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Religious belief alignment: The structure of cultural beliefs from adolescence to emerging adulthood

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ABSTRACT

This article presents an alignment model of cultural formation, arguing that belief systems become increasingly constrained from earlier periods of life-course to adulthood. I show that the pairwise correlations between cultural beliefs increase and the structure of personal culture becomes relatively more aligned before entering adulthood. Moreover, the rate of personal change slows down with each year of age, suggesting that the alignment process is most prevalent in specific socialization periods. Using four waves of data from the National Study of Youth and Religion, I test these propositions through an analysis of religious belief networks. I find that the results are robust to sampling variability, population heterogeneity, and item selection.

1. Introduction

What role, if any, should cultural socialization play in explaining the formation and organization of personal beliefs? Scholars in cultural sociology explored this question time after time, emphasizing the significance of "past conditions of production" (Kiley & Vaisey, 2020:478) on the trajectories of cultural orientations. These studies suggest that personal culture (Lizardo, 2017), culture manifest in individual attitudes, beliefs, and opinions, is remarkably stable throughout an individual's life course. Change in cultural orientations, the argument goes, is typically a function of people's age (Krosnick & Alwin, 1989; Visser & Krosnick, 1998). Namely, beliefs are formed in childhood, adolescence, and emerging adulthood, which are then followed by almost stable adulthood.

However, if adolescence is the time when most of our judgments on *what* to believe is done cooking, it is also the time we learn *how* to believe. A variety of empirical studies documented the mechanisms that undergird the former, while how the organization of beliefs changes through socialization is left unspecified. This article contributes to this discussion by investigating the relationship between cultural formation and the structure of belief systems. Building on the recent work in cultural sociology (Boutyline & Vaisey, 2017), I ask how the organization of personal beliefs changes from earlier periods of life to adulthood.

Using four waves of data from the National Study of Youth and Religion, I examine this question through an analysis of religious belief socialization. Rather than focusing on the direction of religious beliefs (whether individuals become more or less religious), I focus on the connections between religious beliefs (whether having one set of religious beliefs implicates having another set of religious beliefs). The analyses of religious belief networks from age 13 to age 28 show that religious beliefs become much more aligned with each year of age, but the rate of alignment significantly declines. Consequently, the religious belief structure relatively stabilizes with entering adulthood.

The rest of the article is organized as follows. First, I draw an alignment model of cultural formation through an engagement with the theories of belief constraint. Second, I use mixed-effects models and network-analytic techniques to investigate religious belief

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socialization in the National Study of Youth and Religion. I test whether the proposed trends are sensitive to sampling variability, population heterogeneity, and item selection. Third, I discuss the theoretical and methodological implications, and conclude.

2. Network representation of cultural beliefs

2.1. The organization of cultural beliefs

Starting with Converse's (1964) widely influential treatise on the structure of belief systems, scholars have studied the composition of cultural beliefs with the idea that beliefs are organized as relatively connected sets of pairwise relationships, meaning that "what one thinks about one thing affects what one thinks about others" (Martin, 2002:873). In this view, it is inadequate to understand cultural beliefs in isolation. Instead, one should consider the overall structure or organization of beliefs, what Converse calls belief systems.[1]

In their most basic form, theories on belief systems claim that cultural beliefs are organized in a way that suggests a certain amount of coherence. In political sociology, this is grounded on the structuring power of political ideologies (Fleishman, 1988; Judd & Krosnick, 1982; Judd & Milburn, 1980; Nie & Andersen, 1974; Peffley & Hurwitz, 1985), such that latent political orientations *constrain* how individuals respond to survey questions. In other words, individuals respond to survey items in relatively predictable patterns, as these latent orientations have an organizing power on personal beliefs. Hence, if individuals hold certain opinions, it is probabilistically more likely that they hold certain other opinions.

These survey patterns lead theories on belief constraint to argue that individuals have some sort of cognitive organization (DiMaggio, 1997; Heider, 1946; Osgood & Tannenbaum, 1955; Rumelhart & Ortony, 1977; Strauss & Quinn, 1997). Scholars thus frequently use opinion surveys to measure belief constraint by constructing population-level belief networks, where nodes denote survey responses to belief questions while the edges between these nodes denote the correlations between these responses (Boutyline & Vaisey, 2017). In this vein, studies document the dynamics of belief organization with the understanding that cultural beliefs are organized as weighted networks of opinions (Baldassarri & Goldberg, 2014; Boutyline, 2017; Brandt, Sibley, & Osborne, 2019; DellaPosta, 2020; Hunzaker & Valentino, 2019).

Considering personal culture in terms of weighted networks has an important implication: the question of how cultural beliefs are formed can be restated as the question of *how the structure of personal culture changes from earlier periods of life to adulthood.* One possible result is that life course transformations can be seen as an accumulation of cultural, moral, and political adjustments to an individual's belief system. If it is true that adulthood is relatively stable while childhood, adolescence, and emerging adulthood are relatively variable, we can conceptualize socialization as an evolution from comparatively low belief constraint among cultural beliefs to comparatively high belief constraint. Specifically, socialization can be seen as an alignment of cultural orientations.[2]

2.2. An alignment model of cultural formation

I draw on two established findings in psychological research, *constraint satisfaction* and *attitude strengthening*, to develop an alignment model of cultural formation. First, an influential finding in psychology is that individuals strive to reduce cognitive dissonance (Festinger, 1957), which refers to the psychological tension resulting from conflicting attitudes. Scholars show that individuals resolve these tensions through constraint satisfaction (Shultz & Lepper, 1996; Simon, Krawczyk, & Holyoak, 2004), such that individuals restructure their beliefs and attitudes to reduce conflict. Hence, over time, individuals should alter their cultural orientations to make incompatible cultural beliefs increasingly aligned. Correspondingly, however, individuals become less susceptible to attitude changes and more attached to certain attitudes with time (Krosnick & Alwin, 1989). Compared to adolescents, adults give more importance to attitudes, their perceived knowledge of attitudes is higher, and they are more confident of their beliefs (Visser & Krosnick, 1998). This, in turn, decreases the chances of widespread attitude change in later periods of life.

Taken together, these two mechanisms induce countervailing tendencies to belief systems: while beliefs change through constraint satisfaction, attitude strengthening results in higher resistance to change. Suppose that we have three beliefs in the belief system (A, B and C), and while A-B and A-C have positive connections, B and C are negatively connected. According to constraint satisfaction theories, the belief system seeks to reduce the tension in the system by pushing B or C to change and align with other beliefs. Nevertheless, if attitude strengthening leads to an increase in the importance of B or C, this move toward constraint satisfaction can be thwarted. In sum, the success of constraint satisfaction very much depends on the strength and importance of the targeted attitude.

If we extend this framework to longer time periods, we can see that these two mechanisms interact to push people to have more constraint and less susceptibility to change. If constraint satisfaction leads to constrained belief systems, the increasing connections between beliefs contribute to the attitude strengthening, since these connections enhance the strength of personal beliefs (Dalege et al.,

[1] In what follows, I use the term *belief* to invoke values, attitudes, and opinions. Hence, beliefs will refer simply to "propositional statements about the self, others, and the world" (Vaisey and Valentino 2018:137). In this sense, belief system refers to the domain-specific organization of beliefs, such that individuals can have different belief systems about politics, religion, or culture in general. I will use the terms personal beliefs and cultural beliefs interchangeably to denote beliefs pertinent to the relevant belief systems.

[2] It is essential to situate the terms *constraint* and *alignment* in more detail. The former refers to the static state of cultural beliefs, i.e., if the correlations among beliefs are high, it means that the belief system is constrained. In contrast, the latter refers to the dynamic changes of cultural beliefs, which means that alignment refers to the alignment of cultural beliefs with one another, which dynamically generates higher belief constraint.

2016; Visser & Krosnick, 1998). In other words, attitudes strengthen with the successful change of belief systems toward more constraint. Therefore, change in cultural beliefs should become less and less likely in time due to the (a) increasing constraint among beliefs and (b) strengthening of particular attitudes.

These two mechanisms have particular relevance for explaining the transitions to adulthood. Most developmental studies show that the periods of childhood, adolescence and emerging adulthood are highly significant for identity and opinion formation (Arnett, 2000; McFarland & Pals, 2005), and various social institutions pattern an individual's belief system, including parents and close adults (Regnerus, Smith, & Smith, 2004), political elites (Zaller, 1992), social networks (Cornwall, 1989; Settle, Bond, & Levitt, 2011) and cognitive authorities (Martin, 2002; Rawlings, 2020). These sources induce relative coherence to cultural beliefs and carve stable positions for individuals. Thus, socialization involves an extensive period of belief formation. If constraint satisfaction and attitude strengthening provide the dynamic description for belief network organization, the period of socialization should be the time when most of the alignment and subsequent stabilization takes place.[3]

Model Outline. (a) In earlier periods of the life course, individuals show low belief constraint. (b) In time, cultural beliefs change through constraint satisfaction, which results in the alignment of belief networks. (c) At the same time, with each year of age, individuals become less likely to change beliefs due to attitude strengthening, and therefore, the number of beliefs changed per individual declines. In the end, (d) belief networks become relatively aligned and stabilized. There are two significant implications of this model, providing two hypotheses for empirical testing. First, *the average level of absolute belief network constraint should increase* (Hypothesis 1). Second, *since beliefs become less likely to change with each consecutive year of age, this increase should slow down over time* (Hypothesis 2).

2.3. Empirical implications and scope conditions

The operationalization of the belief alignment model is grounded on two basic strategies. First, following the previous literature (Baldassarri & Gelman, 2008; Boutyline & Vaisey, 2017; Converse, 1964), pairwise correlations between survey items are used to indicate the degree to which these items hold together. To the extent that absolute correlations are closer to 1, the belief network is said to be *constrained*. Second, the changes in these belief networks are observed for each year of age. Insofar as constraint increases, the corresponding belief network is said to be *aligned*.

Three challenges restrict the performance of the model to evaluate the proposed alignment trends. First, the model provides individual-level mechanisms, though the observed correlations are measured at the group level. This can be problematic in at least two respects. First, the model cannot differentiate belief alignment for individuals (alignment of beliefs with one another) and belief alignment between individuals (alignment of certain groups with other groups). Thus, the model cannot adjudicate whether individuals change from low constraint to high constraint as a whole or whether there are individuals with low constraint initially, and what we see as alignment is nothing but belief consolidation for that specific group. Moreover, individuals can respond differently to such destabilizing events as institutional change and social mobilization, or the salience of one's role identities and their corresponding social networks might change. These, in turn, might disrupt the alignment process at specific points of the socialization period. This conceals the high probability that there are individuals who do not conform to the population-level trends.

