

Number of Siblings and Participation in Voluntary Associations

DENIZ YUCEL

Department of Sociology, William Paterson University of New Jersey, 300
Pompton Road, 465 Raubinger Hall, Wayne, NJ 07470, USA.
E-mail: yuceld@wpunj.edu

While demographers have long been concerned with population increases, recent significant declines in fertility also warrant concern. So far, however, most researchers have focused on the causes of lower fertility rather than its consequences. This study makes a theoretical contribution by proposing a new conceptual framework, which suggests that growing up with fewer siblings is associated with more participation in voluntary associations. Using General Social Survey (GSS) from the US, the relationship between sibship size and participation in voluntary associations is empirically tested. It is found that there is a negative relationship between sibship size and participation in voluntary associations among American adults who have at least four siblings. These findings have implications for researchers who seek a better understanding of the consequences of declining sibship size, not only in the US but also in Europe. Specifically, these results have implications for several countries in Central, Eastern, and Southern Europe, regions that have experienced ‘the lowest-low fertility’ in the last two decades.

Introduction

Many scholars have expressed deep concerns about the decline of community and social cohesion in the United States. In his book *Bowling Alone*, Putnam¹ argues that younger American age cohorts, socialized in the wealthy economic conditions of the 1960s and onwards, are less inclined to engage in community life and politics, and also less likely to trust their fellow citizens. Putnam’s main message is that Americans have become increasingly disconnected from their families, friends, neighbors, institutions, and public life; in short, he argues that American communities are faced with a serious loss of social capital. According to Putnam, the loss of confidence and degradation of social ties have pervaded all aspects of society. As a consequence, Americans participate less actively in all kinds of voluntary associations, and they also refrain from typical political involvement, such as membership in political parties. Not only are memberships dwindling, especially among young people, but as a consequence of diminishing trust in government and the weakening of

party identification, voter turnout has also declined – a trend prior research has suggested is not limited to the United States, but also prevalent in other Western societies.^{2–4}

Despite Putnam's influential work on the 'decline of social capital' in the US, many scholars find that this decline in social cohesion is not just a phenomenon of American society, but also applies to other Western societies. In Lane's (Ref. 5, p. 3) words: 'The haunting spirit is manifold: [...] increasing distrust of each other and of political and other institutions, declining belief that the lot of the average man is getting better, a tragic erosion of family solidarity and community integration'. Using data from the 1991 World Values Survey across 32 countries, Schofer and Fourcade-Gourinchas⁶ tested empirically whether membership in voluntary associations varies among nations. The results show that people in different nations differ dramatically in their level of involvement in volunteer activities. In the same study, the percentage of individuals claiming membership in at least one voluntary association ranged from about 70% in the United States and most Scandinavian countries to less than 30% in Japan and in the southern European nations. This low participation in voluntary associations, mainly in Europe, was also supported in another study conducted in the UK. Using the British Household Panel Survey data from 1991 to 2007, McCulloch⁷ (2014) found a decline in membership over time for the 1955–1964 and 1965–1974 male cohorts, compared with men in earlier-born cohorts. Similarly, McCulloch⁷ found notably lower membership levels among women born between 1965 and 1974.

Alongside this decline in participation in voluntary associations, there has also been a significant decline in fertility rates. Over the last 50 years, the US fertility rate dropped from an average of four children per woman to 2.08, which is below the replacement level. However, this decline does not merely indicate that the average number of children born to a woman in her childbearing years is decreasing: it has far-reaching implications, both for individuals and society. Fertility rate at the replacement level means the population growth will be at a constant level. Fertility rate below the replacement level, however, indicates that generations cannot replace themselves. The rate of fertility decline, however, is much more severe in most European countries. The emergence of sustained lowest-low fertility^{8,9} – a Total Fertility Rate (TFR) at or below 1.3 – has occurred in several Southern, Central, and Eastern European countries. Based on a Council of Europe study (2001), 17 countries attained lowest-low fertility levels by 2002: three in Southern Europe (Greece, Italy, and Spain), ten in Central and Eastern Europe (Bosnia and Herzegovina, Bulgaria, Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia) and four in the former Soviet Union (Armenia, Belarus, Moldova, and Ukraine). The first countries to reach lowest-low fertility levels were Spain and Italy in 1993. They were then joined by Bulgaria, the Czech Republic, Latvia, and Slovenia in 1995, and by the other 11 countries between 1996 and 2002. In addition, several other countries in Central and Eastern Europe and the Balkans have very low TFR levels, and are expected to join (or re-join, in Russia's case) the lowest-low group soon: Croatia (1.34), Estonia (1.37), and Russia (1.32).^{8,9}

