



# *Maryland Population Research Center*

WORKING PAPER

## Assessing the Predictive Value of Fertility Expectations through a Cognitive-Social Model

PWP-MPRC-2014-013

October 2014



Authors:

**Heather M. Rackin**  
Louisiana State  
University

**Christine A.  
Bachrach**  
University of  
Maryland



# Assessing the Predictive Value of Fertility Expectations through a Cognitive –Social Model

Heather M Rackin\*  
Christine A. Bachrach\*\*

\*Department of Sociology, Louisiana State University; [hrackin@lsu.edu](mailto:hrackin@lsu.edu).

\*\* Department of Sociology; University of Maryland; [chrisbachrach@gmail.com](mailto:chrisbachrach@gmail.com).

Working Paper: Currently under review at *Population and Development Review*

## **Acknowledgements**

We appreciate the comments and helpful advice on this paper from Michael S. Barton, Yoshinori Kamo, S. Philip Morgan, Ilene S. Speizer, and participants in a session at the 2014 Annual Meeting of the Population Association of America and a colloquium in the Department of Demography at UC Berkeley.

## **Abstract**

This paper grounds its analysis in a novel model (Bachrach and Morgan 2013) that suggests that responses to questions about fertility intentions may reflect distinct phenomena at distinct points in the life course. The model suggests that women form ‘true’ intentions when their circumstances make the issue of childbearing salient and urgent enough to draw the cognitive resources needed to make a conscious plan; before this, women report intentions based on cognitive images of family and self. We test the implications of this model for reported fertility expectations using NLSY79 data that measure expectations throughout the life course. We find that early in the life course, before marriage and parenthood, women’s fertility expectations are associated with family background and cognitive images of family and future self. Later in the life course, as women experience life course transitions that confer statuses normatively associated with childbearing – such as marriage, and parenthood– their reported expectations are much better predictors of their fertility than before they passed these life course milestones. Our empirical results provide support for a model which has important implications for both the measurement and conceptualization of women’s intended and expected fertility.

## **Assessing the predictive value of fertility expectations through a cognitive-social model**

### **Introduction**

Beginning with the earliest fertility surveys (Westoff, Mishler and Kelly 1957), demographers have measured fertility intentions in hopes of improving predictions of future fertility (Morgan 2001). Work on these fertility “forecasts” has persisted, in part, because while they have proven to have important predictive value, they have never quite predicted fertility as well as hoped. Research has examined correlates of predictive validity and obstacles to achieving predicted targets, but very little research has actually theorized or attempted to understand how the meaning of these reports might affect their predictive value. In this paper, we draw on a recent cognitive-social model of fertility intentions (Bachrach and Morgan 2013) to make the case that these survey measures may be capturing different things at different points of the life course, and that understanding these meanings may help us to understand the measures’ predictive value.

Fertility intentions have been useful predictors but often far from perfect ones. The failures of prediction are generally modest at the aggregate level (Bongaarts 2001; Monnier 1989; Morgan and Rackin 2010; Quesnel-Vallée and Morgan 2003; Van de Giessen et al. 1992) but very common at the individual level (Davidson and Beach 1981; Heaton, Jacobson and Holland 1999; Morgan and Rackin 2010; Noack and Østby 2002; Schoen et al. 1999; Westoff and Ryder 1977). For example, women and men surveyed in the 1979 National Longitudinal Survey of Youth were more likely to miss than hit their predicted number of births over an 18 year period (Quesnel-Vallée and Morgan 2003).

These predictive lapses have led some researchers to attempt to understand why people do not succeed in fulfilling the forecasts they provide (Bongaarts 2001; Morgan and Rackin

2010).<sup>1</sup> More commonly, research has examined how a respondent's age, marital status, parity and other characteristics at the time of an interview affect the accuracy of the forecast (Barber 2001; Noack and Østby 2002; Quesnel-Vallée and Morgan 2003). Some researchers have pointed to the uncertainty that many survey respondents express with regard to their forecasts (Ní Bhrolcháin and Beaujouan 2011) and noted that this uncertainty undermines predictive value (Schoen et al. 1999).

Occasionally, researchers have questioned the meaning of the measures themselves (Hayford and Morgan 2008; Simons 1978; Stevens-Simon, Beach and Klerman 2001). However, in most cases, the forecasts collected in surveys are taken at face value and assumed to reflect an actual decision to have a certain number of children (an intention) or a well-informed conscious expectation. Although Noack and Østby (2002) suggest that these measures “have to be treated cautiously and with a good deal of skepticism”, they, like others (Bongaarts 2001; Morgan and Rackin 2010; Quesnel-Vallée and Morgan 2003), do not critically examine or theorize the meanings underlying the measures. In fact, even the language used to describe achieving intentions has represented reported intentions as “givens.” For example, Quesnel-Vallée and Morgan (2003) refer to individuals as either meeting their “target”, “overachieving”, or “underachieving”. Noack and Østby (2002) refer to individuals with “realistic” or “unrealistic” intentions. At the aggregate level, demographers have referred to the differences between intentions and behavior as “unmet need”. When forecasts prove unreliable, the causes are sought everywhere but in the measures themselves.

The suggestion that the measures might not capture personal goals may have been raised first by Simons (1978), who suggested that women only come to know their desired family size after they have achieved it and, before this, reported intentions only reflect perceptions of what

an achieved family size would/should be for people like herself. Ní Bhrolcháin and Beaujouan (2012) suggest that fertility forecasts are constructed on the spot in response to interview questions and thus may or may not reflect “real” intentions. Miller (2011) suggests that fertility desires and intentions are distinct constructs with different antecedents; desires are simply a hope for a fertility outcome, whereas intentions imply a decision and commitment to act on that decision. Here, we explore these ideas further by testing the empirical implications of a cognitive-social theory of intention formation and realization (Bachrach and Morgan 2013). Our model is fully consistent with the empirical results found elsewhere, but goes further to suggest that the nature of what survey respondents are telling us changes as the life course proceeds. We summarize the theory first, and then develop our hypotheses.

### **Cognitive-social model of fertility intentions**

In psychology, intentions are complex mental states in which there is a desire for some outcome, a belief that taking a particular action will lead to that outcome and some degree of commitment to perform the action (Malle, Moses and Baldwin 2001; Miller 2011). The social cognitive model of fertility intentions draws on a dual process model of cognition to suggest that fertility intentions are formed only when the circumstances of a situation demand or motivate it, and that survey queries about intentions may produce responses that reflect a variety of different cognitive structures, including not only intentions but also general representations of the family and the self.

A “dual-process” model of cognitive function (Chaiken and Trope 1999; Lieberman 2007) posits that the brain accomplishes its work through both automatic and deliberative processes. Automatic processes, which dominate neural activity, have as a major function the

creation of “mental maps” of the world based on sensory inputs (Damasio 2010). Through automatic brain processes, individuals develop emotionally laden cognitive representations of the self, as well as of concepts such as families, parenthood, and childbearing. These are formed as a by-product of experiencing these phenomena in their daily lives: in material forms, in social interaction, and through the media. Deliberative processes refer to the cognitive mechanisms through which the brain manipulates information, projects the future, and decides upon courses of action. Deliberative processes are more closely tied to consciousness and are costly to invoke because the brain’s capacity for them is highly limited. Therefore, they are called upon only when necessary, generally when automatic processes do not produce a coherent story or direction for action (DiMaggio 1997; Kahneman 2011).

Bachrach and Morgan (2013) suggest that the formation of fertility intentions depends on both types of processes. Intentions are formed, through deliberative processes, only when circumstances demand or motivate it: for example, when people confront new or unexpected situations or choices requiring tradeoffs between similarly valued options. To formulate intentions, deliberative systems draw in and weigh the emotionally laden images of self, family, childbearing, and childrearing that have been sculpted in the brain through cumulative experience. What does an ideal family look like? What does being a parent entail? Do I like changing diapers? Are babies adorable or messy? How do I envision myself as an adult?<sup>2</sup>

While people may or may not formulate fertility intentions, all people will form the kind of cognitive representations of family and self that are invoked in intention-formation. These are built and evolve over the life course, beginning in childhood. Individuals will also develop cognitive representations of self that include preferences and expectations of one’s future life

course. Images of future self may include things such as pursuing a career, marriage, education, etc.