Second, the *range* of belief systems (Converse, 1964:4–5), which defines the spectrum of beliefs deemed pertinent to the belief system, can be context-dependent and somewhat arbitrary. For instance, religiosity or parental values can significantly affect how political beliefs are organized, even though the researcher can overlook these items as not relevant to the political belief system. Increasing the number of items most likely results in a lower mean constraint, but decreasing the number of items could dampen the effects of potentially relevant variables. In sum, including or excluding one belief item leaves too much room for variation, increasing the researcher degrees of freedom.

Third, it is well-known that survey context affects the respondents in multiple ways (Alwin & Krosnick, 1991b; Zaller, 1992). Most significantly, the polysemy of certain beliefs might result in the situation where some beliefs signify different things for different respondents, which can prompt potential dynamics not accounted for in the model. Therefore, whether the survey items used in the analyses have the same referents for the respondents is not considered in the final model structure.

Despite these limitations, the belief alignment model is capable of detecting broad population-level trajectories of the organization of cultural beliefs. Concretely, the model has the advantage of answering a simple question on belief organization, whether constraint increases through socialization, without making strong assumptions about the processes by which belief alignment occurs. This approach mainly allows us to test whether the periods of socialization are indeed the times for an increasing organization of beliefs.

2.4. The case of religious socialization

In order to test these propositions, I examine the case of religious socialization from adolescence to emerging adulthood. Studying religion in this way has at least three payoffs. First, up until now, the literature on belief systems has exclusively worked on political beliefs, leaving other domains of culture untouched. Replicating this approach for religious beliefs might show different dynamics than

[3] It is important to note that these dynamics suggest an alignment process without strictly implying that individuals *always* hold consistent opinions (Zaller 1992). There are limits as to what level of constraint one can achieve, and contextual factors can affect how people respond to survey questions (Kiley and Vaisey 2020). Thus, the model argues that the structure of beliefs should be stabilized, not the individual responses to surveys.

Table 1
Survey ıtems, abbreviations used in network diagrams, and question wordings.

Survey Items	Abbr.	Questions and Response Ranges
Belief in After Life	*aftrlife*	Do you believe that there is life after death: Not at all; Maybe; Definitely?
Belief in Angels	*angels*	Do you believe in the existence of angels: Not at all; Maybe; Definitely?
Commitment to God	*comitgod*	Made a personal commitment to live your life for God: Yes/No (In Wave 4, "maybe" is coded as "no")?
Congregation Is A Must	*congmust*	In order to be truly religious, one needs to be involved in a religious congregation: Disagree/Agree?
Belief in Demons	*demons*	Do you believe in the existence of demons or evil spirits: Not at all; Maybe; Definitely?
Religious Doubt	*doubts*	How much, if at all, have you had doubts about whether your religious beliefs [or being nonreligious] are true: No doubts; Few doubts; Some doubts; Many doubts?
Importance of Faith	*faith*	Importance of religious faith: Not important at all; Not very; Somewhat; Very; Extremely Important?
Belief in Judgment Day	*judgeday*	Do you believe that there will come a judgment day when God will reward some, punish others: Yes/No?
Belief in God	*god*	Do you believe in God, or not, or are you unsure: Not at all; Maybe; Definitely?
Closeness to God	*godclose*	How distant or close do you feel to God most of the time: Extremely distant; Very Distant; Somewhat distant; Somewhat close; Very close; Extremely close?
Views on God	*godview*	Views that come closest to your own view of God: God is a personal being (1); God created the world, but not involved in it, God is not personal and none (0)?
Learning About Religion	*learnrel*	Interested or not in learning about religion: Not at all; not very; somewhat; very interested?
Experience in Miracles	*miracle*	Experienced what you believe was a miracle from God: Yes/No (In Wave 4, "maybe" is coded as "no")?
Belief in Miracles	*miracles*	Do you believe in the possibility of divine miracles from God: Not at all; Maybe; Definitely?
Okay to Convert	*okayconv*	Religious conversion: Leave others; Okay to convert?
Okay to Pick	*okaypick*	Okay to pick and choose religious beliefs without having to accept the teachings as a whole: Disagree/Agree?
Practice Other Religions	*onlyone*	Okay for someone of your [one] religion to also practice other religions: Okay to practice; Should only practice one faith?
Answers to Prayers	*prayansr*	Definite answer to prayer or specific guidance from God: Yes/No (In Wave 4, "maybe" is coded as "no")?
Spirituality	*spiritua*	Some people say that they are 'spiritual but not religious.' How true or not would you say that is of you: Not true at all; Somewhat; Very?
Views on Religion	*viewrel*	Views that come closest to your own view about religion: There is little truth in any religion; many religions may be true; only one religion is true?

Note: The relevant procedures are detailed at the end of each question. To obtain the full questionnaires for all waves, see The National Study of Youth and Religion at https://youthandreligion.nd.edu/.

previously found for political beliefs.

Second, religion is an institutionally and organizationally powerful area of culture, while it is salient enough for studying personal beliefs. For instance, in the first wave of the NSYR, 80% of the respondents reported church attendance, 70% had religious Sunday schools, and 37% were involved in religious youth groups. Thus, there are strong contextual factors at the local and organizational level, which might increase the salience of religiosity in one's life. In sum, the acquisition of religious beliefs is highly dependent on the local circumstances within which the actor is placed and the continuing salience of these circumstances through the developmental period (Regnerus et al., 2004; Smith, 2003). We can thus clearly observe the effects of these local structures on the formation and organization of religious beliefs in the adolescence and emerging adulthood.

Third, recent studies on religion and adolescence (Pearce, Uecker, & Denton, 2019) demonstrate the significance of religious institutions on adolescents' developmental trajectories. In empirical studies, religion is analyzed both as an outcome of demographic, social and cognitive determinants (Erickson, 1992; Ozorak, 1989; Smith, 2003) and as an object of cultural change across the individual life course (Desmond, Morgan, & Kikuchi, 2010; Hardie, Pearce, & Denton, 2016; Wink & Dillon. 2002). In this sense, in addition to the direction of religiosity from earlier periods of life to adulthood, which is the sole focus of the previous research, it is equally productive to investigate the change in the structure of religious beliefs, particularly as an example of the formation of one's personal culture.

3. Data and analytic strategy

I apply the belief alignment model to four waves of panel data from the National Study of Youth and Religion (NSYR), a nationally representative survey of adolescents and emerging adults in the United States (for an extensive description of the data collection process, see Smith and Denton, 2008). The cumulative NSYR datafile consists of 10,648 individual observations (spanning from age 13 to age 28), which are collected through four consecutive waves between 2002 and 2013. The initial representative sample consisted of 3,370 unique individuals. The NSYR is particularly appropriate to an analysis of religious belief networks, as it includes question items encompassing various dimensions of religious beliefs (Pearce, Hayward, & Pearlman, 2017), and the period it covers is reasonably long.

3.1. Item selection and correlation coefficients

In order to decide on the relevant question items to include, I classified all non-factual questions whose responses cannot be

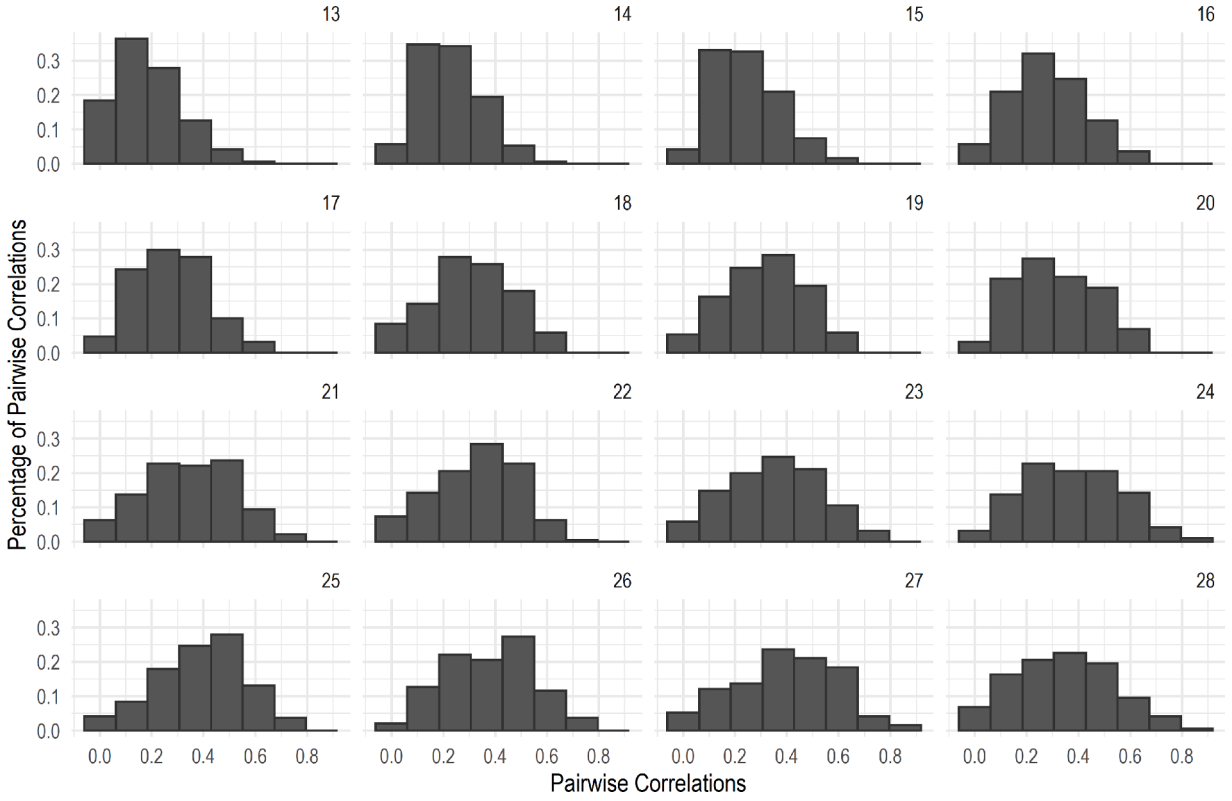

Fig. 1. The Distribution of Pairwise Correlations.

objectively verified, such as an individual's opinions, beliefs, and values. I then dropped the variables that are not of particular relevance to religious beliefs.[4] Since the analyses concern the connections between survey items, I excluded variables with nominal response categories that do not show or cannot be recoded to reflect an explicit ordering.[5] I also excluded questions that are not asked in at least two consecutive waves to ensure temporal continuity. This procedure leaves a total of 20 items, all of which are detailed in Table 1.

