



# DEMOGRAPHIC RESEARCH

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*Research Article*

### **An implicit ambivalence-indifference dimension of childbearing desires in the National Survey of Family Growth**

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## **An implicit ambivalence-indifference dimension of childbearing desires in the National Survey of Family Growth**

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### **Abstract**

#### **BACKGROUND**

It is common in fertility surveys to ask women to retrospectively rate on a bipolar scale how much they wanted a pregnancy right before they became pregnant. Using a theoretical framework based on the interaction between positive and negative desires for pregnancy, we argue that the mid-point response to a bipolar survey question about preconception childbearing desires implicitly measures an ambivalence/indifference dimension of their preconception motivation.

#### **OBJECTIVE**

We create a variable that measures this dimension and examine its construct validity by testing hypotheses about how scores on this dimension predict the postconception wantedness of a pregnancy and how certain social and demographic contexts influence that prediction.

#### **METHODS**

Using data from the 2006–2010 National Survey of Family Growth, we use linear regression analyses to test these hypotheses on over 5,000 pregnancies that occurred in the 3 years prior to the survey interview.

#### **RESULTS**

The results confirm our general hypothesis that women who endorse the bipolar scale at or near the mid-point, and thus are high scorers on the proposed ambivalent/indifferent dimension, tend to resolve their preconception mixed feelings in the direction of wanting their pregnancies after they have occurred. The results also confirm that

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whether or not preconception mixed feelings are resolved in the direction of postconception wantedness depends upon the woman's relationship status at the time of conception, her age at conception, her income, and -within certain racial/ethnic groups, her level of education and income.

## **CONCLUSIONS**

We conclude that the dimension of ambivalent/indifferent desires provides additional explanatory power for the construct of postconception pregnancy wantedness and that our findings support the development of measures of positive and negative desires for pregnancy so that the constructs of ambivalent and indifferent childbearing desires may be directly measured in future fertility surveys.

## **1. Introduction**

It is common in fertility surveys to collect data about the respondents' motivations and intentions regarding future childbearing. It is also common to collect data about the degree to which each of any previous pregnancies was intended and wanted. These data are collected in order to inform fertility forecasts, as well as to provide information about the family planning status of births in the population of interest. Because of society's special concern with preventing the individual and family suffering associated with pregnancies that are not wanted, considerable attention has been devoted to understanding their antecedents and social contexts.

In recent years it has become clear that there are two different approaches to determining when a pregnancy is unwanted. One approach asks respondents whether they wanted to have a baby before the pregnancy occurred, thereby defining an unwanted pregnancy in terms of their preconception desires. This approach is well represented by the National Survey of Family Growth's (NSFG's) series of questions about intended, mistimed, and unwanted pregnancy, where these three constructs all reflect preconception phenomena (London, Peterson, and Piccinino 1995). The other approach asks the respondents what they wanted and felt after the pregnancy had occurred, thereby defining an unwanted pregnancy in terms of their postconception desires and feelings. This approach is well represented by Miller's (1974, 1994a) series of questions about a pregnancy's intendedness and wantedness, where intendedness reflects the amount of intention that went into the respondent getting pregnant and wantedness reflects the degree of motivational and emotional acceptance or rejection of being pregnant. Numerous other researchers have adopted the postconception approach as well (for example, Adler 1992; Sable and Herman 1997; Blake et al. 2007; East,

Chen, and Barber 2012). While in many cases there is little or no difference in the assessment of pregnancy wantedness between the two approaches, in others, especially when preconception desires are weak, conflicted, and/or largely unconscious but the pregnancy is welcomed, the difference may be appreciable. This discrepancy raises the question of how the two assessments of pregnancy wantedness are related to each other. In addition, because both of these assessments are commonly made after the pregnancy, and in most cases after the birth has occurred, the question of retrospective bias is also raised.

In previous research, Miller and Jones (2009) used data from the NSFG to test a multivariate model of the relationship between women's preconception desires for a pregnancy (reported within four years of conception) and their postconception wantedness of that pregnancy. Their analysis showed that preconception desires were the primary predictor of postconception wantedness and completely eliminated preconception intentions from the prediction regression in the general model, as well as in a number of the context specific models. These authors questioned whether retrospective bias may have contributed to this predictive strength. However, they found that inclusion of a time-since-the-pregnancy variable as a moderator in the analysis showed that the length of retrospection had no effect on the predictive strength of preconception desires in their models, leading the authors to conclude that whatever retrospective bias was present, it did not invalidate their findings.

Miller and Jones (2009) also discussed how the meaning of the construct of "unwanted pregnancy" had evolved during the twentieth century. In the first four decades of that period when Margaret Sanger and others in the nascent family planning movement were struggling to legalize birth control and make it available to the poor, the construct had its postconception meaning. During the next six decades the construct progressively assumed its preconception meaning as demographers progressively focused first on predicting family size, then on the determinants of both the number and timing of births, and finally settled on the three category preconception measure with the launching of the NSFG. Miller and Jones (2009) discussed the shortcomings of this categorical measure, and then considered two continuous measures introduced in 2002, one based on preconception desires for a pregnancy and the other on preconception trying to get pregnant/avoid getting pregnant, both of which were added to the survey interview in an effort to address these shortcomings. It is that continuous preconception desires measure that is used in the current study as a measure of preconception wantedness.

Finally, Miller and Jones (2009) discussed an additional continuous variable introduced in 1995 that focused on postconception feelings by asking how happy the woman felt when she learned she was pregnant. Although adding this variable provided the NSFG with a measure of women's feelings about the pregnancy during the

postconception period, a limitation of this question was that it did not directly measure postconception wantedness. A good case can be made that a construct based on wanting is the most appropriate one to measure both the woman's preconception mental state about getting pregnant and her postconception mental state about actually being pregnant. Using 'want' for both time periods rests on the reasonable assumption that there is a continuity of the motivational underpinnings for both preconception and postconception mental states. 'Want' also seems to capture better how women commonly approach both getting pregnant and being pregnant, namely having a gut feeling of wanting it or not wanting it. The 'want' construct also implies decision-making and action, each of which are important components of both the preconception period (vis-a-vis both contraceptive and proceptive behavior) and the postconception period (vis-a-vis both prenatal care and abortion-seeking). Lastly, using the same constructs in both time periods provides a before and after measure that is unclouded by terminological differences.

In the current study we do not have a 'want' based construct available for measuring postconception wantedness and must, therefore, rely on a closely related variable, the 'happiness' measure. This variable has often been used as a proxy for postconception wantedness but little work has been conducted to validate this practice. Fortunately, a study by Piccinino and Peterson (1999) does provide some good support. They examined the associations in their data between the traditional NSFG three-category preconception wantedness scale and the postconception happiness scale and found a high level of consistency between them, to the point that they considered the happiness scale to be a good proxy for preconception wantedness. The question remains, however, how well does the happiness scale serve as a proxy for postconception wantedness? The authors also conducted regression analyses using several measures of ambivalence constructed from pairs of items that were matched so that similar scores on any pair would represent opposite feelings about being pregnant. Importantly, all of the ambivalent items were asked about a recent pregnancy, i.e., they were addressing postconception feelings about the pregnancy. The regression results showed a strong predictive association between the ambivalence measures and the happiness scale (high ambivalence, low happiness), supporting the validity of that scale as a measure of postconception wantedness.