On the surface, we might expect declining fertility to be one more characteristic of a modern society that promotes the reduction of social capital. In this model, children who grow up in smaller families may become more individualistic (i.e., self-involved) and create a society with people who care less about others in their community or broader society. To explore this potential consequence, this study focuses on one dimension of social capital: participation in voluntary associations. A theoretical argument is developed here which argues that growing up with fewer siblings may promote more participation in voluntary associations. To test this framework this paper uses General Social Survey data from the US, and focuses on two research questions: (1) is growing up with fewer siblings associated with more participation in voluntary associations? (2) Does the relationship between sibship size and participation in voluntary associations continue after taking into account a variety of control variables? Despite the fact that this study is based on US data, future studies can potentially test this model using European data. Given the significant fertility decline over the last two decades as well as the decline in participation in voluntary associations in Europe (as pointed out above), testing the effect of sibship size on participation in voluntary associations in other contexts (especially Europe) becomes especially timely and important.

Not all participation in voluntary associations is equivalently influential at both the individual and aggregate levels. One of the most compelling studies of this influence comes from Paxton.¹⁰ Using data from the *World Values Survey* and the *International Yearbook of Associations*, Paxton found that isolated associations have a negative influence on democracy, whereas connected associations have a strong positive influence on democracy. In the same study, Paxton also concluded that a positive interaction exists between trust and associations, such that an increase in associations is negatively associated with democracy at low levels of trust, but positively associated with democracy at higher levels of trust. Overall, the results in this study provide evidence that the type of associations present in a country (isolated versus connected) has implications for its level of democracy. This result is also consistent with some prior research, which suggests that connected associations (i.e., bridging social capital) have positive influences for the overall society, such as lower crime rates¹¹ and higher economic activity.¹²

As Paxton's results suggest, it is important to distinguish between isolated and connected associations. The key feature of connected associations is the expansion of networks beyond a single association.¹³ Paxton¹⁰ measures the connectedness of associations by looking at how many of their members also participate in other associations. Connected associations are voluntary associations that are linked to other voluntary associations through these multiple memberships.¹⁰ This is also supported in older research, which argues that when individuals have multiple association memberships, it indicates some connection between the associations through individuals,¹⁴ creates a network across the associations,¹⁵ and is more likely to cross-cut social boundaries and promote contact with diverse others, compared with associations with fewer such ties.¹⁰ Isolated associations, on the other hand, are 'inherently bounded. The more dependent individuals are on close associates and kin, the more they are likely to think of the world in terms of "we" vs. "they," where "we" is a limited group'.¹³

A Direct Relationship between Number of Siblings and Participation in Voluntary Associations

I am the first researcher to propose and empirically test a new theoretical framework that suggests a direct relationship between number of siblings and participation in voluntary associations. However, prior researchers have suggested and empirically found that larger sibship size is associated with more kin-based social networks. Conversely, people with fewer siblings are expected to have less kin-based social networks.^{16,17} More kin-based social networks reduce the amount of non-kin in one's inner social network. Roberts et al.¹⁸ concluded that individuals with large familial networks (i.e., kin) have smaller networks of unrelated people (i.e., non-kin). This finding supports the argument that smaller families increase non-kin ties. Overall, people born into a large family place a premium on maintaining family contacts, and only extend their networks beyond the family if their total network size permits. Nevertheless, Roberts et al.¹⁸ also made the important point that this logic only applies if those born into large extended families actually maintain contact with a large number of their family members, a pattern that they empirically tested and confirmed.

