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The 'Friendship Dynamics of Religion,' or the 'Religious Dynamics of Friendship'? A Social Network Analysis of Adolescents Who Attend Small Schools*

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Abstract

Longitudinal social network data on adolescents in seven schools are analyzed to reach a new understanding about how the personal and interpersonal social dimensions of adolescent religion intertwine together in small school settings. We primarily address two issues relevant to the sociology of religion and sociology in general: (1) social selection as a source of religious homophily and (2) friend socialization of religion. Analysis results are consistent with Collins' interaction ritual chain theory, which stresses the social dimensions of religion, since network-religion autocorrelations are relatively substantial in magnitude and both selection and socialization mechanisms play key roles in generating them. Results suggest that socialization plays a stronger role than social selection in four of six religious outcomes, and that more religious youth are more cliquish. Implications for our understanding of the social context of religion, religious homophily, and the ways we model religious influence, as well as limitations and considerations for future research, are discussed.

Keywords

adolescent social networks; friendship networks; religion

1. INTRODUCTION

Although religious beliefs are typically considered at the *individual* level (e.g., Greer and Roof 1992; Stark and Bainbridge 1985), religion is fundamentally a *social* phenomenon. Sociologists long ago recognized not only that religion is social in function, but also that it is socially produced and reinforced. For instance, Simmel (1905:366) argued that the "faith which has come to be regarded as the essential, the substance, of religion, is first a relation between individuals." Similarly, Durkheim (1965[1915]) emphasized that interaction in groups creates and reifies religion by fostering solidarity through the genesis of shared symbols. Historically, religion has been viewed as a creation of groups as well as a source of

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group – and thus interpersonal – connection. In contemporary terminology, this suggests that religion is a source of *friendship selection* leading to network homophily (Lazarsfeld and Merton 1954; McPherson et al. 2001). That is, a means by which people come to know, affiliate, and become close to each other (Stark and Finke 2000).

Of course, the processes producing religion socially can also change participants' religion, whether renewing it or inspiring new faith. Ernst Troeltsch (1992[1931]), for example, considered religious faith to be socially and contextually, rather than individually, produced. This theme is evident in much of Durkheim's work too. For instance, in his emphasis on how religious interactions generate symbols that preserve feelings of group solidarity, thereby transforming individuals by shaping cognitions and emotions, and stimulating the desire for more religious experiences (Collins 2004). In other words, the religious content of people's social worlds can be a source of personal and possibly religious change. To the extent that religion is socially derived and embedded in social networks, the religious content of those networks may feedback to influence the affiliations, beliefs, and involvement of individuals (Lofland and Stark 1965). In this way, the religion of friends can influence that of individuals through *socialization* processes (Kandel 1978).

In contrast to the focus on the social origins and influences of religion by early sociologists, however, most quantitative research on American religion is now based on surveys of unconnected individuals, with the result that the social context of religion is obscured (c.f., Schwadel 2005; Wald, Owen, and Hill 1990). More than four decades ago, White (1968:24) criticized the implicit assumptions of the "psychological consonance" model that had become, and remains, so dominant in the sociology of religion. As White argued, the prevailing sociological approach to religion is "peculiarly individualistic." We do not argue that all scholars of religion endorse this view so much as they have their hands tied by design and method (McPherson 2004), so that even as data collections and analytic tools have become more sophisticated, individualistic approaches to studying religion still dominate.

In contrast to this individualistic emphasis, we concentrate on the friendship dynamics of adolescent religion. In doing so, we find that religious beliefs, activities, and affiliations are both a cause and consequence of friendships for adolescents who attend small schools. The findings are consistent with Collins' (2004) *interaction ritual chain theory*, which builds off of Durkheim and Goffman to argue that social interactions create powerful symbols – such as religion – that influence and organize subsequent interactions. The analytic approach we adopt uses innovative new social network analysis models (Snijders, Steglich, and Schweinberger 2007; Steglich, Snijders, and Pearson 2010) that decompose social selection and socialization processes directly. Social selection reflects changes in social networks that result from the religious similarity among actual and potential friends, and socialization reflects religious changes in persons as a function of friends' religion (Kandel 1978; Friedkin 1998). We use data from 7–12th grade adolescents from seven small K-12th grade schools where friendship networks were collected over time to assess whether religion is uniquely friendship-inducing, a friend-based socializing factor, or if both processes are jointly operative. We build upon this analysis by quantifying the relative contributions of each to the network-religion autocorrelation, while also assessing whether the selection/socialization results derive from additional structural network and background factors.

1.1. Religious Individualism in Adolescence

Individualistic narratives are quite common in contemporary society, as Bellah and his coauthors' outlined in their influential book, *Habits of the Heart* (1985). The account they present describes the contemporary American preoccupation with "individual agency" (Bellah 1998), even among regular churchgoers (Madsen 2009; Wuthnow 1998). In

particular, American youth are thought to be highly individualistic in their religious beliefs and activities (Arnett and Jensen 2002). Smith and Denton (2005:233) summarize the contemporary adolescent preoccupation with individualism:

> …nearly all American teenagers believe that they are not influenced by *anything* at all, religious or otherwise. Like most of the adults who have socialized them, teenagers take for granted an image of themselves as autonomous and self-defining individuals fully responsible for and capable of the formation of their own lives. Many teenagers actually bristle at the suggestion that they are directly influenced by people and institutions outside of themselves.

It is during adolescence – when Americans are apparently most resistant to the idea that they are social beings, even while paradoxically entering what is generally the most intensely social phase of their lives (Carstensen 1992; Hartup and Stevens 1997) – that we examine the social nature of religion.

During adolescence youth expand the time they spend socializing with peers as they seek to forge their own futures (Brown 1990). They interact together in various settings in and out of school, at church, youth groups, during sporting events, parties, etc., and so come to develop histories with each other that form and reform friendship networks, socializing each other in the process (Hartup and Stevens 1999; Rubin, Bukowski, and Parke 2006). Though research on adolescent social networks tends to focus on risky behaviors and delinquency (e.g., Haynie 2001), late adolescence is a time of substantial religious (Uecker, Regnerus, and Vaaler 2007) and friendship change (Giordano 2003; Crosnoe, Frank, and Mueller 2008), making this period, particularly when combined with the strong social and interactional foci provided jointly by school and church (e.g., Feld 1981, 1982), a key time to study the individual – and social – natures of religion (Alcorta and Sosis 2005).

1.2. Friends and Religion: Homophilous Social Selection vs. Socialization

Network autocorrelations reflecting the tendency for friends to be similar to each other in various ways is a normative feature of social relations (Bottero 2007) expressing the fact that interpersonal associations are socially arranged (Blau 1977). For the most part, Americans interact with people similar to themselves in terms of age, class, race, gender, and religion (McPherson et al. 2001). In fact, Americans' social networks are predominantly composed of people with similar religious perspectives, affiliations, and levels of religious participation (Cavendish et al. 1998; Louch 2000). This is especially true for women (Brashears 2008), conservative Protestants, Jews, and the religiously unaffiliated (Olson 1993; Porter and Brown 2008; Smith 1998). Yet, the question remains: how does network-religion autocorrelation arise?

There are two primary global mechanisms leading to cross-sectional network autocorrelation. The first mechanism, *social selection*, involves friendships forming among those who are similar to each other (McPherson et al. 2001). Friendship selection processes have become a widespread concern in adolescent research (Ennett and Bauman 1994; Steglich, Snijders, and West 2006), albeit one that is rarely but increasingly being studied directly (Crosnoe et al. 2008; Weerman 2011). For our purposes, religion-based selection reflects changes in the ties between individuals comprising the network based on religion.