These findings notwithstanding, some researchers have pointed to findings that preconception wantedness can diverge from postconception happiness and suggested that the latter is therefore not a good proxy for postconception wantedness. An example of such findings can be found in recent research by Aiken, Dillaway, and Mevs-Korff (2015), which found during in-depth interviews with a small sample that some women demonstrated incongruence between their wanting and trying not to get pregnant and the happiness they would feel if a pregnancy occurred, in spite of their efforts. Although

this certainly is an understandable scenario, the preconception wantedness/postconception happiness divergence does not address the question of how well postconception happiness reflects postconception wantedness. In fact, it seems likely that the women who expressed postconception happiness in this study would also have expressed postconception wantedness, had they been asked. Thus although there may be some modest differences in connotation between the two postconception measures of happiness and wantedness, we believe that the happiness measure is a satisfactory alternative indicator of postconception wantedness in the latter's absence.

In a recent study that sheds some important light on preconception desires, Miller, Barber, and Gatny (2013) used data from a population-based sample of one thousand unmarried 18 to 19 year old women living in Michigan in order to explore the relationship between desires for a child and the risk of an unintended pregnancy. In this study separate measures of both positive and negative desires were administered at weekly intervals over several years, making it possible to examine prospectively their effect on the risk of a subsequent pregnancy during those years. In their data analysis, these authors constructed four interaction variables that were based on these two types of desires. These were defined as follows: antinatal desires occurred when positive desires were low and negative desires were high; pronatal desires occurred when positive desires were high and negative desires were low; ambivalent desires occurred when positive and negative desires were both high; and, indifferent desires occurred when positive and negative desires were both low. They found that these four variables were more successful in predicting future pregnancies than were either positive or negative desires alone. Although the focus of this study was on pregnancies that were unintended rather than unwanted prior to conception, the design of the study eliminated any possibility of retrospective bias and demonstrated clearly the different patterns of preconception desires that have the potential to produce different degrees of postconception wantedness.

In the current study, our goal is to further examine the relationship between preconception desires and postconception wantedness. Because of the superior predictive success of the four interaction variables, our preference would be to use fertility surveys that have two separate questions for positive and negative preconception desires, thereby enabling the construction of the four interaction variables. Unfortunately, to our knowledge this option is not currently available in any national or international survey. However, the NSFG does have a question that asks women to rate their preconception desires for pregnancy on an eleven-point bipolar scale, where 0 indicates the woman "wanted to avoid pregnancy" and 10 indicates she "wanted to get pregnant". Thus this question does measure both pronatal and antinatal preconception motivations, although by measuring them with a single scale, it is not

possible to completely disentangle them. However, what about the other two interaction states, ambivalent and indifferent preconception motivations?

In the NSFG scale a 5 indicates the exact mid-point, halfway between the negative and positive poles. In selecting that response, a woman is indicating that she neither wanted to avoid getting pregnant nor wanted to get pregnant. One approach to the measurement of ambivalence in several recent empirical research studies has been to define it by using just such a mid-point (Schunmann and Glasier 2006; Schwartz et al. 2007; Sipsma et al. 2011). This seems reasonable, given that motivational ambivalence may be defined as simultaneously having both strong positive and strong negative desires to achieve a goal. However, theoretical considerations indicate that the mid-point of a bipolar scale represents a more complex construct than just ambivalence. For example, McQuillan, Greil, and Shreffler (2011) asked their sexually active respondents whether they were “trying to get pregnant, trying not to get pregnant, or okay either way?” These investigators discuss this okay-either-way category in terms of ambivalence, but to us it looks much more like indifference, which may be defined as simultaneously having both weak positive and weak negative desires for a goal. (For a more extended discussion of the measurement of ambivalent and indifferent motivation in recent literature, see Miller, Barber, and Gatny 2013). In order to demonstrate these points in greater detail, we turn next to our theoretical framework.

## **1.1 Theoretical framework**

Miller (1994b) has proposed a three-step motivational sequence that leads to fertility behavior. This T-D-I-B sequence begins with positive and negative childbearing motivational Traits, which lead to Desires for children, which in turn lead to the Intentions to have children, which then produce the Behavior that results in pregnancy. Expanding upon the first step in this sequence, Miller, Trent, and Chung (2014) used separate measures of positive and negative childbearing motivations to construct the four interaction variables discussed above and showed in a sample of young, African-American females that antinatal motivation was positively related to regularity of condom use and that pronatal, ambivalent, and indifferent motivations were each negatively associated with regularity of condom use. However, because the instrument for measuring such motivational traits is too long to use in most surveys, in the study described in the previous section Miller, Barber, and Gatny (2013) turned to the second step in the motivational sequence and devised separate unipolar measures of positive and negative pregnancy desires.

These measures were introduced to the 18–19 year old respondents by saying, “most people your age have both positive and negative feeling about getting pregnant



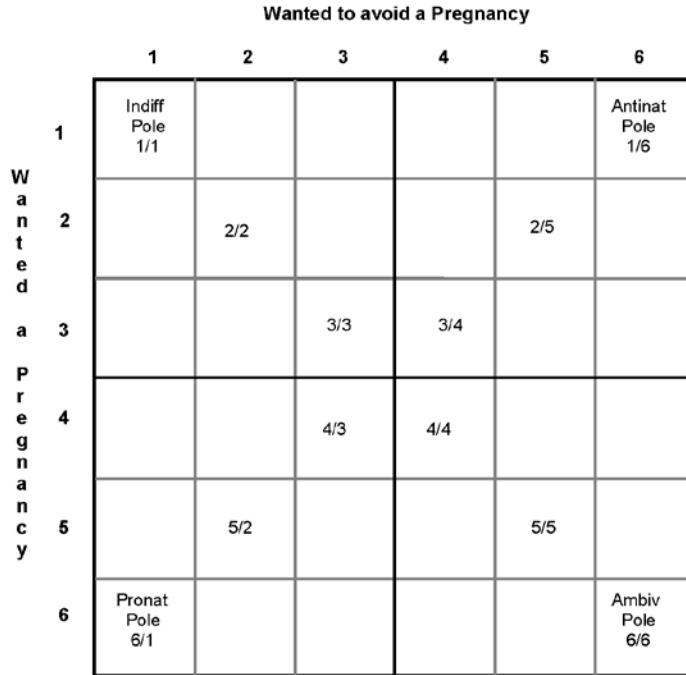
and having a child” and then asking the respondents first to answer, “How much do you want to get pregnant during the next month?” and then second to answer, “How much do you want to avoid getting pregnant during the next month?” Respondents indicated their answer to the first question by choosing “a number between 1 and 6, where 1 means you don’t at all want to get pregnant and 6 means you really want to get pregnant” and then indicated their answer to the second question by choosing “a number between 1 and 6, where 1 means you don’t at all want to avoid getting pregnant and 6 means you really want to avoid getting pregnant.” Using the responses to these two questions, Miller, Barber, and Gatny (2013) were able to construct the four interaction variables that successfully predicted pregnancy risk. Figure 1 helps to clarify the theoretical assumptions underlying this approach, representing the interaction between positive and negative pregnancy desires as an orthogonal cross-tabulation<sup>4</sup>.