Even when fertility intentions have not yet been formulated, these images can be evoked at any time by a relevant cue in the environment, for example, a survey question about plans for childbearing. In the context of an interview inquiring about fertility intentions, respondents who have not yet formulated intentions provide the best answers they can, drawing on idealized images of a family, vague desires, and/or images of future self. This suggests that in many cases, responses to questions about fertility intentions reflect these representations and not “true” intentions that carry with them a commitment to act.

A further point of the cognitive-social theory is that structure plays a major role in shaping cognitive representations of self and family and in the formation of intentions. We define structure as durable forms of organization, patterns of behavior, or systems of social relations (Johnson-Hanks et al. 2011).

Structure shapes intentions in two ways. First, a person’s experience of different structures (as influenced by family background, education, religion, ethnicity, etc.) shapes the representations and emotional meanings of self and family life constructed in the brain. Cognitive representations of family life and family size are influenced by structured experiences within one’s family of origin, and have been shown to be associated with ideal family size, reported fertility intentions, and fertility behavior (Axinn, Clarkberg and Thornton 1994; Barber 2000; Duncan et al. 1965; Hendershot 1969). Also, structures influence whether fertility is seen as relevant for future life course choices (getting married, having a career, etc.).

Second, structures shape the circumstances that prompt intention formation. As the social structures that one is embedded within shift over the life course, they influence the constellation

of opportunities and constraints that characterize situations that prompt intention formation. For example, getting married embeds an individual into a new structure that makes planning a family both more feasible (sexual access, combined income) and more constrained (spouse's wishes). Structures further influence the array of material cues that elicit the specific images and meanings on which intentions, when they are formed, are based.

The logic of the theory developed above in relation to intentions also applies to expectations, which are our focus in this paper.<sup>3</sup> We define expectation as a representation of a future state that is perceived to be most likely.<sup>4</sup> Expectations do not imply a commitment to act and their elicitation in an interview setting implies nothing more than a momentary assessment of likely futures. As in the case of intentions, however, those likely futures are identified by processing images of self and family relevant to future fertility (e.g., prototypical family size, parenting roles, careers), and they are influenced by the emotional valence of these images (we are drawn to expect positive rather than negative outcomes). The structured patterns of life that people experience provide the template for the representations that people carry around in their heads and for the expectations they are likely to construct. Because intentions imply a commitment to take action to achieve the target outcome, expectations should be strongly influenced by intentions, but if intentions have not been formulated expectations will be shaped by general cognitive images of family and self.

Figure 1 summarizes the key points of our argument. "Expressed expectations" represent survey reports of fertility forecasts (intentions or expectations). When fertility intentions have been formulated, they should affect both these reports and fertility outcomes. Intention formation, in turn, is triggered by situations that (a) require a decision about future action that (b) cannot be produced automatically by the brain and in which (c) fertility is perceived to be

centrally in question. *What* intentions are formed is shaped by automatically produced, emotionally laden, images of self and family. Background factors and life course transitions have an effect on these (Ajzen 2011) because they shape the structures that an individual experiences.

### **When are fertility forecasts most predictive?**

Figure 1 also points to the central assertion of our paper. Forecasts that are grounded in “real” intentions should be more strongly predictive of fertility than those grounded only in general images of self and family, because they entail a commitment to act. In the figure, this is evident because intentions are linked to both expressed intentions and actual fertility, whereas images of self and family are linked only to expressed intentions. Thus, if real intentions have been formed, the correspondence between expectations and actual fertility should be greater.

We define a continuum along which cognitive representations of self and family evolve and intersect as an individual’s life course unfolds (see Figure 2). Early in life individuals develop representations of family life based on their own family experience. At this point in the life course, questions about fertility expectations would elicit responses that draw on these general cognitive maps. As experience in the world broadens and deepens, cognitive maps of parenthood and other adult roles become more fully developed and articulated with each other, so that, for example, adolescents may recognize tradeoffs between education, careers, and family life. Also during adolescence, as identity begins to consolidate, images of future selves become more elaborated and may or may not integrate images of parenthood. At this point in the life course, these more fully developed images and identities are likely to inform responses about

fertility expectations. Some adolescents will have formed fertility intentions, but we suggest that most will not have taken this step.

Experiencing key life transitions such as the completion of education, marriage, and first birth should affect the images and identities that give rise to stated expectations. There are three reasons for this. First, by exposing the individual to new experience and embedding him or her in new structures, these transitions lead to the elaboration of images related to adult roles of various types. Second (Elder 1994), each transition narrows the range of possible futures by reducing the odds of some possibilities and increasing the odds of others and therefore sharpens the definition of identity. Third, these transitions can prompt the formation of fertility intentions because they create circumstances in which future fertility becomes salient to the self.

Inconsistencies in past research on the accuracy of fertility forecasts may stem, in part, from the importance of such transitions. The research that has most strongly shown accurate fertility forecasts has focused on married women (e.g., Westoff and Ryder 1977). The studies that have shown less predictive accuracy have included women in earlier life course stages in which intention-formation is less likely to occur (e.g., Quesnel-Vallée and Morgan 2003).

We reason that the extent to which transitions prompt changes in fertility-related cognitive structures and the formation of intentions depends on the cultural models associated with the transitions, specifically the extent to which childbearing is tied into cultural models.<sup>5</sup> Completion of education is associated with the transition to adult roles, but is less specifically tied to childbearing than are marriage and first birth. Marriage is closely associated with childbearing because of traditional norms linking the two and because both are linked in cultural models of the family. Thus, marriage is likely to stimulate attention to and elaboration of images related to fertility, and may well prompt the formation of fertility intentions. Having a first birth,

of course, closes off a potential future of childlessness, but also makes images of family life and beliefs about whether a child needs siblings and issues of spacing between children highly salient. It also provides concrete experience with the realities of pregnancy, birth and childrearing, further sharpening the images that individuals can draw on. Given the variation in the extent to which these three transitions are tied into cultural models of fertility, we would expect that marriage would contribute to the predictive accuracy of stated expectations more than the completion of education, and having a first birth to a greater extent than marriage.

Figure 2 illustrates the progression of cognitive structures relevant to parenthood from the general representations initially developed in childhood, to more elaborated representations and models that are progressively integrated into self-images, to yet more specific models tailored to life course transitions that have clarified potential futures, to specific intentions to achieve a particular future outcome. Because movement on this continuum implies that images of childbearing and self both become increasingly elaborated, specific and integrated, and since the formation of intentions implies a commitment to act, our theory implies that the predictive power of stated expectations should be greater when the individual who states them is further along the continuum.

## **Hypotheses**

Our theory suggests several hypotheses that can be tested using available data. Our first set of hypotheses is grounded in the idea that early in life, when intentions are less likely to have been formed, survey reports of fertility expectations will reflect cognitive representations of the self and family shaped by the structural conditions of early life. Specifically, factors such as sibship size and family structure will shape cognitive representations of families, and religious

participation may influence both the values attached to family life and the scripts associated with it. Research has found that women with more siblings have higher ideal family sizes, family size preferences, and completed family sizes (Anderton et al. 1987; Axinn, Clarkberg and Thornton 1994; Duncan et al. 1965; Hendershot 1969; Johnson and Freymeyer 1989; Johnson and Stokes 1976; Zimmer and Fulton 1980). Religion is deeply intertwined with the values and scripts associated with childbearing. Pearce (2002) found that religious attendance at age 18 was associated with both ideal family size and personal family size preference and these effects were mediated by importance of religion. Family structure (e.g. co-residence with two biological parents) may influence cognitive images of family and childbearing in ways relevant to family size expectations. It may be the case that women from intact families have more positive cognitive images of family and childbearing and may have higher fertility expectations compared to women from other family arrangements. Indeed, Axinn and Thornton (1996) found that having a divorced mother was associated with lower ideal family size preferences.

1. Family background characteristics (sibship size, family structure, and religious participation) will predict fertility expectations expressed early in the life course, before marriage and childbearing.

The one measure available in our data that directly captures a cognitive image of the family early in life is ideal family size. Ideal family size can be thought of as a generalized “best” number of children in a prototypical family. It is developed over the life course from experiences in the respondent’s social milieu, especially those pertaining to family. As a direct indicator of cognitive images of the family, and because of its roots in early life experience, we

expect ideal family size to not only strongly predict fertility expectations, but to substantially mediate the effects of family background characteristics on expectations.

