Measuring Five Dimensions of Religiosity across Adolescence

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Abstract

This paper theorizes and tests a latent variable model of adolescent religiosity in which five dimensions of religiosity are interrelated: religious beliefs, religious exclusivity, external religiosity, private practice, and religious salience. Research often theorizes overlapping and independent influences of single items or dimensions of religiosity on outcomes such as adolescent sexual behavior, but rarely operationalizes the dimensions in a measurement model accounting for their associations with each other and across time. We use longitudinal structural equation modeling (SEM) with latent variables to analyze data from two waves of the National Study of Youth and Religion. We test our hypothesized measurement model as compared to four alternate measurement models and find that our proposed model maintains superior fit. We then discuss the associations between the five dimensions of religiosity we measure and how these change over time. Our findings suggest how future research might better operationalize multiple dimensions of religiosity in studies of the influence of religion in adolescence.

The social scientific study of religion in the lives of adolescents has come far in the past few decades. Religious characteristics and their developmental trajectories in adolescence, as well as their social sources and consequences, are all being examined with a variety of improved data sources and methods (Pearce and Denton 2009). When it comes to the use of survey data to study adolescent religiosity, most studies offer a few standard measures such as religious affiliation, frequency of religious service attendance, frequency of prayer, importance of religiosity, and belief in God. When analyzing the association between "religion" and adolescent outcomes, these measures are sometimes kept independent in models (e.g., Nooney (2005)), and they are sometimes averaged into an index or two (e.g., Benda (1995)). Occasionally, scholars take a latent variable approach to operationalize religiosity, but a handful of available indicators are used to form one, maybe two, latent variables (e.g., Bahr et al. (1998)). The intent of those studies is to measure associations between available measures of religion and other outcomes, not to examine how a wide and holistic set of measures of religiosity might provide evidence of multiple unique dimensions

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of religiosity that would then inform future measurement and analysis of adolescent religiosity and its correlates.

Without clear empirical evidence for the kinds of unique but interrelated dimensions of religiosity that exist among adolescents, researchers have little to go on when designing surveys and selecting measures to use in analyses. Also, without evidence for how unique dimensions of religiosity relate to each other across adolescence, analysts may not know how to best use or interpret results from multiple measures of religiosity in their models. In this paper, we theorize five dimensions of religiosity likely to exist among American adolescents, drawing on a long-running literature in Psychology and Sociology proposing frameworks for religion's many facets (e.g., (Allport 1958; Glock 1962; James 1985; Lenski 1961). We describe each of the five dimension's unique attributes, and propose ways they are likely to relate to each other and how these associations might change over time. We then use structural equation modeling for latent variables (SEM) to test whether the multidimensional measurement model we theorize is the best fitting model at two time points during adolescence. For data we use the nationally representative cohort of adolescents who participated in Waves 1 and 2 of the National Study of Youth and Religion conducted in 2002 (ages 13–17) and 2005 (ages 16–21).

Evaluating adolescent religiosity in a structural equation modeling framework enables us to propose a specific set of latent variables and to test statistically whether this set of latent variables captures adolescent religiosity better than several alternative formulations. In addition, compared to alternative methods such as creating a scale sum or average from observed indicators, SEM relies on fewer assumptions about the relationships between the latent variables and indicators used to measure them and thus allows for maximum flexibility in estimating the relationships between the latent constructs and the observed indicators. This method and our results allow us to recommend how adolescent religiosity might be best conceptualized, measured, and operationalized in future studies.

Conceptualizing Dimensions of Religiosity

For over fifty years, sociologists and psychologists have been debating the contours of religiosity, defining a variety of multidimensional models (Levin, Taylor, and Chatters 1995). Few major surveys have religion sections that perfectly mirror these models. Instead, to replicate prior measurement and conserve survey space, they typically contain a short set of questions prior surveys have used such as something about religious affiliation, one or two measures of practice, and possibly a measure of importance or salience. Further, even when there are two or three measures of religion available, they are often combined into one index by analysts, under the assumption that there is one underlying construct of religiosity and to try and minimize measurement error. We do not mean to be overly critical of these practices which describe much of our own prior work, but we suggest there is a need to evaluate how well we are doing with the few measures we tend to have in surveys. We shed light on whether we might use existing measures better in the short run and search out resources to develop and field better sets of measures in the long run. Below, we theorize what dimensions of religion seem most likely to exist for adolescents and how they might be

interrelated as well as somewhat unique. We then test a theoretically informed set of models and provide advice for the design of future studies of adolescent religiosity.

The understanding of religion or religiosity as having multiple dimensions is rooted in theories of religion from the early 1900s that have been repeatedly revised, especially during the second half of the 1900s. For example, Joachim Wach (1944) proposed a three dimensional model including the "theoretical" dimension, referencing strength of doctrinal adherence, the "cultic" dimension which is one's level of devotional practice and worship, and the "sociological" dimension, or social involvement in fellowship activities. Working to refine earlier conceptualizations through empirical investigation, others have presented three four, five, six, nine, ten, and eleven dimension models for different religious groups and used a variety of types of adult samples (Cornwall et al. 1986; Faulkner and De Jong 1966; Glock and Stark 1965; Himmelfarb 1975; King 1967; King and Hunt 1969, 1972b; Lenski 1961; Levin et al. 1995; Verbit 1970).

When looking across the many existing frameworks for understanding the multiple dimensions of religiosity, and the ways in which they overlap, we see several clear dimensions of religion that we might expect to exist for adolescents. We focus on five of the most commonly proposed dimensions in this paper, primarily because they are ubiquitous across frameworks, and secondarily because we have multiple valid empirical measures corresponding to these five dimensions. Other dimensions that have been proposed, but for which few measures exist in any study, include an "intellectual dimension" that represents what a person knows about the basic tenets or sacred scriptures of a religion (Glock 1962) or a "consequential dimension" that captures behaviors or attitudes expected to result from a particular religious affiliation (Glock 1962; Verbit 1970). We return to discussing dimensions of religiosity that may be missed in our discussion and analysis in our conclusion section.

Five Dimensions of Religiosity

The first of the five dimensions of religion on which we focus in this work is *Religious Beliefs* or what others have called the "ideological" (Glock 1972) or "doctrine" component (Verbit 1970). It is the acceptance of a standard set of religious beliefs, such as God, the afterlife, the supernatural, etc. It indicates a meaning system that involves a higher power and a sacred or supernatural realm. Research has linked this dimension of religiosity to physical and mental health (George, Ellison, and Larson 2002; Harding et al. 2005). This dimension of religiosity for adolescents is an important one for assessing how their own religious identity is developing. Other dimensions of religiosity are often higher or lower based on parental levels, but as adolescents mature and develop the cognitive skills to process their beliefs, this dimension of reality becomes more authentic and representative of their own systems of meaning (Pearce and Denton 2011).