All of our previous empirical work suggests that these positive and negative motivational dimensions are more or less orthogonal to each other (Miller 1995) and the theoretical work of Cacioppo, Gardner, and Berntson et al. (1999) provides a sound biological explanation for why this should be so. The six categories of positive desires are labeled along the left side of the figure, increasing from top to bottom. The six categories of negative desires are labeled across the top of the figure, increasing from left to right. We have inserted positive/negative interaction scores appropriate to each cell across the two main diagonals in order to illustrate how combined scores on the two measures of desires vary across the figure. In each corner, or pole cell, of the figure we have named the motivational characteristic of individuals falling in those four extreme cells. Thus the ambivalent pole cell contains those individuals who are high scorers on both the desire for pregnancy and the desire to avoid pregnancy (6,6). Therefore they have a motivational conflict of high intensity. The indifferent pole cell contains those who are low scorers on both types of desires (1,1). Therefore they have a motivational conflict that is of very low intensity. In contrast, the antinatal pole cell contains those individuals who are low scorers on the desire for pregnancy and high scorers on the desire to avoid pregnancy (1,6). Therefore they are unconflicted in their motivational opposition to pregnancy. Finally, the pronatal pole cell contains those who are high scorers on the desire for pregnancy and low scorers on the desire to avoid pregnancy (6,1). Therefore they are unconflicted in their motivational support for pregnancy. The other cells in each of the four quadrants are less extreme forms of those four types.

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<sup>4</sup> In the actual study, response scales extended from 0 through 5 so that zeros would reinforce the “don’t at all” aspect of the instructions to the respondents. For the sake of clarity, we use scale values of 1 through 6 in this report.

**Figure 1: Graphic representation of the interaction between two unipolar dimensions of pregnancy desires, one positive and the other negative, both varying from 1 to 6**



Note: The combined positive and negative desires scores of individuals falling in each cell along the two major diagonals are shown and the pole cell of each quadrant is named according to the psychological significance of its score.

Note that the two unipolar scales of positive and negative desires interact along the two primary diagonals of Figure 1 to produce two bipolar scales. The antinatal/pronatal diagonal represents a bipolar continuum and all the cases not falling in the cells of that diagonal can be represented in that continuum by compressing the figure from the top left and bottom right so that the indifferent and ambivalent pole cells, and all the other non-diagonal cells, get pushed at right angles into the antinatal/pronatal diagonal until there is a single continuum. Similarly, the ambivalent/indifferent diagonal represents a bipolar continuum that is orthogonal to the antinatal/pronatal diagonal and all the cases not falling in the cells of that diagonal can be represented in the continuum by a

corresponding compression from the top right and bottom left until there is a single continuum.

These two continua can be derived with simple arithmetic from scores on the positive and negative desires scales. The bipolar antinatal/pronatal continuum can be constructed by subtracting the negative desires score of each cell from its corresponding positive desires score. This subtraction produces a scale that goes from -5 for the antinatal pole to +5 for the pronatal pole, with all the scores of the ambivalent/indifferent diagonal collapsing to a mid-point of 0. Similarly, the bipolar ambivalent/indifferent continuum can be constructed by adding the negative desires score of each cell to its corresponding positive desires score. This addition produces a scale that goes from +12 for the ambivalent pole to +2 for the indifferent pole, with all the scores of the antinatal/pronatal diagonal collapsing to a mid-point of 7. Note that the arithmetic creation of an antinatal/pronatal continuum generates an 11-point scale that is identical to the NSFG's 11-point preconception desires scale, even to the extent of having a mid-point of 5 where the cases originally located at the ambivalent and indifferent poles were relocated as a result of the top left and bottom right compression.

The bipolar antinatal/pronatal continuum corresponds to the bipolar dimension that underlies the NSFG's measure of preconception desires, except that the continuum based on Figure 1 has only six rather than eleven categories. On the other hand, the bipolar ambivalent/indifferent continuum represents the intensity of conflict between positive desires to get pregnant and negative desires to avoid pregnancy, with the ambivalent pole representing high conflict and the indifferent pole representing low or zero conflict. There is no corresponding measure in the NSFG. There is, however, one step we can take that allows us to measure the ambivalent/indifferent dimension as a whole and as a dimension that is orthogonal to the antinatal/pronatal dimension.

Consider Figure 1 and suppose that we create the antinatal/pronatal dimension by compressing the more indifferent cells from the upper left to the antinatal/pronatal diagonal and the more ambivalent cells from the lower right to the same diagonal. Suppose that we then take a second step in which we fold the pronatal pole from the lower left up to the antinatal pole at the upper right. This results in a three category bipolar dimension in which one pole represents cases that are either highly antinatal or highly pronatal and the other pole represents cases that are either highly ambivalent or highly indifferent. Of course, a measure that lumps all the cases into three categories does not generally provide enough separation between cases to conduct satisfying ordinal or linear analyses, but fortunately, the NSFG measure of preconception desires when compressed and folded as just described provides a variable with a more than adequate six categories.

There remains an important question about interpretation when using such a compressed and folded variable in any kind of correlation based analysis: what does it

mean to say that some other variable is positively or negatively associated with it? This problem can be visualized by looking at the frequency distribution of the preconception desires variable in Miller and Jones (2009) or in the first table of this study (in both cases, the original scale values of 0 through 10 have been recoded to 1 through 11 for analytic purposes). In each study there is a marked heaping of responses at the two extreme categories, 1 and 11, and a lesser but still considerable heaping at the mid-point category, 6<sup>5</sup>. When this 11-category variable is folded, the two extreme categories (1 and 11) are located together at one pole and the mid-point category (6) is located at the other pole. What phenomena do these two poles of the folded variable actually represent? It is helpful to think of the first pole as representing those whose positive and negative motivations reinforce each other to produce extreme desires about either getting or not getting pregnant and of the second pole as representing those whose positive and negative motivations work against each other to produce equally balanced desires both for and against getting pregnant. Because our interest here focuses more on this second group, it is important that we conduct our analyses using a control variable that can partial out the extreme positive or negative feelings represented by the folded variable's first pole, thereby allowing the mid-point category at the folded variable's second pole to have the predominant effect in these analyses. Clearly, the best such control variable would be the unfolded bipolar variable representing the antinatal/pronatal dimension. In the data analysis section, we will present an additional important reason for including the unfolded control variable in our analyses.

