Background: Depictions of the "Second Demographic Transition"(Lesthaege 1995; Van de Kaa 1987) highlight large-scale cultural change as a factor in reconfiguring the nature and processes of fertility. One dimension of this is the identification of both cultural change and cultural variation around ideas of personhood and the meaning of relationships, including inter-generational ones, as a key determinant of how relationships develop and consequent fertility behaviors. A complementary dimension emphasizes the potential of cultural change to shape and re-shape long-standing relationships between socio-economic status and fertility. While existing theory articulates multiple dimensions of cultural change and speculates about the links between cultural and socioeconomic resources in shaping fertility behavior, there have been few attempts to either explicitly measure "culture" as collective beliefs (see Hammel 1990 for a discussion of the use of culture in demographic research) or to model culture and socioeconomics as joints processes. Equally important, there is little cross-national, comparative work that would meaningfully capture variation in culture and relate it to individual fertility.

Against this backdrop, this research makes three important contributions. First, we explicitly measure culture in the form of population values. Here, we focus on the ongoing articulation of large-scale cultural change with respect to "materialist" or "postmaterialist" value orientations. Given that arguments for a second demographic transition emphasize a change in the cultural meaning of fertility, a change from children as economic asset and a source of management for socioeconomic risks over the life course (see discussion in Friedman, Hechter and Kanazawa 1994) to fertility as a means of self-actualization (Lesthaeghe and Surkyn 1988), there is a clear conceptual link with Inglehart and colleagues juxtaposition of a materialist orientation that emphasizes security and minimized socioeconomic risk and a post-materialist orientation that emphasizes self-expression, actualization, and quality of life.

A second contribution is the development of a macro-micro model that explicitly incorporates direct measures culture and connects to individual socioeconomic and sociodemographic characteristics in the production of fertility behavior across a wide array of countries and at various time periods over the last 30 years. In doing so, we explicitly examine cross-level relationships that relate educational attainment, a widely recognized determinant of fertility behavior and long-standing proxy for individual socioeconomic status, and birth cohort/age to broader cultural context. In doing so, we offer a multi-level perspective that explicitly connects culture and social structure in the production of individual fertility.

Third, we explicitly examine the robustness of this model in a cross-national, comparative context. Here, we elaborate the model to examine variation in culture-structure linkages across countries with different levels of socioeconomic development. The argument that is examined here is whether culture has a stronger impact upon fertility behavior when life course socioeconomic risks *in general* are lower, as would be the case in countries with higher socioeconomic development.

Specific research questions include:

1) Does a materialist/post-materialist culture influence the fertility behavior of individuals;

2) Does a materialist/post-materialist culture condition the effect of education and cohort/age on fertility behavior?

3) How do these effects vary by country, specifically with respect to general socioeconomic development?

Data: The data that we use comes from the World Values Survey, a worldwide investigation of sociocultural and political change. Over its history, **i**nterviews have been carried out with nationally representative samples of the publics of almost hundred societies on all six inhabited continents. Each wave of data includes national samples of at least 1,000 people and includes detailed information about basic values and beliefs of the people of each society that uniquely allow for cross-national comparison and in specific instances cross-time comparisons within countries.

The current data includes five waves of the Values Surveys, carried out in 1981, 1990-1991, 1995-1996, 1999-2001 and 2005-2007. Each wave contains a non-random sample of countries but collectively now represents more than 80 independent countries that include almost 85 percent of the world's population. Importantly, this unique database makes it possible to examine cross-level linkages, specifically between public values, individual characteristics, and individual demographic behavior. As such, it provides a unique opportunity for exploring the role of culture, the centerpiece of thinking around the second demographic transition, in individual fertility behavior.

Focal Measures: Our focal independent variable is the Ingelhart's widely-used *postmaterialist* index. This is a composite index that captures what individuals personally value with a juxtaposition between values oriented around issues of physical security and safety (i.e., materialism) and belonging, self-expression and quality of life issues (i.e., post-materialism) (Abramson and Inglehart 1987; Inglehart 1981; 2000; Inglehart and Abramson 1999). Importantly, with the multi-country and multiple time period character of the sample, this index can be aggregated up by taking the country-period mean of the sample as characteristic of where a country falls on the materialism-postmaterialism index. Preliminary factor analysis shows considerable across-nation heterogeneity in post-materialist orientation and hence supports the argument that country averages in postmaterialism significantly captures variation in collective beliefs that are the standard definition and operationalization of culture.

A second focal independent variable is *educational attainment*. Educational attainment has a long tradition in fertility research as both an independent determinant of fertility behavior and as a proxy for socioeconomic status (Basu 2002). Although there is variation in the specific forms of educational systems across countries, there is increasing evidence of isomorphism and increased similarity in the generalized structure of education across nations (Meyer et al 1977; Ramirez and Boli 1987). Given this, total years of education is a robust and powerful measure of variation in the extent of schooling within a population and has reasonable validity for a multi-national sample.

