Ellison 1999). In some cases, the magnitude of influence appears striking. Among adults, attending religious services regularly (versus never attending) provides a protective effect against the risk of death that is comparable in scope to the harmful effect of smoking a pack of cigarettes a day – about seven years (Hummer et al. 1999). More common than this, however, are direct influences of religion or religiosity that are less substantial, but still noteworthy. From family relations to delinquency, from sex to seatbelt use, and from educational aspirations to heart disease, links between religion and a wide variety of behaviors, attitudes, and outcomes continue to be documented (Wallace and Forman 1998; Darnell and Sherkat 1997; Koenig, McCullough, and Larson 2001; Meier 2003; Pearce and Axinn 1998; Regnerus 2003).

However, some scholars are more skeptical about religious influences altogether, choosing to attribute them to selection effects, social desirability bias in survey responses, spurious artifacts, or some combination thereof (e.g., Cochran, Wood, and Arneklev 1994; Sloan, Bagiella, and Powell 1999). Religion is thought to mask the real cause or causes, or is simply the product of the key causal influence, which may remain unknown. There may be occasions that merit such concern. Alternately, there may be good reasons to drop persistent skepticism about religious effects. In this study we evaluate the empirical evidence concerning selection effects and social desirability explanations for religious influences. We accomplish this in two ways: first, we systematically review the historical and contemporary research evidence concerning

these explanations. This important part of a comprehensive assessment of religious influences has never been undertaken in one place, and involves bringing together disparate literatures (e.g., demography, personality studies) that seldom overlap and typically ignore each other.

Second, we conduct our own empirical evaluation using data from a nationally representative, longitudinal dataset of American adolescents. We chose to study adolescents given their higher odds of change (in behaviors, attitudes, statuses) over a relatively short period of time. We explore three outcomes in particular: adolescent satisfaction with family life, self-reported incidences of theft, and a self-rating of their general physical health. This is an unusual study, since we are *not* testing any particular theory about family satisfaction, delinquency, or physical health. Nor is our aim to better understand these three outcomes. Rather, we selected them for their dissimilarity in order to evaluate, and put to the test, religious influences on a wide range of adolescent life. This study provides the first known explicit examination of the veracity of these concerns about religion and social scientific claims about its broad social effects.

EXPLANATIONS FOR RELIGIOUS INFLUENCES

COMMON EXPLANATIONS

We begin with the simple assertion that sometimes people do things for God (Stark 2000). That is, religion can directly influence attitudes, perceptions, and behaviors. The idea behind this is straightforward: there are certain features in religion (e.g., practices, norms) that have the capacity to elicit given outcomes in people's lives. To be sure, religious effects are not often strong effects, in part because non-religious people sometimes act in ways that are in keeping with religious norms, and because devoutly religious people sometimes act in ways that are at odds with what is expected of them.

Social scientists typically document two types of religious influence: direct and indirect effects. In the direct effects framework, religion is thought to provide people with sets of moral teachings about what is real and how they therefore ought to live, and provides relational and material resources to back up those teachings. People with greater religious commitment will be more apt to reflect in their actions the implications of those moral teachings. The more those implications diverge from social norms or expectations, the more researchers should expect to find significantly different religious effects. There is a good deal of historical evidence to suggest that religion possesses the capacity to socialize, motivate, constrain, and direct human assumptions, values, preferences, moral commitments, choices, and behaviors (Smith 2002; 2003). Such direct effects are not the only way that religion influences human action, nor are they the most common way. But they are the most straightforward way.

Religion is also thought to produce indirect influences: unintentional social byproducts when religious people doing things for religious reasons (e.g., gathering together for worship) facilitate other distinctive outcomes (e.g., fostering relational networks that aid in psychological coping, or getting better jobs, or success in school). Research on the indirect effects of religion is typically concerned with mechanisms, unmeasured pathways by which religion helps bring about a desired end. Examples of possible pathways might include exposure to sermons, religious education, more frequent interaction with family members, or subtle interpersonal sanctioning of non-normative behaviors. Distinguishing between direct and indirect effects is not important here, however. We mention both simply to describe the manner in which religious effects are commonly understood by those who study them. In contrast, there are several explanations that characterize apparent religious effects as illusory.

ALTERNATIVE EXPLANATIONS

Observational data, upon which most analyses of religious effects are based, have unavoidable limitations that make it difficult to determine without doubt the direction of cause and effect between religion and the outcome under consideration. Many researchers are uncomfortable with even inferences of causation. This is in part because the observed associations may be the result of alternative possible processes involving different relationships and directions of causal influences. We consider four alternatives to the more straightforward "religious influence" explanation.

The Selection Effects Explanation. A selection effects explanation begins with the fact that a predictor variable (such as religiosity) may actually be a "choice" variable – that is, it is self-selected – and for that reason is likely correlated with unobserved variables that are consigned to model error terms. Selection effects concern the apparent association between a predictor variable (e.g., religiosity) and a particular outcome (e.g., avoiding extramarital sexual behavior) which may in fact have nothing to do with the predictor variable's apparent influence, but instead results from some other factor or set of factors that influence both independently. Estimates of the effect of the predictor variable on the outcome may then be considerably biased due to the presence of unobserved heterogeneity that affects both the predictor and the outcome. Some variables are obviously not chosen, such as age or gender, and thus not at risk for selection effects. In this perspective, religion conducts, but does not cause, the outcome under consideration. If in fact religion is a reflector rather than a producer, then it may not deserve as much attention as it has been getting, and researchers would be wiser to focus on the more basic

characteristics that actually account for the direction of people's lives (Batson, Schoenrade, and Ventis 1993). This explanation is modeled in Figure 1.[1]

Figure 1 about here

The nature of choosing infers a variety of concerns about *why* people choose to be more or less religious, or why they choose to affiliate with a particular religious group, and what consequences these choices have for predicting a particular outcome under consideration. To use an example, subjective religiosity (e.g., self-rated importance of religious faith) is typically a choice; that is, it is self-selected.[2] People tend to be more or less religious for a variety of reasons, including several that have nothing to do with the content of the religion itself. Such reasons might include personality type, age, race or ethnicity, and cultural surroundings (e.g., living in a cosmopolitan city). Might these variables also predict a given outcome (e.g., health care utilization) that a researcher is evaluating? If the reasons for (or predictors of) greater or

[1] It is worth noting that religious influences may, depending on the outcome, constitute sources of *sample* selection bias concerns as well. Sample selection bias refers to problems where the dependent variable is only observed for a non-random portion of a sample. While religion may vary systematically with the sources of the censored sample, sample selection bias per se falls outside of the immediate purview of this study, given its concerns with missing data based on a given outcome, rather than concerns that the predictor variables' effects (i.e., religious effects) are not really real. Unfortunately, there are scenarios (e.g., studies of religious influence on first sex using a sample of adolescent virgins) in which one could have *both* a potential selection effects and a sample selectivity bias problem with religion.

[2] While parents may be able to compel religious service attendance from their adolescent children, parents cannot easily force their children to personally value religion. How important religion is in their lives is up to them.

lesser religiosity affect such an outcome, then social scientists may be erroneously attributing influence to religion when it should rather be attributed to these other reasons why people choose to be more or less religious. This could be a simple case of omitted variable bias[3], easily corrected by including these variables in our analytic models. However, sometimes social scientists lack measures of these predictors of religiousness, as is frequently the case with personality types.