The emphasis on homophilous social selection is evident in research in the sociology of religion. For instance, the church growth literature asserts that people prefer friends with religious beliefs and affiliations similar to their own (e.g., Wagner 1979). Similarly, the "religious economies" perspective argues that sociodemographic characteristics play a smaller role than "homophily of preference" in structuring religiously homophilous social networks (Stark and Finke 2000:195). More recently, Vaisey and Lizardo (2010) suggest

that worldviews are related to selection but not influence. Sherkat (2003:157) perhaps most clearly exemplifies the emphasis on homophily: "People choose friends and spouses in accordance with [religious] preferences; hence, valued others are likely to reinforce existing desires rather than arouse new ones." Thus, our first research question is: *Do adolescent friendships disproportionately form amongst those who are religiously similar to each other, and is this the primary mechanism of network-religion autocorrelation (or religious homophily)?*

The second mechanism, *socialization*, posits that friends socialize each other and so become similar over time (Kandel 1978). This mechanism postulates changes in religion as friends adapt to and influence each other (Friedkin 1998), possibly in order to find balance with the perspectives and beliefs of their friends (Heider 1946), to impress them (e.g., Payne and Cornwell 2007), or to gain social acceptance and status (Cronoe 2011). Furthermore, as we elaborate below, socialization may also reflect the internalization of shared religious symbols that increase in emotional salience as a result of socializing together. The influential Lofland and Stark (1965) theory of religious conversion emphasizes the role friends play in bringing new members into the fold and is based on a version of a socialization hypothesis. Other research in the sociology of religion supports this perspective, suggesting that social networks are instrumental in introducing people to new religious groups and viewpoints (e.g., Ebaugh and Vaughn 1984; Kox, Meeus, and Hart 1991). This view is also a reflection of the general concern in the risk behavior literature that peers negatively influence each other (see Hoffman, Sussman, Unger, and Valente 2006). Our second research question is thus: *Do friends' socialize each other's religion over time, and is this the primary mechanism leading to network-religion autocorrelation?*

1.3. Friends and Religion: Homophilous Social Selection AND Socialization

In contrast to the emphasis on either selection *or* socialization, it is possible, and perhaps likely, that *both* selection and socialization operate to produce religious-based network autocorrelation, leading to the question of the relative contribution of each. Collins' (2005, 1975) interaction ritual chain (IRC) theory provides a framework for conceptualizing and expecting such joint social dynamics. In IRC theory (Collins 2004:7), the ritual, often an everyday interaction between friends or acquaintances, "is a mechanism of mutually focused emotion and attention producing a momentarily shared reality, which thereby generates solidarity and symbols of group membership." IRC theory posits a joint process of interpersonal engagement leading to observable patterns of social selection in friendship networks and peer socialization in religious participation and belief.

Key to IRC theory is the idea that interactions are "ritualized" in the sense of Goffman (1967) so that actors have behavioral and emotional expectancies for their socializing. These interactions both create and sustain symbols that have meaning to the participants. Indeed, religious symbols and ritual styles organize interactions, and thereby form a basis for new and renewed interaction (Collins 2010). The result is that even changes in friendship networks outside of religious institutions will reflect religion-based social selection. At the same time, the very experiences promoting group solidarity and vitalizing religion changes participants. When participants become caught up in a mutual focus of attention, they become "emotionally entrained" with one another, which heightens the salience of the social experience. Creating emotionally charged intersubjectivity is what religious services are designed to do (Nelson 2005), and the emotions evoked by religious symbols are qualitatively different from those evoked by other symbols (Collins 2010). Similar processes can unfold between peers in friendly interactions, so individual religious views or engagement can change as friends socialize each other. Such interpersonal influences capitalize on communal symbols during interpersonal interactions and through the creation of shared emotionally charged interpersonal symbols created during socializing.

IRC theory thus provides the foundation for understanding the microdynamic processes aggregating across individuals to produce homophilous selection in networks and socialization-induced patterns of individual religious change, which can also produce homophily when viewed cross-sectionally. Moreover, the theory is clear on a number of points. First, both processes should unfold concurrently since the two are inextricably interlinked. Social selection mechanisms lead people to form relationships with those to whom they have more emotionally entraining interactions, of which shared religious symbols are likely to be important. Collins also argues that we are "emotional energy seekers," and so intersubjective shared realities experienced during interactions change people. Second, these processes should be evident outside of religious congregations to the degree that participating in religion creates powerful, socially shared symbols that can be reinforced and changed through interactions with others (Collins 2010; Geertz 1973; Vaisey 2008). Therefore, our third research question is: *Do both friend selection and socialization work jointly to produce network-religion autocorrelation, and are the magnitudes of both processes comparable?*

1.4. Network & Background Factors

Both network processes and background factors could result in spurious estimates for selection and socialization if not accounted for. Network mechanisms reflecting the fact that these processes are sources of change and stability may be particularly influential. For selection processes, accounting for triadic closure may be especially important (Snijders et al. 2010). Consequently, we control for network closure as a source of friendship change. Network closure, in particular, appears to vary across religious traditions and is correlated with religious participation (Porter and Brown 2008; Smith 2003). In addition, we also explore the roles of popularity and activity (nominating friends) on selection since religious youth may have more exclusive friendship groups (Kreager, Rullison, and Moody 2011), and as alternative mechanisms of individual religious change (see Falci and McNeely 2009).

Finally, because individuals have a profile of background characteristics that may jointly influence the role of religion in selection and socialization processes, we also account for several background factors capturing alternative selection and socialization mechanisms. For instance, previous research suggests that religious-based network homophily varies across religious traditions (e.g., Stark and Bainbridge 1981). Of course, the behavioral outcomes – measures of adolescents' religious participation and belief – should also vary across religious traditions (Smith and Denton 2005). We include controls for parents' religiosity and education too since parents' religious beliefs and activities (Smith and Denton 2005) and social class (Schwadel 2008) are strongly associated with adolescents' religious perspectives and behaviors. Previous research also suggests that social networks and religious participation and belief are correlated with friends' having the same religious affiliation (e.g., Stark and Bainbridge 1981). These factors, and other sociodemographic background factors (i.e., gender, grade, and race/ethnicity) implicated in adolescent network processes (see Goodreau, Kitts, and Morris 2009; Moody 2001), must be included in the models to ensure reasonable effect estimates assessing the central research questions around which the analysis is organized.

2. DATA AND METHODS

Data come from waves 1 and 2 of the in-home components of the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a stratified longitudinal study of 7–12th grade youth begun in 1994 with in-school questionnaires administered to approximately 90,000 students in 140 schools. A nationally representative sample of over 20,000 students was drawn from the in-school study and data were collected in-home in 1995 from both adolescents and parents. Another survey was administered again to the adolescents

approximately one year later at Wave 2. This longitudinal sample consists of a core probability sample and special oversamples (racial/ethnic, disabled, genetic) including 16 "saturated" school-settings where efforts were made to collect data on all attending 7–12th grade students so that a network sample could be maintained over time. Of these 16 schools, two were large (N≈1,000; 2,100) and 14 were small (N<300).