This research argues that more interactions with kin-based networks will lead an individual to have less participation in voluntary associations. Social networks differ in terms of size, strength, and density. Simmel's concept of cross-cutting ties¹⁹ argues that each individual in society is associated in different affiliations with different individuals. Simmel distinguishes these social differences between individuals as either *intersecting* or *consolidating*. In the former group, individuals participate in social circles that intersect (overlap) a lot, whereas in the latter, they participate in social circles that overlap only a little. Smaller, more homogeneous societies characteristically have social groups that overlap/intersect a lot, so most people are in the same group with lots of the same people. On the other hand, larger, more diverse societies with much specialization or division of labor characteristically contain social groups that overlap/intersect only a little, so few people are in the same groups with each other. Having many shared characteristics between the ego and the alters (i.e., strongly related dimensions) is expected to consolidate (i.e., intensify) these social differences, thus reinforcing barriers to social intercourse. On the other hand, having few shared characteristics between the ego and the alters (i.e., weakly related dimensions) is expected to make group boundaries more permeable. As a result, intersecting social circles are expected to emerge, and these may form cross-cutting circles.

The strength of an interpersonal tie is defined as 'a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie' (Ref. 20, p. 1361). Blau²¹ also argues that we might expect individuals at all levels to be inclined toward homophily – the tendency to choose friends that are similar to oneself – and that homophilous ties are more likely to be strong. Using these approaches, through kin, individuals may share many overlapping social ties that are expected to increase in-group solidarity and reduce intergroup relations. Weak ties through non-kin interactions promote

cross-cutting ties, which makes the in-group boundaries more permeable. As a result, weak ties allow individuals to extend their social network to other different groups. Despite the fact that a person's ties with another network may not be as tight as those with his or her own group, being acquainted allows a level of communication and some trust. 'People with many weak ties are ... best placed to diffuse such a difficult innovation, since some of these ties will be local bridges' (Ref. 20, p. 1367). More kin in the network will intensify the group boundaries and encourage homogeneous ties.²²

Using Simmel's argument,¹⁹ these homogeneous ties are expected to discourage not only membership in diverse social groups but also membership in multiple groups at the same time. By contrast, networks with fewer kin are more likely to be heterogeneous and individuals in such groups are more prone to move in different circles due to their instability. The number of voluntary associations one participates in is a proxy to determine the connectedness of the association. Thus, the higher the number of associations, the more connected one will be. Using these arguments, growing up with more siblings (forming more kin-based social networks) is expected to be positively linked to isolated associations (negatively linked to connected associations), and growing up with fewer siblings (forming less kin-based social networks) is expected to be negatively linked to isolated associations (positively linked to connected associations).

Prior research has also suggested that connected associations are important for society. Distinguishing between connected and isolated associations has been important in predicting different outcomes, such as democracy,¹⁰ pro-social behavior,²³ economic activity,¹² and generalized trust.^{13,24} Audia and Teckchandani's¹² study on the varying effects of connected versus isolated associations is particularly valuable here. Using data from the Quarterly Census of Employment and Wages (QCEW), they test the effect of connected and isolated voluntary associations on economic activity. The results suggest that connected voluntary associations have a positive effect on the number of manufacturing establishments, whereas isolated voluntary associations either have a negative effect or do not have any effect.

Given these contexts, I propose the following hypotheses.

Hypothesis 1: Growing up with fewer siblings will lead to more participation in voluntary associations. Specifically, adults with at least one sibling will have significantly less participation in voluntary associations than those who have no siblings.

Hypothesis 2: The relationship between having at least one sibling and participation in voluntary associations will remain negative even when other variables are controlled for.

Data and Methods

To test these research questions, I use the GSS data because it contains information on participation in voluntary associations over an almost 30-year period (1972–2010). The GSS is a face-to-face survey of the non-institutionalized United

States adult population. GSS has a repeated cross-sectional design; that is, different individuals (and thus different samples) from the same population respond to the survey. Moreover, this dataset is well-known for monitoring social change within the United States, and is widely regarded as a major source of data on societal trends. Specifically, the analytical models contain a total of 24,168 respondents who report participation in voluntary associations. The indicators are available for 20 years of observation, ranging between 1978 and 2010, where each year samples a different set of individuals.