## **1.2 Hypotheses**

Our goal of examining the relationship between the four types of preconception desires and postconception wantedness has been frustrated by the absence of a distinction between positive and negative desires in extant survey research data bases. However, our theoretical framework indicates that the midpoint of a bipolar antinatal/pronatal scale may be conceptualized as representing a combination of the two types of preconception desires not explicitly measured in that scale, namely ambivalent and indifferent desires. Therefore we turn in this section to the statement and testing of a small number of hypotheses that should be true if our theoretical conclusions are true. Although we consider the results of testing these hypotheses to be important per se, the results are equally important in the extent to which they provide validation of our conceptualization of the bipolar antinatal/pronatal scale midpoint.

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<sup>5</sup> The analysis presented in this section suggests that the presence of heaping at the midpoint of any bipolar measure may well indicate that the underlying domain is not adequately described by bipolarity and that two unipolar scales would better describe the domain.

There are very few research results that can specifically guide the formation of hypotheses about how the ambivalent/indifferent pregnancy desires of the women in our study affect the postconception wantedness of their pregnancies or about the role that different situational contexts play in the resolution of their conflicted feelings. However, there are three recent papers in which researchers who make use of a mid-point definition of ambivalence (Heil et al. 2011; Schwarz et al. 2007) or indifference (McQuillan, Greil, and Shreffler 2011) report some results on the relationship between selected demographic variables and their measure of ambivalence/indifference. Schwarz et al. (2007) found that ambivalent women were older and more frequently non-white when compared with women with a positive attitude towards getting pregnant. Heil et al. (2011) found that ambivalently pregnant women were older, more frequently non-white, and less often employed when compared with women with an intended pregnancy. McQuillan, Greil, and Shreffler (2011, see Table 1) found that women who were "okay either way" about getting pregnant (i.e., indifferent) fell between those trying to get pregnant and those trying not to get pregnant on a number of demographic variables, including age (the group trying to get pregnant was youngest), marital status (the group trying to get pregnant was most often married), parity (the group trying to get pregnant had fewer children), race/ethnicity (the group trying to get pregnant was most often Hispanic and least often white), and education (the group trying to get pregnant was most educated). They also found that women who were "okay either way" about getting pregnant were highest on religiosity. Popkin et al (2011) used data from the Fog Zone study (Kaye, Suellentrop, and Stroup 2009) to explore the performance of different definitions of ambivalence, including a mid-point definition. They reported that older young adults were more ambivalent than younger ones and that more educated young adults were less ambivalent than less educated ones.

In spite of the limited quantity of these findings and the fact that they tell us little about how ambivalence might affect postconception pregnancy wantedness, we use them as a starting point for our hypotheses, together with our own understanding of the ambivalence/indifference dimension. First, our general hypothesis is that when controlling for preconception desires, we should observe a significant positive relationship for all women in our sample between their score on the ambivalence/indifference dimension and the postconception wantedness of their pregnancies. There are several lines of evidence that converge to suggest this expectation. First, there is research indicating that biologically based nurturant schemas act to promote bonding with the fetus during pregnancy and with the infant after birth (Miller 2003). For example, research on the theory of maternal fetal attachment supports the conclusion that a unique bond between the pregnant woman and her fetus develops long before birth (Brandon et al. 2009) and that there are diverse factors that are favorable for this bond and others that threaten it (Alhusen 2008). Second, there is empirical evidence in

the U.S. for a gradual increase in the postconception wantedness of unintended pregnancies in married women, beginning at conception and continuing during pregnancy and into the immediate postpartum months (Miller 1994a). This pattern suggests that women who are having mixed feelings about being pregnant, and who therefore delay making a decision about what to do, may begin to bond with the fetus and ultimately come to accept the pregnancy. Third, Miller's (1994c) finding that unintended pregnancy is only weakly endorsed as a sufficient reason for an abortion by women (6.2%) and men (10.5%) suggests that reluctance to seek an abortion may contribute to a delay in decision-making. Fourth and finally, the overall social milieu in the U.S. that influences these biological and psychological factors tends to strongly support family life and childbearing, i.e., it has pronatal effects. Two examples based on the nationally representative survey data of the NSFG illustrate this point. One is the response to an attitude item where respondents during the 2006–2010 survey were asked to indicate their degree of agreement or disagreement with the following statement: "The rewards of being a parent are worth it, despite the cost and work it takes". Among women, 60.3 % strongly agreed and 35.1% agreed, while among men, 52.3% strongly agreed and 41.8% agreed ([www.cdc.gov/nchs/nsfg/key\\_statistics/a.htm](http://www.cdc.gov/nchs/nsfg/key_statistics/a.htm)). These findings indicate that both women and men in the U.S. overwhelmingly endorse parenthood in spite of its drawbacks. The other example is related to birth expectations. In the NSFG surveys conducted between 2002 and 2013, the average number of births expected by women was 2.3 and by men was 2.2. In addition, the number of women who expected no births in their lifetime varied between 8.3% and 9.0% (Martinez, Daniels, and Chandra 2012). These findings indicate that all but a small fraction of U.S. women and men anticipate bearing children and becoming parents and only a small proportion of women anticipate being childless.

Taken together, these considerations suggest the following account. Women's maternal bonding dispositions provide a natural tendency for them to develop positive feelings about their pregnancy. Dealing with an unintended pregnancy requires that the woman take action but such action may be delayed by her initial ambivalent/indifferent motivations and by her negative feelings about abortion. The longer the pregnancy continues, the stronger the positive feelings may become. Throughout the course of her decision-making the woman's positive feelings about the pregnancy are shaped by the pronatal forces she experiences in her social network. Although her ultimate decision is certain to be greatly influenced by the status of her relationship with her partner, her reproductive status, and the constraints that exist within her socioeconomic and subcultural statuses, we propose that when we control for these contextual factors, women in the U.S. as a whole will tend to resolve their ambivalent/indifferent preconception desires in the direction of a pregnancy that is more wanted after conception has occurred.

Given the potential influence of contextual factors on this resolution process, we have selected seven specific contexts within which we hypothesize some variation in how favorably feelings about an ambivalently/indifferently conceived pregnancy may be resolved. These include the relationship context (married, cohabiting, or neither at conception), the reproductive context (age at conception, number of prior births), the social economic context (education, income, and religiosity), and the subcultural context (race/ethnicity). Below we discuss our expectations of how each of these seven specific contexts will affect the resolution of ambivalence/indifference and the reasoning behind those expectations. Because we plan to control for all six of the remaining contexts when analyzing how any one of them interacts with ambivalence/indifference in the prediction of postconception pregnancy wantedness, we explain each context-specific hypothesis without justifying it in terms of any of the other contexts.