We used seven of the saturated settings, all K-12th grade schools that are relatively racially and ethnically homogeneous, to construct our sample. Our decision to use these schools was based on several criteria. First, because our analysis requires longitudinal measures of friendship networks, we were limited to the saturated schools. Second, one of the schools was a special education school and another six were 6th–8th grade. We chose not to use these latter schools because the 8th graders moved into high schools for which full network data is not available. Third, larger schools capture different macro-settings than the small schools as indicated by the enormous size differences. The grade cohorts of the two big schools are larger than the entire 7–12th cohorts of the smaller schools. The result is that we focus on the social dynamics in a collection of smaller, more homogeneous settings. The joint sample size of the small schools comprising this study is 798 mostly white 7–12th grade students. The largest school contributed 163 students to the analysis and the smallest contributed 61. Three were public rural schools (N=363), the remaining four were private (N=435), three of which were urban (N=374). Network data was present for 70–89% of the students on the school-provided roster, rates that are acceptable for social network analysis (Huisman 2009; Kossinets 2006).

2.1. Measures

Dependent & Focal Independent Variables—We employ six dependent variables that measure religious activity, belief, and affiliation/identification.1 Religious service attendance is coded from the question, "In the past 12 months, how often did you attend religious services?" Youth service attendance is similar in that it asked about attendance at special activities for teenagers at churches, synagogues, and other places of worship. These two variables take on values 1=never, 2=less than once a month, 3=once a month or more but less than once a week, and 4=once a week or more. *Importance of religion* is assessed with responses to the question "How important is religion to you?" The importance of religion measure takes values from 1=not important at all to 4=very important. Frequency of *prayer* ranges from 1=never to 5=at least once a day. Religious identification is captured with two dichotomous variables: whether the respondent self-identifies as a *born again Christian* or reports *no religious affiliation* (a "none" on the question "What is your religion?").2

[1]Although some researchers combine measures of religion into scales, such as public and private religiosity (e.g., Nonnemaker, McNeely, and Blum 2006), we examine single-item indicators for three reasons. First, since this is the first analysis to simultaneously model selection and influence in the religious homogeneity of adolescents' social networks, we did not want to assume that selection and influence operate the same across different aspects of religion. Second, as recent research shows (e.g., Schwadel 2011), individual attributes can impact different indicators of religion in unique ways, which can lead to misleading results if measures of religion are combined into scales. Third, the models we employ are designed to work with ordinal dependent variables making scales more complicated to use.

[2]Due to an unfortunate skip pattern in Add Health, adolescents with no religious affiliation were not asked about their religious beliefs and activities. These unaffiliated respondents must be kept in the sample for all analyses to ensure proper specification of the network portion of the model (e.g., Huisman 2009; Huisman and Steglich 2008). Consequently, we code unaffiliated respondents as never attending services or youth services, as not being born again, as placing no importance in religion, and as never praying. This coding most closely reflects what we know about unaffiliated adolescents. For instance, according to Wave 1 of the National Study of Youth and Religion, a nationally representative survey of adolescents ages 13 to 17, 94 percent of unaffiliated adolescents never attend religious services (compared to less than 8 percent of affiliated adolescents), only 13 percent of unaffiliated adolescents say religion is very or extremely important in daily life (compared to 55 percent of affiliated teens), and more than half of all unaffiliated adolescents never pray (compared to less than 10 percent of affiliated adolescents) (see Smith and Denton 2003 for information on the National Study of Youth and Religion).

The last dependent variable, the friendship network matrix, is used to map whom each adolescent views to be a friend over time. The network thus reflects the peers each adolescent views to be a close friend at each wave. This includes "best friends," but is not limited to them since our definition of friendship captures individual views onto their network and not dyadic consensus reflecting reciprocal ties (e.g., Prinstein 2007). The adolescent friendship network at each wave is constructed from two sets of variables requesting nominations of up to five male and five female friends from the school roster. The total sample makes use of all available nominations.

Control variables—For controls we include whether the respondent is *female* (=1), *grade* (range: 7–12th), whether the youth is *white* (=1), and whether the *parent is single* (=1). Religion is also included in two ways. First, religious tradition is included with the following categories: *evangelical protestant* (ref.), *mainline protestant, Catholic, other religious affiliation*, and *no religious affiliation*. This scheme follows the denominational coding outlined by Steensland and colleagues (2000), though we combine the Jewish and "other" religion categories due to small number of respondents in these groups.3 Second, the Wave 1 parent interview is used to construct a standardized scale for *parent religiosity* (α=. 82) for the responding caretaker coded from the following four items: religious service attendance over the prior year, importance of religion, frequency of prayer, and agreement with sacred scriptures of their religion.4 The *parent education* of the responding parent is included as a five-value variable with categories ranging from 1=did not graduate from high school to 5=received postgraduate training.

Finally, we include the number of *off list nominations* provided by the adolescent during the network portion of the survey. Although the majority of nominations in Add Health are to friends at school, close to 30% are not (they are thus 'off list'; see Falci and McNeely 2009). In addition, we also include an indicator for whether the respondent was in the *restricted nomination* sample because some adolescents were allowed to nominate only one male and female friend due to a survey implementation error. The result of this error is that the full friendship network was not captured at the wave 1 in-home survey for 40% of the youth in the sample. We carried the wave 1 in-school nominations forward for these youth5 (note that the present study relies on the subsequent wave 1 and 2 in-home surveys) to preserve the full network so that we could conduct the longitudinal social network analysis. There will thus be greater change in the networks for the restricted nomination than regular sample, so we have constructed this indicator to reflect the fact that overall change in friendships will be greater for these adolescents.

2.2. The Model

Studying religion-based network selection processes is complicated by the fact that the model must account for tie changes between individuals. Consequently, the model must consider both who is a friend with whom and who is not. Socialization processes reflect how individuals change in response to characteristics of their friends as well as the changing composition of friends over time as interpersonal interconnections change. Changes in

[3]Add Health uses relatively broad denominational categories. This was particularly problematic when coding Baptist and Lutheran respondents, who may be considered either evangelical or mainline Protestant depending on the specific Baptist or Lutheran denomination. We chose to code all Baptist respondents as evangelical since the considerable majority of Baptist denominations, as well as the largest Baptist denominations, fall into the evangelical category. There were only seven Lutheran respondents in our sample. The five Lutherans who reported being born-gain Christians were coded evangelical and the two who did not identify as born-again Christians were considered mainline Protestant.

[4]Parent and adolescent religious affiliation are highly correlated, so parents' religious tradition is largely represented by the youth themselves (Smith with Denton 2005).

[5]A series of robustness checks comparing results utilizing imputation and other techniques suggested that this decision had a negligible impact upon our results.

behaviors can also feedback to influence the friendship network to the extent that selection is a salient interpersonal process. In order to address this complicated set of interlocking processes with friendships predicting changes in religion, and religion predicting changes in the friendship network, the analyses presented in this paper utilize the new class of Simulation Investigation for Empirical Network Analysis models (SIENA) developed by Snijders (1996; 2001) and colleagues (e.g., Snijders et al. 2007).