2. Ideal family size will significantly predict fertility expectations.
3. The effect of family background characteristics on fertility expectations will be mediated by ideal family size.

Cognitive representations of self that have evolved over the course of childhood and adolescence can include not only expected life course trajectories but also expected tastes and skills. When these images conflict with having children rates of childbearing and fertility expectations tend to decline. Barber (2001) found that having positive attitudes about childbearing increased rates of marital childbearing, while, in contrast, having positive views about careers and owning luxury goods in the future reduced rates of pre-marital childbearing. Waite and Stolzenberg (1976) found that young women's plans for labor force participation significantly decreased women's fertility expectations. Taken together, this suggests that cognitive images of self that include careers, which tend to conflict with childbearing, may be associated with lower fertility expectations.

4. Cognitive images of future selves are significant predictors of fertility expectations expressed early in the life course, before marriage or childbearing.

Because cognitive images of self and family influence the content of expectations that are expressed, but not the formation of intentions, we do not expect them, or the family background characteristics that shape them, to directly influence the predictive value of stated expectations.

5. Neither family background characteristics, ideal family size, nor cognitive images of future selves will be associated with the predictive validity of expectations expressed early in the life course (i.e., the correspondence between these expectations and completed parity).

The remaining two hypotheses derive from the assertion that passing life course milestones that are culturally relevant to family formation will prompt (to varying extents) the elaboration of cognitive images related to childbearing and the formation of actual fertility intentions, making stated expectations more predictive of final parity.

6. The predictive accuracy of stated expectations should be significantly greater after passing certain life course milestones (first birth, marriage, and completion of schooling) than before passing these milestones.
7. The improvement in the predictive accuracy of stated expectations associated with a life course transition will be greatest for the transition to first birth, intermediate for the transition to marriage, and smallest for the completion of schooling.

## **Data & methods**

### *Data*

Our analyses rely on data from the 1979 National Longitudinal Survey of Youth (NLSY79). The NLSY79 provides a rare opportunity to study the unfolding life course and fertility expectations of a representative sample of Americans born in the late 1950s and early 1960s. No other survey provides such abundant data on the parallel evolution of fertility expectations and life course events from the beginning until the end of the respondents' reproductive years (by 2010, the youngest respondents were 45 years old).

The NLSY79 is an ongoing longitudinal panel survey of a national probability sample of 12,686 American civilian and military youth aged 14 to 21 years old in 1978 (Zagorsky and White 1999). Respondents were surveyed annually until 1994, after which the survey was administered biennially. This survey, sponsored by the Bureau of Labor Statistics (BLS), was designed principally to gather longitudinal information on the labor force experiences of young American men and women. Importantly, fertility expectations were asked in 1979, every year from 1982 to 1986, and every other year after 1986.

Out of the 6,292 women interviewed in 1979, 1,331 were dropped due to funding constraints before completing fertility. We restrict our analyses of birth expectations to the 4,792 women who were childless and never married at the initial interview. We further restrict analyses of the predictive validity of expectations to the 3,420 women who have parity information at age 40 or older.

### *Dependent variables*

The dependent variables of interest include fertility expectations and the predictive validity of these stated expectations. Fertility expectations were asked by the following question:

“Altogether, how many (more) children do you expect to have?” This was then added to current parity to measure fertility expectations (the total number of children each respondent expected to have). To examine the predictive validity of these reported expectations we compared fertility expectations reported at each wave to completed fertility, creating a measure of whether expectations matched, fell short of, or exceeded final parity.

### *Independent variables*

Family background characteristics included number of siblings, family structure at age 14, and religiosity, all measured at the first interview in 1979. Because only children or children from very large families may form different family representations than children from normatively sized families we generated five categories for number of siblings (zero, 1, 2, 3, and 4+). Family structure was measured by a question which asked who the respondent lived with at age 14: those living with their mother and father were coded as one and all other living arrangements were coded as zero. Religiosity was assessed by asking respondents how often they attended religious services in the past year; categories in our measure include never attended (not at all), infrequently (several times or less during the year), 1-3 times per month (2-3 times a month and about once a month), and once a week or more (about once a week and more than once a week).

A question asked in 1979 about ideal family size provides our one direct measure of cognitive images of family. This question was asked in the following manner, “Now I’d like to ask you your opinions and expectations about family size. First, what do you think is the ideal number of children for a family?” The number reported was recoded to zero, one, two, three, and four or more.

Short-term and long-term cognitive representations of future selves were also measured in 1979. Short-term marriage, employment, and education expectations were assessed by asking respondents three separate questions: if they expected to be married, working, or in school in five years; these responses were coded one for yes and zero for no. Longer-term expectations were created from the question: “Now I would like to talk with you about your future plans. What would you like to be doing when you are 35 years old?” Answers to this question included present job, some occupation, married/family, or other. If respondents answered that they either wanted to be in their present job or some occupation we coded this as working, marriage/family was coded as family, and other was coded as other.

Life course transitions included the transitions to completion of education, first marriage, and first birth. As described below, these are coded as dichotomous variables indicating whether, at each survey wave, the transition had occurred.

Finally, because age, race, and socioeconomic status may confound our findings, in all models we included controls for age, race, and maternal education. Age was included as a continuous variable obtained by subtracting the date of interview from the respondent’s birth month and year. Race was coded from interviewer remarks in 1979 and was coded as White, Black, and other. Maternal education was obtained from respondent reports in 1979 and was coded as less than high school, high school, some college, and college or more.

### *Analysis Strategy*

To answer our research questions we used several analysis strategies. We used OLS regression to examine whether family background characteristics predicted reported expectations for childless unmarried women in 1979. In the next model, we added ideal family size to test whether the relationship of background factors to expectations was mediated by this directly

reported cognitive image of family size. In the final model, we also included cognitive images of future self to examine if images of future self were related to fertility expectations expressed early in the life course.

Next, we used multinomial logistic regression to predict whether these same variables predicted the accuracy of expressed expectations, that is, whether the expectations matched, exceeded or fell short of final parity. In the tables predicting predictive accuracy of these expectations we show the odds ratios of expectations that were too-low (i.e., expectations that were lower than final parity) and were too-high (i.e., expectations that were higher than final parity) compared to expectations that matched final parity.

To address our hypotheses linking life course milestones to predictive validity of expectations, we conducted a within-person analysis that compared how well expectations predicted completed fertility of the same women before and after a major life event. To provide a broad perspective on changes in accuracy surrounding these events, we examine accuracy across four waves of interviews. This enables us to judge whether significant changes in accuracy occur in conjunction with life course milestones and not during other intervals, as implied by our hypothesis. For example, if a woman reported a parity of zero in 1984 and a parity of one in 1985, we examine the accuracy of her expectations in 1983 ( $w^{-2}$ ), 1984 ( $w^{-1}$ ), 1985 ( $w^{+1}$ ), and 1986 ( $w^{+2}$ ). Our hypothesis would be supported if significant increases in the accuracy of expectations are found in the  $w^{-1}$  to  $w^{+1}$  intervals (immediately around the life course transition) and not in the  $w^{-2}$  to  $w^{-1}$  or  $w^{+1}$  to  $w^{+2}$  intervals.

We modeled the three transitions (completion of education, getting married for the first time, and having a first child) separately because women typically complete these transitions at different points in time (e.g., the wave before a woman completes education may be much earlier

than the wave before she has a child). For each woman, each model included observations with all four waves of NLSY data – two waves before ( $w^{-2}$ ), one wave before ( $w^{-1}$ ), one wave after ( $w^{+1}$ ), and two waves after a transition ( $w^{+2}$ ). Women missing data on fertility expectations in any wave were excluded. Using multinomial logistic regression controlling on age, race, and mother's education and clustering standard errors to account for multiple observations for each woman, we estimated the effect of the wave in which expectations were measured (before and after the transitions) on the likelihood of reporting expectations that matched, fell short of, or exceeded final fertility. For ease of interpretation, we present a table that shows predicted probabilities of expectations that fell into each of these categories in the waves before and after each life transition occurred. We measured significant changes in the accuracy of expectations compared to the prior wave. More specifically, we compared if there were significant changes in accuracy between the waves prior to each transition ( $w^{-2}$  vs.  $w^{-1}$ ), between the waves immediately surrounding the life course transition ( $w^{-1}$  vs.  $w^{+1}$ ), and between the waves after each transition ( $w^{+1}$  vs.  $w^{+2}$ ). In these models we controlled on age, race, and maternal education and for the predicted probabilities we held age constant at 25, race constant at White, and maternal education constant at high school.