Our focal dependent variable is the total number of children. This measure also has a long history of use in demographic research, including cross-national research and is an individual analog to population estimates of Total Fertility Rates (TFR). Its main

limitation is that it characterizes fertility in a given period and hence blends together past fertility behavior with uncompleted fertility. Given the universal power of age as a determinant of fertility, a control for age mitigates to a large degree both cohort differences in completed fertility and the potential bias of uncompleted fertility among the younger members of a sample.

Control Variables: In addition to age, our models also control for other sociodemographic factors that influence fertility behavior. These include sex, marital status, type of employment and a measure of period.

Analytic Strategy: Given that the data we use has at least one, country, and potentially two, period, pooling components, the use of conventional OLS regression approaches that assume independence of units would generate biased estimates of standard errors and hence increase the likelihood of Type I errors (i.e., falsely rejecting the null hypothesis that the true value of a coefficient is zero). To mitigate, we use a random-effects approach. Here, individual outcomes are expressed as a global mean, a group specific deviation from the mean, and an individual specific deviation from the group specific mean. More formally,

$$Y_{ij} = \mu + \omega_j + \upsilon_{ij}$$

where Y_{ij} is the outcome (e.g., number of children), μ is the global mean (e.g., average number of children for the whole sample, ω_j indexes the difference between average in a given country *j*, and υ_{ij} is the individual specific error that indicates the deviation of the *i*th individual from the average of the *j*th country. Such a model is easily elaborated to include covariates at both an aggregate level (e.g., country GGP) and individual level (e.g., educational attainment), as in

$$Y_{ij} = \mu + \beta GGP_j + \gamma Education_{ij} + \omega_j + \upsilon_{ij}$$

where Y_{ij}, μ, ω_j, υ_{ij} have the same definition as earlier while β is the effect of country level GGP on individual outcomes and γ is the effect of individual level education on individual outcomes. This type of structure generates a standard multilevel model and can be elaborated even further to consider interactions both within- and across-levels.

Results: The first model simply examines individual level determinants of total number of children in the WVS data (see table 1). In all respects, these data conform to conventional wisdom about the determinants of fertility. Educational attainment has a strong negative association ($B = -.116$, $p < 0.001$), total number of children has declined over time ($B = -.0167$, $p < .001$), total number of children increases with age, which is likely both a cohort effect (where older cohorts had more children) and a right censoring effect (where younger women have yet to complete their fertility), being married ($B = 1.226$, $p < .001$) and being formerly married ($B = .862$, $p < .001$) are associated with having more children, and those who active in the labor force have more children, although the latter effects are quite small.

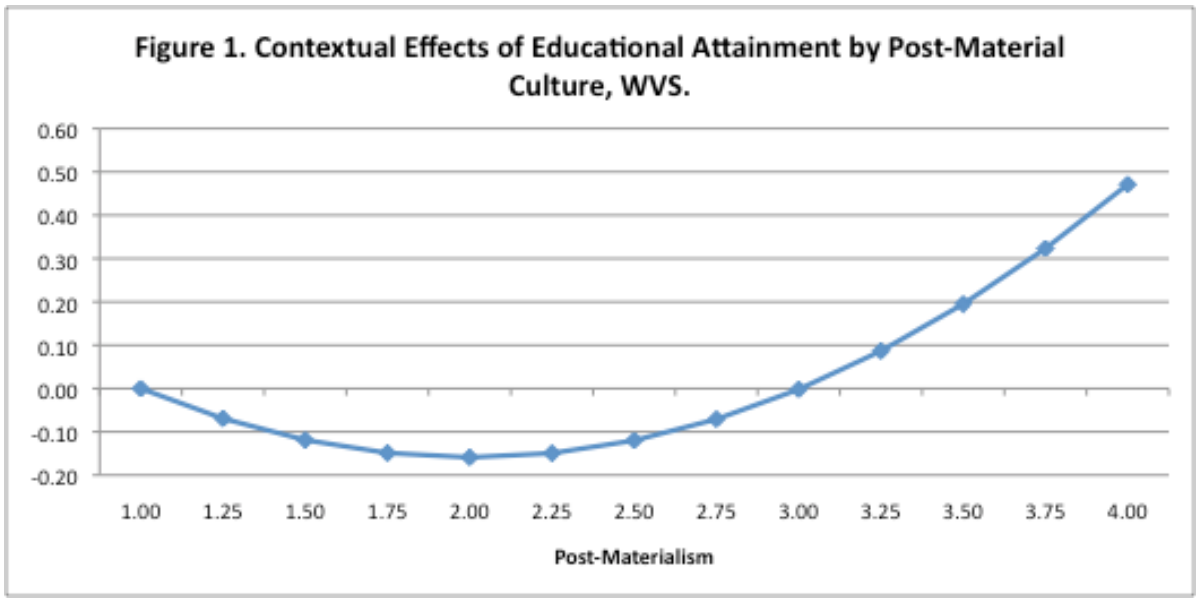
Table 1. Random-Effect Regression Coefficients: Number of Children and Educational Attainment, WVS 1989-2005.