Building on previous works (Baldassarri & Gelman, 2008; Boutyline & Vaisey, 2017; DellaPosta, 2020), I constructed 190 unique age-specific correlations between belief items across 16 years. Namely, I first grouped the observations by respondents' age and computed the Pearson correlations[6] between unique pairs of belief items. Since the object of analysis is the relative strength of the correlations rather than their direction, I took the absolute values of the coefficients. This procedure resulted in 3,040 correlation pairs distributed across the ages of 13 and 28 and nested within 190 unique pairs of beliefs. Correlations range from nearly 0 to as high as 0.86. In order to maintain the balance between data sparsity, which is most pronounced in later ages, and information quality, I restricted the minimum number of observations for correlations to be gathered to 50. Figure 1 provides an overview of the distribution of correlations for each age group.[7]

[4] Specifically, I used the NSYR codebook organization as my benchmark and kept the variables listed under the pertinent categories. See the Religion sections in the NSYR codebook at https://youthandreligion.nd.edu/.

[5] To rule out the possibility that these items might change the results, I re-estimated the models with these additional nominal variables: views on Jesus Christ, views on the world's origin, and views on who will go to heaven. I recoded them as binary (1 for the most saliently religious response and 0 for all others). The substantial results are identical to the ones presented below. Since the justification of this coding strategy is somewhat arbitrary, I decided to drop these variables in the following analyses.

[6] Since Pearson correlations are biased for binary variables, I replicated all the analyses with tetrachoric correlations between binary variables, polychoric correlations between ordinal variables, and Kendall's rank correlations between binary and ordinal variables. The substantial results do not change.

[7] One potential problem with this strategy is that there can be unique cohort and period effects in the NSYR sample. Since the data are collected through four waves, which include overlapping age groups, there might be different levels of alignment between waves, net of specific ages. To mitigate this potential bias, I replicated the models by taking the period effects into account. In doing this, I grouped the data by wave and age (instead of only age), gathered the correlations, and estimated correlations nested within both belief pairs and waves. I could detect virtually no period effects that change the substantial interpretations of the following models. Nevertheless, whether the results are due to specific cohort effects cannot be resolved with the data at hand and requires replicating this study in different settings.

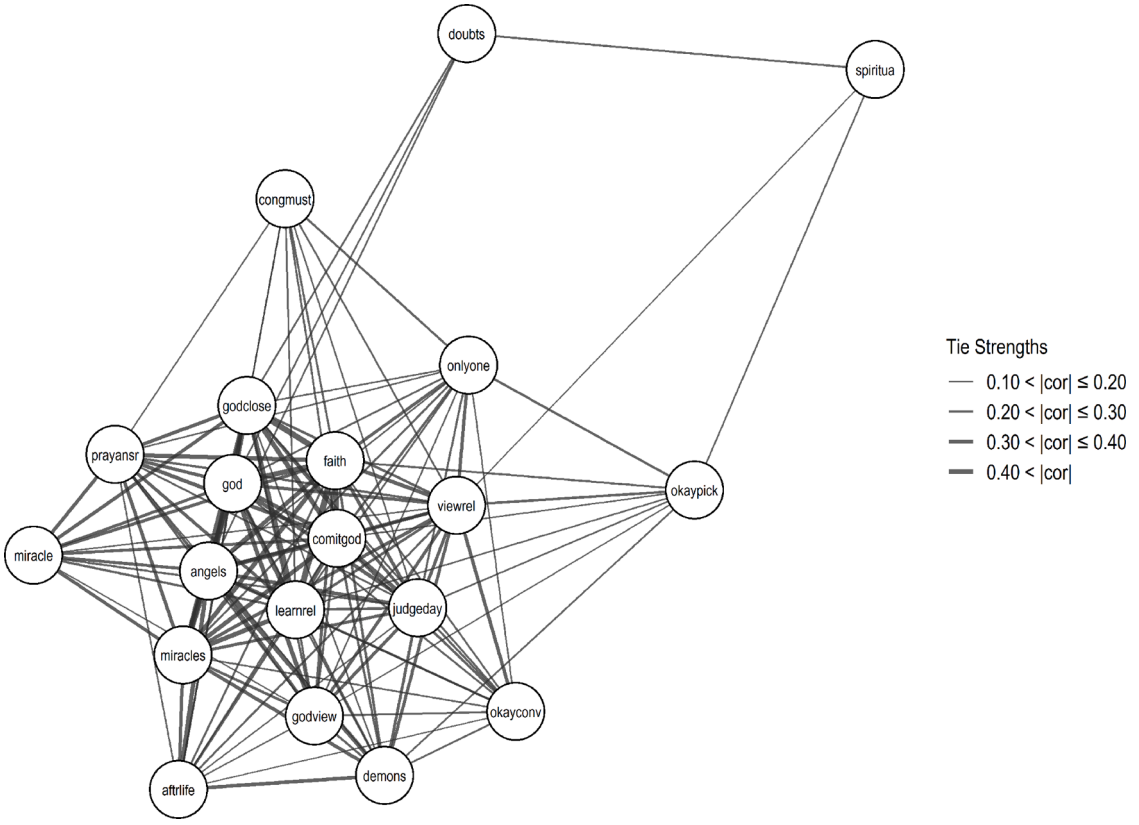

Fig. 2. The Religious Belief Network for Age 13.
Note: Nodes represent religious beliefs and the edges between these nodes represent the absolute correlations between these beliefs. Correlation coefficients below 0.10 are not depicted for legibility. The graph is force directed and depicted using the Fruchterman–Reingold algorithm.

3.2. Statistical models and alternative explanations

Since the correlation coefficients are structured in groups of belief pairs, I used a linear mixed-effects model (Baldassarri & Gelman, 2008) to produce average age-specific estimates. Formally, the set of correlations consists of pairs of religious belief items x and y, such that all unique belief correlations are indexed by a belief-pair j. For each instance of pairing (a total of 190 pairs), j represents the correlations between x and y. The resulting model takes the form

$$|r|_{j,\,t} = \alpha_j + \beta_j t + \epsilon_{j,\,t} \tag{1}$$

where $|r|_{j,\,t}$ is the value of the absolute correlation in belief-pair j and age t, α_j is the intercept that varies by each belief-pair j, $\beta_j t$ is the linear age-specific trend for correlations that varies by each belief-pair j, and $\epsilon_{j,\,t}$ is the residual variation. In order to test Hypothesis 2, I modified Eq. 1 by adding the square of age as an additional predictor.

In addition to the models, I also conducted several sensitivity analyses to test the robustness of the findings. First, to rule out the possibility that the results are contingent on sampling variability, I followed Boutyline and Vaisey (2017) and used nonparametric bootstrapping. I first generated 1,000 bootstrap iterations for each year of age and examined the changes in the mean constraint of the correlations. Second, I divided the population along 16 demographic dimensions and reestimated the models for each subpopulation to tackle possible population heterogeneity canceled out at the population level. I examined alignment trajectories and compared the correlation signs between these networks, testing the possibility that belief connections mean different things for each group. Nevertheless, whether these sample partitions adequately capture how different groups organize their belief networks remains problematic. Thus, I used correlational class analysis (Boutyline, 2017), or CCA, to inductively search heterogeneities in the sample, testing the age-specific trajectories for each belief community. Third, I analyzed the possibility that item selection drives the observed conclusions. I constructed 5,000 additional samples by randomly dropping 10 belief items out of 20 and estimated the models with the remaining 45 pairs to mitigate possible selection effects. For each resample, I again implemented mixed-effects models, extracted the coefficients, and examined the signs of the coefficients and their variation.

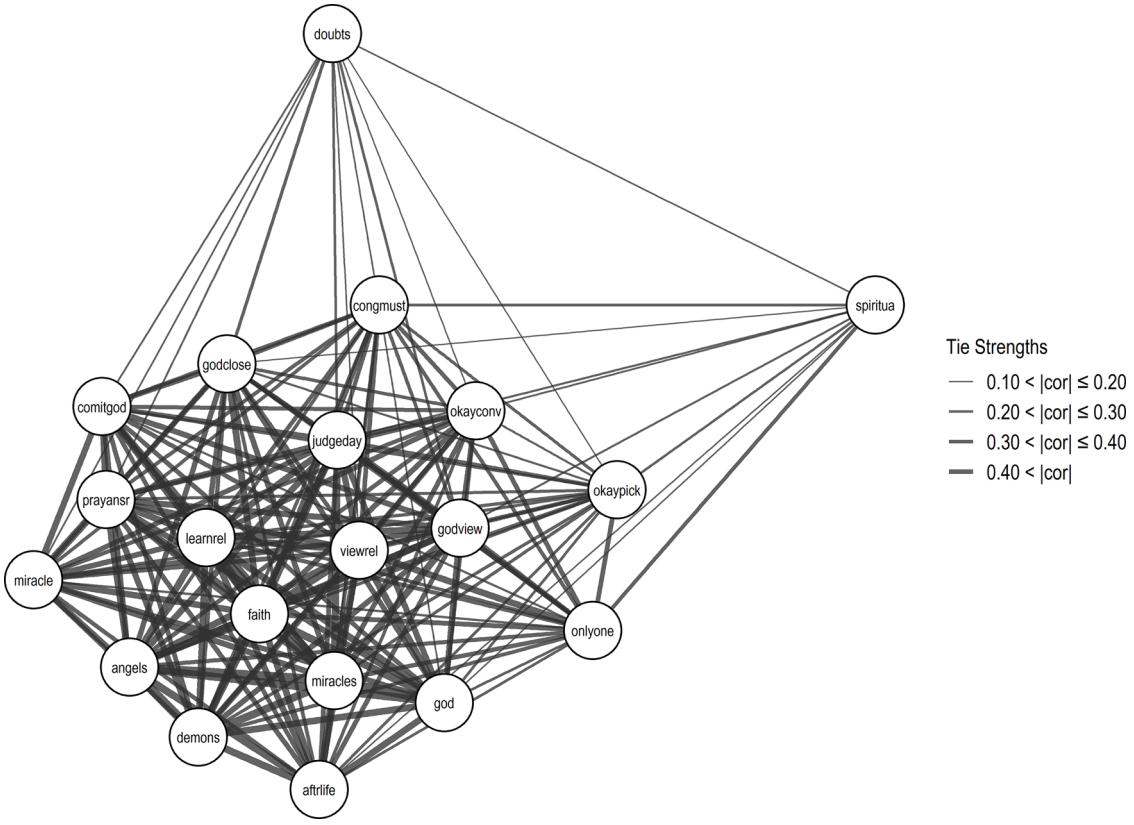

Fig. 3. The Religious Belief Network for Age 27.
Note: Nodes represent religious beliefs and the edges between these nodes represent the absolute correlations between these beliefs. Correlation coefficients below 0.10 are not depicted for legibility. The graph is force directed and depicted using the Fruchterman–Reingold algorithm.

Table 2
Multilevel mixed-effects regression models estimating pairwise correlations.