## **Results**

### *Fertility expectations reported early in the life course*

First, we explore if family background characteristics were associated with reported fertility expectations. Model 1 in Table 1 predicts fertility expectations using family background for unmarried childless young women in 1979 controlling on age, race, and maternal education. As expected, family background significantly predicted expressed fertility expectations. Fertility

expectations were .477 lower for only children, .339 lower for women with one sibling, .391 lower for women with two siblings, and .349 lower for women with three siblings compared to women from large families (four or more siblings). Living with both biological parents at age 14 was associated with .184 higher fertility expectations than all other living arrangements. Finally, women who never attended religious services had fertility expectations that were .193 lower than women who attended once a week or more, women who rarely attended services had fertility expectations that were .2 lower than women who attended once a week or more, and women who attended 1-3 times per month had marginally lower fertility expectations than women who attended once a week or more. In sum, women with four or more siblings had higher fertility expectations than other women, as did women who lived with both biological parents and women who attended church once or more per week.

Second, we hypothesized that ideal family size would be a strong and significant predictor of fertility expectations. As shown in Model 2 in Table 1, cognitive images of ideal family size were highly related to reported fertility. Compared to women whose ideal family size was four or more, fertility expectations were 3.09 less for women whose ideal family size was zero, 2.22 less for women whose ideal family size was one child, 1.511 less for women whose ideal family size was two children, and .789 less for women whose ideal family size was three children. Including ideal family size increased the model fit by a factor of over eight and a half from 0.029 in Model 1 to 0.253 in Model 2.

As expected, ideal family size strongly mediated the effects of family background characteristics on expressed fertility expectations. Model 2 shows that most of the effect of sibship size was explained by including ideal family size; women with no siblings and one sibling had the same expected fertility expectations as women from very large families. Women

with two and three siblings still had significantly lower fertility expectations than women from large families, but about 61% of the effect for two siblings and 33% of the effect for three siblings was explained by including ideal family size. Also, over 41% of the effect of living with both parents at age 14 was explained and decreased to marginal significance by including ideal family size. Ideal family size also largely mediates the relation between religious attendance and expectations: in Model 2, only those who rarely attended had marginally significantly lower fertility expectations than those who attended once a week or more and about 41% of that effect was explained by including ideal family size.

Table 1 also shows that, as hypothesized, cognitive images of one's future life course are significantly related to fertility expectations. In Model 3, both shorter-term and longer-term cognitive images of future self that include employment significantly lower expectations while envisioning being married increases them. Women who stated that they wanted an occupation or to be in their current job/other at age 35 had lower fertility expectations than women who envisioned being married and/or having a family at age 35 (.218 and .439 lower, respectively). Cognitive images of future self in the shorter-term had similar effects, with women who expected to be employed in five years expecting .224 fewer births than women who did not. Women who expected to be married in five years had fertility expectations that were .331 higher than women who did not. Expecting to be in school in five years, however, had no significant effect on fertility expectations.

We find mixed support for our hypothesis that, while cognitive images of family and of one's own future occupational and family behavior would predict fertility expectations, neither family background characteristics, cognitive images of family, nor cognitive images of future selves would predict the accuracy of expectations reported at the first interview. Models 1-3 in

Table 2 show the odds ratios of having too-high or too-low fertility expectations compared to having expectations that matched (i.e., were accurate) and Figure 3 shows the predicted probabilities of matching expectations by selected characteristics based on Model 3. While religious attendance was not significantly associated with accuracy of fertility expectations, the remaining two family background factors showed some significant relationships. Having one or two siblings compared to four or more lowered the likelihood of having expectations that were too-high versus expectations that matched. Also, women with no siblings compared to those with four or more siblings were marginally more likely to have expectations that were too-high in Model 1 and significantly more likely in Model 2 and 3, and, as shown in Figure 3, women with no siblings have a much lower probability of matching expectations than women with more siblings. Living with both biological parents at age 14 was associated with having expectations that were too-high versus those that matched, but, as shown in Figure 3, there were no differences in the probability of matching expectations between those that lived with both parents and those that did not.

Table 2 also shows that ideal family size was related to accuracy of expectations. Women whose ideal family size was four or more were more likely to have expectations that were too-high compared to all other women. Also, women whose ideal family size was three children were less likely to have expectations that were too-low than women whose ideal family size was four or more.

In contrast, as we hypothesized and Table 2 shows, cognitive images of future self were not related to either having fewer or more births than expected. For long-term images of future self at age 35, there were no significant differences in having expectations that were too-low or too-high compared to those that matched; indeed, as shown in Figure 3, the predicted probability

of having the number of children expected for women who envisioned an occupation was .259 compared to .261 for those who envisioned marriage and/or family. For shorter-term images of future self we find nearly the same results; the probability of having the number of children initially expected was .263 among women who anticipated being employed in five years (.220 for those who did not,  $p=.209$ ), .253 among women who anticipated being married (.267 for women who did not,  $p=.454$ ), and .250 among women who anticipated being in school (.259 for those who did not,  $p=.961$ ). Taken together, we find that cognitive images of future self predicted how many children a woman expects to have but did not predict the accuracy of these stated expectations.

To summarize these findings, we found that family background characteristics and ideal family size influence the fertility expectations reported by young women who have not yet married or given birth. We also found that the effects of background characteristics on expectations operate, in part, through ideal family size. Cognitive images of one's future self, specifically images of employment and family behaviors, also influence reported expectations. We had expected that family background, images of family and future self that take root early in life would not affect the accuracy of reported expectations. Although this was true in the case of images of future self, we found that sibship size, living with both biological parents, and ideal family size were all related to the accuracy of expectations.

#### *Fertility expectations reported before and after life course transitions*

We now turn to our hypotheses that, because experiencing life course milestones would prompt the elaboration of cognitive images related to childbearing and the formation of "true" fertility intentions, completing education, marrying and giving birth should be associated with an

increase in the accuracy of reported fertility expectations. We explored this by examining changes in the accuracy of expectations in the waves surrounding a transition: two waves prior ( $w^{-2}$ ), one wave prior ( $w^{-1}$ ), one wave after ( $w^{+1}$ ), and two waves after ( $w^{+2}$ ). We hypothesized that accuracy would increase significantly between  $w^{-1}$  and  $w^{+1}$ , but did not expect significant changes in prior and subsequent intervals. Table 3 shows the predicted probability of accurate fertility expectations, too-low (i.e., expectations fell short of final parity), and too-high (i.e., expectations exceeded final parity) before and after life course milestones that may encourage women to formulate accurate intentions. The results are generally, but not perfectly, consistent with our hypotheses.

For two out of the three transitions we examined, accuracy of expectations did indeed increase between the wave immediately prior to and immediately after the transition. In the case of marriage, women are more likely to have accurate expectations and less likely to have expectations that are too-high in  $w^{+1}$  compared to  $w^{-1}$ . Across the transition to marriage, the probability of matching expectations rises from .400 to .431, an increase of 8%. Across the interval containing a first birth, the probability of too-low expectations significantly decreases from .282 to .252. Importantly, the probability of matching expectations rises by over 11% from .432 in the wave prior to a first birth to .480 in the wave after. During the interval in which education is completed, however, there is no significant change in having expectations that are accurate, too-low, or too-high. In fact, the point estimate for matching expectations appears slightly, albeit insignificantly, lower in  $w^{+1}$  compared to  $w^{-1}$ .

A broader look at changes in accuracy of expectations across the four waves surrounding the transition presents a more complicated view, however. As expected, prior to the transitions to both marriage and first birth, levels of accuracy are stable. In the case of marriage, there is no

difference in the probabilities of having expectations that are accurate, too-low, or too-high between  $w^{-2}$  and  $w^{-1}$ . There is also no difference in the probability of matching expectations in the two waves prior to a first birth. However, women approaching a first birth are significantly more likely to have expectations that are too-low and significantly less likely to have expectations that are too-high in  $w^{-1}$  compared to  $w^{-2}$ . Changes in accuracy between the two waves prior to the completion of education are marginally significant for matching expectations and significant for expectations that were too-low. Here again the tendency was for accuracy to decrease across waves.