The second dimension we include is *Religious Exclusivity*. It shares much in common with "doctrinal orthodoxy" (Lenski 1961) or "dogmatism" (King 1967). Like others, we extend the focus to concepts such as orthodoxy or dogmatism beyond whether one holds particular religious beliefs to a more global belief in absolutes, the view that there are definite rights and wrongs–that rules for living are unambiguous, permanent, and ordained by God. Some

have called this dimension religious fundamentalism (Pargament 2002). Among adults, this type of religiosity has been linked to higher levels of sexual orientation prejudice (Leak and Finken 2011). Much research has emphasized a religious eclecticism among young people, picking and choosing various beliefs and practices and rejecting others, but scholars have shown that a significant minority of youth are not so eclectic in belief (Trinitapoli 2007). Using the same data we do, Trinitapoli (ibid.) finds 29 percent of 13–17 year olds believe only one religion is true, and fifty-one percent believe a person should accept the teachings of her religion as a whole. Twenty percent of youth believe both. Given that beliefs about right and wrong are at its core, we argue this dimension of religion is especially important to use in studying adolescent values and behaviors. Youth who score high on religious exclusivity may be less tolerant of those they deem "wrong" in belief or action. They may also be less likely to engage in behaviors they consider "wrong," such as early sexual initiation or illicit drug or alcohol use.

External Practice is our third dimension of religiosity and is a dimension that exists in almost every dimensional map proposed. It universally includes religious service attendance, group membership, and social activities. There is something unique about the practice of religion with other people and the resources that come from religious institutions and co-congregants (Smith 2003). For example, studies of adolescent sexual behavior often find that over and above the associations of other religious variables with the timing of sexual initiation and other risk behaviors, religious service attendance maintains its own statistically significant association to those behaviors (Burdette and Hill 2009). Adolescents often practice external forms of religiosity with and at the request of their parents, so this is one dimension of religiosity that may not always reflect adolescents' own religious commitments. However, as adolescents gain autonomy, it is likely that their level of religious service attendance is more reflective of their own interest in religion.

The fourth dimension of religion we propose as relevant in the lives of adolescents is *Personal Practice*. This dimension is much like what Lenski (1961) referred to as "devotionalism," or an emphasis on means for a personal connection to the sacred (see also Roof (1976)). It involves religious behaviors usually done on one's own, thus requiring a level of personal dedication.[1] For these reasons, we expect this to be a dimension of religion that heavily reflects how adolescents themselves practice religion.

The fifth and final dimension of religion we highlight is *Religious Salience*. This dimension is in line with King and Hunt's (1972a, 1972b, 1975) version of "salience." This is a dimension of religion representing the place in one's hierarchy of identities that religion holds (Wimberley 1989). Many studies use a measure of how important religion is in one's life to capture this dimension, but it is important to realize that another key aspect of how this dimension is theorized is that it represents religion's relative position among other influential identities (e.g., friend, loving partner, popular student, or progressive) (Stryker and Serpe 1994). For example, other dimensions of religiosity such as beliefs or frequency of practice might suggest value in certain lines of action, but it is the salience of one's

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[1]We also acknowledge that religious institutions and communities encourage these activities, so there may be a sense of obligation or duty separate from or related to one's own desire to enact these religious behaviors.

religious identity (i.e., how important religion is) compared to other action-motivating identities that is likely to be most associated with whether one acts in line with religious values or schema (Johnson-Hanks et al. 2011; Stryker 1968). Therefore, this dimension is unique in describing the potential level of influence that religion might have on other realms of life.

In sum, we argue that five unique dimensions of religiosity that are important in the lives of adolescents are religious beliefs, religious exclusivity, external practice, personal practice, and religious salience. These dimensions are certainly all associated with one another. It is relatively uncommon for those with no religious belief or salience to practice religion personally, although certainly not impossible as Allport (1950) outlines in presenting his category of extrinsic religious orientation. Also, those who are more religiously exclusive tend to be more active externally and personally. However, we also argue these dimensions are different enough to warrant a measurement model in which they remain somewhat unique to one another. This differs from other theoretical models and past empirical approaches, so we describe alternative models and why we do not find them as convincing below.

Associations between Dimensions and Over Time

We expect high correlations between all five dimensions of religion we propose, because all dimensions relate in some way to a general religious identity, and could be thought of as reciprocal in the maintenance of such an identity. We predict that certain pairs of dimensions will correlate more strongly than others. For example, because personal practice requires self-motivation and often involves connecting with the sacred, we expect that dimension to correlate most highly with another more "internal" dimension, religious salience. Further, we expect that the association between personal practice and external practice will be relatively high given they are both forms of religious behavior. Understanding how the various dimensions relate to one another provides information about how much correspondence between dimensions exist. Where associations are relatively low, we learn which dimensions might be particularly unique from each other. With new understandings of how dimensions of religiosity overlap, we can make better decisions about which kinds of dimensions to measure in surveys or to use in analyses and how.

Religiosity is not only multidimensional, it is fluid and dynamic, especially during adolescence as youth come to learn about themselves and how they view the world around them (Pearce and Denton 2011). Thus, it is important to assess whether a model of religion holds up at multiple points in adolescence for the same group of young people. As they solidify their identities and gain autonomy in their religious lives and beyond, we expect to see the relationships between all dimensions of religiosity correlate more strongly. We especially expect to see improvement in the association between external practice and the other dimensions since public religious expression becomes increasingly self-motivated and less a reflection of parental expectations.

Alternative Conceptual Models

Although we argue there are at least five unique dimensions of religiosity among adolescents, other conceptual and empirical work might suggest that some (or all) of our five dimensions could be merged into single dimensions. Here are some of those possibilities.

What Allport (1950, 1958) defined as an "intrinsic" religious orientation and what Lenski (1961) called "devotionalism" reference both personal religious *behavior* and an internal *feeling*, connection to, or valuing of the sacred. If this is the case, two of the dimensions we propose—personal practice and religious salience—may really be one dimension. On this basis, many empirical studies of the relationship between religion and other aspects of life take measures of private practices (often prayer) and religious salience (often the importance of religion in one's life) and combine them as measures of the same underlying construct (e.g., Adamczyk and Felson (2006)). While they are no doubt associated, we argue that they are different enough (with religious salience having the unique aspect of how central religiosity is in one's identity) that a model with both dimensions kept separate is likely a better fit to an overall model of religiosity.