### **1.2.1 Relationship status at conception**

Married women and unmarried, cohabiting women tend to have greater commitment and support from their partners than those who are neither married nor cohabiting. Considerable social and medical science evidence has been accumulated over the last several decades indicating that this type of partner involvement contributes appreciably to the occurrence of favorable medical, psychological, and social birth outcomes (Waite 1995; Kroelinger and Oths 2001; Rini et al. 2006; Chibber et al. in press). Therefore we expect that both married women and unmarried, cohabiting women are more likely to resolve their feelings about an unintended pregnancy in the direction of greater postconception wantedness compared with unmarried, non-cohabiting women. Further, because marriage tends to represent a more committed and enduring relationship status, we expect that the effect of these relationship factors is greater among married women than among unmarried cohabiting women.

### **1.2.2 Age at conception**

The literature cited above suggests that ambivalence/indifference may be positively associated with age. In addition, much of the ambivalence research literature focuses on adolescent pregnancies (Crosby et al. 2002; Jaccard, Dodge, and Dittus 2003; Sheeder et al. 2010). We expect that a curvilinear relationship exists such that women in the prime reproductive years of 21 to 30 tend to resolve ambivalently/indifferently

conceived pregnancies in the direction of greater postconception wantedness more than those who are younger or older.

### **1.2.3 Number of prior births**

Recent Gallup polls indicate that ideal family size has remained stable in the U.S. at around 2.5 children (Carroll 2007). We propose that women who have two or more children tend to resolve an ambivalently/indifferently conceived pregnancy in the direction of lesser postconception wantedness and women who are early in their reproductive careers (zero or one child) tend to resolve an ambivalently/indifferently conceived pregnancy in the direction of greater postconception wantedness. However, childless women may be difficult to predict depending upon the relative mix of commitment to school and career versus a fear of infecundity, and this should be true both among women in their late teens and twenties (Kaye, Suellentrop, and Stroup 2009) and those who have postponed childbearing until their late thirties or early forties.

### **1.2.4 Education**

The cited literature suggests that more educated women are less ambivalent/indifferent. We conjecture that this may be related to their having a greater capacity for organization and planning, which in turn may be facilitated by their having greater social and economic resources. Assuming this capacity and its associated resources, we propose that more educated women with ambivalently/indifferently conceived pregnancies will be better able to reorganize their plans and take advantage of their resources to resolve these pregnancies in the direction of greater postconception wantedness.

### **1.2.5 Income**

The cited literature suggests that ambivalently/indifferently pregnant women are less often employed. Greater income represents an important resource that allows flexibility in decision-making. We propose that higher income women with ambivalent/indifferent preconception motivations will be able to take advantage of this resource and thus more likely to resolve an ambivalently/indifferently conceived pregnancy in the direction of greater postconception wantedness.



### **1.2.6 Religiosity**

On the basis of McQuillan, Greil, and Shreffler's (2011) findings and the well-documented positive association between pronatalism and religiosity, we propose that women high on religiosity who have ambivalently/indifferently conceived pregnancies will tend to resolve those feelings in the wanted direction.

### **1.2.7 Race/Ethnicity**

Three of the papers cited above indicate that non-white women reported more ambivalence/indifference than white women. Blacks and Hispanics are the two non-white racial/ethnic groups with sufficient NSFG data to be studied separately. In the U.S., both blacks and Hispanics tend to differ from whites on education and income and Hispanics also tend to be different on religiosity. Because these are the three socioeconomic contexts we have identified as potential moderators of the resolution of ambivalent/indifferent preconception desires, we suspect that the association of ambivalence/indifference with blacks and Hispanics found in the literature is related to their socioeconomic differences. We therefore propose that black and Hispanic women will not tend to resolve their feelings about ambivalently/indifferently conceived pregnancies differently from white women. As a consequence of this proposal, we will explore whether race/ethnicity acts as a moderator in any of the above six hypotheses by testing whether they apply differently to one or two of the three race/ethnicity groups separately.

## **2. Methods**

### **2.1 Sample**

This report analyzes data from the 2006–2010 NSFG, which contains interviews conducted from June 2006 through June 2010 with a nationally-representative sample of 12,279 women 15–44 years of age. These women had experienced 20,492 pregnancies from the beginning of their childbearing up to the date of their interview. These pregnancies resulted in 14,292 live births (69.7%), 2,295 induced abortions (11.2%), 166 still births (0.8%), 2,945 miscarriages (14.4%), 298 ectopic pregnancies (1.4%), and 516 current pregnancies (2.5%). For the current study, we selected the 5,100 most recent pregnancies that began, regardless of outcome, in or after the January that occurred three years prior to the interview. Depending on the month the woman was

interviewed, this interval was between three and four years. For example, if a woman was interviewed in June 2010, we included any pregnancies conceived between January 2007 and June 2010, an interval of 3 years, 6 months. Pregnancies occurring before the January three year prior to the interview were excluded from our sample in order to avoid any confounding effect of the recent pregnancy on the memory of earlier ones. Finally, there were 12 cases with incomplete information on the preconception desires and postconception pregnancy wantedness variables that were excluded from the study, leaving a total sample of 5,088. Within this total sample, there were 2,848 pregnancies that were the only ones that occurred during the three to four year interview interval, 1,120 pregnancies that were the first of two pregnancies that occurred during that interval, and 1,120 pregnancies that were the second of two pregnancies that occurred during the interval.

## 2.2 Measures

The preconception desires variable was based on a question (wantscal) that asked the woman to rate “how much you wanted or didn’t want a pregnancy right before you got pregnant”, using a scale from 0 to 10, where 0 meant she wanted to avoid a pregnancy and 10 meant she wanted to get pregnant. (As previously indicated, we have recoded this scale to 1 to 11 for analytic purposes). The ambivalent/indifferent desires variable was constructed from the recoded preconception desires variable by folding the latter at its mid-point of 6, i.e., by recoding 11 to 1, 10 to 2, 9 to 3, 8 to 4, and 7 to 5. This results in a variable where a score of 1 indicates low ambivalent/indifferent desires and a score of 6 indicates high ambivalent/indifferent desires. The postconception pregnancy wantedness variable was based on the best indicator of that construct available in the NSFG data base, a question (feelinpg) that asked the respondent to rate “how you felt when you found out you were pregnant” using a scale from 1 to 10 where 1 meant she was very unhappy to be pregnant and 10 meant she was very happy to be pregnant.

Table 1 shows the unweighted and weighted frequencies and descriptive statistics of these three variables. The heaping of frequencies at the lowest, mid-point, and highest values can be seen clearly in the preconception desires variable. Heaping is also apparent at the same three locations in the postconception pregnancy wantedness variable, although it is proportionally greater at the highest value compared to the lowest value. Note that 5 is not the mathematical mid-point but – as commonly happens with ten-point scales – is probably perceived as such by most respondents.