What is the evidence for religious selection effects? First, we cannot assume that all forms of religiosity *are* chosen. There is a distinctly age-graded nature to the choice to attend religious services. In some cultural settings (e.g., the South, rural areas, within the context of devout extended families) attendance patterns are so extensive as to create a "moral community" replete with subtle sanctions for failing to participate (Stark 1996a). For African Americans in the rural South, public religiosity is "semi-involuntary" (Ellison and Sherkat 1995). In other settings, such as cosmopolitan San Francisco or Seattle, regular worship attendance at some types of religious services (e.g., evangelical Protestant) is non-normative. The same could be said for people in certain industries, such as artists and university faculty. And in some religious traditions, such as orthodox Judaism and conservative Catholicism, regular attendance is more

[3] Selection effects or endogeneity can be distinguished from omitted variable bias by the former's twin emphases on what *causes* the endogenous variable (or at least consistently predicts and is clearly unidirectional in effect) as well as the typically unobserved nature of this cause(s). Omitted variable bias, on the other hand, is typically denoted by concern that variable(s) that are related to the outcome have been left out of the model, and thus may artificially inflate or deflate religiosity's influence. Moreover, researchers typically have in mind what the omitted variables may be and typically attempt to include them, whereas with selection effects this is not often the case.

emphasized than others. Thus, social scientists should first familiarize themselves with how normative religion or religious involvement is or is not in their research settings. On the other hand, private religiosity – such as the self-rating of one's own religiousness – is a choice at most stages of life.

Three settings – family, friends, and formal religious education – have been consistently linked with greater religiosity in youth and young adults (Erickson 1992; King, Furrow, and Roth 2002). Parents' religiosity easily constitutes the strongest and most reliable influence across studies of adolescents (Myers 1996). But parental religiosity cannot be thought to *cause* religiosity in a strong sense, but instead comprises a *context* in which its development is more likely to occur. Religious socialization also is more likely to occur in families characterized by considerable warmth and closeness (Ozorak 1989). Studies nearly universally find girls to be more religious than boys (King et al. 2002; Miller and Hoffmann 1995; Regnerus, Smith, and Smith 2004). Here again, however, being female is less a cause than a more conducive setting for religiosity to develop. Nevertheless, researchers typically know about such demographic and family differences in religiosity and account for them in their analyses of attitudes and behaviors.

Miller and Stark (2002), however, find evidence for an increasingly compelling argument about the foundations of religiosity. While gender role socialization is typically considered the obvious reason for women's greater religiosity, they found no evidence of a relationship between gender, religiousness, and sex role traditionalism, and no difference over 30 years in the relationship between gender and religiosity in the United States (despite women's increasing labor force participation rates). On the other hand, they noted evidence favoring a "risk preference" explanation: that "just as secular norms assign considerable risk to criminal behavior, religious doctrines specify serious consequences for irreligion" (2002: 1404). Those

who reject their religious "obligations," or who delay in accepting them, are taking risks. Women are more risk aversive, they argue, and risk aversive people are more religious (Miller and Hoffmann 1995). Indeed, the most plausible claims of unmeasured selection effects (i.e., not demographic differences) appear to involve concepts like "conformist," "risk aversive," and "strategic" personality types. That is, religiosity may be in part the result of hard-wired personality differences. "Safe" or risk-aversive people are more likely to both display greater religiosity and to exhibit positive health practices, lifestyles, and generally pro-social behavior.[4] These are people that are already inclined toward conformism and "clean living" (Ellison 1991a). Furthermore, persons involved with religious communities may in turn be comfortable with social control or be immersed in nuclear families that further reinforce an aversion to risk behaviors (Ellison and Levin 1998). Thus researchers might erroneously attribute influence to religiosity when it would more appropriately be accorded to risk-aversion and temperament.[5] At

[4] For a more extensive discussion of the relationship between religion and risk aversion, see Iannacone (1995), Miller and Hoffmann (1995), and Miller and Stark (2002). We should note that the risk aversion explanation is not likely linear. People who are very religious have filled the ranks of foreign missionaries and religious relief organizations, often at significant personal risk to themselves and their families. While they may be outliers, their numbers and persistence is enough to suggest a curvilinear relationship. Stark (1996) captured something of this curvilinear association in his examination of early Christian growth during epidemics. Christians' greater commitment to basic nursing for the sick, he argues, put them at considerable risk of infection yet ironically resulted in their overall reduced mortality and enhanced immunity (not to mention numerous converts).

[5] Other personality associations with religiosity have been noted as well. Reiss and Havercamp (1998) found that more devoutly religious persons displayed a lower desire for independence, and Reiss (2000) also noted that self-reported religious salience was associated with high desire scores for honor and

best, religion may be an indirect influence, fostering social support or healthier lifestyle practices and channeling protective personality impulses.

Finally, there has been related speculation (but not much evidence) in religion and family studies that findings concerning religious influence on marital happiness or diminished risk of divorce are in fact the result of an unmeasured "marital conventionality" concept (Glenn and Weaver 1978). That is, persons who exhibit this latent quality are both more likely to be religious and more likely to stay married. Other studies of the conventionality thesis, however, have uncovered little evidence of its effect on mitigating religious influences (Filsinger and Wilson 1984; Schumm, Bollman, and Jurich 1982; Wilcox 2002).

The Religious Strategy Explanation. The religious strategy explanation is similar to the general selection effects account, but suggests that religion is an active *strategy* used by individuals to achieve a desired outcome. That is, some people who are already predisposed toward certain outcomes (e.g., staying married, remaining healthy and active, retaining virginity) may instrumentally choose to become religiously involved as one strategy toward achieving that end. This explanation suggests that observed outcomes in people's lives are not directly the result of the influence of religion per se. Rather, they are the result of a larger, preceding (non-religious or a-religious) life orientation to avoid trouble, to attain personal goals (e.g., graduate from college, stay married), and to be as happy and "self-fulfilled" as possible. Such people are then thought to implement a variety of strategies at different levels and in different areas of their lives to achieve

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family, and with low desire scores for vengeance and independence. Nevertheless, the direction of effect is impossible to distinguish in these study. Spilka, Hood, and Gorsuch (1985), however, located few associations between religiosity and standardized personality test outcomes.

this kind of generally positive, constructive life. Religion is one such instrumentally-chosen strategy, and some people are thought to strategically heighten their existing religiousness or religious participation, or add it to begin with, if they deem themselves more apt to reach certain ideal goals with religion than without it.[6] The difference between the religious strategy explanation and the more general selection effects explanation is that the former recognizes that religion may still wield influence. However, apparent religious influence is not due to the motivating power of a belief system. Rather, participation in organized religion will provide social support in avoiding negative behaviors, and will help restrict negative opportunities and increase positive ones. This explanation is modeled in Figure 2.

Figure 2 about here

Unfortunately, research on religious strategizing or "instrumentalism" is not extensive. Allport and Ross (1967) suggested that people who are extrinsically religious seek religion to provide security and solace, sociability and distraction, status and self-justification (though not necessarily all at once). A classic example of perceived religious strategizing concerns religious

[6] The religious strategy hypothesis implies a rational actor framework wherein individuals are thought to rationally evaluate their options and select actions that maximize their likelihood of attaining preferred goals. As Watkins and Warriner (2003: 110) articulate concerning the distinction between "treatments" and "controls" in observational and experimental data, "…it is typically assumed that rational actors can and do calculate for themselves whether they would be better off with a 'treatment' (or not), and then select a treatment (or not). Although some of the bases for these choices may be observable in the data, others are likely to be unobserved."

attendance. Why do people attend religious services? Intrinsically religious people attend church as an end in itself (i.e., for reasons of worship, etc.), while the extrinsically religious may do so because it is thought to be a good way to make friends, bolster social and business networks, or because it helps them cope with stress in their lives. This panoply of potential reasons and motivations for being or becoming religious ought to interest researchers more than attendance patterns. The motivation arises from some other source, perhaps the desire to avoid trouble, please parents, achieve certain goals, or to simply be happy.