	Model 1	Model 2
Age	0.0117*** (0.0005)	0.0250*** (0.0008)
Age^2		-0.0009*** (0.0000)
Intercept	0.2280*** (0.0092)	0.1970*** (0.0093)
SD: Age	0.0066	0.0066
SD: Intercept	0.1249	0.1252
AIC	-8,446.09	-8,807.03
BIC	-8,409.98	-8,764.90

Note: Models estimate zero-order bivariate correlations (N = 3,040) nested within 190 unique pair of items. The minimum number of observations for correlations to be gathered is set to 50. Age is rescaled such that age 13 is equal to 0 and each unit corresponds to 1 year. AIC refers to Akaike Information Criterion and BIC refers to Bayesian Information Criterion. Standard errors in parantheses.
*** $p < 0.001$ (two-tailed tests).

4. Results

Fig. 2 presents the religious belief network for age 13, while Fig. 3 presents the religious belief network for age 27.[8] The graphs reveal striking differences between the structure of belief systems in the two periods. In the first graph, the average strength of ties is relatively low (mean = 0.19, standard deviation = 0.13), while in the second graph, tie strengths substantially increase (mean = 0.40, standard deviation = 0.19). Curiously, the centralization of the second graph (i.e., the degree to which the overall network is organized around its most centralized point) is lower than the first graph, suggesting that an increased number of beliefs gain influence over the whole network. These two measures provide strong visual evidence for the alignment of religious beliefs from adolescence to emerging

[8] Since the number of observations is substantially smaller in age 28 ($N = 183$) than age 27 ($N = 426$), I decided to present the network for age 27.

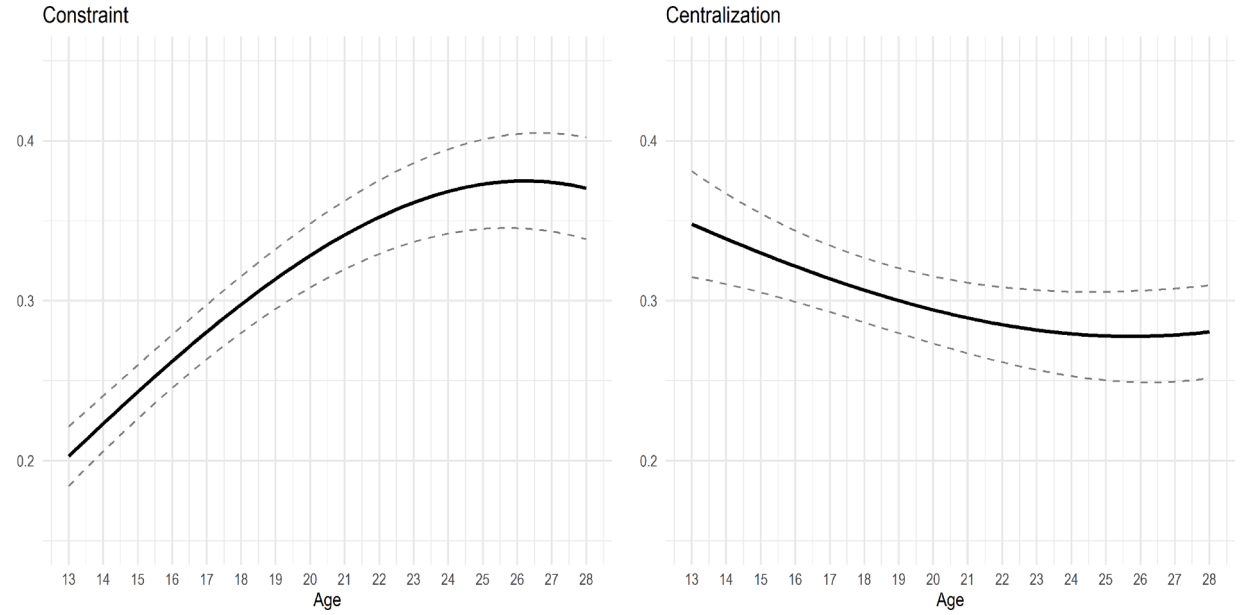

Fig. 4. Bootstrapped Replications for Belief Alignment Trends.
Note: Each panel is represented with cubic spline-smoothing functions of age-specific mean values for 1,000 bootstrapped replications: constraint refers to mean correlations and centralization refers to the overall eigenvector network centralization score for each age. Dashed lines indicate 95% confidence intervals.

adulthood.

In order to substantiate the initial evidence, I conducted multi-level linear mixed-effects regressions of the absolute correlations on respondents' age. Table 2 presents the results. As previously hypothesized, average correlations from age 13 to age 28 are estimated to increase 1.17% per year of age, with an estimated standard deviation of 0.66% across the pairs (see Model 1), which confirms Hypothesis 1: the average level of mean constraint increases with time, and the individual effect for each belief pair is either close to zero or positive. In order to test Hypothesis 2, which claims that this rate of increase should slow down with each consecutive year of age, I included an additional predictor (age-squared) to Model 2. Results confirm Hypothesis 2: coefficients for age and age-squared are 2.50% and -0.09%, respectively, both of which are statistically significant at $p < 0.001$, and the residual standard deviation of age is not different from Model 1 (0.67%). Comparing the model fits, both Akaike Information Criterion (-8,807 < -8,446) and Bayesian Information Criterion (-8,764 < -8,409) show that Model 2 fits significantly better than Model 1. In additional analyses that are not shown in the regression output, I experimented with cubic polynomial regressions but could not detect an additional spike in the final quadratic fit. Overall, mixed-effects regressions validate the claim that mean constraint increases with each year of age, and the correlations between religious belief items become stabilized over time.[9]

4.1. Sampling variability

There are three sources of potential error that need to be addressed. First, the alignment trends might simply result from the peculiarities of the particular sample at hand. In order to provide more rigorous estimations, I followed Boutyline and Vaisey (2017) and DellaPosta (2020) and used non-parametric bootstraps to establish the statistical significance of the presented results. In each bootstrap replication, I re-sampled the NSYR respondents 1,000 times for each year of age, created belief networks for each iteration of the bootstrap, resulting in 1,000 networks per year of age, calculated the mean constraint levels, as well as the eigenvector centralization scores. In the end, I arranged the resulting network statistics and calculated their mean and 95% confidence intervals for each age.

The results are presented in Fig. 4, confirming that the previous estimations are not sensitive to sampling variability. In order to substantiate the observed trends, I again fitted quadratic regression models to grouped bootstrapped samples. Similar to multi-level mixed-effects models, the coefficients for constraint are 2.47% for age and -0.08% for age-squared; both are significant at $p <$ 0.001. An additional concern would be to ask whether this alignment occurs with or against the backdrop of belief centralization. Perhaps, the alignment is the result of an increasing influence of certain items over others. The second plot ("centralization") rejects

[9] In an alternative specification, I estimated the models with age dummies in the predictors. The results are presented in the Appendix. These estimations show that, although there is an increase in correlations with each year of age, there is a substantial drop in correlation coefficients at age 28. This alone does not discard the conclusion that there is an increase of constraint from adolescence to emerging adulthood, but it should lead us to ask whether this increase can be sustained over the years. See Appendix for the complete results.

this claim. In fact, centralization scores slightly reduce with time: the coefficient of age is significant at -1.07% ($p < 0.001$) and age-squared at 0.04% ($p < 0.05$). In sum, bootstrapped replications support the belief alignment model.[10]

4.2. Population heterogeneity

An additional source of error is population heterogeneity (Baldassarri & Goldberg, 2014; Goldberg, 2011), i.e., the proposed trends may vary systematically across the subpopulations. In order to test this possibility, I divided the sample along 16 axes organized around 4 main themes. First, for demographic differentiation, I compared groups across whether (1) the respondent is coded as male or female, (2) white or non-white, (3) living in the South or not, and (4) affiliated with any religion.[11] In order to disentangle distinct life trajectories and social relations, I divided the sample along (5) social network homogeneity (defined as the percentage of close ties with same beliefs about religion), (6) whether the respondents went through traumatic experiences such as the death of close relatives or accidents, (7) whether the respondent went to college, and (8) downward mobility, defined as the reported financial hardships given that the respondents' parents had annual income above the median country-level income in 2002.[12] To capture the effects of parents, I compared respondents across whether (9) faith is "extremely important" for parents, (10) parents are married, (11) at least one of the parents went into college, and (12) household income is above or below $40.000, which is relatively close to the median income in 2002. Finally, I also divided the respondents with respect to their religiosity, comparing groups across (13) church attendance, (14) the respondent's participation in religious youth groups, (15) the respondent's religious training, and (16) religious conversion (including non-affiliation). I then replicated the same modeling process for each subgroup. Fig. 5 presents the results.[13]

Overall, most trends conform to the population-level process of belief alignment, though there are two significant exceptions. First, there are substantial differences between the intercepts of White and non-White respondents (the latter of which has significantly lower levels of mean constraint), respondents above and below the $40.000 cutoff (again, the mean constraint of the latter is substantially lower than the former), and those that had a college education and those that had not. Second, the rate of belief change for respondents with more institutional contact with religion is strikingly different from the others: church attendees rise relatively more quickly than non-attendees, and those who have not participated in youth groups or received religious training rise more slowly and remain less constrained than the others. Nevertheless, the alignment trends are still present across the subpopulations. All coefficients for age are positive and statistically significant (ranging from 1.37% to 3.16%), which is similar for age-squared, whose coefficients are negative and statistically significant (ranging from -0.12% to -0.01%). I estimated regressions with cubic terms as well. Still, AIC and BIC estimations show that in 15 out of 16 subpopulation comparisons, quadratic estimations provide the best-fitting models, except for the network homogeneity, where the cubic model is marginally better than the quadratic model. These results support the argument that, despite the varying levels of mean constraint observed in different subpopulations, the alignment of beliefs is present in all groups.

Nevertheless, an analysis of subgroups requires that each group understands the correlations between beliefs in the same manner, and there is a single dominant process that generates a belief network at the population. To test these assumptions, I conducted two additional tests. First, rather than looking at the absolute belief correlations, I compared the coefficient signs across subpopulations. Following Boutyline and Vaisey (2017), I first constructed adjacency matrices for each group. Since statistical noise can affect the results, I removed all correlation coefficients that were not statistically different from 0 at $p < 0.05$. Then, I compared the correlation signs of belief pairs between these exclusive groups. For example, at age 28, 149 belief-pairs out of 190 (78%) are statistically different from 0 for two subgroups, those who attend church gatherings and those who do not, and 140 (93%) of these pairs have the same sign. This suggests that these groups are not substantially different in understanding the relationalities between religious beliefs. Table 3 presents the summary measures for each subpopulation, including the mean percentage of similar signs in all ages and their standard deviation. The results show that there are indeed significant differences between groups, albeit modestly. Nearly 22% of belief correlations have different signs for affiliated and non-affiliated respondents, followed by church attendance and religious education. Therefore, one's religious adherence, as well as her socialization into religious organizations, do seem to affect the ways belief networks are constructed.[14]

If there are heterogeneities in the population but no perceptible differences in age trajectories of belief constraint, population heterogeneity tests may have assumed too much, since looking at paired subpopulations detects heterogeneity only if one set of identities dominates the others. Specifically, populations can differentiate through shared understandings, "the extent to which they organize meaning in similar ways" (Goldberg, 2011:1403). Hence, it is vital to look at the data inductively. To that end, I used correlational class analysis (CCA) to identify different groups (Boutyline, 2017), the detailed procedure of which is documented in the Appendix. In particular, I applied the CCA for the first wave, and analyzed the correlational structure of the resulting groups. Then, I

[10] In addition to sampling variability, panel attrition can also affect the results (see Appendix for discussion).