The model has a number of advantages over traditional analytic approaches (see Steglich et al. 2010). For instance, the model incorporates friendship preferences as well as structural network mechanisms, and direct information on friends in the network allows estimation of how friends influence each other (Weerman 2011: 267). These models are unique because they are designed specifically to model tie changes and simultaneously link these alterations to changes in behavioral variables so that socialization effects "control" for selection, and *vice versa* (Steglich et al. 2010). The parameters are estimated by constructing models decomposing the total amount of change in the networks and religion between observation moments into a series of smaller changes, called microsteps in the SIENA procedure. These micosteps reflect one change in either the interconnections or the religious behavior of a focal adolescent that together, across many microsteps, aggregate up to produce the total amount of observed change. In application, this means that the estimated coefficients capture changes in the logit of creating/keeping or terminating one tie in the network selection portion of the model, or the logit of a one-unit change in a religion measure. The sequence of these microsteps is designed to be a Markov process where changes in friendship and religion are linked together and modeled jointly. For more detailed and technical discussions see Snijders et al. (2007) and Steglich et al. (2010).

Friendship selection processes are studied in the network portion of the model since selection reflects changes in friendships over time that result from prior religious belief, activity, or affiliation, and from structural as well as other factors. This model component specifies the effects of network structure and adolescent's attributes on change probabilities in friendship status (Mercken et al. 2010a). Religious selection is operationalized with three parameters including the influence of religion on the number of friends chosen (referred to as the *ego* effect), the effect of religion on being chosen as a friend (referred to as the *alter* effect), and a dyadic religion similarity effect. Religion similarity ranges between 0 (=dissimilar) and 1 (=perfectly similar) and expresses how similar the adolescent and their friend/potential friend are to each other and is the key homophilous selection parameter under scrutiny. Friendship choices can depend on the configuration of the network more broadly, so a number of network structure effects capturing triadic network closure processes are also included (see Ripley, Snijders, and Lopez 2011), along with parameters for the control variables: the adolescent (ego), potential friend (alter), and potential friend and focal adolescent operationalizations (i.e., similarity; though this is qualified below). These effects are described in Table 1.

The friend socialization process is captured in the religion dimension of the model since individual changes are motivated by friends' religion and other factors. This component models individual religion with functions of network statistics and the main effects of control variables in a way analogous to logit coefficients from ordinal logit models. The key socialization parameter, a network statistic, is the average religion similarity between the focal adolescent and their friends (0=max. dissimilar, 1=max. similar). As we indicate below, it is possible to include other network effects. However, those we explored using score tests were unrelated to changes in religion, and so have been omitted (see discussion below and Table 1). Control effects include main effects of the background variables indicating increases/decreases in religion, as well as the shape parameters, both linear and

quadratic, describing the distribution of religion over time. These parameters are described in Table 1.

2.3. Analysis

The analysis uses the SIENA software (Ripley et al. 2011) to model friendship and religion changes in the joint combined social network of the schools. Because youth in different schools are unable to select each other as friends, out-of-school elements in the sociomatrices are fixed (see Ripley et al. 2011 for a discussion of this and other approaches6). All respondents were included in the analysis and were allowed to enter the study later or leave early (e.g., graduates, movers, dropouts) using the composition change method of Huisman and Snijders (2003). Missing attribute and religion data were treated as non-informative following the method described by Huisman and Steglich (2008).

Parameters were tested using t-ratios of the coefficient estimate divided by standard error based on findings indicating that the distribution follows an approximately standard normal distribution (Snijders 2001). Additional parameters that were tested but not included in the analysis are also presented at the bottom of Table 1. Score tests were used to determine if these parameters improved the model performance against a baseline model including the network structure effects and religion influence and selection parameters (Schweinberger 2011). Because these parameters did not improve the model performance, they are not included in the model series we present. Score tests were also used to simplify the model structure with respect to the control variables. Ego, alter, and similarity parameters were omitted from the model specification when they were not statistically associated with half of the outcomes to maintain a consistent model structure across behavioral and network processes.

Finally, the contribution of the different processes to the autocorrelation between the friendship network and the religion outcomes is decomposed by the method described in Steglich et al. (2010; see also Mercken et al. 2010a,b). The spatial network-religion autocorrelation is calculated using Moran's I (Moran 1950) across a special model series disaggregating the contributions of different mechanisms. In this way, religion similarity is decomposed into the proportionate contributions of selection, socialization, alternative selection and influence from the other control variables and structural network effects (i.e. controls), and general trend effects in friendships and individual religion.

3. RESULTS

3.1. Descriptive Statistics

Descriptive statistics for the religion outcomes at both waves are presented in Table 2. Average service attendance is 3 on a scale of 1–4 with approximately equal proportions increasing or decreasing their scores over time (total 30%). In addition, the average similarity between friends is over .7, indicating that friends are on average about 70% similar to each other. In general, average similarity at wave 1 is high for all of the outcomes. Youth service attendance is the lowest at .69 and no religious affiliation is highest at .84. These results indicate that friends' religious homophily is already substantial by the later

[6]First, there is a full meta-analysis approach requiring estimation on each network separately. This approach is generally considered preferable because it allows parameters to differ across networks. There were estimation problems due to the small network sizes, model complexity, and limited observations over time, however, so we opted to use this simpler method. In other work with these schools, results have tended to be nearly identical whether network models are grouped as we have done here or the meta-analysis approach is used. The second approach treats schools as different time periods and so allows rate parameters to differ across schools while fixing the coefficients. Inferences were virtually identical to those reported here so we have used the joint network approach since doing so simplified other aspects of the project management.

grades for youth who attend small schools. In addition, 30–45% of youth increase/decrease their participation or religiosity over the study period, while much smaller proportions change their affiliation (15%) and/or born again status (7%). Although there is substantial pre-existing similarity, the considerable change in participation, importance of religion, and prayer indicates that adolescent religion is not fixed over this time period. The amount of change in the identification variables is much smaller and the total proportion of "nones" is also low, which suggests that there is less information for identifying social dynamics of religious identification than for participation, importance of religion, and prayer.

Descriptive network and covariate statistics are shown in Table 3. On average, youth nominated 2.4 off-list friends, while sending and receiving approximately 3.3 friend nominations, about 1.2 of which were reciprocated. Moreover, adolescents were in nearly 3.4 transitive triplets, two 3-cycles, and were connected to seven other students through one intermediary. The sample is almost entirely white (97%) and only 22% reside with a single or divorced parent. Half of the sample is affiliated with an evangelical denomination, 23% are affiliated with a mainline denomination, and 11% are Catholic. Finally, the average responding parent (generally the mother) in the sample had between a high school degree and some college attendance.

3.2. Model Results

We present coefficients and standard errors for the service attendance model series in Table 4 in the *logit* metric. The first service attendance model, denoted S1, includes the religion and structural parameters, in addition to the off list and restricted nomination sample controls. Because these models are complicated and not familiar to most researchers, we begin our interpretation of the model with a discussion of the structural, rate, and shape parameters.

The outdegree parameter is negative because the network density is low given that the average adolescent nominated fewer than four friends who were also present in the network. At the same time, the reciprocity parameter expresses the tendency for friendships to be reciprocated (about one in three are, Table 3). The transitive triplets, 3-cycles, and number distance=2 are three ways to express network closure. In this case, friendships tend to form among the friends of friends' to the effect that the odds of a friendship that closes a transitive triplet are larger by a factor of (exp(.44)=) 1.55, while friendships producing the other two structural patterns are less likely as indicated by the negative coefficients. This suggests that there are local hierarchies so that some youth are more popular in their local network neighborhood than others, as implied by the combination of the positive transitive triplet and negative 3-cycles effect (Ripley et al. 2011). Moreover, distance=2 connections tend to close over time or to be removed. These factors thus drive friendship change and consistency through structural closure processes.