In Glock's (1962) original set of dimensions and Faulkner and DeJong's (1966) follow up, public and private forms of religious practice were united under the terms "ritualistic dimension" or "devotionalism," respectively. This suggests there may exist an underlying construct of religious practice or ritual regardless of whether it is public or private. Although few other theoretical models have taken this approach, choosing to separate religious behaviors into public and private modes (e.g., Cornwall et al. (1986)), many empirical studies combine measures of public and private practice into one index of religiosity or religious practice (e.g., Benda (1995)). These types of practice as associated, but studies in which the two types of measures are kept separate show that, indeed, there are often independent statistical associations, reflecting theories arguing that public or social participation has unique mechanisms through which adolescents' lives are shaped as compared to how private religious practice operates (e.g., Vasilenko et al. 2013). We, therefore, postulate that the best fitting model of religiosity will keep these two dimensions separate.

Another alternative conception of the dimensions of religion we have proposed involves the cognitive or belief side of religiosity. Some dimensional maps mix what we term religious exclusivity and religious beliefs into one dimension, because both have to do with cognitive understandings of religion and one's faith (e.g., Glock and Stark (1965)). However, we find there to be a key difference between belief in fairly universal religious tenets (e.g., God, the afterlife, the supernatural) and theological beliefs that vary greatly across religious traditions. An adolescent could believe strongly in God, angels, and demons, but find truth in a variety of religions or feel that one should be able to choose which tenets of faith are acceptable or unacceptable. Also, we argue that religious exclusivity will be especially predictive of certain moral behaviors deemed "black and white" by one's religion or congregation. Therefore, we hypothesize that keeping these two dimensions separate will result in better model fit in our measurement model.

Finally, although few scholars today would theorize religiosity as a one-dimensional construct, a very popular empirical strategy is to take whichever measures of religiosity are available and scale them all together to measure one underlying construct of religiosity (e.g., Benda and Corwyn (2000)). Many studies combine external practice with religious salience, external practice with belief, or any or all of the dimensions together. In a desire to be parsimonious and to produce a more reliable measure, this unidimensional approach prevents the ability to detect any independence between dimensions or assess which dimensions of religion are more or less related to each other. Also in analyses that link dimensions of religiosity with adolescent behaviors or well-being, this may hide the fact that some dimensions of religion are more related than others to key outcomes. Therefore, we propose that a five-dimensional model will outperform a unidimensional model in our analyses.

Data and Methods

We estimate a longitudinal measurement model of adolescent religiosity, using two waves of survey data from the National Study of Youth and Religion (NSYR), the most comprehensive nationally representative survey of adolescent religiosity to date. The first wave of the survey was fielded between 2002 and 2003, via telephone, with one adolescent and one parent in 3,290 English and/or Spanish speaking households nationwide. The sample, obtained through a random-digit dial (RDD) method, was designed to represent all U.S. households with at least one adolescent between the ages of 13 and 17. An additional oversample of 80 Jewish households was included, so our full sample is 3,370 adolescents.

The second wave of the NSYR involved a follow-up telephone survey with Wave 1 youth respondents and was conducted in 2005 when the participants were ages 16 to 21. Every effort was made to contact and re-survey all original NSYR respondents, including those out of the country and in the military. Of the original respondents, 2,604 participated in the second wave of the survey resulting in an overall retention rate of 78.6 percent, making the combined response rate for Waves 1 and 2 of the NSYR telephone survey 44.8 percent, a standard rate for telephone surveys. Diagnostic analyses comparing NSYR data with U.S. Census data on comparable households and with comparable adolescent surveys—such as Monitoring the Future, the National Household Education Survey, and the National Longitudinal Study of Adolescent to Adult Health—confirm that the NSYR provides a nationally representative sample without identifiable sampling and nonresponse biases of U.S. adolescents ages 13–17 and their parents living in households (see National Study of Youth and Religion 2008).[2] Because our sample is nationally representative, our sample mirrors the religious distribution of the United States, meaning over 90 percent of the sample at both waves identifies as Protestant, Catholic, or not having any religious affiliation. No other religious group makes up over three percent of the population.

For our analyses, we use the 3,370 respondents from Wave 1, and the 2,596 respondents from Wave 2 available after removing cases for which *all* indicators of religiosity are missing[3]. In this sample of 13 to 17 year olds in 2002, the mean age of respondents is 15

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[2]See Appendix A for more information on attrition and its potential implications for our analyses.

years, 51 percent are female, 21 percent have at least one parent with a four-year college degree, average household income was between $50,000 and $80,000, and 57 percent lived with two parents (Smith and Denton 2005).

Measures and Model Specification

The five latent constructs in our proposed measurement model of adolescent religiosity are religious beliefs, religious exclusivity, external practice, personal practice, and religious salience, and they are proposed to underlie the 21 indicators of religiosity we use from the NSYR survey data. We selected these 21 indicators based on their theoretical importance. Other indicators which initially seemed theoretically relevant were excluded due to either questionable validity regarding the five dimensions of religiosity we propose (e.g., questions about experiencing miracles or answers to prayer) or changes in their measurement across waves (e.g., frequency of meditation, listening to religious music, or wearing religious jewelry). Several of the indicators we use are consistent in content and wording to measures used in other large-scale sociological surveys such as the General Social Survey, the Monitoring the Future Study, and the National Longitudinal Study of Adolescent to Adult Health (Add Health). Indicators that are original were created based on some mix of previous literature, similar questions from other studies, and the results of focus groups, pilot survey interviews, and cognitive interviewing conducted by NSYR researchers (Smith and Denton 2005). The descriptive statistics for each indicator are shown in Table 1.[4]

Alternative Models

In order to test our hypothesis that religiosity (based on our available indicators) is best conceptualized and measured as the five separate latent constructs described above, we compare our five-dimensional model to four alternate models that resemble how religiosity has been conceptualized by others. First, we test whether combining the dimensions of personal practice and religious salience into one leads to a better fitting model. Second, we test whether external practice and personal practice should be collapsed into one dimension of religious practice as is common in other studies. Third, we test whether combining religious exclusivity and religious beliefs (two more cognitive forms of religious expression) leads to better model fit or not. Finally, we test whether a one-dimensional model in which all indicators are related to one latent variable for religiosity is a better model.

Data Analysis

Our analysis uses longitudinal structural equation modeling for latent variables (SEM). More specifically, we design and test the fit of an SEM measurement model, which estimates the underlying structure of a set of latent variables as well as the relationship of these latent variables to each other and to the indicators used to measure them across two points in time. The form of SEM that we use for this paper is mathematically equivalent to confirmatory factor analysis (Alwin 1988; Bollen 1989; Schoenberg 1989). Because we postulate that the

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[3]We use the direct maximum likelihood method for dealing with missing data which allows us to include respondents who have missing values on one or more indicators of religiosity.
[4]The question wordings and response options for each indicator are available in Appendix B. Correlation matrices showing how the indicators are associated with each other at Wave 1 and Wave 2 are available in Appendices C and D, respectively.

five latent variables are distinct but inter-related, we allow them to correlate. Our model is longitudinal, so we allow the measurement errors of the same indicator at both points in time to correlate. In addition, the relationships between each underlying latent variable and the indicators used to measure that latent variable, as well as the relationships between the latent variables, are allowed to vary over time. Because our measures are ordinal and binary we use the weighted least squares estimator which has been shown to produce consistent parameter estimates, correct standard errors, and accurate fit statistics for categorical indicator variables (Bollen 1989). We use MPLUS Version 7, a latent variable modeling program (Muthen and Muthen 1998–2012).