[11] Religious affiliation is coded according to self-report. Thus, religiously non-affiliated individuals are the ones that explicitly identify themselves as not affiliated with any religion.

[12] Changes in socioeconomic status are relatively hard to operationalize with the NSYR, and this measure is less than satisfactory. Nevertheless, given limitations, it seems to be the only way to approximate mobility.

[13] An important caveat for the following results is the relatively low levels of observations in certain ages when the unit of analysis is reduced to subpopulations.

[14] I also checked whether the signs of belief pairs change with respect to age, but apart from differences between subpopulations, there are no age trajectories.

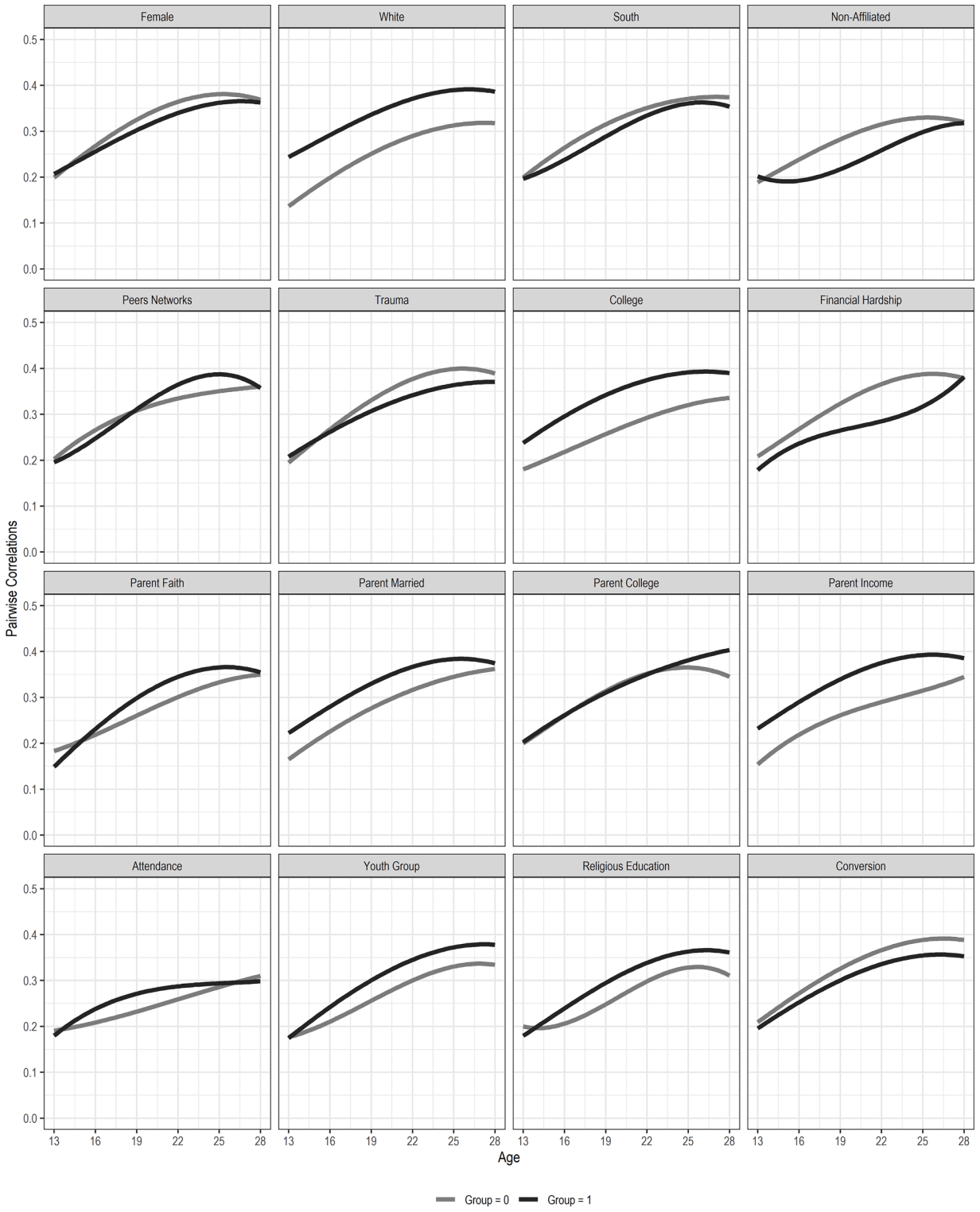

Fig. 5. Belief Alignment Trends Across the Subpopulations.
Note: Each panel is represented with cubic spline-smoothing functions of age-specific mean values.

Table 3
The Percentage of similar signs among belief pairs between subgroups.

Subpopulations	Percent Similar (Mean)	Percent Similar (SD)
Non-Affiliated	0.781	0.032
Church Attendance	0.854	0.046
Religious Education	0.884	0.046
Youth Group	0.932	0.027
Financial Hardship	0.948	0.034
Parent Faith	0.955	0.020
College	0.963	0.022
Parent Married	0.967	0.020
Parent Income	0.968	0.022
White	0.969	0.025
Female	0.980	0.017
Trauma	0.983	0.020
South	0.983	0.014
Conversion	0.985	0.012
Homogeneous Peers	0.989	0.007
Parent with College	0.991	0.012

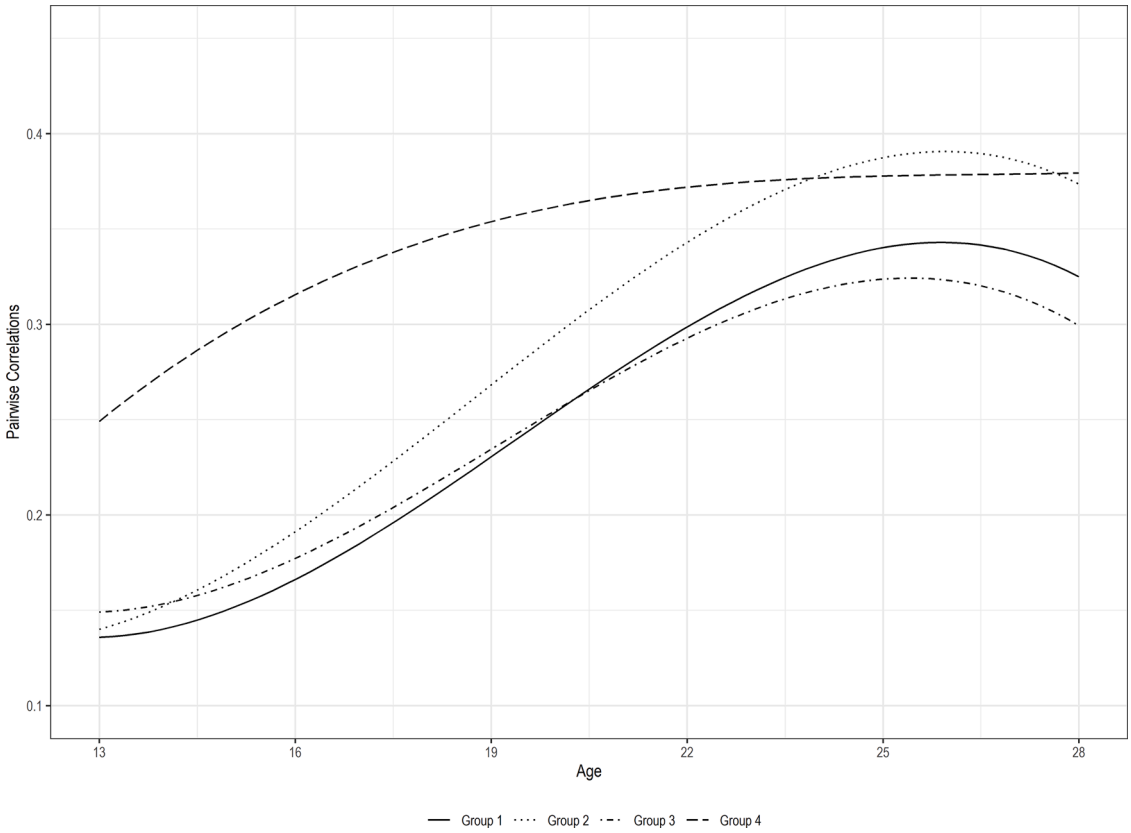

Fig. 6. Belief Alignment Trends Across the CCA Groups.
Note: Each line is represented with cubic spline-smoothing functions of age-specific mean values.

assigned these classes to later waves and inspected the trajectories of these classes throughout the period.