Before interpreting the focal parameters, we turn briefly to the rate parameters to clarify them, although we do not view them as substantively meaningful. Rate parameters capture the change opportunities in either the selection (keep, form, or drop a friendship) and socialization (increase, decrease, no change) models at each microstep of the routine. Thus, there were an average of 12.7 friendship change opportunities, which were .44 higher for the restricted nomination sample reflecting the longer time-lag between networks for this group, and three opportunities to change service attendance. We do not view these as substantive parameters since they reflect the number of microsteps needed for the data-constrained simulation portion of the estimation algorithm to reproduce the total amount of change in the network and religions variable. The shape parameters capture the distribution of service attendance so the other parameters in this part of the model reflect movement along this distribution. The fact that the linear and quadratic parameters are both positive indicates a

shape function with small frequencies at low values and high frequencies at high values. In other words, the frequencies increase at an increasing rate, which is consistent with the descriptive statistics showing high levels of service attendance among these adolescents.

Finally, the service attendance parameters in the network selection model indicate a tendency for more religious youth to be more popular (alter; $p<.1$), that there is no difference in the tendency to nominate others (ego), and, most importantly, that there is homophilous social selection. The odds of having a friendship relative to not having one are approximately (exp(.32)=1.38) 38% larger among perfectly similar compared to maximally dissimilar youth (that is, ties are more likely to form or be kept among those with similar levels of attendance), all else equal. Moreover, average friend similarity is large and positive in the service attendance model, which shows that individual service attendance changes to become similar to that of friends, a form of social influence we have referred to as socialization. The odds of increasing service attendance is (exp(1.87)=) 6.5 times larger for an adolescent maximally similar to their friends than for one maximally dissimilar, but it is important to note that full coverage over that range is not realistic, particularly when considered in light of the fact that selection is operative and that pre-existing similarities are large. More realistically, each average similarity difference of .1 relative to friends' increases the odds of increasing attendance by (exp(1.87*.1)=1.21) 21%. These results are thus consistent with the idea that both selection and socialization processes take place simultaneously so that changes in religious attendance is responsive to that of friends', even while it forms a basis for friendship.

The remaining models, S2–S5, build the full model by including the background factors in groups. Although the magnitude of the homophilous selection parameter shrinks by Model S5 when parent religiosity is included, service attendance selection remains an important process in the model. The same holds true for socialization, which also remains large and significant across models. The other parameters in the model indicate that friendships tend to form among those of the same gender, same grade, similar parent educational backgrounds, the same family structure, and the same religious tradition. Moreover, whites reported more friends than minorities in these schools (ego) and were more likely to be friends (same). Notably, youth whose parents were religiously similar were more likely to be friends as well. Results for the service attendance portion of the model further indicate higher levels of attendance among those whose responding parent has more education and is more religious. Notably, the no affiliation effect is significant. This captures a regression to the mean – since the "nones" had very low involvement at wave 1, a few increased their involvement, leading to the counter-intuitive estimate. This finding shows a few times over the course of the analysis.

Overall, comparing effect magnitudes for the service attendance selection and influence processes is complicated by the meaning of the similarity measures used (i.e., dyadic similarity vs. average similarity across friends) and the fact that the coefficients are derived from two different probability models. In order to facilitate comparisons, we have decomposed the network-behavior autocorrelations into key model components in Table 5.7 Results are presented for each of the outcomes, so we will refer back to this table to supplement the additional outcome-specific results (see Table 6). The network-service attendance autocorrelation is observed at .41 and the estimate, at .39, is very close to this value in Model S5. Over 64% of this reflects the "trend" of existing homophilous

[7]These are *estimates* of the decomposition and there is uncertainty in these estimates that is not quantified. This uncertainty reflects other factors such as the uncertainty in the parameter estimates themselves. Moreover, as one anonymous Reviewer pointed out, it remains possible that the proportionate contributions do not fully capture the endogenous process resulting in some misattribution of the contributions because of the narrow time frame that the study covers.

friendships and the consistent pattern of attendance observed among these youth. Approximately 9.2% results from selection, similar to the amount due to the other background factors, including the influence of parent religiosity, and nearly 20% from socialization. These findings suggest that the influence of friends plays a larger role than friendship preferences.

A subset of results for the remaining outcomes is presented in Table 6. Two models for each outcome are reported. The first corresponds to model S1 in Table 4, and the second corresponds to S5. Only focal parameters in the network portion of the model are included because the other coefficients are generally similar to those reported in Table 4.

Youth service attendance shows stronger signs of both selection and socialization than service attendance does, as indicated by the larger coefficients. Indeed, both key parameters are significant in Y1 and Y2 (youth service models 1 and 2), once gain suggesting the presence of IRC processes. The autocorrelation results in Table 5 corroborate and elaborate this. Approximately 35% and 27% of the .38 (estimated at .56) autocorrelation results from socialization and selection, respectively. Moreover, the proportion due to trend effects is much smaller because youth service attendance is more socially responsive than regular service attendance. In Y2 the alter effect is also marginally significant, suggesting that more involved youth are also more popular, all else considered. With respect to youth service attendance, females decreased their involvement relative to males over time. Surprisingly, and in contrast to regular service attendance, parent religiosity was unrelated to youth service participation. Note too that the negative linear and positive quadratic slope for the shape parameters indicates a bi-modal distribution with groups of youth at opposite ends of the distribution.

Turning to the religion measures, importance of religion is also a dual process combining elements of social selection and socialization in both the simpler (I1) and more complicated model (I2). Interestingly, youth for whom religion has greater importance both receive fewer friendship nominations (alter) and report fewer (ego), which, when considered in conjunction with the selectivity parameter, suggests that they are more exclusive in who they consider friends. As shown in Table 5, although trend effects indicating some state dependencies are important (50%), nearly 25% and 17% of the .42 autocorrelation reflect socialization and selection, respectively. Importance increased for those with single parents and no affiliation over time (indicating a move towards the average), and among those with more religious parents ($p<.1$). Results are somewhat similar for frequency of prayer, at least in terms of support for the idea that prayer is both a source of friendship selection while also being responsive to friends' prayer with both contributing about 15% to the estimated autocorrelation. As with importance, youth who pray more are also more socially exclusive, both in nomination receipt and in who they view as friends. Surprisingly, parent religiosity is unrelated to changes in prayer. At the same time, females, youth with more educated parents, those with single parents, and the unaffiliated all increased their frequency of prayer.

The final set of outcomes captures religious identification. Despite the low numbers of religious "nones," and the small amount of total change in this variable between waves, model N2 reports selection and socialization effects ($p<.1$) with each accounting for over 20% of the .25 autocorrelation (Table 5). Whereas those who pray frequently and place a great importance in religion were less popular (Model I2 and P2), Model N2 shows that those with no religious affiliation are more popular (alter). Of the background factors, only parent religion predicted no religion: youth with more religious parents were less likely to be a "none." Identifying as a "born again" Christian is also related to friendship selection (10% of the .4 autocorrelation), while also being responsive to whether or not friends identify as

born again (33%). Although born again youth are more popular (alter), they report fewer friends (ego). When combined with the selectivity parameter, this suggests, once more, that more religious youth are more cliquish. Mainline and Catholic youth were substantially less likely than evangelical Protestant youth to report being born again, as were those with no and other religions, though these latter two effects were not statistically significant.