**Table 1: Frequencies (N = 5,088), weighted frequencies (N = 23,290), and descriptive statistics of pre-conception desires, ambivalent/indifferent desires, and post-conception wantedness**

Variable					SE of
Category		Frequency	Weighted Frequency	Weighted Percent	Weighted Percent
Pre-conception Desires for Pregnancy					
1	Wanted to avoid pregnancy	1,206	4,805	20.6	0.91
2		226	876	3.8	0.35
3		188	792	3.4	0.36
4		196	868	3.7	0.41
5		165	679	2.9	0.31
6		752	3,250	14.0	0.92
7		181	771	3.3	0.39
8		206	1,112	4.8	0.55
9		220	984	4.2	0.44
10		169	716	3.1	0.45
11	Wanted to get pregnant	1,579	8,438	36.2	1.36
		Unweighted Mean = 6.35 Standard Deviation = 3.99			
Ambivalent/ Indifferent Desires for Pregnancy					
1	Low	2,785	13,242	56.9	1.27
2		395	1,592	6.8	0.55
3		408	1,775	7.6	0.57
4		402	1,980	8.5	0.74
5		346	1,450	6.2	0.48
6	High	752	3,250	14.0	0.92
		Unweighted Mean = 2.49 Standard Deviation = 1.92			
Post-conception Pregnancy Wantedness					
1	very unhappy to be pregnant	665	2,524	10.8	0.78
2		125	465	2.0	0.26
3		213	938	4.0	4.00
4		176	716	3.1	4.00
5		469	2,023	8.7	0.61
6		210	789	3.4	0.31
7		303	1,294	5.6	0.47
8		391	1,728	7.4	0.54
9		285	1,367	5.9	0.50
10	very happy to be pregnant	2,251	11,447	49.2	1.34
		Unweighted Mean = 7.11 Standard Deviation = 3.31			

Source: CDC/NCHS, National Survey of Family Growth, 2006–2010

The context variables were based on either NSFG-recode variables or original questionnaire variables. NSFG-recode variables are used when available because any missing values on these variables were replaced with imputed values as discussed by Lepkowski et al. (2006). Missing values on original questionnaire variables were not imputed and their handling is discussed below where we present specific information on the definition and coding of each of the seven context variables.

The ‘relationship status at conception’ variable was an NSFG recode, RMARCON6, computed by comparing the date the pregnancy was conceived to the dates of marriage and divorce and the dates cohabitation began and ended with all husbands and partners. ‘Age at conception’ (NSFG recode AGECON) is the woman’s age in years at the time the pregnancy was conceived. It was calculated by subtracting the month she was born (Blaise-computed variable<sup>6</sup> cmbirth) from the month the pregnancy began (NSFG recode DATECON) and dividing by 12. ‘Number of prior births’ (based on the NSFG recode BIRTHORD) is a count of all pregnancies that ended in live births before the pregnancy being analyzed. Pregnancies not ending in live births are excluded from this count. If a woman had no live births before this pregnancy, she would be coded ‘0’ on this variable; if she had 1 prior birth, she would be coded ‘1’; and so on. There is a separate category consisting of women who were currently pregnant with their first pregnancy grouped together with women for whom any previous pregnancies had not ended in a live birth.

‘Education’, represented by an NSFG recode HIEDUC, was calculated as the highest year of school the woman had completed or the highest degree she had received at the time of the interview. Analysis of this variable was limited to women 22 years of age or older because many younger women are still in school and have not completed their education. This is a standard practice when reporting NSFG data in NCHS reports (e.g., Daniels, Mosher, and Jones 2013; Jones, Mosher, and Daniels 2012; Mosher, Jones, and Abma 2012). ‘Income’ (NSFG recode POVERTY) as percent of poverty level was calculated as a measure of the total family income expressed as a percentage of the poverty level threshold for a family of that size in the calendar year preceding the interview. Analysis of this variable was limited to women aged 20 and over because women 15–19 often do not know their family’s income.

‘Religiosity’ was constructed from two variables: how important religion was in the respondent’s daily life and how frequently the respondent attended religious services (Miller and Jones 2009). These variable values were transformed and summed to create a scale as follows: the importance of religion was assigned a value of 1 if religion was very important, 7.5 if somewhat important, and 15 if not important; frequency of attendance took a value of 1 if she attended services more than once a week, 4.25 if once a week, 7.5 if 1–3 times a month, 11.25 if 1–11 times a year, and 15 if she never attended religious services. The composite variable ranged from 2 to 30 after summing these values. These values were then categorized into low religiosity

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<sup>6</sup> A Blaise-computed variable is one that is calculated during the interview based on answers given by the respondent. In order to easily calculate the amount of time in months between two events, each date is first converted into century months by subtracting 1900 from the year, multiplying the remainder by 12, and finally adding the number of the month, where January = 1, February = 2, etc. The difference between the two resulting calculations then provides the time difference in months between the two events.

(values greater than or equal to 22.5), medium religiosity (values greater than 8.5 and less than 22.5), and high religiosity (values less than or equal to 8.5).

'Race/ethnicity' was reported following the OMB 1997 guidelines (Office of Management and Budget 1997). These guidelines specify that persons of multiple races should be reported separately from those of a single race. Persons of Hispanic origin may be of any race. We do not discuss results for the 'other' race/ethnicity category because it is composed of women of other single race groups (Asian, American Indian and Alaskan Native, or Native Hawaiian and Other Pacific Islander) and women of multiple races and there are too few cases to break out any one category.

Table 2 shows the unweighted and weighted frequencies and descriptive statistics of these seven context variables.

**Table 2: Frequencies (N = 5,088), weighted frequencies (N = 23,290), and category percentages for seven context variables**

Variable				
Category	Frequency	Weighted Frequency	Weighted Percent	SE of Weighted Percent
Relationship Status at conception				
Not married/ Not cohabiting	1,692	5,896	23.4	1.16
Cohabiting	1,378	5,733	24.6	1.14
Married	2,018	11,661	50.1	1.76
Age at conception				
<21	1,137	4,508	19.4	1.00
≥21 and 31 <	2,741	11,844	50.9	1.45
<31	1,210	6,939	29.8	1.51
Number of prior births				
None	1,189	5,473	23.5	0.76
One	1,016	4,938	21.2	0.69
Two	556	2,521	10.8	0.59
Three or more	407	1,662	7.1	0.61
Pregnant/Pregnancy loss <sup>a</sup>	1,920	8,697	37.3	1.06

**Table 2: (Continued)**

Variable				
Category	Frequency	Weighted Frequency	Weighted Percent	SE of Weighted Percent
Education				
Less than HS diploma	990	3,553	15.3	1.29
HS diploma	1,179	5,041	21.7	1.19
Some college	1,161	5,367	23.1	1.14
BA or above	896	5,778	24.8	1.46
Age < 22 <sup>a</sup>	862	3,550	15.2	1.04
Income				
<150% of poverty level	2,413	8,808	37.8	1.41
150%–299% of poverty level	1,260	6,592	28.3	1.23
≥300% of poverty level	1,037	6,405	27.5	1.53
Age < 20 <sup>a</sup>	378	1,486	6.4	0.60
Religiosity				
Low	1,386	5,928	25.5	1.39
Medium	1,798	8,426	36.2	1.46
High	1,904	8,936	38.4	1.70
Race/Ethnicity				
Hispanic	1,319	5,020	21.6	2.21
Non-Hispanic black	1,274	4,028	17.3	1.48
Non-Hispanic white	2,122	12,211	52.4	2.24
Others <sup>a</sup>	373	2,032	8.7	1.30

<sup>a</sup> For an explanation of these four categories, see the description of their respective variables in the Measures section. Due to difficulty making any interpretation, we do not discuss the results shown in the remainder of the tables for these four categories. Source: CDC/NCHS, National Survey of Family Growth, 2006–2010.