Contrary to our expectations, accuracy continued to increase during the period after the transitions to marriage and first birth. The probability of matching expectations significantly increased by 8% after the transition to marriage, from .431 in the wave directly after to .466 two waves after. For childbearing, the probability of matching expectations continued to increase between the first and second waves after first birth, but less precipitously than in the wave including the transition (by about 7%, from .480 to .514, compared to 11% between  $w^{-1}$  and  $w^{+1}$ ). For both marriage and childbearing, the probability of having expectations that were too-high significantly declined in the waves after these transitions. There are no differences in the probabilities of having expectations that are accurate, too-low, or too-high between the two waves following the completion of education. Overall, for the transition to marriage and childbearing, the probability of matching expectations only begins to significantly increase after each transition and continues to significantly increase in the waves following these transitions.

With respect to our final hypothesis, our results confirm that having made the transition to motherhood had the strongest impact on the predicted probability of accurately forecasting the number of children, marriage had the second strongest impact, and educational completion had

an insignificant negative impact. As described above, women had the same probability of accurate expectations across the two waves prior to all of these transitions (except for the marginally significant decrease for completing education), but between the waves before and after the transition to motherhood, a woman's probability of accurate expectations increased by about 11%. Compare this to a significant 8% increase in the predicted probability of expressing accurate intentions directly after the transition to marriage and a non-significant 3% *decrease* in the predicted probability of expressing accurate intentions the wave after completing education compared to the wave before.

## **Discussion and Conclusion**

Our analyses provide clear support for most of the hypotheses we tested, but not for all. As anticipated, we found that family background variables did predict expectations expressed at the start of the study by women who had never married or had children. Women coming from larger families, those who were highly religious, and those who still lived with both biological parents at age 14 reported higher expected parities. Also, we found that some, but not all, of the effects of family background on reported expectations operate through affecting ideal family size. The partial mediating role of ideal family size is consistent with our theory. Ideal family size should reflect a prototypical family as experienced during childhood and adolescence. This would be shaped not only by one's own family background but also by experience outside the family and through media images. Also, cognitive images of family include much more than prototypical family size: they include images of what being a mother entails and the rewarding or stressful experiences of family life. Family background characteristics should be important for generating images of ideal family size, but family background should still have some

independent effect given that we could not measure the full set of cognitive images and emotional valence related to family.

Our results consistently support the hypothesis that cognitive representations of family and self held at the time of the initial interview are associated with fertility expectations. Ideal family size, our measure of a cognitive representation of family, was strongly and significantly associated with fertility expectations—women with larger ideal family sizes had higher fertility expectations. Consistent with Barber (2001) and Waite and Stolzenberg (1976), we find that women who imagine themselves in future roles that may conflict with parenthood report lower expected parity, and those who imagine themselves in family roles report higher expectations. As we predicted, anticipated future roles were not associated with the accuracy of reported expectations. Our prediction, however, that family background variables would be similarly uncorrelated with predictive accuracy was supported only in the case of religiosity. Sibship size and living with both biological parents were predictive of the accuracy of expectations stated at the initial interview.

Additionally, our prediction that ideal family size would not be related to accuracy of expectations was not supported. We found that there was a strong relationship between ideal family size and accuracy of expectations; women whose ideal family size was four or more were more likely to have expectations that were too high compared to all others. Given the strong relationship between ideal family size and expectations, our findings are consistent with Morgan and Rackin's (2010) finding that women who have non-normative expectations (i.e., less than two or greater than two children) are less likely to meet these expectations; indeed, they found that women with expectations lower than two are likely to have more children than expected and women with expectations greater than two are likely to have fewer children than expected. Our

findings are similar: women with non-normative ideal family sizes are less likely to have accurate expectations. This may be due to normative pressure, finding a partner that shares these expectations, or even the simple statistical fact that one is more likely to be correct if one predicts a likely rather than an unlikely outcome.<sup>6</sup>

Our subsequent analyses generally support our hypothesis that passing major milestones in the life course increases the likelihood of reporting accurate expectations. While the improvements in accuracy across the waves immediately before and after transitions may seem fairly small (an increase of 11% for the transition to motherhood and 8% for the transition to marriage), these improvements are large compared to the mainly non-significant improvements in accuracy found in the waves prior to these transitions. Before the transitions to marriage and motherhood women's predictive accuracy is relatively stable and only begins to change after these transitions.

Our findings regarding the transition to education support our contention that education has less relevance than marriage and first birth for intention formation, but provide no support for our hypothesis that completing education would still improve the reporting of accurate expectations. There was no significant difference in the accuracy of expectations reported in the waves prior to and after completing education. Indeed, women were more likely to have accurate expectations two waves *prior* to the completion of education compared to the waves that followed the transition. The probability that women reported too-low expectations also was lowest two waves prior to the transition and increased over succeeding waves. We conjecture that these unexpected results may reflect, in part, the presence of instability and uncertainty in women's lives in the first few years after completing education, and, in part, the potential dominance of self-oriented concerns that could crowd out thinking about family goals as women

find employment and new living arrangements and attend to other challenges in the transition to independence.

Nevertheless, as expected, improvements in accuracy were greatest for the transition most closely associated with fertility (first birth) and lowest (and non-significant) for the transition least closely associated (completion of education).

Also, there is evidence that expectations continue to become more accurate after the transition to motherhood and marriage. Adjustment to a transition often occurs gradually, as women gain experience with adult roles and modify prior cognitive models. Thus, women may continue to reevaluate expectations and formulate intentions well after transitions have occurred. Indeed, between the first and second waves following the transition to motherhood, women do have a 7% increase in the probability of matching expectations. Accurate prediction improves 8% between the two waves following the transition to marriage. Women are also less likely to have expectations that are too-high two waves after compared to the wave immediately after these transitions. This suggests that women may continue to form and re-form their intentions after these transitions are made. In future research we plan to explore how long these increases in predictive accuracy continue into the life course and if the factors associated with increases in predictive accuracy vary over the life course.

The results we find are consistent with previous research that shows that survey-based fertility forecasts are predictive of final parity for certain individuals at certain times and not for others. It is also consistent with our suggestion that forecasts made at times when the formation of actual intentions may have been prompted are more predictive than those that are not.

Our results are also generally consistent with the cognitive-social theory of fertility expectations (Bachrach and Morgan, 2013). Could other theories have produced the same

results? The Theory of Planned Behavior (Fishbein and Ajzen 2010) suggests that intentions that are formed closer in time to the targeted action are more predictive (see also Morgan 2001). This would suggest that the effects of passing life course milestones could be spurious; our results simply reflect the passage of time that draws people closer to the target of their intentions. The general stability of accuracy in predictions prior to passing key milestones would argue against this interpretation. To test the idea directly, we replicated our models while controlling for the expected timing of next birth (results available upon request). We found very similar effects and passing the milestones of motherhood and marriage still had significant effects on the predictive accuracy of intentions.

Our study has inevitable limitations. One concerns our measurement of the completion of education. This transition was not as crisply defined as the transition to marriage and first birth because women may return to education as their life course proceeds, and this transition may be triggered by the occurrence or non-occurrence of marriage and birth. We have explored other measures of completion of education and find generally similar results.<sup>7</sup> Our findings thus suggest (as predicted) that the completion of education may be less important than the transition to marriage and parenthood for stimulating the formation of intentions.

Perhaps most importantly, we have not been able to directly test whether the two mechanisms hypothesized to produce accurate expectations (increasing specificity and elaboration of cognitive representations of self and family; the formation of intentions) are responsible for the increases in predictive accuracy that occur with life course transitions. Data limitations prevent us from directly measuring either intention formation or changes in specific cognitive representations across periods of transition. Thus, we can't distinguish whether passing life course milestones improves predictive accuracy because it triggers intention

formation or merely brings cognitive representations of family or future selves into sharper focus.

These distinctions may be less relevant to research on the predictive accuracy of birth expectations, and more relevant to studies of whether women are able to achieve their reproductive goals and how and when women formulate reproductive goals. For demographers who want to know when stated expectations are predictive, the question of which mechanism is at work has less importance than identifying the conditions that make expectations accurate. For researchers who want to know whether women, having formed specific reproductive goals, are able to carry them out, the mechanism is important. For this type of work, we need to measure fertility intentions and desires, whether intentions have been formed, and how representations of future selves evolve to include highly valued representations of self-as-mother.