Model Confirmation

When taking an approach like confirmatory factor analysis, theory informs initial model formulation. Usually mid-range theory proposed, tested, and refined in prior studies forms the basis by which indicators are selected. In this case, we rely on prior theoretical and measurement work in the sociology of religion described in a prior section. Our analyses are consistent with other studies in which model confirmation is a multi-step process involving both an examination of the internal fit of a measurement model and its merits relative to alternative models (e.g., Levin et al. 1995). This approach is based on the logic that no one model is necessarily a perfect representation of the underlying structure between the latent variables and their relationship to the indicators of measurement. However, a model can be determined to meet widely accepted criteria (e.g., fit statistics) regarding the adequacy of its representation of the 'true' model and can be found superior to alternate models in this regard. We confirm our five dimensional model using data from two time points, Waves 1 and 2 of the NSYR, and discuss how changes over time in model parameters might reflect changes in religiosity across adolescence.

In order to test and refine our model formulation we use three steps. First, we use five standard measures of global model fit to evaluate the appropriateness of our hypothesized model with five latent variables. The Tucker Lewis Index (TLI) and Comparative Fit Index (CFI) compare the fit of our hypothesized model to a "baseline model" in which all coefficients are zero; that is, there is no relationship between the latent variables and the observed indicators. A score of 1.0 on these statistics indicates 'ideal' model fit; below .90 indicates poor fit (Bentler 1990). A score of .95 or greater on these measures is generally considered indication of good model fit. The chi-square statistic, the Root Mean Square Error of Approximation (RMSEA) and the Bayesian Information Criterion (BIC) compare the hypothesized model to a "saturated model" in which as many possible parameters (e.g. coefficients, correlated errors) are included so that chi-square equals zero. A value of less than .07 on the RMSEA (Steiger 2007) and a value of less than 0 on the BIC (Raftery 1995) each are considered to indicate a good fitting model. Ideally, the chi-square statistic would not be statistically significantly different from 0 (e.g., $p > .05$), but as the chi-square detects very small differences between the hypothesized and saturated model, it is typically statistically significant in large samples.

Second, we evaluate the component fit of each of the 21 indicators. To do this, we use the proportion of the variance of each observed indicator (R^2) which is explained by the

respective latent variable. The higher the R^2, the stronger the relationship between the latent variable and respective indicator. While a higher R^2 generally indicates a better fitting model, an R^2 below approximately .16-.20 is considered problematic. Finally, once we have confirmed the basic fit of our hypothesized measurement model, we use a series of chi-square difference tests to compare the fit of our hypothesized measurement model to the four alternate models described earlier.

Results

Figure 1 is a visual representation of our proposed measurement model using Waves 1 and 2 (respectively) of the NSYR survey data. The ten gray ovals represent our five latent variables or dimensions of religiosity at Waves 1 and 2. The rectangles linked to each oval by arrows are the observed indicators of that latent variable. The results in Table 2 show the R^2 values for each indicator at each wave, reflecting the proportion of the variance in each indicator explained by the latent variable to which it belongs. Because we scale the model by assigning each latent variable a variance of 1, the coefficient (factor loading) for each observed indicator is standardized and thus is equal to the square root of the respective R^2 for that indicator. All R^2 values are above the minimal acceptable cutoff of .16; most are much higher than that.

Our model does not include any covariances between the errors of different observed indicators.[5] We explored alternate model specifications including a variety of theoretically-based error covariances, but these had a negligible impact on global model fit. Therefore, for the sake of parsimony, we chose the simplest model excluding the correlated errors. The darker straight arrows connecting all five of the latent variables at each wave represent the correlations between them, and the curved arrows represent the correlations between the same latent variable at the two waves, all of which are statistically significant. Our model allows all latent variables at Wave 1 to correlate with all latent variables at Wave 2; however, for the simplicity of the figure, we only draw the correlations over time between the same latent variable. We will discuss the relationships between latent variables further below, but first, we present the overall model fit and compare it to alternative models.

Table 3 shows the fit statistics for our proposed measurement model which all suggest this is a good fitting model. The Tucker Lewis Index (TLI) and Comparative Fit Index (CFI) are both above .95, the RMSEA is .035, and the BIC is well below 0. The chi-square is highly statistically significant but this is not unusual in models with very large samples.

Table 4 presents fit statistics for our five alternative models and test whether the fit of our proposed model is statistically significantly better than each alternative. As the table shows, the proposed model fit is clearly superior to all eight alternative models, suggesting the five latent variables are best modeled as distinct.

Next we turn our attention to the relationship between latent variables in our proposed model. All correlations between pairs of latent dimensions at Waves 1 and 2 are presented in

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[5]As mentioned earlier, we do allow the errors of each indicator's Wave 1 and Wave 2 measurement to covary.

Table 5. The associations are all strong (the lowest correlation is .62), suggesting that the five dimensions, while distinct, are also closely related to each other. The correlations between each latent variable at Wave 1 and its counterpart at Wave 2 are also quite strong (the lowest is .77), suggesting that there is substantial consistency in these religious dimensions during adolescence.

In addition, nearly all the correlations between different latent dimensions increase between the two waves, suggesting that the strength of the associations grow with age or across time for all ages. In supplementary analyses not presented in the paper, splitting the sample into younger and older age groups to compare youth within and across time points, we find evidence that the change across time for all age groups is more substantial than change by age. We surmise that either sample attrition, specifically the potential loss of participants whose reports on different dimensions of religiosity were less similar, or survey reactivity wherein (a) participants' religiosity was affected by the questions they were asked at Wave 1 or (b) knowing the types of questions they would be asked in the Wave 2 follow-up changed the way respondents replied to religion questions.

In our model, we find that the two latent dimensions of religiosity that are most highly correlated with each other at both waves are personal practice and religious salience. This is not surprising given that both are internal forms of religious expression or identity. The correlation between religious salience and religious beliefs, the third more internal dimension, is also among the highest in both waves. However, in both waves, the correlation between personal practice and religious beliefs, while high, is more than .10 lower than the correlation between personal practice with religious salience. Thus, religious salience appears to be the central pillar (the most highly connected) within the three more personal or internal forms of religious expression.