4. DISCUSSION AND CONCLUSIONS

Sociologists have long been interested in the social nature of religion, but directly incorporating different social and contextual processes into the study of religion has proven challenging. We sought to remedy this situation by examining the social nature of religion with the adoption of a dynamic longitudinal social network analysis framework. In so doing, this study offers a number of innovations and unique insights into the sociological study of religion while also extending the adolescent research literature and providing a broad empirical assessment of a key expectation derived from interaction ritual chain (IRC) theory (Collins 2004). When viewed cross-sectionally, the youth in this study prefer friendships to those who are religiously similar. Even so, religious participation, devotion, and identification changed for many, and these changes were systematically related to changes in the friendship network.

We have shown that religion, whether measured as participation, devotion, or identification, is pervasively *social* among adolescents who attend small schools. That is, religion is a source of social attraction influencing who spends time with whom, and is thus a source of the religious homophily that has been noted by others (e.g., Cavendish et al. 1998; Louch 2000; McPherson et al. 2001; Stark and Bainbridge 1981). At the same time, however, individuals' religious participation, devotion, and identification also respond to that of friends', which shows that how people engage with religion is subject to the same social forces as other behaviors and preferences, such as alcohol use and music tastes (Steglich et al. 2006). In fact, the results show that socialization plays a somewhat larger role than friend selection in explaining network autocorrelation for four of the six measures of religiosity.

Overall, then, these results suggest that both processes captured in our first two research questions play an important role among adolescents who attend small schools, but that of the two socialization appears to be a slightly stronger force than selection since we estimate that it accounted for 25% vs 17% of the autocorrelation, on average. Given the salience of these two processes, and the fact that the influence of neither is overwhelmingly larger than the other, these results are consistent with the idea that religion and networks mutually influence one another. Overall, we interpret this to be more consistent with IRC theory expectations than the traditional frameworks motivating the first two mechanism-specific research questions.

Although scholars have recently begun incorporating social contexts into the study of religion using multilevel approaches to operationalize group-level effects (e.g., Schwadel 2005; Wald, Owen, and Hill 1990), these studies have a number of limitations that we have begun to address here. First, they tend to focus on congregations as the relevant religious contexts. We have shown that religion can be important and pervasive in other social contexts too. Religious contexts are not self-contained, and they clearly spill-out to influence social processes in other settings. Collins' (2004; 2010) framework suggested that this would be the case because the powerful symbols religious participation generates create a foundation for interpersonal interaction, which renew old and generate new symbols, and thus lay the foundation for interpersonal influence and changes in religion.

Second, group-level effects as typically operationalized and modeled take the whole group to be a monolithic entity in which the interpersonal processes unfolding within them are invisible to the analyst. These processes are undoubtedly important as adolescents compete for standing and acceptance in peer crowds that extend beyond the local friendship groups studied here (Milner 2004), and even into the broader adolescent marketplace for relationships (Crosnoe 2011). While group effects matter for religion (Schwadel 2005), there is also a great deal of social activity within larger groups (i.e., the school or congregation). Religion, among the adolescents comprising this study, was an important part of those dynamics. Religion is both consequential for structuring the group itself and is differentially distributed based upon the sub-group friendship structure through interpersonal friend socialization processes. This demonstrates that the difficulties of incorporating social contexts into studies of religion are exacerbated by the fact that individuals influence their environments (Bronfenbrenner 1995), so that the flow of influence between “group” and “individual” levels is nonrecursive.

Third, some years ago White (1968) critically noted that a “psychological consonance model” had become dominant in studies of religion, and we believe it still remains commonplace, albeit often implicitly. According to White (1968:24), this model assumes “that theology is the primary source of religious behavior.” Even so, motivations for studying aspects of the interpersonal dynamics of religion have long been evident in the sociology of religion (e.g., Sherkat 2003; Lofland and Stark 1965), though the theoretical focus tends to be on only one of our equations, namely the role of selection *or* socialization. In contrast, our results suggest that a broader conception of interpersonal social process and religion may be warranted. That is, there is “jointness” in the friendship selection and socialization processes leading to social congruence. The role of theology in predicting religious behavior may in fact be less central than has been assumed. Thus, a broader integration of Collins’ (2004; see also Turner 2007) IRC theory into the study of religion, and more broadly in adolescence since the social forces at play in religion may be similar to those for risky behaviors (e.g., Ennett and Bauman 1994; Kandel 1978), should prove fruitful.

The approach we adopted is inferentially stronger than others since we measured the network directly, and thus the behaviors of friends were measured directly. Moreover, the SIENA models we employed allowed for both selection and socialization processes to be assessed longitudinally and concurrently. Most research on religion and social networks is handicapped by reliance on the information that respondents provide about their friends’ religion, but not their friends’ actual religion, or the religion of their potential friends in their personal networks (e.g., Cornwall 1989; Porter and Brown 2008; Vaisey and Lizardo 2010; c.f., Adamczyk and Felson 2006). This information on potential friends was an integral portion of the analysis allowing us to clearly identify how religion is incorporated into selection processes. Consequently, change in our models was not biased by either inaccurate cognitions that arise when individuals impute the behaviors of others (Iannotti, Bush, and Weinfurt 1996; Rice, Donohew, and Clayton 2003), or the “reflection problem” that is inherent in multilevel analyses because reference groups cannot be identified (Manski 1993).

Just as there are strengths to this analysis, there are also a number of important limitations that circumscribe the generality of our findings. First, this study covers only a one-year period over adolescence. While studies among adults suggest similar social dynamics of mood across the life-course (e.g., Fowler and Christakis 2008; Cacioppo, Fowler, and Christakis 2009), more studies over longer periods and age ranges are needed. The result of this limitation, however, is that some youth may already be going through transitions in both friendships and religion, and it is not entirely clear if two waves are sufficient to completely

disentangle this process. Second, the schools in our sample do not comprise a random sample, and so generalizability, as with most social network analysis studies, is suspect. Third, while we have limited our analysis to friends that adolescents feel closest to, social influences, and possibly even selectivity, may extend out further into the network. This could reflect the desire to participate in crowds like “jocks” or “geeks” (e.g., Milner 2004), indirect connections to other youth whom adolescents share friends with (Payne and Cornwell 2007), or romantic partners and their friends (Kreager and Haynie 2011). That is, we have only captured a narrow – albeit important slice of adolescent social life.

Fifth, our analysis is limited to adolescents in small schools, leading to concerns that social processes (and the interactions they reflect) may differ substantially across settings. Indeed, there are several reasons to believe that the social dynamics of religion may differ by school size. For instance, youth in small schools have more knowledge of each other and they are more connected to each other and to their schools (Crosnoe, Johnson, and Elder 2004; Leithwood and Jantzi 2009; McNeely, Nonnemaker, and Blum 2002), just as attendees of smaller congregations are more likely to know one another (Wagner 1984). In addition, there is evidence that network processes vary across schools (Mouw and Entwisle 2006). School size has a large impact on administrative factors and the structure of the curriculum (Leithwood and Jantzi 2009), which, via course selection, can constrain friendship opportunities in larger schools (Kubitschek and Hallinan 1998) and thus the knowledge that students have about each other, such as their religious affiliation and involvement. There will also be more opportunities for shared religious experience among adolescents in smaller settings to the extent youth may be more likely to attend the same religious congregations.