Whether most parents attend church primarily to reinforce values for their children is impossible to ascertain, and would certainly vary across religious traditions. Studies of religious influence on education have noted that church attendance can constitute a form of social integration that reinforces values conducive to educational achievement and goal-setting (King, Elder, and Whitbeck 1997; Regnerus 2000). While not directly addressing the question of religious strategizing, Furstenberg et al. (1999) note that several of their qualitative study participants (urban parents of adolescents) relied on their religious ties as another source of "functional community" for their children. This ranged from decisions to pursue Catholic schooling as an alternate to the Philadelphia public school system to membership in the socially-encompassing culture of Jehovah's Witnesses.

However, even if individuals utilize organized religion to help achieve a particular goal, this hardly implies that religion is unimportant. A recent example of strategizing related to religion is adolescent virginity pledges, oaths that youth take to abstain from sex until marriage. When effective, such pledges also protect them from unplanned pregnancies and sexually transmitted infections. This religiously-inspired movement – while not random in its selection – makes a considerable difference toward obtaining a desired outcome (delayed first intercourse).

Bearman and Brückner (2001) found that pledging effectively reduced initiation of intercourse for youth in schools where some students, but not too few or too many, took the pledge. On average, adolescents who pledged to remain abstinent until marriage delayed first sex nearly 18 months longer than those who did not pledge. However, those who experienced "pledging failure" were less likely to use contraception at first sex. Religiosity was not only an effective predictor of pledging, it was also independently related to delayed first sex.

The Reverse Causation (or Religious Exit) Explanation. Unlike the other two explanations, the reverse causation explanation is about leaving religion. This conceptual model emphasizes the possibility that persons self-select *out* of religion, giving rise to the threat of reverse causation. It is thought that some religious persons, for whatever reasons, develop certain attitudes and behaviors that are at odds with their religious beliefs and practices, and thus subsequently reduce their religious involvements and so appear to be less religious. This would create observed (but not real) associations between religion or religiosity and particular outcomes among the population of individuals that did *not* decrease their religious involvement or did *not* alter their religious beliefs or attitudes.

From this perspective, religion does not influence positive or negative outcomes in people's lives. Instead, other non-religious (and perhaps unknown) factors explain different levels of family problems, criminal behavior, substance use, etc. Yet, if and when individuals do for these other reasons become depressed, lose their virginity, commit crimes, or drink excessively, they also tend to reduce their religious involvement, alter their religious beliefs, or drop out of organized religion altogether. This is especially the case when the new attitudes or

actions are at odds with the norms of their religious community.[7] At the same time, other religious youth will *not* participate in normatively deviant practices, for whatever reason. When researchers find inverse associations between religiosity and deviant outcomes, it may be because the respondents with the negative outcomes reported diminishing religiosity, leaving behind other respondents with better average outcomes. Hence in this way religion itself does not influence individuals toward better outcomes, but rather is avoided by individuals with deviant outcomes. This explanation is modeled in Figure 3.

Figure 3 about here

Empirical evidence for the reverse causation (or religious exit) explanation is mostly supportive, though it varies by the outcome under consideration. Inconsistencies between personal behavior and religious belief often contribute to altered religious commitments as individuals sense that their actions are outside normative religious teachings (Thornton 1985). Thornton and Camburn

[7] A conceptual example of this might be the regulated behavior and expected obedience in conservative Protestant traditions (Bartkowski and Ellison 1995; Ellison and Sherkat 1993; Wilcox 1998). Conservative Protestant adolescents will likely perceive that God expects them to, among other things, obey their parents, avoid alcohol, theft, premarital sex, cheating, and lying. Youth who violate such norms are expected to experience cognitive dissonance in light of the inconsistency. Such youth will be at pains to either cease the behavior or alter their religious beliefs or practices so they are in step with their chosen actions. However, ceasing the behavior only solves part of the problem. Certain actions – like a criminal record or a sexual reputation or a blemished academic transcript – are not easily undone, forgiven, or forgotten. The urge to avoid settings, such as the local church or religious youth group, where the inconsistency is remembered (though perhaps not publicly) would be tempting.

(1989) tested a structural model of the relationship between adolescent sex and religious participation, and found evidence of such a reciprocal relationship, while Benda and Corwyn (1997) noted the same in their study of religion and adolescent delinquency. Indeed, they discovered that religion predicted less delinquency only for particular outcomes, while a variety of delinquent behaviors predicted a decline in religiosity. The same can be said for religiosity and drug use (Benda and Toombs 2002). In their study of cohabitation and marriage, Thornton, Axinn, and Hill (1992) reported that cohabitation reduced religious attendance among young adults, while marriage (without previous cohabitation) tended to increase their religious involvement. Exceptions exist, however. Using nationally representative data on American adolescents, Meier (2003) found no evidence that adolescents reduced their religiosity after experiencing virginity loss. In general, though, there is considerable evidence across a variety of outcomes to suggest that changes in behaviors (e.g., delinquency, cohabitation, sex) may also produce changes in the religiosity or extent of religious involvement of the actors.

The Social Desirability Bias Explanation. Social desirability bias is the tendency of individuals to want to make themselves appear better than they are. In survey research, this can affect the answers to researchers' questions. Social scientists should attempt to include indicators of social desirability in regression models when predicting behaviors and outcomes of populations deemed at risk of such bias. Failure to do so may bias model coefficients, especially those that contain the source of the systematic response bias.

Social desirability comes in at least two different forms: self-deception, or the tendency to give biased but honestly held descriptions of oneself and one's behavior, and other-deception, or the tendency to give more favorable self-descriptions to a researcher (Paulhus 1984). It is widely held among social scientists that Americans tend to over-report the extent of their actual

participation in religious worship services, due primarily to other-deception (Hadaway, Marler, and Chaves 1993; Presser and Stinson 1996). While the true extent of the problem is unknown, others (e.g., Hout and Greeley 1998; Woodberry 1998) argue that it is less of a problem than is often suggested. In general, though, more devoutly religious populations are considered to be at an elevated risk of giving more socially desirable answers on surveys (Batson, Naifeh, and Pate 1978; Trimble 1997).

Leak and Fish (1989) found that intrinsic religiosity was related to both the tendency toward impression management as well as self-deception. In a meta-analysis of studies on religion and social desirability bias, Trimble (1997) found that the average correlation between intrinsic religiosity and social desirability was 0.15, while extrinsic religiosity was generally unrelated to social desirability. Stronger correlations appeared in an early direct test of religiousness and the Crowne-Marlowe Social Desirability Scale (Batson, Naifeh, and Pate 1978). Not surprisingly, others disagree. Watson et al. (1986) argue that a number of social desirability measures are confounded with "religious relevance" and may be inappropriate to model as a statistical control alongside religion. That is, some measures of social desirability (such as "I sometimes try to get even rather than forgive and forget") may actually measure religiosity. In another study, intrinsically religious persons were not susceptible to a socially desirable response bias, while intrinsic religiosity remained the strongest predictor of "psychospiritual" health (Genia 1996). Finally, Plante et al. (1999) found no relationship between the Crowne-Marlowe scale and study participants' strength of religious faith.

Thus there is modest evidence that more devoutly religious individuals may mischaracterize their real attitudes or behaviors, choosing instead to cast themselves in a more positive light. If consistent, this may lead researchers to accord greater influence to religion than

it is actually due. Studies that jointly evaluate social desirability and religiosity effects together are rare, however. Perhaps the focus of social desirability concerns ought to be less on the reporting of religious *practices* (as it often is in sociological research) and more on the self-report of personal religiosity (as it typically is in psychological research). Whether religiosity invokes social desirability or not, there is little systematic evidence to suggest that social desirability bias can actually account for the religious influences noted on human behavior (Rowatt and Kirkpatrick 2002; Rowatt and Schmitt 2003).