## 2.3 Data analysis

The frequencies, cross-tabulations, correlations, and regression analyses reported here were produced using SAS<sup>TM</sup> software, version 9.3 (available from [www.sas.com](http://www.sas.com)), and SAS-Callable SUDAAN<sup>TM</sup> software, version 11.0 (available from [www.rti.org/sudaan](http://www.rti.org/sudaan)). SUDAAN<sup>TM</sup> is designed to handle complex sample designs, such as that used by the NSFG, and was used to produce regression coefficients and their associated standard errors. Descriptive statistics are shown unweighted and weighted;

standard errors are shown when weighted estimates are presented. Weighted estimates reflect the pregnancies that occurred to the reproductive-age female household population of the United States across the years 2006–2010. Women 15–44 years of age living on military bases or in institutions were not included in the survey.

In order to test our hypotheses, we conducted three primary types of linear regression analyses. In all three types we regressed the postconception pregnancy wantedness variable on both the preconception desires for pregnancy variable and the ambivalent/indifferent desires variable, as well as on all seven of the context variables as controls. The first type of regression simply looked at how well this group of nine predictor variables explained the variance of the postconception pregnancy wantedness outcome variable. This single regression represents our base model and tests the first hypothesis that higher ambivalence/indifference is associated with higher postconception wantedness when controlling for preconception desires. The second type of regression added as a predictor to the first type the two-way interaction between the ambivalent/indifferent desires variable and one of the context variables. This type of regression was run seven times, once for each of the seven different context variables. Each of these seven regressions tests one of the seven context-related hypotheses. The third type of regression added as a predictor to the second type the three-way interaction between the ambivalent/indifferent desires variable, the context variable that participated in the two-way interaction, and the race/ethnicity variable. Finally, for any of the analyses that had a significant three-way interaction, we conducted the corresponding two-way analysis (i.e., tested the two-way interaction between ambivalent/indifferent desires and the corresponding context variable) separately in each of the three race/ethnicity groups.

In the introductory section, we presented our theoretical rationale for controlling for preconception desires when predicting postconception pregnancy wantedness with ambivalent/indifferent desires. Here we present a parallel methodological rationale. Because the ambivalent/indifferent desires variable is constructed from the preconception desires variable, it is very likely to be correlated with it. In fact, this is exactly what we observed, as we report in the results section. This means that if the ambivalent/indifferent desires variable proved to be a significant predictor in our models, those findings might simply represent its correlation with the parent variable. This would be especially of concern because the parent variable's much greater power as a predictor relative to the ambivalent/indifferent desires variable. Thus it is essential that we control for the parent variable when conducting all our analyses.

There is a final issue that required our attention during data analysis. As we discussed in the methods section, about 44% of the pregnancies providing data for our analyses were either first or second pregnancies that our respondents reported having had during the three to four year interview interval. The presence of these different

groups within our sample raises the question of whether there might be different findings for respondents with more than one pregnancy during the interview interval. For example, the recall of preconception desires might be influenced by the close proximity of a previous or subsequent pregnancy. In order to test this possibility, we conducted three additional analyses with the base model using dummy variables based on whether the pregnancy in question was the only one during the interview interval, the first of two, or the second of two.

### 3. Results

The unweighted/weighted Pearson correlation between ambivalent/indifferent desires and preconception desires in our sample is -0.0652/-0.1382, with a P-value < 0.0001 in both cases. Table 3 shows the results of our base model predicting postconception pregnancy wantedness with ambivalent/indifferent desires while controlling for preconception desires and seven context variables. As expected, preconception desires have a large positive effect on postconception pregnancy wantedness such that desires to get pregnant are associated with a pregnancy that is more wanted after conception and desires to avoid pregnancy are associated with a pregnancy that is more unwanted after conception. As hypothesized, ambivalent/indifferent desires also have a positive effect on postconception pregnancy wantedness such that ambivalent/indifferent desires are associated with a pregnancy that is more wanted after conception. The effect of this variable (0.07) is much smaller than for its parent variable (0.53) but still significant (P-value=0.018). Of the seven context variables in the base model, only relationship status at conception, number of prior births, and race/ethnicity are significantly associated with postconception pregnancy wantedness. Running the same model without controlling for preconception desires produces a beta coefficient for ambivalent/indifferent desires that is negative at -0.02 (S.E. 0.03) and non-significant at 0.6220, and the Model R2 drops to 0.2340. Finally, in a step where we added separately to the base model each of the three dummy variables indicating whether the pregnancy was the only one, the first of two, or the second of two during the interview interval, each dummy variable was not significant (P-value>0.05) and none of the other coefficients was materially changed following their addition to the base model.



**Table 3: Base model of the prediction of postconception pregnancy wantedness by the motivation and context variables**

Variable Category	Beta	SE Beta	T-Test	P-value/ T-Test
Preconception Desires	0.53	0.01	38.74	0.0000
Ambivalent / Indifferent Desires	0.07	0.03	2.41	0.0179
Relationship Status at conception				
Not married/ Not cohabiting <sup>1</sup>	0.00	0.00		
Cohabiting	0.49	0.13	3.69	0.0004
Married	0.55	0.18	2.99	0.0035
Age at conception				
<21 <sup>1</sup>	0.00			
≥21 and 31 <	0.08	0.16	0.53	0.5955
<31	0.13	0.24	0.55	0.5808
Number of prior births				
None <sup>1</sup>	0.00	0.00		
One	-0.08	0.10	-0.72	0.4735
Two	-0.14	0.17	-0.79	0.4328
Three or more	-0.38	0.22	-1.78	0.0790
Pregnant/Pregnancy loss	-0.95	0.11	-8.46	0.0000
Education				
Less than HS diploma <sup>1</sup>	0.00	0.00		
HS diploma	0.33	0.25	1.31	0.1945
Some college	0.18	0.29	0.63	0.5302
BA or above	0.32	0.31	1.02	0.3083
Age < 22	0.30	0.28	1.07	0.2890
Income				
<150% of poverty level <sup>1</sup>	0.00	0.00		
150%- 299% of poverty level	0.17	0.16	1.06	0.2920
≥300% of poverty level	0.16	0.16	1.04	0.3004
Age < 20	0.17	0.25	0.68	0.4954
Religiosity				
Low <sup>1</sup>	0.00	0.00		
Medium	0.14	0.14	0.98	0.3298
High	0.23	0.15	1.53	0.1285
Race/Ethnicity				
Non-Hispanic white <sup>1</sup>	0.00	0.00		
Non-Hispanic black	-0.17	0.12	-1.37	0.1747
Hispanic	0.52	0.16	3.23	0.0017
Others	-0.02	0.17	-0.14	0.8919
Model R <sup>2</sup> = 0.5495				