In addition, in Wave 1, the correlations between religious salience and three of the five dimensions (personal practice, religious beliefs, and religious exclusivity) is higher than the correlation between any other dimension and that dimension. And only personal practice has a higher correlation with external practice than religious salience does. In Wave 2, these patterns largely hold except that the correlation between religious salience and religious exclusivity is the lowest correlation of any of the four dimensions with religious exclusivity (although the differences are small). Overall, these patterns again suggest that religious salience is the most 'central' dimension of religiosity, exhibiting the highest associations with the other dimensions.

The correlations between external practice and each of the three internal dimensions tend to be slightly lower than correlations between the three internal dimensions. However, one exception to this is that between Wave 1 and Wave 2, the correlation between external practice and personal practice increases by .10, becoming the second highest correlation in Wave 2. It is also the second largest absolute increase between waves. This suggests that over time public and private expressions of religion become more closely integrated than others. Finally, correlations between religious exclusivity and the other dimensions are consistently lower than correlations between the other four latent variables. This suggests,

unsurprisingly, that while related to the other dimensions, religious exclusivity may apply more strongly to a particular subset of youth—those with a more absolutist theology.

Conclusions

Our analyses provide strong evidence to support the idea that five dimensions of religiosity —religious beliefs, religious exclusivity, external practice, personal practice, and religious salience—exist among adolescents in the United States, are related to one another, and yet have unique enough properties to justify conceptualizing and measuring them as separate dimensions. In particular, we find strong evidence that religious salience is a particularly central dimension of religiosity, as it is consistently most highly related to the other dimensions. If researchers are looking for the best measure of a global sense of religiosity, they would do well to include a measure of religious importance in data collection and analysis.

On the other hand, while there is a large degree of overlap between the five dimensions of religiosity, each is characterized by unique aspects of religious experience. When using NSYR data or other data with a wide variety of religion measures, we encourage researchers to employ this measurement model, or something similar. This has the potential to uncover which dimensions of religiosity seem most (and least) related to different kinds of behaviors or values. Given that multiple ~~of these~~ dimensions may influence a particular outcome, distinguishing between them helps us to theorize more precisely how the distinct elements of each dimension impact youth behavior and attitudes. For example, if external practice, personal practice, and religious salience all maintain significantly significant associations in the same model of an outcome, we would argue that there are likely different explanations, or pathways, from these variables to the outcome that are important to theorize (e.g., the social control or closure that a congregation might provide even if a youth does not engage in personal practices nor find religion that important in his or her life). Our findings suggest potential in better specifying the aspects of religiosity that matter more or less for other domains of adolescence.

We find consistency over time in the five dimensions of religiosity, and we also find the dimensions to relate to each other more strongly over time. As we mention earlier, supplementary analyses not presented here suggest that this is more of a time than an aging effect, but further analyses are needed to tease this out. And, if it is mainly a time effect, it would be helpful to adjudicate if this is a result of attrition over time, reactivity to repeated measurement, or period change in how associated dimensions of religiosity are to each other.

One limitation of the study is that although we have a full 21 indicators to work with, there are likely other measures that better relate to the latent variables we have proposed. For example, we use a measure of whether it is acceptable to pick and choose beliefs from one's religion, yet the response options do not fully capture the range of possibilities, especially since some denominations teach that there are subsets of beliefs, some of which are essential, and some of which leave room for disagreement.

Another limitation is that we have likely not exhausted the dimensions of religiosity by using these five. One previously theorized dimension of religion we have not included but which may exist in addition to the five discussed here is the "intellectual" dimension. This dimension represents what a person knows about the basic tenets or sacred scriptures of a religion (Glock 1962) and although validated scales exist, the NSYR data does not include such measures. Others have argued for a "consequential dimension" that captures behaviors or attitudes expected to result from a particular religious affiliation (Glock 1962; Verbit 1970) or an "experiential" dimension (Faulkner and De Jong 1966; Glock 1962) that reflects the extent to which someone has felt or perceived the divine.

More recent critiques of survey measures of religion cite a lack of measures of unconventional or non-institutional practices such as religiously or spiritually motivated service or activism, and the data we use contain no measures of that type with which to work. There have been efforts to develop these types of measures, such as work by Underwood (2006, 2011) to inductively develop and systematically test and validate the Daily Spiritual Experiences Scale.

Additional efforts to design better measures of theoretically-based and empirically validated dimensions of religiosity, and the extent to which they cohere into meaningful and measureable dimensions, or how they might be represented through as few measures as possible, would allow a reassessment of the current state of measurement of religion in our surveys. As Wuthnow (2015) details, there are costs to our overreliance on measures of religiosity that have been used in previous polls and surveys for the sake of measuring change. This reassessment of measurement strategies could lead to bold recommendations that could take our understanding of religion and its links to other forms of social life and personal well-being to new heights.

Acknowledgments

Appendix A. Descriptive Statistics of NSYR Wave 1 Indicator Variables by Attrition Status

			In Both Waves		Lost to Attrition	
Latent Variables and Indicators		*Range*	*Mean*	*SD*	*Mean*	*SD*
Religious Beliefs	Belief in afterlife	0–1	.494	.50	.436[**]	.50
	Belief in angels	0–1	.625	.48	.619	.49
	Belief in demons	0–1	.412	.49	.413	.49
	Belief in miracles	0–1	.600	.49	.615	.49

Latent Variables and Indicators		Range	In Both Waves		Lost to Attrition	
			Mean	SD	Mean	SD
	Belief in God	0–1	.837	.37	.845	.36
	Belief in judgement day	0–1	.700	.46	.738[*]	.44
Religious Exclusivity	Convert others	0–1	.554	.50	.464[***]	.50
	Practice one religion	0–1	.447	.50	.465	.50
	View of truth	0–1	.289	.45	.250[*]	.43
	Pick and choose	0–1	.518	.50	.490	.50
External Practice	Attendance	1–7	4.185	2.19	3.814[**]	2.18
	Prayed with parents	0–1	.411	.49	.410	.49
	Religious group	0–1	.550	.50	.505[*]	.50
	Share faith	0–1	.447	.50	.388[**]	.49
Personal Practice	Prayer frequency	1–7	4.322	2.01	4.349	2.04
	Read scripture	1–7	2.591	1.73	2.490[**]	1.73
	Fasted	0–1	.251	.43	.202[**]	.40
	Day of rest	0–1	.301	.46	.277	.45
Religious Salience	Importance of faith	1–5	3.437	1.14	3.428	1.11
	How decide	0–1	.200	.40	.170[†]	.38
	Commitment to God	0–1	.556	.50	.521[†]	.50

Source: National Study of Youth and Religion, Waves 1 and 2

Notes: Sample sizes vary slightly for the difference in means tests of each variable (depending on missingness at Wave 1 for each respective item), but 2,604 individuals were in both waves and 766 were lost to attrition. No more than 12 individuals who were in both waves, or 7 individuals who were lost to attrition, are missing for any of these comparisons.