In sum, our findings lend support to the idea that considering what reported fertility forecasts may actually reflect at different points of the life course may help us understand the predictive value of those forecasts. Others have examined what gets in the way of women achieving their expectations. For example, Morgan and Rackin (2010) show that changes in marital status, fertility postponement and unwanted births all contribute to a mismatch between stated expectations at age 24 and fertility outcomes by age 41 or older. Our argument is complementary – we do not deny that women may form intentions and later be frustrated by events in achieving them. But we also point to the importance of considering the meanings underlying expressed forecasts. Much of the previous literature has conflated intentions and expectations, drawing support from empirical results suggesting that women give similar answers to the two types of questions (Ryder and Westoff 1965). Indeed, we argue that these survey reports are probably influenced by the same sets of underlying cognitive structures –

representations of family and self, and, when they are formed, intentions to have a certain number of births. Our point is that survey forecasts of fertility may not necessarily reflect intentions, and that examining the mechanisms that produce these reports during the passage through early life provides a complementary, and possibly more realistic, view of why women do not always have the number of children they tell us they will have.

## Endnotes

---

<sup>1</sup> The classic elaboration of this is provided by Bongaarts (2001), who proposes a model of the unanticipated factors that cause fertility to fall short of, or surpass, intentions. Examples of these factors include subfecundity, competition with other goals, unwanted births, and infant deaths.

<sup>2</sup> The Theory of Planned Behavior (Fishbein and Ajzen 2010) similarly views intentions as shaped by attitudes and norms, but does not specify how intentions may develop over the life course.

<sup>3</sup> Demographers have tended to treat intentions and expectations as interchangeable, and indeed, evidence suggests that when these questions are posed to survey respondents, they tend to elicit very similar answers (Morgan 2001; Ryder and Westoff 1965).

<sup>4</sup> The American Psychological Association does not list “expectation” in its glossary of psychological terms (<http://www.apa.org/research/action/glossary.aspx>), but statisticians use the term to refer to the most likely value for a parameter (e.g., expectation of life). Webster’s on-line dictionary defines “expect” as “to think that something will probably or certainly happen” and expectation as something that is expected ( <http://www.merriam-webster.com/>, accessed 3/30).

<sup>5</sup> For the reasoning behind this, see Bachrach (2014).

<sup>6</sup> We are grateful to Josh Goldstein for this insight.

---

<sup>7</sup> Accuracy of reported expectations is greater two waves before the completion of high school than the waves after. For the transition of completing college, women have more accurate expectations two waves before compared to two waves after and one wave after compared to two waves after. Also, when women achieve the level of education achieved by their mothers, they have more accurate expectations two waves before compared to one wave after.

## References

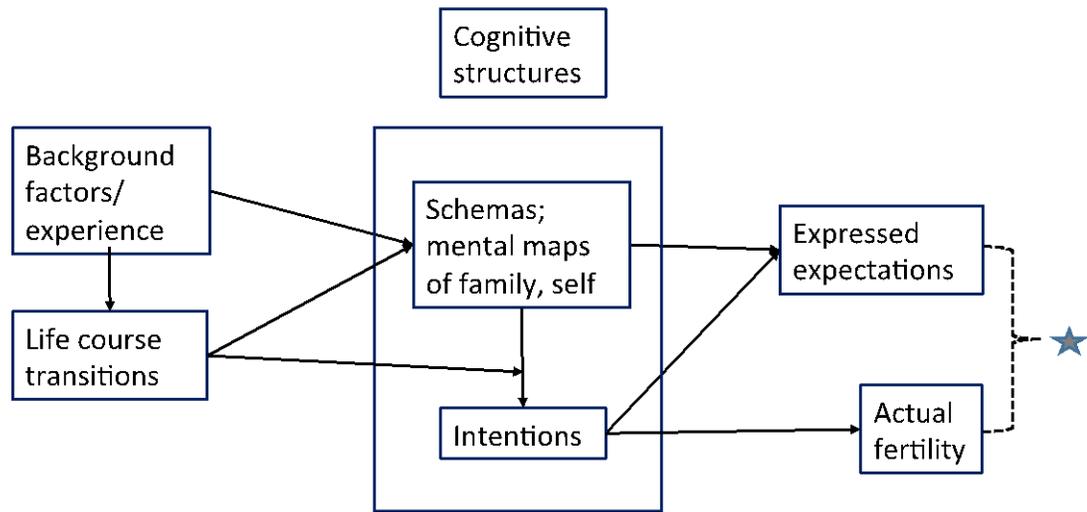
- Ajzen, Icek. 2011. "Reflections on Morgan and Bachrach's critique." *Vienna Yearbook of Population Research*:63-69.
- Anderton, Douglas L, Noriko O Tsuya, Lee L Bean, and Geraldine P Mineau. 1987. "Intergenerational transmission of relative fertility and life course patterns." *Demography* 24(4):467-80.
- Axinn, William G, Marin E Clarkberg, and Arland Thornton. 1994. "Family influences on family size preferences." *Demography* 31(1):65-79.
- Axinn, William G, and Arland Thornton. 1996. "The influence of parents' marital dissolutions on children's attitudes toward family formation." *Demography* 33(1):66-81.
- Bachrach, Christine. 2014. "Culture and Demography: From Reluctant Bedfellows to Committed Partners." *Demography* 51(1):3-25.
- Bachrach, Christine A, and S Philip Morgan. 2013. "A Cognitive–Social Model of Fertility Intentions." *Population and Development Review* 39(3):459-85.
- Barber, Jennifer S. 2000. "Intergenerational influences on the entry into parenthood: Mothers' preferences for family and nonfamily behavior." *Social Forces* 79(1):319-48.
- . 2001. "Ideational influences on the transition to parenthood: Attitudes toward childbearing and competing alternatives." *Social Psychology Quarterly*:101-27.
- Bongaarts, John. 2001. "Fertility and reproductive preferences in post-transitional societies." *Population and Development Review*:260-81.
- Chaiken, Shelly, and Yaacov Trope. 1999. *Dual-process theories in social psychology*: Guilford Press.
- Damasio, Antonio. 2010. *Self Comes to Mind: Constructing the Conscious Brain*. New York: Pantheon.
- Davidson, Andrew R, and Iee Roy Beach. 1981. "Error Patterns in the Prediction of Fertility Behavior1." *Journal of Applied Social Psychology* 11(6):475-88.
- DiMaggio, Paul. 1997. "Culture and cognition." *Annual review of sociology* 23(1):263-87.
- Duncan, Otis Dudley, Ronald Freedman, J. Michael Coble, and Doris P. Slesinger. 1965. "Marital Fertility and Size of Family of Orientation." *Demography* 2:508-15.
- Elder, Glen H. 1994. "Time, human agency, and social change: Perspective on the life course." *Social Psychology Quarterly* 57:4-4.
- Fishbein, Martin, and Icek Ajzen. 2010. *Predicting and changing behavior*. New York: Taylor & Francis.
- Hayford, Sarah R, and S Philip Morgan. 2008. "Religiosity and fertility in the United States: The role of fertility intentions." *Social Forces* 86(3):1163-88.
- Heaton, Tim B, Cardell K Jacobson, and Kimberlee Holland. 1999. "Persistence and change in decisions to remain childless." *Journal of Marriage and the Family*:531-39.
- Hendershot, Gerry E. 1969. "Familial satisfaction, birth order, and fertility values." *Journal of Marriage and the Family*:27-33.
- Johnson, Barbara E, and Robert H Freymeyer. 1989. "Replicating family size: Does living in a single parent family matter?" *Sociological focus* 22(4):263-73.
- Johnson, Nan E, and C Shannon Stokes. 1976. "Family size in successive generations: The effects of birth order, intergenerational change in lifestyle, and familial satisfaction." *Demography* 13(2):175-87.