DATA, MEASURES, AND ANALYTIC APPROACH

DATA

The data for this analysis come from the National Longitudinal Study of Adolescent Health (Add Health), a longitudinal nationally representative study of American adolescents in grades 7-12 that began in 1994. A sample of schools was selected from a list of American high schools provided by the Quality Education Database. To ensure diversity, sampling was stratified by region, urbanicity, school type (public vs. private), racial composition, and size. Each high school in the sample was matched to one of its feeder schools, with the probability of the feeder school being selected proportional to its contribution to the high school's student body. Over 70 percent of the originally selected schools agreed to participate. Replacement schools for those that refused to participate were selected within each community. This multi-stage design resulted in a final sample of 134 middle and high schools in 80 communities.

Add Health 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. Data collection occurred in three steps. First, all students in each selected school were administered a questionnaire to complete in

school (1994-95). Second, a subsample of students, stratified within schools by sex and grade, was selected for in-depth interviews at home. Of this subsample of approximately 200 students from each HS/feeder school pair, over 80 percent participated in the in-home interviews at Wave I (1995). In these interviews, adolescents answered questions on socio-demographic factors, family issues, peer networks and romantic relationships, health, academics, and risk-behavior. In addition, efforts were made to interview one parent for each adolescent. Third, respondents who were still enrolled in school were recruited for Wave II in-home interviews in 1996.

All analyses in this study are based on the subsample of Add Health adolescents who completed the first two waves of interviews, and who have valid parent survey data, resulting in a study sample of just under 13,000 adolescents. This number represents the largest available pool of respondents that have weights that account for unequal probability of selection for both schools and individuals within schools. Missing values ($N \leq 515$) were deleted using listwise deletion. Further details regarding the study can be found in Bearman, Jones, and Udry (1997).

MEASURES

Family satisfaction is a summed index of three indicators of the adolescent respondents' satisfaction with their family life. Respondents were asked, "How much do you feel that people in your family understand you?" Identical questions were also asked concerning how much the respondent felt their family has fun together and how much they felt their family pays attention to them. Answer categories for each ranged from 1 (not at all) to 5 (very much). The alpha coefficients of reliability for this set of three variables were 0.78 at Wave I and 0.79 at Wave II.

Respondents were also asked about their level of participation in four different forms of theft over the previous year (specifically, since the time of the last interview). 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 0.75 at the first wave and 0.77 at the second wave. Unlike family satisfaction and theft, general health is a single-measure indicator. Respondents were asked "In general, how is your health? Would you say excellent, very good, good, fair, or poor?" We have reverse coded this measure here, so that higher values indicate better self-reported health.

We consider two distinct measures of religiosity here: church or religious service attendance, which is an ordinal measure that gauges public religiosity, and the self-reported importance of religion in the respondent's life, which is also ordinal. 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 are: not important at all, fairly unimportant, fairly important, and very important. Their separate inclusion appears justified by their unique and varying effects (Regnerus 2003).

We also include a dichotomous measure of the respondent's conservative Protestant religious affiliation. Those affiliations classified as conservative Protestant include Assemblies of God, Baptist, Adventist, Holiness, and Pentecostal. While Add Health data collectors failed to include a broader and more specific range of religious affiliations, this measure captures something of the embedded-ness of the respondent within a theologically conservative religious identity. We include it primarily as another test for the influence of religiosity – to assess whether religiosity's perceived influence can be accounted for by this unique religious identity. In the pure change models only, we include a dichotomous measure indicating whether the respondent had a "born again" experience between survey waves (1=self identified as "born again" at Wave II but not at Wave I).

We consider three personality predictors of religiosity.[8] The first is the parent's report that their child has a temper (1=has a temper). The second is a single item measure indicating the respondent's proclivity for risk-taking, which consists of the level of agreement with the statement: "You like to take risks." Respondents could range from "strongly agree" to "strongly disagree." Unfortunately, the risk measure was not asked at Wave I, and so is derived from the Wave II survey but treated as indicative of an underlying personality type.

The third variable is a five-item summed index of "planful-ness" or the extent of how strategic a decision-maker the respondent is. All five measures include identical answer categories, ranging (1-5) from strongly agree to strongly disagree, administered to the respondent in the form of statements (and were later reverse coded). The first is: "When making decisions, you usually go with your 'gut feeling' without thinking too much about the consequences of each alternative." The second is: "When you have a problem to solve, one of the first things you do is get as many facts about the problem as possible." The third is: "When you are attempting to find a solution to a problem, you usually try to think of as many different ways to approach the problem as possible." The fourth is: "When making decisions, you generally use a systematic method for judging and comparing alternatives." The fifth and final component is: "After carrying out a solution to a problem, you usually try to analyze what went right and what went wrong." The alpha coefficient of reliability for this set of measures was 0.63.

[8] It should be noted that our approach assumes the direction of influence flows from the personality traits to religion, and not vice versa. This may not be easily upheld under closer empirical scrutiny, but for our present purposes this assumption puts religious influences on our outcome variables to a more stringent test, which is ideal.

Additionally, we evaluate the effect of social desirability on both religiosity and the three outcomes described above. Social desirability is typically measured as agreement with statements that are, essentially, humanly impossible. Thus they are intended to pick up on respondents' desire to be thought of in a way that is both ideal, yet improbable. Our measure of social desirability is a three-item index of dichotomous variables. The index is an attempt to capture the degree to which individual respondents wish to present themselves in a favorable light, and is loosely derived from the Marlowe-Crowne Social Desirability Scale (MCSDS; Crowne and Marlowe 1960). Higher scores reflect a greater degree of socially desirable responding. The actual MCSDS items (not available in Add Health) describe desirable but uncommon behaviors, such as "Before voting I thoroughly investigate the qualifications of all the candidates," or denying participation in undesirable but common activities such as "I like to gossip at times." In Add Health, respondents who answered "strongly agree" to the statement "you never argue with anyone" were given one point toward three possible points on the 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. While some researchers frown upon short forms for social desirability scales (e.g., Barger 2002), others have found them helpful (Hays, Hayashi, and Stewart 1989). In our case, Add Health simply did not include more items on the matter.

We examine several demographic variables in the analysis, including dichotomous race/ethnicity measures (black, Hispanic, Asian, and Native American, compared with the omitted white category), sex, 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 mother's education (1=college degree). Appendix A displays summary statistics for all variables.

ANALYTIC APPROACH

Appropriate solutions to possible selection effects problems will account for possible selection effects of religiosity measures in predicting outcomes while providing optimal estimates of the effects of these measures and accounting for differential selection into religious categories. The simplest (though not the most ideal) solution is for researchers to include in their regression models a number of control variables that are highly predictive of respondents' religiosity (e.g., age, race, region, and gender) with the goal of obtaining models that are as fully-specified as possible. This is a good first step. However, if researchers suspect that religiosity (or religious affiliation, etc.) is subject to selection effects or social desirability bias, then a more aggressive approach is called for to accurately assess its influence.

One approach is to "instrument" for religiosity. By instrument we mean that the model requires a variable that is correlated with religiosity (the endogenous variable), uncorrelated with the error term, and does not affect the outcome of interest when controlling for the included covariates. Many regression models unwittingly accomplish this. Yet as a comprehensive strategy it would seem to fail to account for both the differential selection into religious categories and the effects that predictors of religiosity have on the outcomes being examined.

In this study we first assess the threat of selection effects to religiosity measures by examining religious service attendance and self-rated importance of religion as a product of several personality characteristics, social desirability, and demographic controls. We also evaluate lagged dependent variable models assessing change in religiosity over time. Next we examine our three outcomes – family satisfaction, health, and theft – as a function of our

religiosity measures as well as the personality traits, social desirability, and demographic controls. Here also we explore lagged dependent variable models to assess the influence of religiosity on change in these three outcomes. Next we employ pure change models, predicting inter-wave change in the outcomes as a function of inter-wave change in the religious measures. Finally we explore reverse causation arguments by turning the tables and assessing our religiosity measures as outcomes once again, this time predicted by family satisfaction, health, and theft. We conclude with an assessment of the threat of selection effects and social desirability bias to studies of religious influence and note several emergent methodological approaches that may further improve our ability to test for the presence of religious effects.