[†] p <.1

[*] p <.05

[**] p <.01

[***] p < .001

Appendix B: Wording and Coding for all of the Indicator Variables

Religious Beliefs

Do you believe definitely, maybe, or not at all: That there is life after death?

> 0: Maybe or no

> 1: Yes

Do you believe definitely, maybe, or not at all: In the existence of angels?

> 0: Maybe or no

> 1: Yes

Do you believe definitely, maybe, or not at all: In the existence of demons or evil spirits?

> 0: Maybe or no

> 1: Yes

Do you believe definitely, maybe, or not at all: In the possibility of divine miracles from God?

> 0: Maybe or no

> 1: Yes

Do you believe in God, or not, or are you unsure?

> 0: Unsure or no

> 1: Yes

Do you believe that there will come a judgment day when God will reward some and punish others, or not?

> 0: No

> 1: Yes

Religious Exclusivity

Is it okay for religious people to try to convert other people to their faith, or should everyone leave everyone else alone?

> 0: Leave others alone

> 1: Okay to convert

Do you think it is okay for someone of your religion to also practice other religions, or should people only practice one religion?

> 0: Okay to practice other religions

> 1 Should only practice one faith

Which of the following statements comes closest to your own views about religion?

> 0: Truth is not in only one religion

> 1: Only one religion is true

Some people think that it is okay to pick and choose their religious beliefs without having to accept the teachings of their religious faith as a whole. Do you agree or disagree?

> 0: Okay to pick and choose

> 1: Not okay to pick and choose

External Practice

About how often do you usually attend religious services [at first named church]?

> 1: Never

> 2: Few times a year

> 3: Many times a year

4: Once a month

5: 2 to 3 times a month

6: Once a week

7: More than once a week

In the last year, have you prayed out loud or silently together with one or both of your parents, other than at mealtimes or at religious services?

0: Did not pray with parents

1: Prayed with parents

Religious group participation. Includes any participation, such as a music group, religious group at school, prayer group, or youth group. *Note: In Wave 2, there is no option for a prayer group.*

0: Not part of a religious group

1: Part of a religious group

In the last year, have you shared your own religious faith with someone else not of your faith?

0: Did not share faith with someone

1: Shared faith with someone

Personal Practice

How often, if ever, do you pray by yourself alone?

1: Never

2: Less than once a month

3: One to two times a month

4: About once a week

5: A few times a week

6: About once a day

7: Many times a day

In the last year, have you fasted or denied yourself something as a spiritual discipline?

0: No

1: Yes

In the last year, have you tried to practice a weekly day of rest to keep the Sabbath?

0: Does not practice day of rest

1: Practices day of rest

How often, if ever, do you read from [Scriptures] to yourself alone?

> 1: Never
>
> 2: Less than once a month
>
> 3: One to two times a month
>
> 4: About once a week
>
> 5: A few times a week
>
> 6: About once a day
>
> 7: Many times a day

Religious Salience

If you were unsure of what was right or wrong in a particular situation, how would you decide what to do?

> 0: Something other than God or Scripture
>
> 1: Do what God or Scripture says is right

Have you ever made a personal commitment to live your life for God? *Note: Wave 2 asks if this happened in the past two years.*

> 0: Did not make commitment to live for God
>
> 1: Made commitment to live for God

How important or unimportant is religious faith in shaping how you live your daily life?

> 1: Not important at all
>
> 2: Not very important
>
> 3: Somewhat important
>
> 4: Very important
>
> 5: Extremely important

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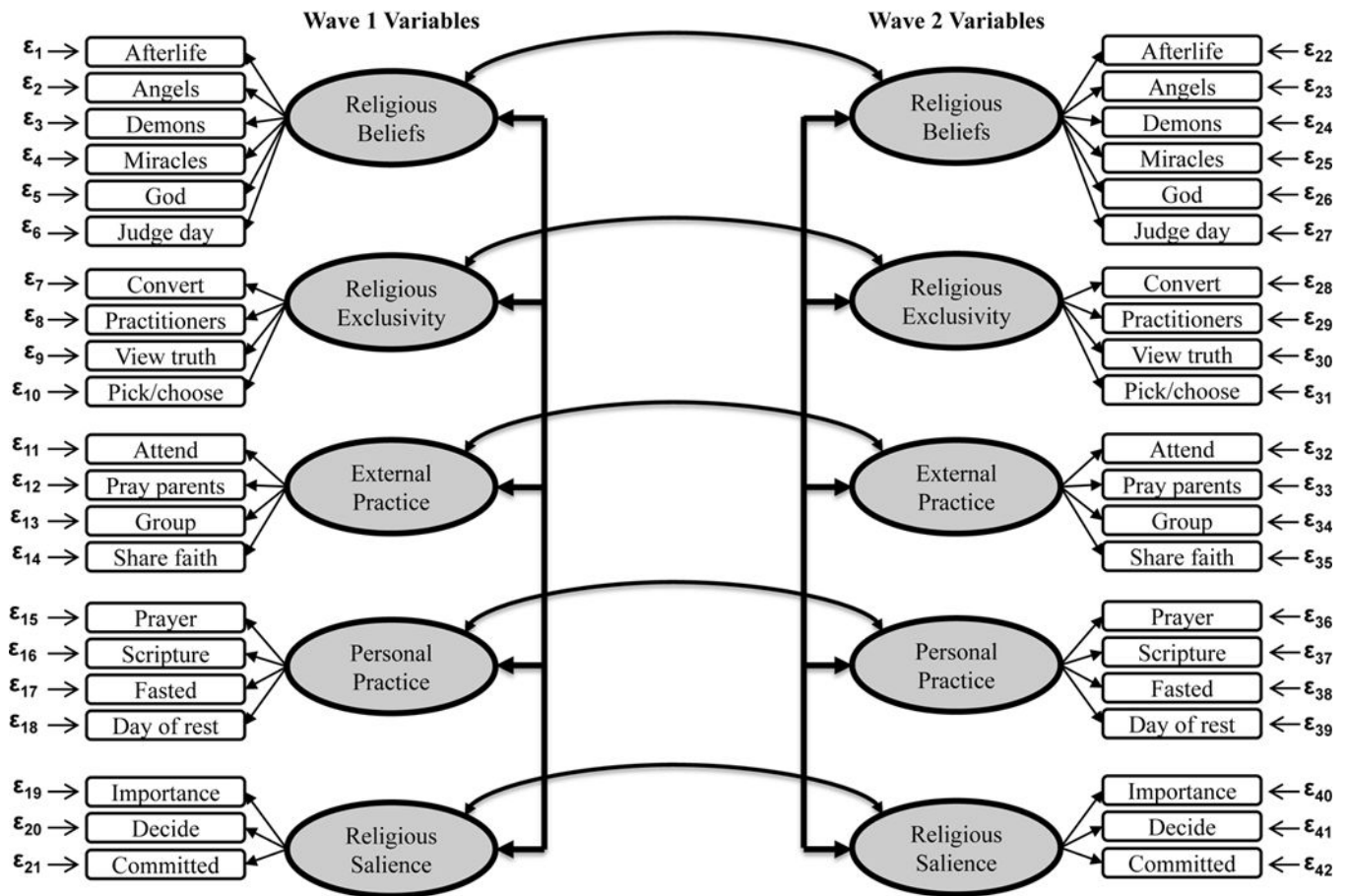
Figure 1. Proposed Longitudinal Model of Religiosity