- Johnson-Hanks, Jennifer, Christine Bachrach, S Philip Morgan, and Hans-Peter Kohler. 2011. *Understanding family change and variation: structure, conjuncture, and action*. New York: Springer.
- Kahneman, Daniel. 2011. *Thinking, fast and slow*: Macmillan.
- Lieberman, Matthew D. 2007. "Social cognitive neuroscience: a review of core processes." *Annu. Rev. Psychol.* 58:259-89.
- Malle, Bertram F, Louis J Moses, and Dare A Baldwin. 2001. *Intentions and intentionality: Foundations of social cognition*: MIT press.
- Miller, Warren B. 2011. "Differences between fertility desires and intentions: implications for theory, research and policy." *Vienna Yearbook of Population Research*:75-98.
- Monnier, Alain. 1989. "Fertility intentions and actual behaviour. A longitudinal study: 1974, 1976, 1979." *Population English Selection No. 1*:237-59.
- Morgan, S Philip. 2001. "Should fertility intentions inform fertility forecasts." in *Proceedings of US Census Bureau Conference "The direction of fertility in the United States"*. Washington, DC: US Census Bureau.
- Morgan, S Philip, and Heather Rackin. 2010. "The correspondence between fertility intentions and behavior in the United States." *Population and Development Review* 36(1):91-118.
- Ní Bhrolcháin, Máire, and Eva Beaujouan. 2012. "how real are reproductive goals? Uncertainty and the construction of fertility preferences."
- Ní Bhrolcháin, Máire, and Éva Beaujouan. 2011. "Uncertainty in fertility intentions in Britain, 1979-2007." *Vienna Yearbook of Population Research*:99-129.
- Noack, Turid, and Lars Østby. 2002. "Free to choose—but unable to stick to it? Norwegian fertility expectations and subsequent behaviour in the following 20 years." *Dynamics of fertility and partnership in Europe. Insights and lessons from comparative research 2*.
- Quesnel-Vallée, Amélie, and S Philip Morgan. 2003. "Missing the target? Correspondence of fertility intentions and behavior in the US." *Population Research and Policy Review* 22(5-6):497-525.
- Ryder, Norman B, and Charles F Westoff. 1965. *Reproduction in the United States*. Princeton, NJ: Princeton University Press
- Schoen, Robert, Nan Marie Astone, Young J Kim, Constance A Nathanson, and Jason M Fields. 1999. "Do fertility intentions affect fertility behavior?" *Journal of Marriage and the Family*:790-99.
- Simons, John. 1978. "Illusions about attitudes." in *Population Decline in Europe: Implications of a Declining or Stationary Population: Proceedings of a Seminar Held by the Council of Europe, Strasbourg, 6-10 September 1976*. by Council of Europe. New York: St. Martin's Press.
- Stevens-Simon, Catherine, Roberta K Beach, and Lorraine V Klerman. 2001. "To be rather than not to be—that is the problem with the questions we ask adolescents about their childbearing intentions." *Archives of pediatrics & adolescent medicine* 155(12):1298-300.
- Van de Giessen, Hans, W Bell, K Szabo, A Larson, SN Mitra, ZA Sathar, F Hobbs, FB Hobbs, PD Johnson, and J Decroly. 1992. "Using birth expectations information in national population forecasts." *International Family Planning Perspectives* 18(4):223-41.
- Waite, Linda J, and Ross M Stolzenberg. 1976. "Intended childbearing and labor force participation of young women: Insights from nonrecursive models." *American Sociological Review*:235-52.

- Westoff, Charles F, Elliot G Mishler, and E Lowell Kelly. 1957. "Preferences in size of family and eventual fertility twenty years after." *American Journal of Sociology*:491-97.
- Westoff, Charles F, and Norman B Ryder. 1977. "The predictive validity of reproductive intentions." *Demography* 14(4):431-53.
- Zagorsky, JL, and L White. 1999. "NLSY79 user's guide: A guide to the 1979–1998 National Longitudinal Survey of Youth data." *Washington, DC: US Department of Labor*.
- Zimmer, Basil G, and John Fulton. 1980. "Size of family, life chances, and reproductive behavior." *Journal of Marriage and the Family*:657-70.

## Figures

Figure 1. A Cognitive-Social Model of Fertility Intentions, Fertility Expectations, and Fertility



★ The correspondence between expectations and actual fertility is the predictive accuracy of expectations.

Figure 2. Life Course Development of Parenthood Representations and Fertility Intentions

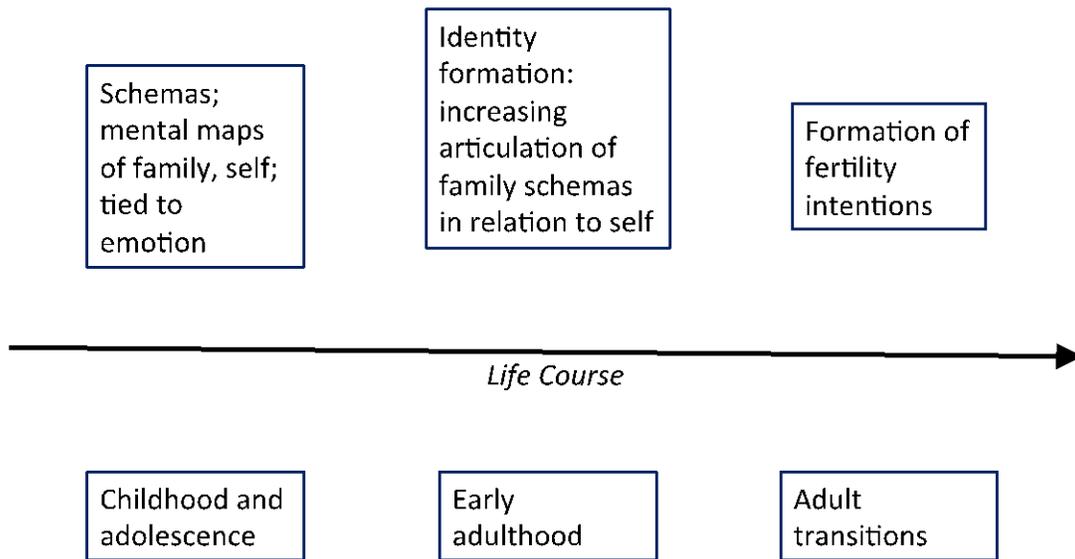
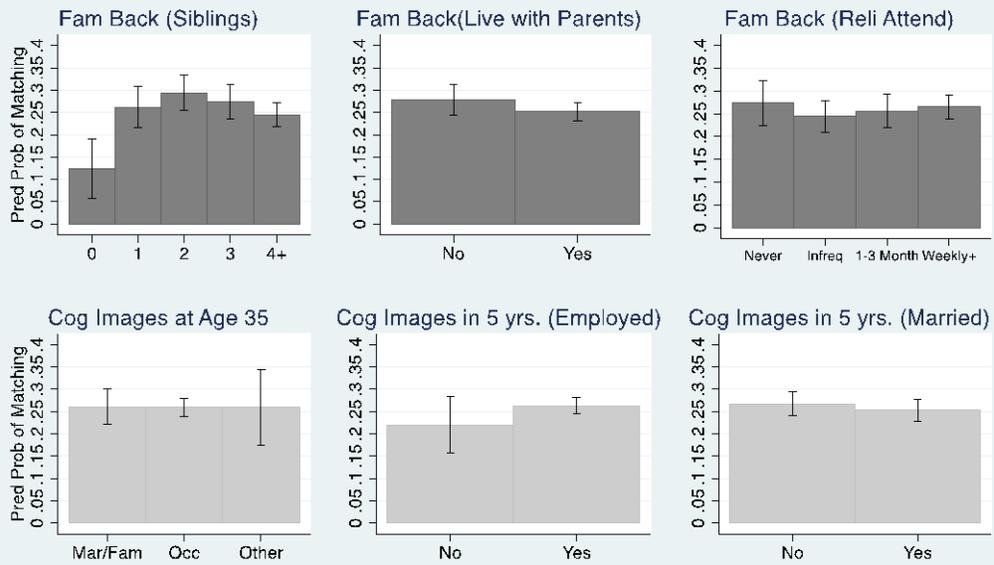


Figure 3. Predicted Probability of Matching Expectations By Family Background and Cognitive Images of Future Self



Note: 95% confidence interval shown in black. Family background factors shown in dark grey and cognitive images of future self shown in light grey.