Measurement

Dependent Variable

The dependent variable used in this study is participation in voluntary associations. Participation in voluntary associations (also referred to as voluntary organizations) reflects the objective ties between individuals and their associations with each other. Paxton^{10,13} classifies voluntary associations as connected or isolated based on the number of connections to other voluntary associations stemming from the multiple memberships of their members. I use the number of voluntary associations in which the respondent participates as the indicator to operationalize participation in voluntary associations. The higher the rate of participation in voluntary associations, the higher is the connectedness of voluntary associations. The total number of voluntary associations the individual participates in ranges from 0 to 16 total memberships. This variable, however, is highly skewed, as around three-quarters of the sample participated in three or fewer voluntary associations. Thus, I top coded this variable so that those who have at least three memberships are given a value of 3. So, the *associations* variable has a score that ranges between 0–3 (0 indicates no participation; 3 indicates participating in at least 3 voluntary associations).

Independent Variable

The main independent variable is the number of siblings. The respondent is asked the following question: ‘How many brothers and sisters did you have? Please count those who were born alive, but no longer living, as well as those alive now. Also include stepbrothers and stepsisters, and children adopted by your parents.’ This indicator is also highly skewed; around three-quarters of the sample reported having five or fewer siblings. Thus, I also top coded this variable, so that those who have at least five siblings are given a value of 5. As a result, the recoded *number of siblings* has a score that ranges between 0–5.

Coding *number of siblings* as a continuous variable, however, assumes that there is a linear relationship between the number of siblings and voluntary associations. To explore the possibility that this relationship is instead nonlinear, I chose to use binary dummy variables instead. Using the binary variable approach, I divide sibship size into six categories: those who have (i) no siblings (reference category); (ii) one sibling; (iii) two siblings; (iv) three siblings; (v) four siblings; and (vi) at least five siblings.²⁵

Control Variables

Isolating the causal effect of siblings is a special challenge. Given that the independent variable cannot be manipulated, we are left with observational approaches. I employ the standard practice of controlling statistically for many potentially confounding variables. Table 1 summarizes the definitions and descriptives of the control variables I selected for this study, based on their association with the number of siblings and participation in voluntary associations in earlier empirical research studies. These are: the respondent's education, current family income, gender, whether the respondent had ever been separated or divorced, age, race, respondent's family structure at age 16, type of residence (urban or rural), religious affiliation, region of current residence, frequency of church attendance, year of observation, employment status, immigrant status (natives versus foreign-born), and political ideology.^{13,26–31}

To handle missing data, I employed multiple imputation in all of my analyses to address the research questions. The advantage of multiple imputation is that this method allows the researcher to use all of the data.³² After employing multiple imputation, the final sample was 24,168. Statistical analyses were performed using STATA 11.

Results

Descriptive Statistics

The descriptive statistics (shown in Table 1) are based on one of the imputed datasets.

The sample was 84% White, 13% Black, and 3% of respondents identified with a different race. Around 33% of the respondents were between 30–44 years old. Around 1 in 5 respondents (21%) in this sample had either no siblings (6%) or one sibling (15%). The majority of respondents in the GSS data are from older cohorts, however, and so the modal number of siblings was at least five (35%), while 18% had two siblings, 15% had three siblings, and 11% had four siblings. On average, the mean age of the respondents is around 45. The sample includes 44% men.

Analyses

Is Growing Up with Fewer Siblings associated with More Participation in Voluntary Associations?

Models 1 and 2 in Table 2 presents the results of the unadjusted and adjusted models that predict participation in voluntary associations, respectively. The unadjusted model (Model 1) suggests that there is no difference in participation in voluntary associations between those who have three siblings or fewer and those who have no siblings. The results suggest that respondents with four siblings ($b = -0.187$, $b < 0.001$) and those with at least five siblings ($b = -0.346$, $p < 0.001$) participate in fewer voluntary associations than those with no siblings.