Coefficients		
	Educational Attainment	-0.116***
		(0.0120)
	Year	-0.0167***
		(0.00581)
	Female	0.188***
		(0.00633)
	Age	0.0489***
		(0.000227)
	Married	1.226***
		(0.00733)
	Divorced/Separated	0.862***
		(0.0151)
	Full-time Worker	0.0312***
		(0.00741)
	Part-time Worker	0.0553***
		(0.0124)
	Student	0.0159
		(0.0138)
	Constant	-0.237
		(0.148)
Variance Components		
By: Country		
	SD(Educational Attainment	.1096463 .0087356
	SD(Year)	.0414173 .0041626
	SD(Constant)	1.189663 .1020585
	SD(Residual)	1.356411 .002113
	Observations	206,284
	Number of groups	85
	Standard errors in parentheses	
	*** p<0.01, ** p<0.05, * p<0.1	

Table 2 presents results from a preliminary multi-level model. An initial interesting finding is that there is a strong curvilinear relationship between country level, aggregate materialism/post-materialism and individual fertility. Here, an initial model with simply the linear association showed no significant relationship, but an inspection of the regression residuals illuminated a power curvilinear trend (B = 4.388, $p < .001$, B-squared = -1.056, $p < .001$). Equally interesting, the post-materialist effect is only seen at the aggregate level, the level of culture. Whether any given respondent has a materialist or post-materialist orientation is inconsequential for their fertility behavior (and we tested both a linear and quadratic specification). The nature of the effects for a post-materialist

culture suggests that fertility is greatest in the ambivalent range of the scale. In other words, fertility is suppressed when living in a cultural context that either strongly materialist in orientation or strongly post-materialist. Importantly, this effect is independent of the traditional individual level drivers of fertility, including education and age and independent of general trends in fertility over time.

The second aspect of the research and the last part that we report here examines micro-macro- contingencies, specifically whether cultural context conditions the effect of education on number of children. Consistent with expectations, education has a strong interaction with cultural context. Because interactions with quadratic functions are difficult to interpret, we calculated the implied effects and graphed them (see Figure 1).



The resulting graph show that education has variable effects on fertility and the strongest negative effects, the effects most commonly reported, are seen during the middle range of the materialism/post-materialism index (what some refer to as the range of ambivalence or transition). Equally interesting, educational attainment in a context of high post-materialism has a null or even positive effect on fertility (B = 0.00, *ns* at PMI = 3.0, B = .20, $p < .01$ at PMI = 3.5). Such effects suggest an important intersection of social structure and culture and highlight the capacity of multi-level models that blend socioeconomic and ideational factors to better understand fertility behavior.

Future Directions: The final paper and PAA presentation will elaborate these findings in three ways. First we will explore other aspects of culture and beliefs that would be anticipated by discussions around the second demographic transition as important for understanding contemporary fertility behavior. Second, we will elaborate the current model by first examining age/cohort contingencies both with respect to the general effect of post-materialist culture on fertility and with respect to the interaction of education and culture. Finally, we will consider a second dimension of context, specifically socioeconomic development, and examine whether this is a conditioning factor for the effects of culture on fertility.

Table 2. Multi-Level Random-Effect Regression Coefficients: Number of Childrenand Educational Attainment, WVS 1989-2005.

Coefficients	**Individual Level Effects**		**Multilevel Effects**	
	Educational Attainment	0.475***	**Post-Materialism**	**-0.00318**
		(0.0394)		**(0.0115)**
	Year	-0.0176***	**Post-Materialism - Squared**	**-0.000506**
		(0.00134)		**(0.00256)**
	Age	0.0699***	**Mean(PMI)**	**4.388*** **
		(0.000598)		**(0.297)**
	Married	1.081***	**Mean(PMI)-Squared**	**-1.056*** **
		(0.0119)		**(0.0738)**
	Divorced/Separated	0.767***	**Education X Mean(PMI)**	**-0.633*** **
		(0.0219)		**(0.0408)**
	Full-time Worker	-0.233***	**Education X Mean(PMI)-Squared**	**0.158*** **
		(0.0111)		**(0.0103)**
	Part-time Worker	-0.133***		
		(0.0170)		
	Student	-0.0683***	**Constant**	**-4.648*** **
		(0.0180)		**(0.297)**
	Observations	67,733		
	Number of groups	81		
	Standard errors in parentheses			
	*** p<0.01, ** p<0.05, * p<0.1			