RESULTS

Table 1 displays simple scores or means of the personality indicators and the social desirability index by levels of the two religiosity measures. The results indicate that temperamental adolescents report lower attendance at religious services than youth whose parents say their child has no temper problem. Only 27 percent of youth who attend weekly were reported as having a temper, compared with 38 percent of youth who never attended. Youth that like to take risks are similarly less likely to attend. Just under two-thirds of teens who never attend reported that they liked to take risks, compared with about 54 percent of teens who attend regularly. Hot-tempered and risk-taking youth also report that religion is less important to them in about equal ratios to that found for attendance. Youth who attend services most often are also slightly more strategic or planful. The relationship is stronger with religious salience: adolescents who say religion is "very important" are significantly more strategic than other youth, including those that say religion is "fairly important." No significant connection appears between social desirability and

self-reports of religious service attendance. Adolescents who report that religion is of considerable importance are slightly less likely to avoid giving socially desirable answers.

Table 2 displays estimated odds ratios from ordered logit regression models predicting religious service attendance at Time 2. While the first model confirms no indication of a social desirability effect on adolescents' self-reported attendance, the second model introduces three personality measures, each of which is very much related to attendance reports in intuitive directions. Respondents whose parents indicated they have a temper decreased the odds that they would report higher attendance by about 23 percent. Risk-taking youth are similarly less likely to attend, and a unit increase in the trait of being strategic corresponds to a 2-5 percent increase in the odds of more frequent attendance (the figure varies slightly across models).

Tables 1-3 about here

Even with the addition of the set of demographic measures in Model 3, the personality effects weaken only slightly. Living with two biological parents is linked with a nearly 85 percent increase in the odds of more frequent attendance. African Americans and Southern residents displayed comparable positive relationships with more frequent attendance. Despite these controls, risk-taking and hot-tempered youth still attend less, and more strategic respondents still attend more. The model fit is far from extensive, however, indicating even these measures' limited ability of accounting for attendance. Model 4 is a lagged dependent variable model, and assumes that earlier attendance patterns are an appropriate predictor of subsequent attendance. At this point, no significant relationship is noted with hot-temperedness, but risk-taking and strategizing still predict lower and higher attendance, respectively, while controlling

for respondents' previous religious behavior. Clearly these personality traits are robust in predicting attendance.

Table 3 displays models identical to those in Table 2 predicting respondents' self-rated importance of religion. Unlike with attendance, social desirability is at least initially related to the self-rated importance of religion, controlling for age and gender. Youth who give more socially desirable answers on surveys are slightly more likely to report that religion is of considerable importance. The relationship, however, diminishes quickly when accounting for the three personality traits, which are related to religious salience in an identical fashion to their relationship with attendance. Hot-tempered and risk-taking youth report that religion is less important to them: temper accounts for a 23 percent reduction in the odds of reporting greater religious salience, and a unit increase in preference for risk corresponds with a 15 percent dip in the odds of reporting greater religious salience. Being strategic also corresponds with valuing religion more intensively.

Again, the introduction of demographic traits in model 3 does little to these personality effects. Moreover, all three remain very strong predictors even in the lagged dependent variable model (#4). Accounting for the inter-wave stability of religious salience, hot-tempered and risk-taking youth still report lower religious salience, while strategic youth report greater religious salience. Clearly, there is a link between religiosity and these personality traits.

Table 4 reports results from OLS regression models predicting adolescents' self-reported family satisfaction, overall physical health, and delinquent behavior (i.e., theft). Each dependent variable was measured at the second wave of data collection. Each outcome features two reduced-form models: the first model includes our two religiosity measures along with a

conservative Protestant affiliation control, and ten demographic control variables.[9] The second model in each series adds the three personality variables and social desirability score, primarily to evaluate their ability to mitigate any religious influences in the first models.

Tables 4-5 about here

Religious service attendance appears entirely unrelated (at least directly) to adolescent family satisfaction, while greater religious salience appears to be a consistent predictor of better family relations. A unit increase in religious salience contributes to a nearly one-third unit increase in reported family satisfaction (in model #1). While attendance is only related to overall health, religious salience also predicts better overall health and lower incidence of theft. These effects remain significant despite controlling for a variety of demographic control measures. Adding the personality and social desirability variables to the religion-and-demographics models weakens the overall influence of religious salience only modestly. These four variables make a considerable independent contribution, doubling the explained variance in two of the three models. A unit increase in preference for risk-taking corresponds with a 0.22 unit decline in family satisfaction and a 0.17 unit increase in the number of thefts reported, while hot-tempered youth display a nearly 0.40 unit decline in family satisfaction and a more modest increase in reported theft. Strategizing appears to be related to all three outcomes, operating comparably to

[9] Controlling for conservative Protestantism seems particularly appropriate here, since conservative Protestants display more extensive attendance and are more likely to report that religion is very important. Evaluating religiosity effects without this control may result in attributing influence to religiosity that would better belong to this particular religious affiliation.

religious salience by predicting better family relations and health as well as fewer reported incidents of theft.

We noted in the first two tables that personality and demographics were effective predictors of the two religiosity measures. Yet in spite of controlling for these here, the importance of religion still corresponds to more optimal outcomes in each model. Thus we can say with a reasonable amount of confidence that the influence of personal religious salience on these outcomes is *not* a function of social desirability, personality, or demographic traits. In other words, there is no evidence yet that the effect of religious salience is a result of measurable selection processes.

Table 5 reports results from three lagged dependent variable models that are otherwise identical to the models in Table 4. This series of models constitutes a more rigorous test of the influence of religiosity on what is essentially change between survey waves in respondents' self-reported family relations, health, and theft. The modest significant effect of attendance on health (in Table 4) disappears altogether here, while religious salience remains a significant predictor of change in both family relations and health. That is, for each additional unit of religious salience, family satisfaction and physical health were expected to improve by 0.094 and 0.028 units, respectively. These relationships, while certainly not remarkable in magnitude, are stable when controlling for personality and demographic traits, social desirability, and the outcomes themselves when measured at Wave I. Here again, risk-taking personality types appear similarly related to the outcomes in ways consistent with those in Table 4. In these more rigorous lagged dependent variable models strategizing is related to health and diminished frequency of theft, but no longer to family relations.

Table 6 displays estimated coefficients from pure change models predicting change in self-reported family satisfaction, overall health, and theft. No other covariates were included in these three models. Greater religious salience (over time) appears related to a significantly better assessment of family relations between survey waves. A unit increase in religious salience between study waves corresponds with a 0.16 unit increase in family satisfaction over the same period. No comparable relationship appeared with change in attendance or having become a "born again" Christian between survey waves. It should be apparent that with more rigorous models (and the assumptions that accompany them) it is increasingly difficult to document religious influence across the range of outcomes, though it still remains evident here with family relations.

Tables 6-7 about here

Table 7 displays OLS regression models predicting Wave II attendance and religious salience as a function of family satisfaction, theft, and general health. Good family relations and good health predict more frequent attendance and greater religious salience at Wave II, even when accounting for their values at Wave I. More frequent reports of theft similarly predicted subsequent declines in both aspects of religiosity, providing evidence that suggests some youth – whether to mitigate feelings of cognitive dissonance or due to enhanced disinterest in things religious or some other reason – move to reduce their religiosity in step with their delinquent behavior. On the other hand, some youth, amid their experience of better health and family relations, appear to heighten their religious commitments (for reasons that are not ascertainable here). The results suggest a considerable likelihood that the relationship between religiosity and these three outcomes is bi-directional. In this more rigorous test, evidence for a reciprocal

relationship is considerable, stronger than the evidence that religiosity predicts our three outcomes when controlling for their Wave I values (as displayed in Table 4).