Table 1. Descriptive statistics of dependent, independent, and all other control variables in the analyses ($N = 24,168$)

Variables	Mean/ Percentages* (Standard Deviations are in parentheses)	Description
Associations	1.41 (1.18)	‘We would like to know whether or not you are a member of each of the following organizations, (1) fraternal group, (2) service group, (3) veteran group, (4) political club, (5) labor union, (6) sports club, (7) youth group, (8) school service, (9) hobby club, (10) school fraternity, (11) nationality group, (12) farm organization, (13) literary or art group, (14) professional society, (15) church group, and (16) any other.’ (1 = Yes, 0 = No). The author added all 16 items to measure the number of associations. The total scale is skewed, so the author top-coded those who participate in at least three associations and coded it as 3. Thus, the total scale ranges from 0–3 (0 = no participation, 1 = one association, 2 = two associations, 3 = at least 3 associations)
Siblings	4.17 (1.65)	Respondents were asked: ‘How many brothers and sisters did you have? Please count those born alive, but no longer living, as well as those alive now. Also include stepbrothers and stepsisters, and children adopted by your parents.’ (No sibling [reference]: 0.05; One sibling: 0.16; Two siblings: 0.18; Three siblings: 0.15; Four siblings: 0.11; Five or more siblings: 0.35).
Gender	0.44	1 = Men, 0 = Women
Race		(White [reference]: 0.84; Black: 0.13; ‘Other’: 0.03).
Family structure of the respondent at age 16	0.71	1 = Those living with two biological parents; 0 = any other family structure.
Education		(Respondent had less than a high school degree: 0.20; Respondent is a high school graduate: 0.52; Respondent completed some college: 0.06; Respondent had college degree or more [reference]: 0.22).
Income (logged)	44,870 (36,016)	‘What is your family income in constant dollars (i.e., inflation-adjusted family income)?’
Age of the respondent		

		Age of the respondent at the time of the interview (Age between 18–29 years [reference]: 0.21; Age between 30–44 years: 0.33; Age between 45–54 years: 0.16; Age 55 years and older: 0.30).
Ever been divorced or separated	0.17	‘Have you ever been divorced or separated?’ (1 = Yes, 0 = No).
Urban	0.37	The type of place the respondent currently lives. If the place had at least 50,000 residents, I coded it as urban. If less than 50,000 residents, then I coded it as rural (1 = Urban, 0 = Rural).
Church attendance	5.19 (2.70)	Respondents were asked, ‘How often do you attend religious services?’ 1 = more than once a week, 2 = every week, 3 = nearly every week, 4 = 2–3 times a month, 5 = once a month, 6 = several times a year, 7 = once a year, 8 = Less than once a year, 9 = never.
Religion		Respondents were asked, ‘What is your religious preference? Is it Protestant, Catholic, Jewish, some other religion, or no religion?’ I created several dummy variables: Mainline Protestant (reference category), Evangelical Protestant, Catholic, Jewish, Other religion (Buddhism, Hinduism, Other Eastern, Moslem/Islam, Orthodox-Christian, Christian, Native-American, Inter/non-denominational, Other), and No Religious Affiliation. (Mainline Protestant [reference]: 0.22; Other religion: 0.06; No religion: 0.11; Catholic: 0.24; Evangelical Protestant: 0.26; Black Protestant: 0.09; Jewish: 0.02).
Region		‘In what state or foreign country do you currently live?’ 1 = South, 0 = elsewhere (South: 0.35).
Year of observation	12.26 (5.92)	There are twenty years of observation, ranging from 1 = year 1975 to 20 = year 2008.
Employment status	0.63	1 = Yes, 0 = No.
Foreign born	0.08	1 = Yes, 0 = No.
Political ideology	3.87 (1.36)	Respondents were asked, ‘We hear a lot of talk these days about liberals and conservatives. I’m going to show you a 7-point scale on which the political views that people might hold are arranged from 1 = extremely liberal to 7 = extremely conservative. Where would you place yourself on this scale?’ 1 = extremely conservative, 2 = conservative, 3 = slightly conservative, 4 = moderate, 5 = slightly liberal, 6 = liberal, 7 = extremely liberal.