As a result of these factors, we have focused on this set of smaller schools as the first step in a larger research agenda. Studying broader sets of schools across a deeper set of more heterogeneous settings is an important goal to be addressed in future research. Even with these restrictions, however, the findings we present here are highly relevant and show that, at least in some places in contemporary America – about 770k students attended small, K-12th schools over the 2009/10 school year (NCES 2011) – religion among adolescents is very socially dynamic. Future research will shed further light on the extensiveness of these processes across settings, but as we have shown, models of individual religious change should strive to incorporate a richer interpersonal backdrop. This is, of course, not a new proposition. Sociologists since Durkheim, Weber, Simmel, and Troeltsch have argued that religion is social in nature. In this article, we offer a new mode of empirical evidence to support this proposition that religion is a social phenomenon, both in the sense that religious similarity promotes social connections, and in the way friends influence each other’s religious participation, devotion, and identification.

> We model adolescent friend religious selection and socialization processes in small schools. > Changes in adolescent friendships are motivated by religious similarity. > Personal changes in religion also reflect friends’ religion. > Religion is not merely a personal phenomenon since it reflects deep interpersonal social roots.

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Table 1

Description of model parameters

	Description
Friendship Network Change: Selection	
Focal Religion Selection Parameter	
Similarity potential friend & adolescent	Tendency to choose a friend based upon religious similarity
Additional Religion Selection Parameters	
Alter (potential friend)	Main effect of potential friend's religion on the selection of friends
Ego (adolescent)	Main effect of adolescent's own religion on the selection of friends
General Selection Parameters	
Varname, alter (potential friend)	Main effect of potential friend's *varname* on the selection of friends
Varname, ego (adolescent)	Main effect of adolescent's own *varname* on the selection of friends
Varname similarity of potential friend & adolescent	Tendency to choose friends based upon similarity of *varname*
Varname, same potential friend & adolescent	Tendency to choose friends with exactly the same *varname*
Structural Network Effects	
Outdegree	General tendency to choose a friend
Reciprocity	Tendency to have reciprocal friendships
Transitive triplets	Tendency to become a friend with a friend's friend
3-Cycles *	Tendency for a friend's friend to chose the adolescent as a friend
Number distance=2 **	Tendency to be indirectly connected through one intermediary
Religious Change: Socialization	
Focal Influence Parameter	
Average friend similarity	Main effect of friends' average religion similarity on individual religion
Additional Parameters	
Linear shape parameter	General tendency for religion
Quadratic shape parameter	Feedback effect of adolescent's own religion on itself
Varname	Main effect of *varname* on own religious participation and religiosity
Score Tests: Extra Effects Tested	
Network Effects	
Religion similarity X reciprocity	Test of whether religion similarity selection differs for reciprocal and non-reciprocal friends
R*eligious Change*	
Incoming friendships	Test of main effect of the number of received nominations on individual religion
Outgoing friendships	Test of main effect of the number of nominated friends on individual religion
Religion average friend similarity X reciprocity	Test of whether the effect of average religious similarity with friends' differs among reciprocal and non-reciprocal friends

* A positive effect implies generalized reciprocity while a negative effect with a positive transitive triplet effect suggests local hierarchies (Ripley and Snijders 2011).

** This effect is an inverse effect of network closure so effects tend to be negative, suggesting that indirect connections tend to close through, e.g., the formation of transitive triplets, or else the indirect connections are lost.

Table 2

Descriptive statistics for the dependent variables (N=798)

Variable	N	Mean	SD	Min	Max	Prop.[a] +	Prop. Same	Prop.[a] −	Tot.[b] +/−	Avg. Sim. Mean	Avg. Sim. SD
Service attendance W1	797	3.03	(1.19)	1	4					0.73	(0.26)
Service attendance W2	627	3.03	(1.21)	1	4	0.14	0.70	0.16	0.30		
Youth service attend. W1	798	2.44	(1.27)	1	4					0.69	(0.26)
Youth service attend. W2	626	2.39	(1.28)	1	4	0.19	0.55	0.26	0.45		
Importance W1	798	3.25	(1.02)	1	4					0.78	(0.23)
Importance W2	626	3.23	(1.05)	1	4	0.13	0.71	0.16	0.29		
Pray W1	798	3.84	(1.53)	1	5					0.76	(0.25)
Pray W2	627	3.77	(1.56)	1	5	0.15	0.67	0.18	0.33		
Born again W1	789	0.53	(0.50)	0	1					0.72	(0.34)
Born again W2	622	0.53	(0.50)	0	1	0.08	0.85	0.07	0.15		
No religious affiliation W1	787	0.10	(0.31)	0	1					0.84	(0.29)
No religious affiliation W2	626	0.12	(0.32)	0	1	0.04	0.93	0.03	0.07		

[a] These columns present the proportion increasing (+) or decreasing (−) their religion between waves.

[b] This column presents the combined proportion increasing/decreasing their religion between waves.

Table 3

Descriptive statistics for the network and control variables (N=798)

Variable	Mean	SD	Min	Max
Network Characteristics				
Off list nomination count	2.39	(2.20)	0	10
Restricted nom. sample	0.40		0	1
Received nominations	3.28	(2.93)	0	19
Out nominations	3.36	(2.27)	0	10
Reciprocal ties count	1.20	(1.31)	0	7
Transitive triplets count	3.37	(4.83)	0	29
3-cycle count	1.99	(3.68)	0	29
Number distance 2 count	6.94	(5.49)	0	27
Covariates				
Female	0.50		0	1
Grade	9.47	(1.69)	7	12
White	0.97		0	1
Parent education	2.63	(1.04)	1	5
Single parent	0.22		0	1
Evangelical Protestant	0.50		0	1
Mainline Protestant	0.23		0	1
Catholic	0.11		0	1
No religious affiliation	0.10		0	1
Other religious affiliation	0.05		0	1
Parent religiosity	0.23	(1.03)	−2.42	1.22

Table 4

Logit coefficients and standard errors for joint models of friendship selection and service attendance socialization (N=798)

	S1		S2		S3		s4		s5	
Variable/Parameter	**b**	**se**	**b**	**se**	**b**	**se**	**b**	**se**	**b**	**se**
Network model: service attendance										
Alter	0.05 +	[0.03]	0.02	[0.03]	0.02	[0.03]	0.01	[0.03]	0.00	[0.04]
Ego	−0.02	[0.03]	−0.04	[0.03]	−0.04	[0.03]	−0.05 +	[0.03]	−0.08 *	[0.04]
Similarity (selection)	0.32 *	[0.11]	0.41 *	[0.11]	0.38 *	[0.13]	0.31 *	[0.11]	0.24 *	[0.11]
Network model: structural parameters										
Outdegree density	−2.11 *	[0.10]	−2.99 *	[0.13]	−3.15 *	[0.12]	−3.20 *	[0.13]	−3.21 *	[0.13]
Reciprocity	2.01 *	[0.08]	1.71 *	[0.08]	1.70 *	[0.08]	1.70 *	[0.08]	1.70 *	[0.08]
Transitive Triplets	0.44 *	[0.04]	0.40 *	[0.04]	0.41 *	[0.03]	0.41 *	[0.04]	0.41 *	[0.03]
3-cycles	−0.48 *	[0.06]	−0.48 *	[0.06]	−0.49 *	[0.07]	−0.49 *	[0.07]	−0.49 *	[0.06]
Number at distance=2	−0.33 *	[0.05]	−0.23 *	[0.04]	−0.22 *	[0.04]	−0.22 *	[0.04]	−0.22 *	[0.04]
Network model: control variables										
Offlist nominations alter	−0.08 *	[0.01]	−0.08 *	[0.01]	−0.07 *	[0.01]	−0.07 *	[0.01]	−0.07 *	[0.01]
Offlist nominations similarity	0.10	[0.14]	0.06	[0.13]	0.06	[0.14]	0.06	[0.13]	0.06	[0.14]
Restricted nominations, same sample	0.18 *	[0.05]	0.21 *	[0.04]	0.21 *	[0.05]	0.21 *	[0.06]	0.22 *	[0.04]
Network model: background variables										
Sex, same			0.27 *	[0.04]	0.28 *	[0.04]	0.29 *	[0.04]	0.29 *	[0.04]
Grade alter			0.01	[0.02]	0.01	[0.02]	0.01	[0.02]	0.00	[0.01]
Grade, same			0.73 *	[0.05]	0.73 *	[0.05]	0.74 *	[0.05]	0.74 *	[0.04]
Nonwhite ego			0.30 *	[0.08]	0.34 *	[0.07]	0.35 *	[0.08]	0.34 *	[0.08]
Nonwhite same			0.37 *	[0.09]	0.38 *	[0.08]	0.38 *	[0.08]	0.37 *	[0.09]
Parent education similarity					0.31 *	[0.11]	0.30 *	[0.12]	0.31 *	[0.11]
Single parent alter					0.09	[0.06]	0.09	[0.06]	0.10	[0.06]
Single parent, same					0.18 *	[0.05]	0.18 *	[0.05]	0.16 *	[0.05]
Religion, same							0.12 *	[0.05]	0.11 *	[0.05]
Parent religiosity alter									0.00	[0.04]
Parent religiosity ego									0.05	[0.04]