CONCLUSIONS, LIMITATIONS, AND FUTURE DIRECTIONS

What can we conclude? There is considerable evidence suggesting that both forms of religiosity assessed here vary by a variety of personality and demographic factors. And these factors in turn are apt to affect both the outcomes we examined as well as (likely) a manifold number of others that we did not. Thus it appears that religiosity is evidently endogenous, not exogenous, and so concern with its predictors (and ideally, its causes) is merited. There is also evidence for a strategic inclination to be *more* religious, and also for a relationship between such strategizing and the three outcomes we examined here – family satisfaction, theft, and general physical health among American adolescents. Yet we know less about whether adolescents (or adults, for that matter) employ distinctly *religious* strategies to attain desired outcomes.

Yet while public and private religiosity are due in part to measurable selection processes, this does not appear to mitigate independent religious effects on a variety of outcomes. This is especially the case with our analysis of personal religious salience. Religious salience still influenced family relations, general health, and to a lesser extent theft, even while controlling for the personality and demographic factors that tend to shape it. Thus concerns about selection effects with religiosity can perhaps be eased. Recall that if the factors that influence persons to be religious do not affect the outcome under consideration, then no concern is merited. If such factors do affect an outcome, they should be considered in the model. Selection effects do not appear to considerably mitigate independent religious effects or make conclusions about religious influences suspect out of hand.

Additionally, despite the considerable linkages that are often conceived to exist between religious persons and social desirability bias, little evidence of it emerges here. The first model of Tables 2 and 3 was designed to give every opportunity for social desirability to reveal itself as a predictor of greater attendance and religious salience, controlling only for age and gender. Social desirability appears only modestly related to self-reported religious salience, prior to controlling for personality traits. This relationship, while hardly robust, is at least predictable from several previous studies of intrinsic religiosity's stronger connection (than extrinsic forms) with social desirability (Batson, Naifeh, and Pate 1978; Leak and Fish 1989; Trimble 1997). While social desirability was not consistently related to either measure of religiosity, it *is* related to each of the three outcomes – better family relations and health, and less theft. For a unit increase in social desirability, respondents reported between a 0.4 and 0.45 unit increase in satisfaction with their family. More modest relationships appear with health and diminished reports of theft. Even in the lagged dependent variable models (Table 5) social desirability remains significantly linked with family satisfaction and lower theft. Yet in both Tables 4 and 5 significant religious salience effects remain, suggesting that social desirability does not diminish religious effects.

To be sure, nobody is claiming that religion is the *only* factor influencing behavior and life outcomes. On many outcomes its influence is modest or not evident at all. On others religiosity appears to be a strong effect. The evidence documented here and elsewhere suggests that researchers are justified in claiming that religion plays a role in helping to produce positive (or inhibit negative) outcomes in the lives of adolescents and adults. Batson, Schoenrade, and Ventis (1993: 372-373) characterize this complex scenario well, suggesting that "…religion is a leader (i.e., causal influence) in many people's lives, but that there is a limit on its ability to

lead…Religion can serve as an active, directing force…only to the degree that it is responsive to and congruent with other forces within our personality." Johnson et al. (2000: 46) suggest that religion, in keeping with its endogenous nature, could be treated as "a proximate cause…," inferring both its ability to directly affect action, as well as conduct indirect influences.

In reality, there are other possible indicators of religious selection effects that we were not able to test here. One is the idea that religious people tend more generally to be "joiners" (that is, they like to get involved with a variety of associations, clubs, etc.), and that joiners so happen to also tend toward more positive life outcomes (Curtis, Baer, and Grabb 2001). Religious involvement is just one aspect of their generally "joining" approach in life. Thus an association between religiosity and positive outcomes can be observed, but it may be that joiners influence religiosity and better outcomes. Certainly peer and friendship network influences (i.e., homophily) on religiosity are worth accounting for whenever possible (Regnerus, Smith, and Smith 2004).

It should also be noted as well that there is a nascent body of literature suggesting a possible genetic or hormonal component to religiosity, or at least some forms of religiosity (Miller and Stark 2002). One novel genetic study notes that African American girls display considerably higher "heritability" of religious involvement and religious values, in contrast to white or other racial/ethnic girls (Heath et al. 1999). Bouchard et al. (1999) also note in their twins study of religiosity and personality that a model containing genetic and environmental factors displayed significantly better fit than a model with only an environmental component. While still underdeveloped, this nascent line of research suggests that – if indeed there is a genetic component to the transmission of religiosity – then failure to account for both it and any influence that such a component might have on one's outcome(s) of interest may inflate religious

effects. In other words, models of religious influence are still more complex than we have been able to outline and test. There are contingencies and variations not noted here.[10]

Additionally, we have only examined three among many outcomes. A more thorough documentation of variables that consistently and considerably reduce the effect of religiosity on a wide variety of adolescent and adult outcomes would be profitable. We focused empirically only on adolescents, while generalizing from other research findings from studies of adults. Given that adults arguably choose their religiosity more than adolescents do, it would make sense to test the hypotheses here using longitudinal data on American adults. Additionally, the evidence and models evaluated here may or may not fit other national origin groups (e.g., European, Latin American, African, Asian) and adherents of other religions.

Finally, while quality solutions should be as simple as possible (since it is unreasonable to expect subject specialists to become statistical experts in a short period of time), researchers should persist in the pursuit of more statistically advanced solutions to selection effects concerns. The several solutions we explored here suggest that modeling decisions (e.g., choice of solution) do indeed matter. Among other solutions that are being evaluated are propensity score matching, studies of Time 1 non-participants (which incurs sample selection bias concerns), structural

[10] Toward deciphering this complexity, there is evidence to suggest that religion influences adolescents who are particularly at-risk for negative outcomes, but exerts less influence on more typical adolescents (Regnerus and Elder 2003). Alternatively, religion may help well-adjusted youth maintain their course toward developmental successes (Elder and Conger 2000). Religion may vary in its influence across the span of adolescence, as well as by the extent to which it affects the lives of others around them (Regnerus 2003; Stark 1996a). All of these, however, are specifications of a more general religious influence hypothesis, and not evidence for continued skepticism or suspicions of selection effects.

equation models that specify correlated error terms between religiosity (as an endogenous independent variable) and its predictors, and perhaps Heckman selection effects models. However, the risk of applying Heckman in an inappropriate manner can outweigh the magnitude of the presenting problem (Stolzenberg and Relles 1997; Winship and Morgan 1999), creating a situation in which the "cure may be worse than the disease" (Watkins and Warriner 2003: 112). Nevertheless, Heckman modeling approaches have begun to be used in ways that transcend simple sample censoring (e.g., Meier 2003). Finally, when in doubt the conservative solution should always apply – evaluate a variety of models (e.g., baseline, lagged dependent variable, change models, etc.) and be most confident when the multiple modeling approaches display comparable results.

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Table 1
Personality and Social Desirability, by Adolescent Religiosity (in percent unless noted).

	Has a temper	Likes to take risks (agrees or strongly agrees)	Avoids socially desirable answers	Mean score on "strategic" behavior index
How often do you attend religious services?				
Once a week or more	26.8	54.3	90.4	18.32
Once a month or more, but less than once a week	28.5	57.6	91.3	18.14
Less than once a month	32.1	60.8	91.9	18.19
Never	37.9	62.8	90.6	17.79
How important is religion to you?				
Very important	27.3	54.8	89.4	18.53
Fairly important	31.3	58.4	92.3	17.96
Fairly unimportant	34.1	62.3	93.4	17.64
Not important at all	37.3	63.7	90.3	17.13
N	15,082	11,170	15,047	14,904

Table 2
Odds Ratios from Ordered Logit Regression of Religious Service Attendance (Time 2) on Social Desirability, Personality, and Demographic Covariates.