Table 2. Unstandardized OLS regression coefficients from models predicting participation in voluntary associations ($N = 24,168$)

	Model 1 Bivariate Regression (Without the control variables)	Model 2 ALL variables (With the control variables)
Independent variable		
One sibling	0.059 (0.047)	-0.016 (0.043)
Two siblings	-0.085 (0.047)	-0.082 (0.042)
Three siblings	-0.085 (0.047)	-0.080 (0.043)
Four siblings	-0.187** (0.050)	-0.153* (0.060)
Five or more siblings	-0.346** (0.044)	-0.133* (0.050)
Control variables		
Age (30–44)		0.359** (0.036)
Age (45–54)		0.734** (0.043)
Age (55 +)		1.022** (0.039)
Year of observation		-0.035** (0.002)
Respondent is Male		0.254** (0.018)
Ever been divorced or separated		-0.072* (0.027)
Lived with two parents at age 16		0.025 (0.020)
Family Income (logged)		0.197** (0.015)
Urban residence		-0.021 (0.019)
Employed		0.014 (0.030)
Foreign born		-0.247** (0.049)
Political ideology		0.060** (0.010)
South		-0.331** (0.027)
Evangelical Protestant		-0.438** (0.037)
Black Protestant		-0.481** (0.069)
Catholic		-0.317** (0.037)
Jew		-0.430** (0.092)
Other		-0.192** (0.059)
Nonaffiliated		-0.127* (0.048)
Church attendance		0.123** (0.003)

Table 2: (Continued)

	Model 1 Bivariate Regression (Without the control variables)	Model 2 ALL variables (With the control variables)
Respondent is Black		-0.100** (0.028)
Respondent is Other		-0.134 (0.056)
Less than high school degree		-1.001** (0.030)
High school graduate		-0.588** (0.025)
Some college		-0.304** (0.046)
Sample Size	24,168	26,168
Adjusted R ²	0.09	0.27
DF	5	30
Chi-square	60.22	199.23

Note: Standard errors are in parentheses.

Model 1 shows the bivariate relationship between number of siblings and participation in voluntary associations (without the control variables). Model 2 includes all the control variables in addition to the number of siblings.

** $p < 0.001$, * $p < 0.01$.

Does the Relationship between Fewer Siblings and More Participation in Voluntary Associations Exist after taking into Account a Variety of Control Variables?

After taking the control variables into account, the size of the coefficients for having four and at least five siblings were significantly reduced compared with Model 1, but both coefficients remain negative and in the expected direction. The coefficient sizes for having four and for having at least five siblings were reduced in the adjusted Model 2. After taking into account the control variables, the results suggest that respondents with four siblings ($b = -0.153$, $b < 0.01$) and at least five siblings ($b = -0.133$, $p < 0.01$) continue to participate in fewer voluntary associations than those with no siblings, but the coefficient sizes as well as the significance levels are both reduced.

As for the control variables, they are in the expected direction. Both income and education are positively associated with participation in voluntary associations. There is a racial difference; Black respondents participate in significantly fewer voluntary associations than Whites. In addition, males and those who attend church more participate in significantly more voluntary associations, whereas having been divorced or separated reduces participation. Mainline Protestants participate in significantly more voluntary associations compared with respondents with other religious affiliations. Foreign-born individuals and those who live in the Southern US were found to participate in significantly fewer voluntary associations. Older individuals and those with more liberal political ideology participate in significantly

more voluntary associations. Adding these variables improved the previous model significantly by increasing the adjusted R^2 to 27% in Model 2, compared with 9% in Model 1.

Discussion and Conclusion

In this study, I have extended the prior literature by formulating a new theoretical framework that suggests growing up with fewer siblings may promote more adult participation in voluntary associations. This approach makes several important contributions. First, this research represents the first attempt to study the relationship between number of siblings and participation in voluntary associations. Among the American respondents polled by the GSS, the results suggested that adults who have either four or at least five siblings have significantly less participation in voluntary associations than those who are only children. Second, this conceptual framework is empirically tested with a rich, nationally representative dataset of US adults, which contains information on participation in voluntary associations over a 30-year period. Third, if this conceptual framework is accurate, it has crucial implications for contemporary families. On one hand, Americans have already reduced their family size significantly. Whereas the majority of Americans used to be raised in large families,³³ most are now raised with zero to two siblings.³⁴ There has been some concern about what this trend means for future generations, and its potential effects. On the other hand, it has been empirically tested that there has been a decline in social capital: specifically, a decline in trust in individuals,³⁵ a decline in group membership,¹ and shrinking social networks for both kin and non-kin.³⁶ Overall, these results suggest that there is social isolation in the USA.