The CCA detected four distinct classes. Group 1 distinguishes itself from the others with its position on religious belief items that can be conceptualized as what Pearce, Hayward and Pearlman (2017) call "religious exclusivity," whether individuals "hold particular religious beliefs to a more global belief in absolutes" (371). These beliefs have negative correlations to other beliefs, suggesting that religiosity and absolutism are not congruent with each other for these individuals. Group 2 is characterized by the negative relation of *congmust* (whether congregations are vital for religiosity) to the other variables, suggesting that individuals in this group have less emphasis on institutional adherence. Group 3 is distinctive with its focus on spirituality (this is the only group where spirituality is positively correlated with the other items) and the centrality of such variables as closeness to God and belief in angels. Finally, Group 4 is the one that has the most similarity to the population-level trends, having strongly positive connections between religious items and

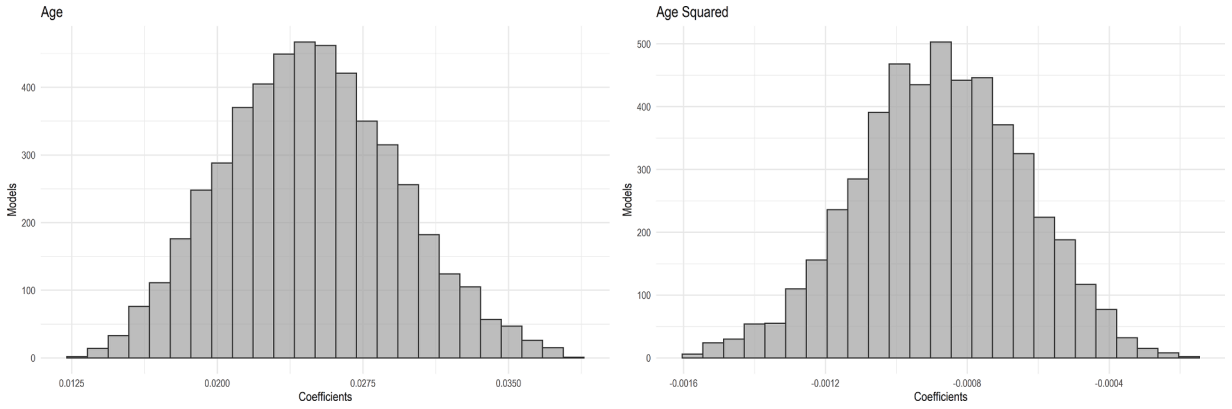

Fig. 7. Belief Alignment Trends in 5,000 Random Samples.
Note: The first histogram (left) presents the distribution of age coefficients drawn from 5,000 samples of 10 randomly chosen belief items. The second histogram (right) presents the same distribution for age squared.

negative connections with religious doubt and spirituality. The results are depicted in Fig. 6, which shows that all groups have a similar pattern: the absolute correlations between religious beliefs become increasingly aligned and relatively stabilized. Nevertheless, it can be seen that Group 4 starts with high constraint, and the alignment occurs a lot earlier than the others.

4.3. Item selection

The last set of analyses concerns the possibility that the variable selection induces an error in the estimations. The collection of belief items presented in Table 1 was the result of an iterative process. Therefore, there can be selection bias because choosing one set of variables instead of another might transform the results. To rule out this possibility, I constructed 5,000 additional samples by randomly dropping 10 belief items out of 20. In each resampling, I reconstructed the pairwise belief correlations (45 belief pairs per year of age), estimated the multi-level mixed-effects regression models with age and age-squared, and extracted the coefficients. Fig. 7 demonstrates that the distribution of the coefficients across 5,000 samples confirms the expectations. The mean score for age is 2.34%, and all coefficients are statistically significant, while the mean score for age-squared is -0.08%, and again, all coefficients are negative and statistically significant.

5. Discussion

In this article, I developed an alignment model of cultural formation from adolescence to emerging adulthood, and I showed that religious beliefs become relatively aligned with time. Pairwise correlations between religious belief items become higher, and the rate of increase slows down with each consecutive year of age. Both the changes in the structure of religious belief networks and the multi-level mixed-effects regression models confirmed this conclusion. Furthermore, results were shown to be insensitive to possible sources of error, including sampling variability, population heterogeneity and item selection. Rather than looking at the direction of religious change, I analyzed the changes in its structure, demonstrating that no matter what the *content* of the belief network is, cultural socialization is crucial for the organization and adjustment of the *form* of belief networks.

5.1. Implications for cultural sociology

These results are consistent with the recent psychological and sociological accounts of cultural change and persistence (Alwin & Krosnick, 1991; Kiley & Vaisey, 2020; Krosnick & Alwin, 1989; Vaisey & Lizardo, 2016; Visser & Krosnick, 1998). An important implication of these studies was to emphasize the past conditions of production in explaining the durability of cultural orientations across the life course. Most accounts argued that earlier life periods constitute "impressionable years" (Alwin & Krosnick, 1991), the periods in which people's susceptibility to change is much higher, and cultural, moral, and political transformations are most probable. To account for this, I provided a possible explanation for cultural formation and stabilization. This conclusion can be replicated for such salient areas as moral or political beliefs and the construction of cultural lifestyles and preferences.

I extended the methodological innovations in cultural sociology (Baldassarri & Gelman, 2008; Boutyline & Vaisey, 2017; Della-Posta, 2020) to studies on socialization and life course transformations. Since the data cover a relatively short period compared to other studies that use surveys like General Social Survey or American National Election Studies, potential changes in the meaning and usage of the belief items are minimized. Yet, applying this analytic framework to both other areas and long-term periods necessitates an engagement with the Age-Period-Cohort problem. This might prove fruitful with the multi-level modeling approach adopted in this article (Yang & Land, 2006).

Using religious socialization as an orienting case, this article also contributed to the debates around religious formation and change in adolescence and emerging adulthood (Desmond et al., 2010; Hardie et al., 2016). Most notably, I showed that most religious beliefs

become constrained over time. Consequently, this article calls for an examination of how religious belief systems are organized. Considering the rich methodological work carried out in studies on the measurement of religiosity (Adams, Schaefer, & Ettekal, 2020; Cornwall et al., 1986; Pearce, Foster, & Hardie, 2013; Pearce et al., 2017), the question of how different dimensions change the belief structure and affect one another can be promising.

5.2. Limitations and extensions

The model of belief alignment outlined in this article has certain constraining assumptions, which hindered the full realization of the model's implications. Most importantly, beliefs are restricted to an assemblage of religious attitudes, opinions, and preferences, leaving out other domains that have potential relevance for the organization of religious beliefs. The analytic payoff of this theoretical choice was to enable temporal continuity and item consistency. Still, at the same time, this might conceal the effects of such issues as morality or politics.

It is also important to note that this article theorizes the change from adolescence to emerging adulthood, but whether belief systems remain stable afterward is an empirical question. In fact, the results show a slight but significant decrease in constraint in age 28, suggesting that the subsequent life course can be more variable than suggested in this article. The previous literature shows that attitude and opinion reports can be random in certain quarters of the population (Converse, 1964), and individuals have conflicting opinions in many cases (Zaller, 1992). However, this does not preclude the possibility that opinion instability and structural stability can be present simultaneously. Future work is needed to assess the conditions under which the belief alignment model does not work and the degree to which social instabilities translate to belief system instabilities.

Finally, the belief alignment model is operationalized at the population level, meaning that the alignment trajectories we see in the sample do not necessarily imply that the effects are similar at the individual level. As previously stated, the model cannot adjudicate whether we see belief alignment for individuals (alignment of beliefs with one another) and belief alignment between individuals (alignment of certain groups with other groups). Future work is needed to assess the results of this study at the individual level.

In conclusion, the propositions of this study are all converged on the claim that the socialization period is decisive in setting the tone for an individual's subsequent life. Adopting Swidler's (1986) famous term, childhood, adolescence, and emerging adulthood are "unsettled cultural periods." This is why understanding how cultural, moral, and political beliefs are organized necessitates an extensive investigation of cultural formation. This article attempts to show that the formal analysis of personal culture can be best complemented with understanding the role of time and the question of political and cultural socialization in shaping the dynamics of personal development.

Declarations of Competing Interest

None.

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Appendix

The Number of Beliefs Changed

The belief alignment model outlined in the article assumes that the number of beliefs changed should decline with time, which is why the organization of cultural beliefs becomes stable. Even though the mixed-effects models confirm that the quadratic estimations provide the best functional form, this assumption is still to be tested.

In order to confirm whether the number of beliefs changed per year of age really declines, I first calculated the difference scores for each variable for each wave and recoded the resulting scores 1 if the respondent changes attitudes between two waves and 0 if not. Then, I summed the change scores to generate a summary measure that captures the total number of beliefs changed per respondent from one wave to another. Since survey contexts might vary between waves, I estimated a Poisson regression model predicting the number of beliefs changed with age and wave dummies. Fig. A.1 presents the results. It is unclear whether respondents indeed increased their attitude strength, but it is clear that the number of beliefs changed per individual declines with time.

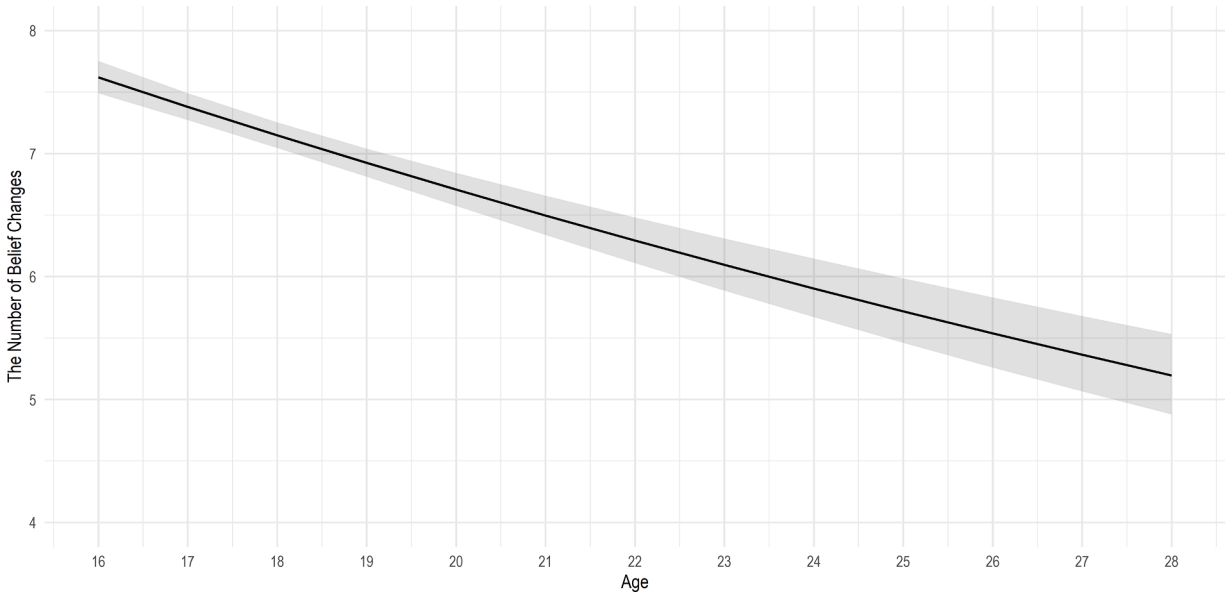

Fig. A.1. The Predicted Number of Beliefs Changed per Individual.

The Composition of the Data and Sample Attrition

Since the NSYR was collected as panel surveys, some respondents dropped out of the surveys over the waves, resulting in high sample attrition. The total sample is 3,369 for Wave 1, 2,604 for Wave 2, 2,531 for Wave 3, and 2,144 for Wave 4. Considering the decreasing numbers, it is essential to ask whether attrition rates affect the estimations. In Fig. A.2, I depicted the changing composition of the sample in 16 domains. The dashed horizontal lines are the percentage of respondents for the specific category at Wave 1, and the solid lines are the percentage of the respondents at each age. For instance, in Wave 1, nearly 65% of the respondents were coded as White, while in Wave 4, this rate increased to 73%. Since Wave 1 is nationally representative, this figure shows the deviation of respondent characteristics in each age relative to the respondent composition in Wave 1.