Notes: The model allows the errors of all indicator variables at Wave 1 to correlate with their respective errors at Wave 2. The model also allows all latent variables at Wave 1 to correlate with all latent variables at Wave 2. However, for simplicity in the diagram, none of the correlated indicator errors are drawn and we only draw correlations over time between the same latent variable.

Table 1

Descriptive Statistics of Indicator Variables

Latent Variables and Indicators		Range	Wave 1 (N=3,370)		Wave 2 (N=2,596)	
			Percent	N	Percent	N
Religious Beliefs	Belief in afterlife	0–1	48%	3,365	47%	2,585
	Belief in angels	0–1	62%	3,368	56%	2,587
	Belief in demons	0–1	41%	3,365	44%	2,588
	Belief in miracles	0–1	60%	3,368	61%	2,588
	Belief in God	0–1	84%	3,369	77%	2,588
	Belief in judgement day	0–1	71%	3,363	67%	2,585
Religious Exclusivity	Convert others	0–1	53%	3,359	51%	2,581
	Practice one religion	0–1	45%	3,354	44%	2,580
	View of truth	0–1	28%	3,361	29%	2,579
	Pick and choose	0–1	51%	3,357	50%	2,579
External Practice	Attendance	1–7	–	3,365	–	2,595
	Never	–	18%	–	28%	–
	Few times a year	–	16%	–	18%	–
	Many times a year	–	8%	–	5%	–
	Once a month	–	7%	–	7%	–
	2–3 times a month	–	12%	–	13%	–
	Once a week	–	23%	–	17%	–
	More than once a week	–	16%	–	11%	–
	Prayed with parents	0–1	41%	3,363	36%	2,581
	Religious group	0–1	54%	3,357	46%	2,580
	Share faith	0–1	43%	3,355	43%	2,578
Personal Practice	Prayer frequency	1–7	–	3,360	–	2,579
	Never	–	14%	–	17%	–
	Less than once a month	–	8%	–	10%	–
	1–2 times a month	–	13%	–	16%	–
	About once a week	–	12%	–	12%	–

Latent Variables and Indicators	*Range*	*Wave 1* *(N=3,370)*		*Wave 2* *(N=2,596)*	
		Percent	*N*	*Percent*	*N*
A few times a week	–	15%	–	15%	–
About once a day	–	22%	–	18%	–
Many times a day	–	16%	–	12%	–
Read scripture	1–7	–	3,358	–	2,577
Never	–	42%	–	49%	–
Less than once a month	–	14%	–	16%	–
1–2 times a month	–	19%	–	15%	–
About once a week	–	9%	–	7%	–
A few times a week	–	8%	–	7%	–
About once a day	–	6%	–	5%	–
Many times a day	–	3%	–	1%	–
Fasted	0–1	24%	3,366	25%	2,577
Day of rest	0–1	30%	3,363	24%	2,578
Religious Salience Importance of faith	1–5	–	3,363	–	2,595
Not important at all	–	7%	–	11%	–
Not very important	–	11%	–	14%	–
Somewhat important	–	32%	–	30%	–
Very important	–	30%	–	26%	–
Extremely important	–	19%	–	19%	–
How decide	0–1	19%	3,367	20%	2,591
Commitment to God	0–1	55%	3,363	39%	2,593

Source: National Study of Youth and Religion, Waves 1 and 2

Note: In Wave 1, sample sizes for descriptive statistics vary between 3,354 and 3,369. In Wave 2, sample sizes vary between 2,577 and 2,595. Our modeling approach of direct maximum likelihood includes all respondents without full missing data, and thus the model sample sizes are 3,370 and 2,596, respectively.

Table 2

R^2 Values for Each Indicator Variable by Wave

		Wave 1	*Wave 2*	*Difference*
Religious Beliefs	Belief in afterlife	.430	.596	.166
	Belief in angels	.679	.753	.074
	Belief in demons	.488	.635	.147
	Belief in miracles	.694	.795	.101
	Belief in God	.885	.865	−.020
	Belief in judgement day	.680	.784	.104
Religious Exclusivity	Convert others	.344	.511	.167
	Practice one religion	.386	.513	.127
	View of truth	.728	.836	.108
	Pick and choose	.234	.259	.025
External Practice	Attendance	.641	.687	.046
	Prayed with parents	.462	.494	.032
	Religious group	.656	.706	.050
	Share faith	.391	.481	.090
Personal Practice	Fasted	.179	.218	.039
	Day of rest	.404	.447	.043
	Prayer frequency	.609	.666	.057
	Read scripture	.549	.607	.058
Religious Salience	Importance of faith	.682	.797	.115
	Commitment to God	.620	.617	−.003
	How decide	.536	.536	.000

Source: National Study of Youth and Religion, Waves 1 and 2

Notes: The model allows all latent variables at Wave 1 to correlate with all latent variables at Wave 2. The model also allows the errors of all indicator variables at Wave 1 to correlate with their respective errors at Wave 2.

Table 3

Global Fit Statistics

χ^2	**3844.435***; (df = 753)**
Tucker Lewis Index	0.970
Comparative Fit Index	0.974
Root Mean Square Error of Approximation	0.035
BIC (Bayesian Information Criterion)[1]	−2,271.930

[1]Calculated as: Chi square - (degrees of freedom)*ln(sample size). See Raftery (1995).