Effect	Model 1	Model 2	Model 3	Model 4
Social Desirability	1.012	0.963	0.948	1.000
	(.06)	(.06)	(.06)	(.06)
Hot tempered		0.769***	0.812***	0.907
		(.05)	(.05)	(.06)
Likes taking risks		0.906***	0.943**	0.953*
		(.02)	(.02)	(.02)
Strategic		1.048***	1.040***	1.022**
		(.01)	(.01)	(.01)
Age	0.861***	0.852***	0.854***	0.885***
	(.02)	(.02)	(.02)	(.01)
Female	1.213***	1.158**	1.192***	1.096+
	(.06)	(.06)	(.06)	(.06)
Lives in the South			1.803***	1.314***
			(.15)	(.07)
African American			1.896***	1.531***
			(.16)	(.10)
Asian American			1.431+	1.121
			(.27)	(.15)
Latino			1.280*	1.066
			(.14)	(.09)
Native American			0.906	1.126
			(.25)	(.47)
Bio-Intact, Two-parent family			1.846***	1.321***
			(.09)	(.07)
Mother has a college degree			1.523***	1.227***
			(.11)	(.07)
Religious service attendance, Time 1				3.794***
				(.17)
Model Fit Statistics				
-2 Log Likelihood	33316.4	33118.3	32289.7	26113.0
Pseudo R-square	0.007	0.013	0.037	0.222
N	12,530	12,530	12,530	12,530

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

Table 3
Odds Ratios from Ordered Logit Regression of Self-Rated Importance of Religion (Time 2) on Social Desirability, Personality, and Demographic Covariates

Effect	Model 1	Model 2	Model 3	Model 4
Social Desirability	1.172**	1.088+	1.026	1.042
	(.06)	(.06)	(.06)	(.06)
Hot tempered		0.774***	0.784***	0.838**
		(.04)	(.04)	(.05)
Likes taking risks		0.849***	0.899***	0.904***
		(.02)	(.02)	(.02)
Strategic		1.073***	1.065***	1.039***
		(.01)	(.01)	(.01)
Age	0.918**	0.904***	0.899***	0.948***
	(.03)	(.03)	(.02)	(.02)
Female	1.298***	1.213***	1.253***	1.138**
	(.07)	(.06)	(.07)	(.06)
Lives in the South			2.283***	1.581***
			(.20)	(.10)
African American			2.366***	1.828***
			(.21)	(.14)
Asian American			1.518*	1.292+
			(.28)	(.18)
Latino			1.345**	1.161+
			(.13)	(.09)
Native American			0.620*	1.016
			(.15)	(.33)
Bio-Intact, Two-parent family			1.482***	1.150*
			(.08)	(.06)
Mother has a college degree			1.129+	1.096
			(.08)	(.07)
Importance of religion, Time 1				4.044***
				(.22)
Model Fit Statistics				
-2 Log Likelihood	30251.3	29940.0	28844.2	23590.8
Pseudo R-square	0.005	0.015	0.051	0.224
N	12,530	12,530	12,530	12,530

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

Table 4

Modeling Approach #1: Results from OLS Regression of Self-Reported Family Satisfaction, Health, and Theft (Wave II) on Religion, Social Desirability, Personality, and Demographic Covariates.

	Family		Health		Theft	
Effect	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Religious service attendance	-0.026	-0.032	0.030*	0.030*	0.006	0.009
	(.04)	(.04)	(.01)	(.01)	(.02)	(.02)
Importance of religion	0.320***	0.281***	0.063***	0.053***	-0.115***	-0.095**
	(.04)	(.04)	(.01)	(.01)	(.03)	(.03)
Conservative Protestant	-0.168*	-0.159*	-0.126***	-0.120***	-0.093+	-0.096+
	(.07)	(.04)	(.03)	(.03)	(.05)	(.05)
Age	-1.561***	-1.417***	0.054	0.080	0.368+	0.310
	(.32)	(.32)	(.11)	(.11)	(.20)	(.19)
Age-squared	0.048***	0.043***	-0.002	-0.003	-0.014*	-0.012+
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)
Female	-0.161**	-0.237***	-0.195***	-0.193***	-0.151***	-0.091*
	(.06)	(.06)	(.02)	(.02)	(.04)	(.04)
Lives in the South	0.123	0.083	-0.021	-0.023	-0.189***	-0.161***
	(.08)	(.07)	(.03)	(.03)	(.05)	(.04)
African American	0.240*	0.108	0.088*	0.076*	-0.100+	-0.021
	(.09)	(.09)	(.04)	(.04)	(.06)	(.05)
Asian American	-0.301+	-0.431*	-0.123*	-0.140*	-0.023	0.046
	(.16)	(.17)	(.06)	(.06)	(.09)	(.09)
Latino	0.024	0.006	-0.084*	-0.084*	0.197**	0.204***
	(.12)	(.12)	(.04)	(.04)	(.07)	(.07)
Native American	-0.180	-0.134	-0.036	-0.025	0.075	0.060
	(.36)	(.36)	(.11)	(.12)	(.26)	(.23)
Bio-Intact, Two-parent family	0.367***	0.325***	0.095***	0.088***	-0.193***	-0.173***
	(.06)	(.06)	(.02)	(.02)	(.04)	(.04)
Mother has a college degree	0.102	0.079	0.181***	0.174***	0.105+	0.116*
	(.08)	(.08)	(.03)	(.03)	(.06)	(.06)
Social Desirability		0.411***		0.071**		-0.128***
		(.07)		(.03)		(.03)
Hot tempered		-0.394***		-0.090***		0.121*
		(.04)		(.02)		(.06)
Likes taking risks		-0.218***		0.017+		0.167***
		(.01)		(.01)		(.02)
Strategic		0.094***		0.028***		-0.052***
		(.02)		(.01)		(.01)
Model Fit Statistic						
R-square	0.035	0.070	0.038	0.050	0.026	0.051
N	12,569	12,569	12,682	12,682	12,682	12,682

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

Table 5

Modeling Approach #2: Results from Lagged Dependent Variable Models – OLS Regression of Self-Reported Family Satisfaction, Health, and Theft.[a]

Effect	Family	Health	Theft
Religious service attendance	-0.028	0.016	0.005
	(.03)	(.01)	(.02)
Importance of religion	0.094**	0.028*	-0.037
	(.03)	(.01)	(.03)
Conservative Protestant	-0.086	-0.071**	-0.076+
	(.05)	(.02)	(.04)
Social Desirability	0.161*	0.021	-0.092**
	(.07)	(.02)	(.03)
Hot tempered	-0.086	-0.038+	0.011
	(.06)	(.02)	(.04)
Likes taking risks	-0.130***	0.001	0.106***
	(.03)	(.01)	(.01)
Strategic	0.008	0.010***	-0.024**
	(.01)	(.01)	(.01)
Model Fit Statistic			
R-square	0.332	0.277	0.223
N	12,533	12,681	12,682

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

[a] Models include but do not display estimated coefficients from lagged dependent variables and demographic covariates.

Table 6

Modeling Approach #3: Estimates from Pure Change Models – OLS Regression predicting Change in Self-Reported Family Satisfaction, Health, and Theft.

Effect	Family	Health	Theft
Change in Attendance	0.043	0.017	-0.003
	(.04)	(.01)	(.03)
Change in Importance of Religion	0.159***	0.007	-0.042
	(.03)	(.01)	(.03)
Became "Born Again" between waves	0.031	-0.015	0.019
	(.09)	(.04)	(.09)

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

Table 7

Modeling Approach #4: Reverse Causation – Ordered Logit Regression of Wave II Attendance and Importance of Religion on Family Satisfaction, Health, and Theft.[a]

Effect	Attendance	Importance
Family satisfaction, Wave I	1.043***	1.044***
	(.01)	(.01)
Theft, events since Wave I	0.972*	0.946***
	(.01)	(.01)
General Health, Wave I	1.073*	1.128***
	(.03)	(.034)
Dependent Variable, Wave I	3.737***	3.934***
	(.16)	(.21)
Model Fit Statistics		
-2 Log Likelihood	25971.3	23444.4
Pseudo R-square	0.224	0.227
N	12,504	12,501

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

[a] Models include but do not display estimated coefficients from demographic covariates, social desirability, and personality traits.