If the analyses confirm the theoretical framework, this would mean that policy-makers may be less worried about this trend in fertility decline. These findings have implications for researchers who seek a better understanding of the consequences of declining sibship size, not only in the US but also in other developed Western countries. Specifically, these results have implications for Europe, which has experienced significant fertility decline in the last two decades. Based on these results, policymakers might not need to be worried about this trend – on the contrary, the fertility decline might actually be beneficial for contemporary society by creating higher voluntary participation. There is a caveat, however: this conceptual framework is one possible mechanism that links fertility decline to social capital among many other variables that could predict participation in voluntary organizations. With this in mind, the results should be interpreted with caution, as reduced family size is not unconditionally associated with higher participation in voluntary associations.

Despite these contributions, there are also limitations in this study. Using pooled cross-sectional data that span over 30 years might have created some limitations, as there might have been macrolevel variations in societies over time, which the current analyses did not control for. As a result, the key variables of participation in voluntary associations and number of siblings, as well as some of the control

variables in the current analyses, could have changed over time. If this is the case, then the relationship between sibship size and participation in voluntary associations is likewise expected to change over time. One way to approach this issue is to test for interactions with each year of observation. Using GSS data and testing such interactions with different years of observation, future researchers could test whether or not (and how) these current results would change over a 30-year time period. However, even after taking into account all of the variables in this study, the models explain a little over one-quarter of the variance in participation in voluntary associations. One reason for this might be that in this study I have only focused on individual variables. Future researchers could advantageously use some contextual variables, such as the characteristics of a respondent's community, neighborhood, and workplace, to predict participation in voluntary associations. Exploring these other characteristics in detail may be quite important for laying the foundation on which more participation in voluntary associations is built in adulthood.

Another limitation is that this study was based on a US sample. Given the importance of contextual effects, future researchers should consider cross-national datasets. Considering that membership in voluntary associations⁶ and fertility rates are both significantly lower^{8,9} in most countries in Europe compared with the US, with available data, future studies could use this study as a potential model to test whether a decline in sibship size promotes more participation in voluntary associations in Europe. Exploring the effect of number of siblings on participation in voluntary associations might help researchers to reveal one positive side to declining fertility, which is promoting more participation in voluntary associations and thus creating more civic engagement. In addition, in the current study I could not empirically test whether or not social network composition mediates the effect of number of siblings on participation in voluntary associations (as hypothesized in the proposed theoretical model). The reason for this is that the questions that measure social network composition are not asked at every wave of data collection in GSS. Therefore, the sample that actually includes measures on social network composition is small and hence not comparable to the total sample size in Table 2. Considering that strong family ties have been found to be associated with less connected (more isolated) voluntary associations, future researchers could either use different datasets that include rich information to measure different aspects of social network composition, or also include family ties in the analyses that predict participation in voluntary associations.

With a trend toward smaller families in American society, where almost one in five children grow up without any siblings, these findings also suggested that smaller families can be enjoyed without concern about a negative effect on participation in voluntary associations in adulthood. Some prior researchers have suggested that siblings are a good source of socialization,^{37,38} and that only children are expected to have social skills and personality deficits during childhood.³³ Despite the fact that most prior researchers have had mixed and inconclusive results about this argument,³⁹⁻⁴¹ if there are real deficits for only children in early childhood, they do not extend far enough to predict participation in voluntary associations in adulthood. On the contrary, the results find that adults who have at least four siblings

significantly participate in less voluntary associations, which overall, indicates the positive effect of growing up with fewer siblings.

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About the Author

Deniz Yucel is Assistant Professor of sociology at William Paterson University of New Jersey. He specializes in the sociology of family and education, child development, demography, the intersection of work and family, particularly the consequences of the family–work struggle on marital outcomes, and social stratification, particularly some of the early processes of social stratification within the life course. He uses quantitative methodological approaches such as dyadic data modeling, confirmatory factor analyses and structural equation modeling, and statistical software packages such as STATA, SPSS and AMOS.