	S1			S2			S3			s4			s5		
Variable/Parameter	**b**		**se**	**b**		**se**	**b**		**se**	**b**		**se**	**b**		**se**
Parent religiosity similarity													0.31	*	[0.13]
Service attendance model: similarity and control variables															
Average similarity (socialization)	1.87	*	[0.51]	1.89	*	[0.56]	1.74	*	[0.52]	2.06	*	[0.61]	1.71	*	[0.59]
Female				0.08		[0.11]	0.07		[0.11]	0.09		[0.12]	0.09		[0.12]
Grade				−0.01		[0.04]	−0.01		[0.04]	−0.01		[0.04]	−0.03		[0.04]
Nonwhite				−0.13		[0.17]	−0.19		[0.16]	−0.18		[0.18]	−0.19		[0.19]
Parent education							0.14	*	[0.06]	0.15	*	[0.07]	0.13	*	[0.07]
Single parent							−0.13		[0.13]	−0.12		[0.15]	−0.08		[0.14]
No religion										0.41		[0.29]	0.45	+	[0.24]
Mainline										−0.09		[0.17]	−0.08		[0.16]
Catholic										0.25		[0.21]	0.24		[0.21]
Other religion										−0.05		[0.29]	−0.02		[0.26]
Parent religiosity													0.20	*	[0.07]
Service attendance model: distribution parameters															
Linear shape parameter	0.67	*	[0.07]	0.67	*	[0.08]	0.69	*	[0.09]	0.69	*	[0.08]	0.71	*	[0.08]
Quadratic shape parameter	0.60	*	[0.05]	0.60	*	[0.05]	0.58	*	[0.05]	0.62	*	[0.05]	0.56	*	[0.06]
Rate function parameters															
Network rate parameter	12.70	*	[0.65]	14.32	*	[0.98]	14.25	*	[0.78]	14.35	*	[1.04]	14.25	*	[0.99]
Offlist nominations	−0.03		[0.03]	−0.04		[0.03]	−0.04		[0.03]	−0.04		[0.06]	−0.04		[0.04]
Restricted nominations	0.44	*	[0.11]	0.58	*	[0.15]	0.57	*	[0.14]	0.58	*	[0.13]	0.58	*	[0.18]
Service attendance rate	2.98	*	[0.37]	2.99	*	[0.42]	3.00	*	[0.36]	2.76	*	[0.45]	2.98	*	[0.45]

+ p<.1,

* p<.05.

Standard errors in brackets.

Note: *Alter* effects reflect being nominated, *ego* effects reflects nominating, and *similarity* and *same* effects capture how similar two adolescents are to each other.

Table 5

Decomposition of the religion-network autocorrelation, estimated autocorrelation from the final model, and the observed autocorrelation (N=798)

	Service Attendance	Youth Services	Importance	Prayer	No Affiliation	Born Again	Avg.
%Contribution to autocorrelation							
Trend	64.2	28.1	50.4	62.1	41.5	45.4	48.6
Control	8.7	9.9	8.6	7.6	12.9	11.2	9.8
Selection	9.2	26.6	16.5	15.0	22.3	10.4	16.7
Socialization	18.0	35.3	24.5	15.2	21.3	33.0	24.6
Indeterminate	0.0	0.0	0.0	0.0	2.0	0.0	0.3
Estimated Autocorrelation							
Full Model	0.39	0.56	0.50	0.45	0.31	0.45	0.44
Observed	0.41	0.38	0.42	0.45	0.25	0.40	0.39

Table 6

Logit coefficients for joint models of friendship selection and religious socialization (N=798)

	Youth Service Att.				Importance				Pray				No Affiliation				Born Again			
Variable/Parameter	**Y1**		**Y2**		**I1**		**I2**		**P1**		**P2**		**N1**		**N2**		**B1**		**B2**	
Network Model: Behavioral Effects																				
Alter	0.31		0.30	+	−0.02		−0.12	*	0.01		−0.05	*	0.23	+	0.51	*	0.36	*	0.22	+
Ego	−0.25		−0.31		−0.01		−0.09	*	−0.03		−0.08	*	−0.02		0.14		−0.29	*	−0.39	*
Similarity (selection)	1.30	*	1.54	*	0.67	*	0.65	*	0.49	*	0.40	*	0.33	*	0.22	+	0.34	*	0.29	*
Behavioral Model																				
Average similarity (socialization)	3.99	*	4.01	*	3.84	*	4.14	*	2.33	*	2.31	*	2.65	*	1.81	+	4.57	*	3.66	*
Female			−0.23	*			0.15				0.25	*			−0.70				0.16	
Grade			−0.06				−0.01				−0.02				0.04				−0.11	
Nonwhite			−0.04				−0.19				−0.32	*			1.18				−0.76	
Parent education			0.09				0.14				0.15	*			−0.13				0.18	
Single parent			0.09				0.60	*			0.35	*			−0.50				0.69	
No religion			0.08				1.78	*			0.57	*							−1.85	
Mainline			0.04				−0.27				−0.04								−1.53	+
Catholic			0.20				0.25				0.03								−2.33	*
Other religion			0.22				−0.49				−0.49	*							−1.45	
Parent religiosity			0.03				0.19	+			0.08				−0.78	*			0.26	
Behavioral rate and shape parameters																				
Basic rate parameter	6.22	*	6.06	*	2.00	*	1.57	*	5.24	*	4.08	*	0.56	*	0.62	*	0.91	*	1.12	*
Linear shape parameter	−0.36	*	−0.37	*	0.59	*	0.76	*	0.55	*	0.61	*	−0.84	+	−1.61	*	−0.49		−0.33	
Quadratic shape parameter	0.48	*	0.45	*	0.48	*	0.66	*	0.38	*	0.40	*								

+ p<.1,

* p<.05.

Some parameters are not included because they are similar to those reported in Table 4