## Tables

Table 1. Predicted Fertility Expectations in 1979 by Family Background and Images of Family & Future Self

	Model 1	Model 2	Model 3
<b>Race (vs. White)</b>			
Black	-0.215*** (0.064)	-0.292*** (0.056)	-0.214*** (0.057)
White	-0.119 (0.120)	-0.160 (0.105)	-0.128 (0.105)
<b>Age</b>	-0.021 (0.013)	0.009 (0.012)	-0.018 (0.013)
<b>Mother's Educ (vs. HS)</b>			
<HS	-0.015 (0.062)	-0.043 (0.054)	-0.051 (0.054)
Some Col	0.208* (0.092)	0.120 (0.081)	0.152+ (0.080)
College+	0.067 (0.102)	0.040 (0.089)	0.063 (0.089)
<b><u>Family Context in Youth</u></b>			
<b># of Siblings (vs. 4+)</b>			
0 Siblings	-0.477** (0.160)	-0.070 (0.141)	-0.056 (0.140)
1 Sibling	-0.339*** (0.086)	0.028 (0.077)	0.022 (0.076)
2 Siblings	-0.391*** (0.074)	-0.154* (0.066)	-0.137* (0.065)
3 Siblings	-0.349*** (0.073)	-0.235*** (0.065)	-0.226*** (0.064)
<b>Lived w/ Parents</b>	0.184** (0.062)	0.108* (0.055)	0.104+ (0.054)
<b>Religious Attendance (vs. 1+ times per week)</b>			
Never	-0.193* (0.088)	-0.065 (0.078)	-0.025 (0.077)
Rarely	-0.200** (0.070)	-0.118+ (0.061)	-0.107+ (0.061)
1-3 times per month	-0.132+	-0.046	-0.036

	(0.070)	(0.062)	(0.061)
<b><u>Images of Family</u></b>			
Ideal Family Size (vs. 4+)			
0 Children	--	-3.090*** (0.284)	-3.003*** (0.281)
1 Child	--	-2.220*** (0.182)	-2.152*** (0.181)
2 Children	--	-1.511*** (0.057)	-1.477*** (0.057)
3 Children	--	-0.789*** (0.064)	-0.774*** (0.063)
<b><u>Images of Future Self</u></b>			
Job Expectations at age 35 (vs. Married/Family)			
Some Occ	--	--	-0.218*** (0.060)
Other	--	--	-0.439*** (0.128)
Employed in 5 yrs	--	--	-0.224* (0.095)
Married in 5 yrs	--	--	0.331*** (0.053)
School in 5 yrs	--	--	0.068 (0.052)
Constant	3.082*** (0.241)	3.357*** (0.212)	3.965*** (0.249)
R <sup>2</sup>	0.029	0.253	0.271
N	2745	2745	2745

Note: Standard errors in parentheses; + p<0.10 \* p<0.05 \*\* p<0.01 \*\*\* p<0.001

Table 2. Predicted Accuracy of Fertility Expectations in 1979 by Family Background and Images of Family & Future Self

	<u>Model 1 (vs. Matched)</u>		<u>Model 2 (vs. Matched)</u>		<u>Model 3 (vs. Matched)</u>	
	Too-Low	Too-High	Too-Low	Too-High	Too-Low	Too-High
Race (vs. White)						
Black	1.439** (0.189)	1.292* (0.149)	1.382* (0.184)	1.189 (0.142)	1.363* (0.185)	1.222 (0.149)
Other	1.132 (0.265)	0.914 (0.191)	1.135 (0.267)	0.870 (0.188)	1.118 (0.264)	0.879 (0.190)
Age	0.939* (0.026)	0.980 (0.022)	0.939* (0.026)	1.008 (0.024)	0.941+ (0.029)	0.998 (0.027)
Mother's Educ (vs. HS)						
<HS	1.133 (0.143)	0.889 (0.097)	1.142 (0.145)	0.848 (0.096)	1.150 (0.146)	0.848 (0.096)
Some Col	0.732 (0.152)	1.116 (0.174)	0.751 (0.156)	1.040 (0.167)	0.750 (0.157)	1.055 (0.171)
College+	0.911 (0.201)	1.069 (0.185)	0.955 (0.212)	1.059 (0.190)	0.943 (0.211)	1.071 (0.193)
<b><u>Family Context in Youth</u></b>						
# of Siblings(vs. 4+)						
0 Siblings	1.112 (0.425)	1.813+ (0.582)	1.083 (0.417)	2.955** (0.974)	1.093 (0.421)	2.961** (0.979)
1 Sibling	0.529*** (0.098)	0.770+ (0.112)	0.529*** (0.100)	1.138 (0.174)	0.528*** (0.100)	1.132 (0.174)
2 Siblings	0.628** (0.096)	0.692** (0.088)	0.636** (0.099)	0.858 (0.114)	0.634** (0.099)	0.858 (0.114)
3 Siblings	0.806 (0.120)	0.787+ (0.102)	0.804 (0.120)	0.890 (0.119)	0.809 (0.122)	0.893 (0.120)
Live w/ Parents	0.858 (0.107)	1.342** (0.148)	0.866 (0.108)	1.307* (0.149)	0.869 (0.109)	1.305* (0.149)
Religious Attendance (vs. 1+ times per week)						
Never	0.766 (0.141)	0.900 (0.134)	0.754 (0.140)	1.041 (0.161)	0.742 (0.138)	1.057 (0.164)
Rarely	0.954 (0.140)	1.070 (0.130)	0.948 (0.140)	1.192 (0.150)	0.946 (0.140)	1.199 (0.151)

1-3 times a mo	1.143 (0.163)	0.926 (0.115)	1.147 (0.164)	0.993 (0.128)	1.149 (0.165)	0.996 (0.128)
<b><u>Images of Family</u></b>						
Ideal Family Size(vs. 4+)						
0 Children	--	--	1.435 (0.740)	0.065*** (0.052)	1.423 (0.736)	0.065*** (0.053)
1 Child	--	--	1.958+ (0.729)	0.140*** (0.066)	1.987+ (0.743)	0.143*** (0.068)
2 Children	--	--	0.925 (0.135)	0.229*** (0.029)	0.925 (0.135)	0.231*** (0.029)
3 Children	--	--	0.687* (0.119)	0.564*** (0.077)	0.689* (0.119)	0.567*** (0.078)
<b><u>Images of Future Self</u></b>						
Job Expectations (vs. Married/Family)						
Some Occ	--	--	--	--	1.074 (0.159)	0.985 (0.122)
Other	--	--	--	--	1.462 (0.425)	0.823 (0.222)
Employed in 5 yrs	--	--	--	--	0.824 (0.198)	0.779 (0.161)
Married in 5 yrs	--	--	--	--	0.981 (0.123)	1.126 (0.123)
School in 5 yrs	--	--	--	--	1.010 (0.125)	0.988 (0.107)
Constant	3.396* (1.694)	2.583* (1.087)	3.750** 1.898	3.106* (1.358)	4.062* (2.441)	4.393** ( 2.298)
BIC	5811.784		5592.918		5663.630	
N	2745	2745	2745	2745	2745	2745

Note: Odds ratios shown; Standard errors in parentheses; +p<.10, \*p<.05, \*\*p<.01, \*\*\*p<.001

Note: Matched refers to expectations matching final parity. Too-low refers to expectations being lower than final parity. Too-high refers to expectations being higher than final parity.

Table 3. Predicted Probabilities of Accurate, Too-Low, and Too-High Expectations Across Life Course Transitions

	Matched	Too-Low	Too-High
<u>Completed Education (vs. wave prior)</u>			
2 waves prior	0.474	0.148	0.378
1 wave prior	<i>0.447</i>	<b>0.183</b>	0.370
1 wave After	0.432	0.195	0.373
2 waves after	0.416	0.200	0.384
N	1515		
<u>1st Marriage (vs. wave prior)</u>			
2 waves prior	0.393	0.196	0.412
1 wave prior	0.400	0.199	0.400
1 wave After	<b>0.431</b>	0.201	<b>0.368</b>
2 waves after	<b>0.466</b>	<i>0.216</i>	<b>0.318</b>
N	1784		
<u>1st Child (vs. wave prior)</u>			
2 waves prior	0.438	0.228	0.334
1 wave prior	0.432	<b>0.282</b>	<b>0.286</b>
1 wave After	<b>0.480</b>	<b>0.252</b>	0.268
2 waves after	<b>0.514</b>	0.267	<b>0.219</b>
N	1693		

Note: Bolded probabilities show significant differences compared to the wave prior at the .05 level. Italicized probabilities show significance at the .1 level.

Note: Each transition was predicted separately controlling on age and race and when generating predicted probabilities these were held constant at age 25, White, and mother with a high school degree.

Note: Matched refers to expectations matching final parity. Too-low refers to expectations being lower than final parity. Too-high refers to expectations being higher than final parity.