[†]p < .1

[*]p < .05

[**]p < .01

[***]p < .001

Table 4

Chi Square Tests for Comparing Longitudinal Model with Models Combining Latent Variables

Combined Latent Variables	
Personal Practice & Religious Salience	$\chi^2 = 147.880^{***}$ (df =17)
External Practice & Personal Practice	$\chi^2 = 365.517^{***}$ (df =17)
Religious Exclusivity & Religious Beliefs	$\chi^2 = 761.609^{***}$ (df =17)
All Five Latent Variables Combined	$\chi^2 = 3483.649^{***}$ (df =45)

[†] p <.1

[*] p <.05

[**] p <.01

[***] p < .001

Table 5

Latent Variable Correlations at Each Wave and Over Time

		Wave 1	*Wave 2*	*Difference*
Correlations Between all Latent Variable Combinations	Religious Beliefs & Religious Exclusivity	.650	.749	.099 ***
	Religious Beliefs & External Practice	.687	.765	.078 ***
	Religious Beliefs & Personal Practice	.809	.844	.035 *
	Religious Beliefs & Religious Salience	.855	.862	.007
	Religious Exclusivity & External Practice	.676	.759	.083 ***
	Religious Exclusivity & Personal Practice	.623	.763	.140 ***
	Religious Exclusivity & Religious Salience	.735	.778	.043 †
	External Practice & Personal Practice	.846	.947	.101 ***
	External Practice & Religious Salience	.836	.890	.054 ***
	Personal Practice and Religious Salience	.919	.970	.051 ***
Correlations Between the Same Latent Variables Over Time	Religious Beliefs (W1) & Religious Beliefs (W2)		.782	
	Religious Exclusivity (W1) & Religious Exclusivity (W2)		.861	
	External Practice (W1) & External Practice (W2)		.770	
	Personal Practice (W1) & Personal Practice (W2)		.770	
	Religious Salience (W1) & Religious Salience (W2)		.805	

Notes. The model allows all latent variables at Wave 1 to correlate with all latent variables at Wave 2. However, for simplicity, we only show here the correlations over time between the same latent variable. The model also allows the errors of all indicator variables at Wave 1 to correlate with their respective errors at Wave 2.

†
$p < .1$

*
$p < .05$

**
$p < .01$

***
$p < .001$

Appendix C

Pairwise Correlations Between All Religious Indicator Variables at Wave 1

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Religious Beliefs	(1) Belief in afterlife	1																				
	(2) Belief in angels	.457	1																			
	(3) Belief in demons	.394	.487	1																		
	(4) Belief in miracles	.380	.512	.350	1																	
	(5) Belief in God	.289	.433	.232	.447	1																
	(6) Belief in judgement day	.258	.382	.313	.399	.465	1															
Religious Exclusivity	(7) Covert others	.178	.193	.214	.198	.170	.218	1														
	(8) Practice one religion	.139	.146	.168	.192	.188	.236	.144	1													
	(9) View of truth	.221	.249	.292	.249	.202	.278	.281	.408	1												
	(10) Pick and choose	.132	.154	.147	.150	.142	.191	.117	.233	.231	1											
External Practice	(11) Attendance	.243	.311	.263	.332	.339	.345	.268	.277	.359	.214	1										
	(12) Prayed with parents	.185	.230	.181	.271	.245	.254	.173	.141	.202	.118	.312	1									
	(13) Religious group	.219	.270	.231	.311	.292	.282	.225	.184	.271	.143	.550	.284	1								
	(14) Share faith	.202	.225	.233	.236	.211	.197	.212	.099	.218	.089	.383	.253	.379	1							
Personal Practice	(15) Prayer frequency	.301	.428	.287	.451	.480	.414	.213	.201	.281	.171	.428	.388	.381	.305	1						
	(16) Read scripture	.240	.298	.254	.335	.289	.320	.220	.233	.287	.178	.393	.350	.377	.262	.518	1					
	(17) Fasted	.168	.116	.159	.152	.108	.126	.127	.077	.126	.057	.234	.143	.220	.252	.192	.193	1				
	(18) Day of rest	.187	.222	.182	.266	.222	.221	.166	.144	.213	.124	.303	.249	.310	.223	.303	.320	.224	1			
Religious Salience	(19) Importance of faith	.335	.428	.322	.461	.485	.447	.247	.282	.329	.218	.496	.355	.426	.326	.571	.474	.237	.355	1		
	(20) How decide	.247	.268	.273	.270	.188	.229	.202	.200	.320	.148	.276	.200	.254	.213	.321	.355	.161	.212	.381	1	
	(21) Commitment to God	.247	.354	.253	.391	.372	.381	.242	.234	.299	.171	.432	.298	.383	.276	.422	.383	.147	.298	.513	.301	1

Notes. All correlations are significant at the p < .001 level. Sample sizes for each pair of variables range from 3,340 to 3,369.

Appendix D

Pairwise Correlations Between All Religious Indicator Variables at Wave 2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Religious Beliefs																					
(1) Belief in afterlife	1																				
(2) Belief in angels	.524	1																			
(3) Belief in demons	.484	.616	1																		
(4) Belief in miracles	.473	.577	.455	1																	
(5) Belief in God	.389	.469	.318	.556	1																
(6) Belief in judgement day	.392	.471	.410	.522	.516	1															
Religious Exclusivity																					
(7) Covert others	.289	.331	.312	.329	.277	.332	1														
(8) Practice one religion	.236	.285	.264	.283	.270	.319	.284	1													
(9) View of truth	.333	.360	.369	.344	.294	.352	.349	.497	1												
(10) Pick and choose	.153	.184	.165	.206	.165	.225	.194	.276	.286	1											
External Practice																					
(11) Attendance	.352	.366	.331	.409	.390	.418	.366	.367	.433	.272	1										
(12) Prayed with parents	.263	.284	.279	.332	.309	.311	.249	.224	.302	.179	.381	1									
(13) Religious group	.270	.319	.279	.370	.345	.393	.327	.288	.357	.235	.598	.368	1								
(14) Share faith	.326	.322	.280	.340	.299	.295	.275	.170	.247	.146	.439	.303	.381	1							
Personal Practice																					
(15) Prayer frequency	.426	.478	.393	.535	.542	.483	.311	.313	.388	.233	.526	.413	.461	.412	1						
(16) Read scripture	.318	.344	.341	.360	.315	.381	.320	.328	.429	.262	.541	.404	.481	.379	.566	1					
(17) Fasted	.187	.139	.186	.175	.144	.159	.158	.109	.154	.106	.319	.211	.264	.289	.250	.254	1				
(18) Day of rest	.234	.240	.255	.248	.228	.265	.264	.241	.335	.173	.373	.301	.357	.232	.338	.360	.253	1			
Religious Salience																					
(19) Importance of faith	.422	.479	.408	.547	.569	.528	.372	.371	.462	.276	.596	.413	.515	.421	.673	.552	.255	.359	1		
(20) How decide	.293	.285	.305	.287	.227	.279	.242	.249	.354	.192	.347	.258	.289	.261	.374	.417	.186	.278	.413	1	
(21) Commitment to God	.316	.363	.282	.420	.368	.400	.291	.253	.331	.196	.454	.305	.416	.331	.506	.452	.195	.320	.550	.317	1

Notes. All correlations are significant at the $p < .001$ level. Sample sizes for each pair of variables range from 2,570 to 2,595.