There are fluctuations in the sample composition, most notably in terms of race, education, and parent income.[15] Expectedly, respondents who are non-white are more likely to drop from the surveys, and those that do not have a college education and those who come from lower SES. In Fig. A.3, I divided respondents once more, using college, parent income and race. In other words, group 0 refers to those who are white, have a college degree and whose parents earn more than the national median (N = 3,996), and group 1 refers to those who are non-white, who do not have a college degree and whose parents earn less than the national median (N = 870). The same results apply. There is still an alignment trajectory, but the level of alignment differs between the two groups. Mainly, respondents with high panel attrition are more likely to have a lower constraint, but the population level alignment is still observable in this group, too. Note, however, that due to the low number of observations in group 1, these results should be replicated in other settings as well.

To test attrition more stringently, I looked at the differences between those who have not dropped out of the surveys and those who have. Fig. A.4 depicts the trajectories of four groups of respondents. The solid lines depict the respondents who are present in all waves, while others depict those present in all but in one wave, those who are not present after Wave 2, and those who are not present after Wave 3. In all cases, it is evident that there are no significant differences between these groups, although the amount of belief organization is high in low attrition groups and low in high attrition groups.

Mixed Effects Models with Dummy Predictors

In order to test the age coefficients more precisely, I also estimated the mixed-effects models by regressing the mean absolute correlations on age dummies.

Fig. A.5 shows the coefficient plot of this model, where age 13 is the reference category. As can be seen, the absolute correlations increased nearly 0.20 across these periods, and after age 24, the values are nearly indistinguishable. Nevertheless, we see a substantial drop in age 28, which might indicate that the organization of beliefs can be more variable at later ages than theorized in this article. I also tested whether the quadratic trend is driven primarily by the distribution of correlations at age 28. In doing this, I reestimated the

[15] There are substantial differences in such variables as attendance and non-affiliation, but this is expected as these are highly dynamic from adolescence to adulthood. For instance, it is known that church attendance significantly decreases in these periods (Desmond et al. 2010), and religious disaffiliation becomes much more probable (Pearce et al. 2019). Thus, these changes should not be seen as evidence of attrition.

mixed-effects models by dropping all observations at this age. The BIC and AIC comparisons show that, again, the quadratic model is a better fit than the linear model.

Procedures on Correlational Class Analysis

Correlational Class Analysis (CCA) is a network-partitioning technique used to discover groups of respondents or classes with similar survey response patterns (Boutyline, 2017). In contrast to other methods that focus on the distribution of responses, such as Latent Class Analysis or Hierarchical Clustering, CCA is adept at finding schematic patterns, meaning that it focuses on the similar *structure* of responses rather than the similar responses. Formally, the algorithm works as follows: (a) a network adjacency matrix of absolute row correlations is calculated, (b) statistically insignificant correlations are set to 0 (which helps reducing noise), (c) the resulting network is partitioned through a graph partitioning algorithm, and (d) each community is assigned with a class id. Boutyline's CCA (2017) is shown to work more efficiently than Goldberg's (2011) Relational Class Analysis, especially in detecting communities more accurately. CCA is also more appropriate to the NSYR since the latter does not use correlations between responses,

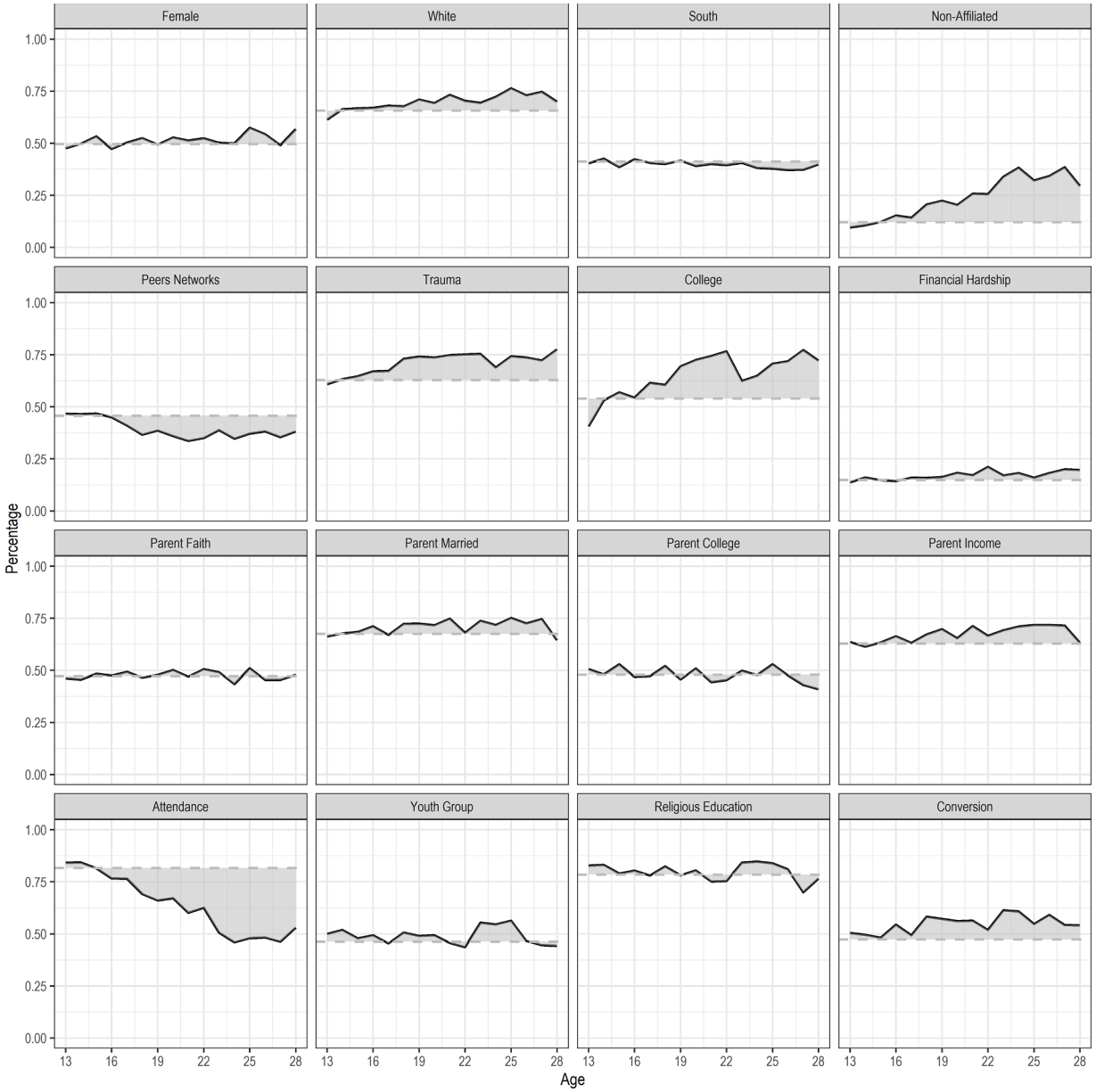

Fig. A.2. The Sample Composition.

Note: Each panel describes the relative position of one group (e.g. female = 1) to another group (e.g. female = 0) over time. Dashed lines denote the percentage of individuals in group 1 (e.g. the percentage of females) at Wave 1, while solid lines denote the actual percentage of these groups across the specific ages.

which are less susceptible to the violation of bivariate linearity between the variables.

I implemented the CCA for Wave 1, which resulted in four distinct classes. In doing this, I first rescaled all the variables from 1 to 5. For instance, *belief in God* is coded as 1-3-5 (instead of 1-2-3), or *views on religion* is coded as 1 and 5 (instead of 0 and 1). Then, I implemented the CCA algorithm with the significance cutoff equaled to 0.05. Fig. A.6 shows the correlation networks for each class, the details of which are depicted in the Results section. I also checked whether the partitioned model shows a better fit than the single correlation network model. Following Boutyline's (2017) recommendation, I used multiple group testing from structural equation modeling. Specifically, I tested whether using separate correlation matrices for each class improves model fit than using a single correlation matrix. I estimated two models, where the variances and covariances are constrained to be equal between classes in the first model. The results strongly prefer the CCA partitions according to both the BIC (170,692 < 170,696) and AIC (169,343 < 169,366) estimations.

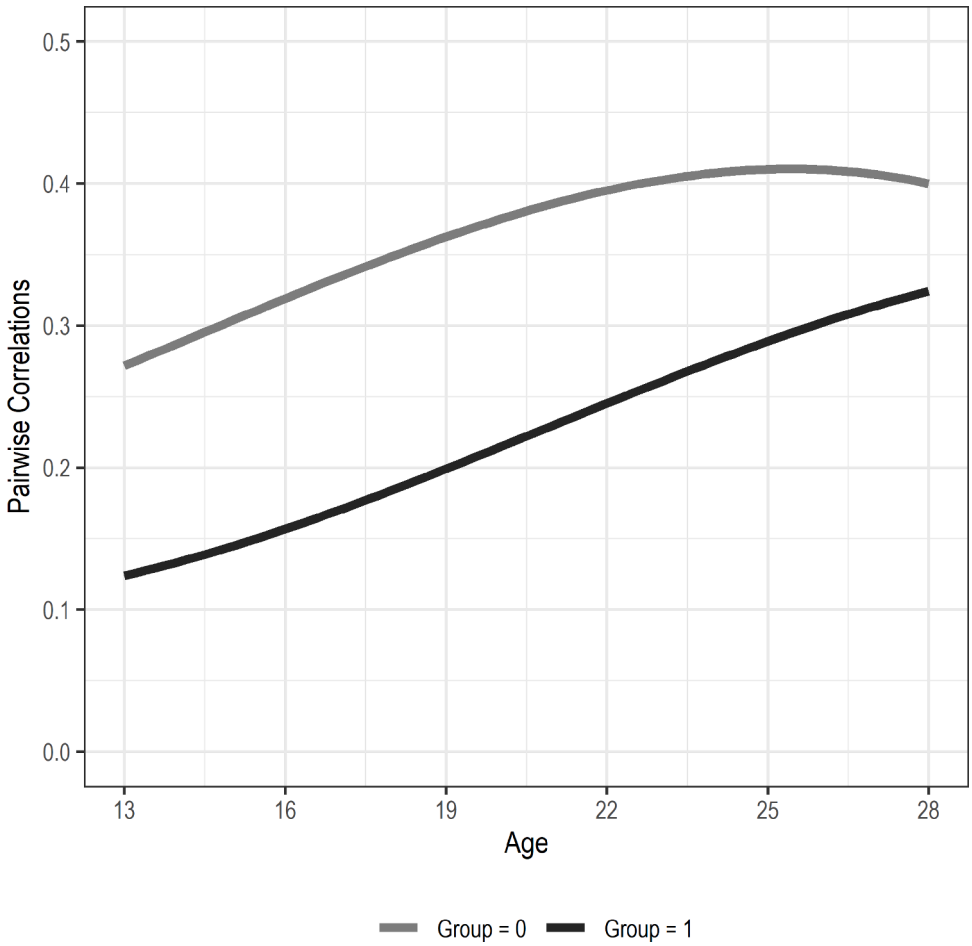

Fig. A.3. Belief Alignment Trends in High Attrition and Low Attrition Groups.