Figure 1: The General Selection Effects Explanation

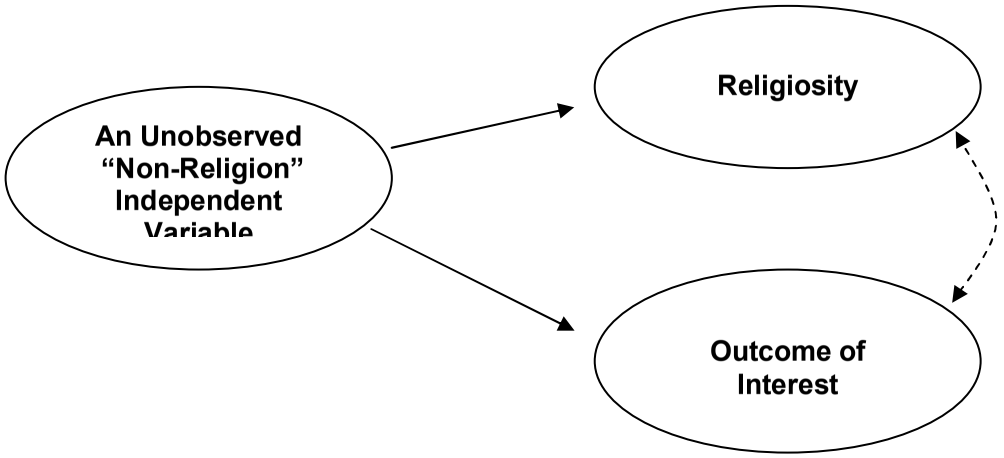


Figure 2: The Religious Strategy Explanation (Subset of General Selection Effects)

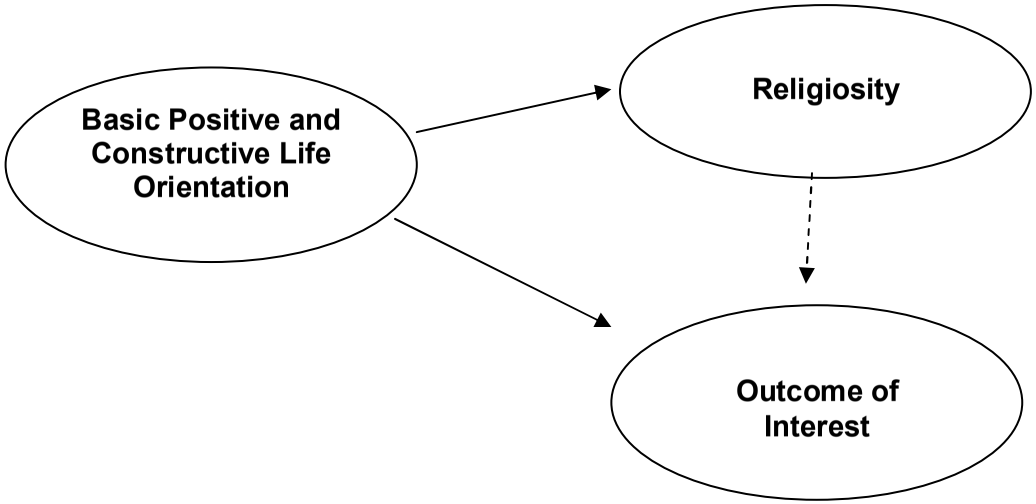
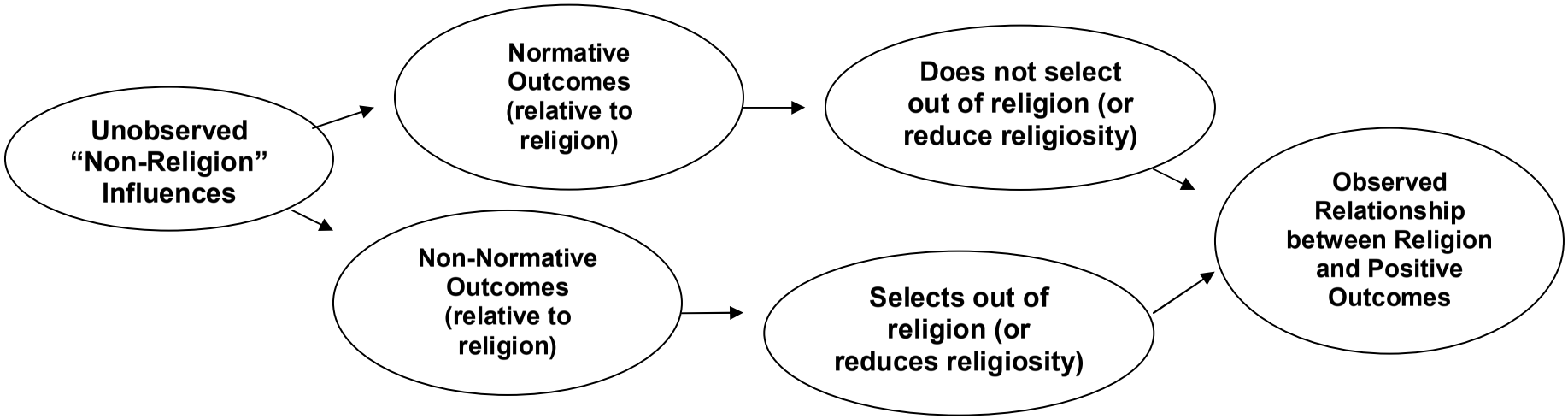


Figure 3: The Reverse Causation (or Religious Exit) Explanation



Appendix A

Descriptive Statistics for all Variables

Variables (N~12,530)	Range	Mean	SD
Religious service attendance, Wave I	1-4	2.769	1.20
Religious service attendance, Wave II	1-4	2.713	1.21
Change in service attendance between waves	-3 to 3	-0.056	0.97
Importance of religion, Wave I	1-4	3.070	1.05
Importance of religion, Wave II	1-4	3.014	1.07
Change in importance of religion between waves	-3 to 3	-0.056	0.88
Social desirability	0-3	0.121	0.41
Hot-tempered	0,1	0.272	0.44
Likes taking risks (Wave II)	1-5	3.532	1.05
Strategic	5-25	18.20	2.86
Family satisfaction, Wave I	3-15	11.25	2.46
Family satisfaction, Wave II	3-15	11.22	2.53
Change in family satisfaction between waves	-12 to 12	-0.038	2.31
General physical health, Wave I	1-5	3.887	0.91
General physical health, Wave II	1-5	3.919	0.90
Change in physical health between waves	-4 to 4	0.032	0.87
Theft, Wave I (# of events in past year)	0-12	0.880	1.85
Theft, Wave II (# of events since Wave I)	0-12	0.661	1.64
Change in incidences of theft between waves	-12 to 12	-0.219	1.79
Became a “Born Again” Christian between waves	0,1	0.077	0.27
Conservative Protestant affiliation	0,1	0.272	0.44
Age	11-20	15.326	1.59
Female	0,1	0.516	0.50
Lives in the South	0,1	0.367	0.48
White/Caucasion	0,1	0.555	0.50
African American	0,1	0.212	0.41
Asian American	0,1	0.070	0.26
Latino	0,1	0.154	0.36
Native American	0,1	0.008	0.09
Biologically intact, two-parent family (0=intact, 1=not intact)	0,1	0.538	0.50
Mother has a college degree	0,1	0.209	0.41