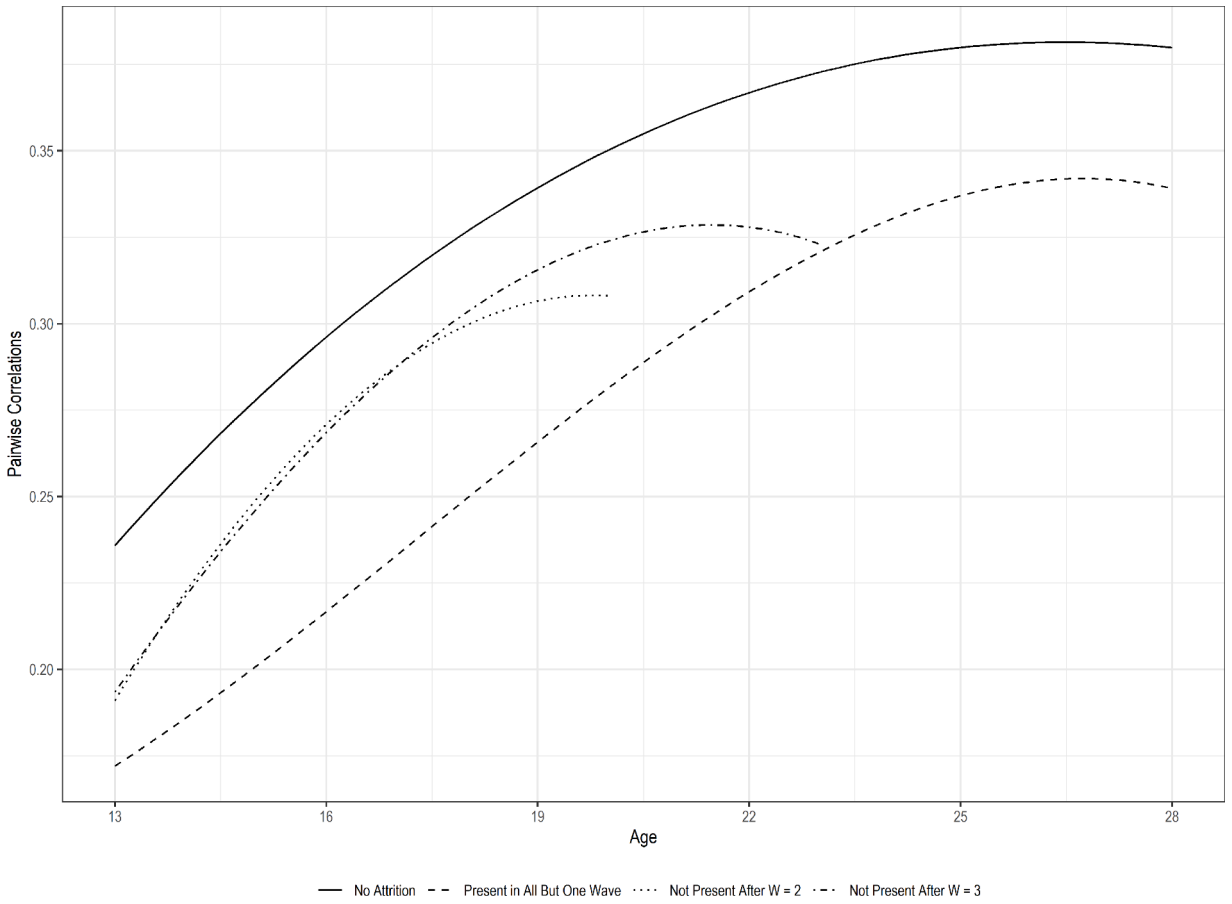

Fig. A.4. Belief Alignment Trends in Different Attrition Samples.

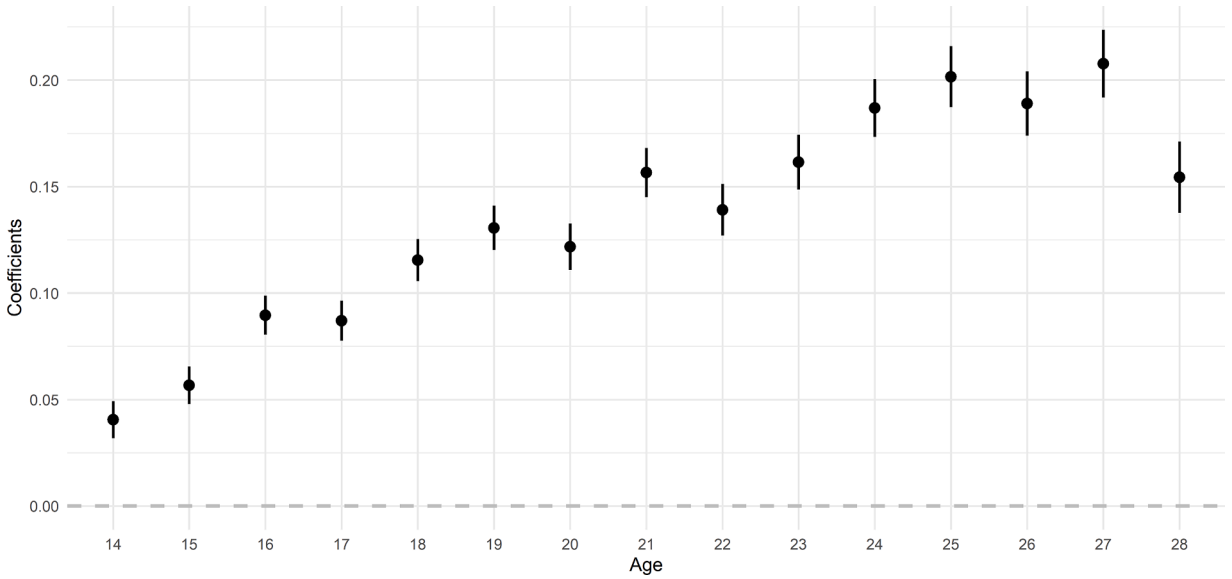

Fig. A.5. Coefficient Plot of the Mixed Effects Model with Dummy Age Predictors.

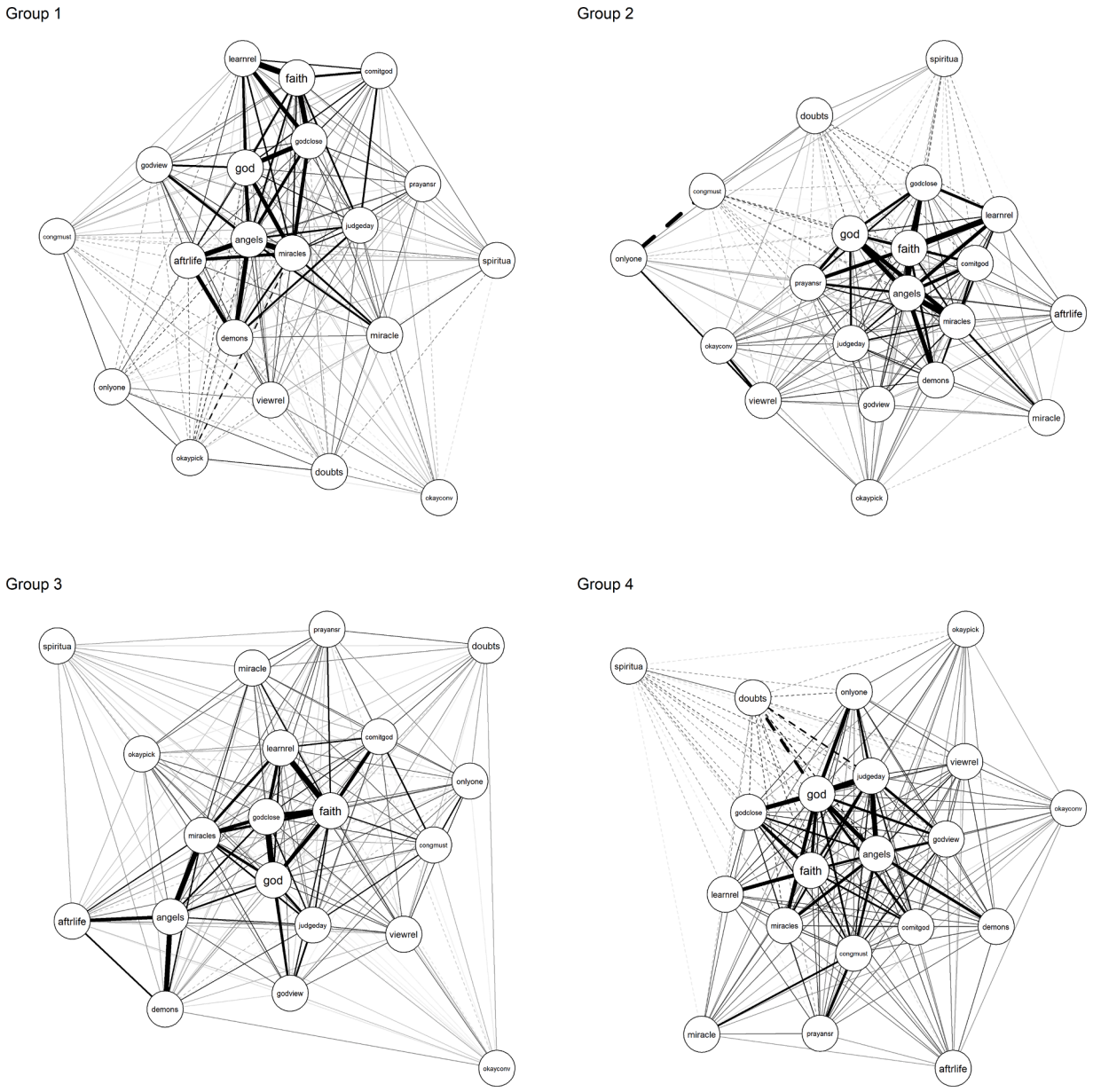

Fig. A.6. Class Partitionings from Correlational Class Analyses.
Note: Nodes represent religious beliefs and the edges between these nodes represent the correlations between these beliefs (solid lines denote positive correlations, while dashed lines denote negative correlations). The graphs are force-directed and depicted using the Fruchterman–Reingold algorithm.

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