<sup>1</sup>Reference category

Table 4 summarizes the results of interest from seven regression analyses, showing for each regression the effect on postconception pregnancy wantedness of the overall interaction between ambivalent/indifferent desires and each of the seven context variables, as well as the specific interaction between ambivalent/indifferent desires and each context variable category. The overall interaction is significant with a P-value based on the Wald  $F < 0.05$  for relationship status at conception and income and just above our selected significance level with a P-value = 0.055 for age at conception<sup>7</sup>. With relationship status at conception, the categories of cohabiting (beta=0.14) and married (beta=0.10) are, as hypothesized, both significant after adjustment for multiple comparisons. However, contrary to our hypothesis, the beta coefficient for married women is not larger than that for unmarried cohabiting women. In the case of income, we disregard the age < 20 category which was included in order to avoid losing cases in the multivariate analyses, and find that only the highest category of  $\geq 300\%$  of the poverty level (beta=0.18) is significant, although the intermediate category of 150-299% of the poverty level is of similar magnitude (beta=0.13; P-value=0.077). With age at conception, only the middle category of  $\geq 21$  and  $< 31$  (beta=0.13) is significant.

**Table 4: Summary results from seven linear regression analyses showing the effect on postconception pregnancy wantedness of the interaction of ambivalent/indifferent (Amb/Ind) desires with each context variable and with the categories of each context variable**

Context Variable	Interaction Variable				
Context Categories	Beta Coeff.	SE Beta	Wald F/ t-Test	P-value / t-Test	P-value / Wald F
Relationship Status at conception					
Amb/Ind Desires Interaction			4.18		0.018
Not married/ Not cohabiting	-0.05	0.06	-0.80	0.423	
Cohabiting	0.14	0.05	2.78	0.007	
Married	0.10	0.04	2.56	0.012	
Age at conception					
Amb/Ind Desires Interaction			2.99		0.055
<21	0.01	0.05	0.20	0.842	
$\geq 21$ and $31 <$	0.13	0.03	4.36	0.000	
<31	-0.00	0.08	-0.03	0.974	

<sup>7</sup> It should be noted that because two of the context variables other than age have a category that is based on age (education  $< 22$  and income  $< 20$ ), the predictive power of the age  $< 21$  category may be somewhat confounded by collinearity.

**Table 4: (Continued)**

<b>Context Variable</b>					
<b>Interaction Variable</b>					
<b>Context Categories</b>	<b>Beta Coeff.</b>	<b>SE Beta</b>	<b>Wald F/t-Test<sup>a</sup></b>	<b>P-value / t-Test</b>	<b>P-value / Wald F</b>
<b>Number of prior births</b>					
Amb/Ind Desires Interaction			0.87		0.484
None	0.13	0.04	3.20	0.002	
One	0.13	0.05	3.79	0.006	
Two	0.09	0.06	1.33	0.187	
Three or more	0.11	0.10	1.16	0.250	
Pregnant/Pregnancy loss	-0.01	0.06	-0.10	0.917	
<b>Education</b>					
Amb/Ind Desires Interaction			1.47		0.218
Less than HS diploma	-0.04	0.11	-0.38	0.707	
HS diploma	0.08	0.05	1.58	0.117	
Some college	0.10	0.06	1.68	0.097	
BA or above	0.17	0.04	4.01	0.000	
Age < 22	0.02	0.06	0.27	0.791	
<b>Income</b>					
Amb/Ind Desires Interaction			4.29		0.007
<150% of poverty level	-0.01	0.04	-0.31	0.760	
150%- 299% of poverty level	0.13	0.07	1.79	0.077	
≥300% of poverty level	0.18	0.04	4.22	0.000	
Age < 20	-0.04	0.12	-0.33	0.746	
<b>Religiosity</b>					
Amb/Ind Desires Interaction			2.07		0.132
Low	-0.05	0.08	-0.60	0.553	
Medium	0.10	0.04	2.29	0.024	
High	0.13	0.03	4.08	0.000	
<b>Race/Ethnicity</b>					
Amb/Ind Desires Interaction			0.04		0.991
Hispanic	0.06	0.10	0.67	0.506	
Non-Hispanic black	0.09	0.10	1.78	0.078	
Non-Hispanic white	0.07	0.40	1.67	0.098	
Others	0.08	0.10	0.85	0.397	

<sup>a</sup>We report a Wald F for the effect of the overall interaction of Ambivalent/Indifferent Desires with each context variable and a t-test for the effect of the specific interaction of Ambivalent/Indifferent Desires with each category of each context variable.

Source: CDC/NCHS, National Survey of Family Growth, 2006–2010.

Of the four remaining variables, none show overall evidence of significance, but there are noteworthy specific category findings. First, race/ethnicity has a Wald F P-value of close to 1.0 and all the coefficients show a minimal variation between 0.06 and 0.09. This confirms our null hypothesis about this variable. Second, with education we disregard the age < 22 category, as we did the age < 20 category for income. For this variable we observe that the four educational categories have an ascending magnitude of coefficients in the hypothesized direction, suggesting a linear order. However, a Wald F test for a linearity effect (not in table) within the regression analysis falls just short of being statistically significant ( $P = 0.0775$ ). Third, in the case of religiosity we observe a descending magnitude for the coefficients in the hypothesized direction, again suggesting a linear order. However, only the high religiosity category is significant after adjustment for multiple comparisons. No linearity test was undertaken. Finally, with the number of prior births, even though those with no or one prior birth are significantly different from zero as we hypothesized, the coefficients for the four categories demonstrate insufficient variability, 0.09 to 0.13, and the overall Wald F P-value is not significant.

The results of the six regression models that tested the three-way interactions between ambivalent/indifferent desires, race/ethnicity, and each of the six other context variables revealed that only education and income produced three-way interaction terms that had a significant Wald F. Table 5 gives the results for two-way interaction between ambivalent/indifferent desires and education calculated in separate regressions for each of the three primary race/ethnicity groups. For the Hispanic women, the two way interaction is highly significant and the category specific t-tests are significant for those with some college ( $\beta=0.31$ ) and those with a BA or above ( $\beta=0.54$ ). In the test for linearity (not in table), the Wald F is 10.72 ( $P=.0015$ ) in the hypothesized direction. For the black women, neither the interaction term nor the specific categories have statistically significant P-values, but for the white women, although the interaction term is non-significant, the category specific t-test is significant for those with a BA or above ( $\beta=0.15$ ). Further, in the test for linearity (not in table), the Wald F is 4.27 ( $P=.0415$ ) in the hypothesized direction.

**Table 5: The results of linear regression analyses showing the effects on postconception pregnancy wantedness of the interaction of ambivalent/indifferent (Amb/Ind) desires with education within each major race/ethnicity category**

Race/Ethnicity					
Interaction Variable					
Education Category	Beta Coeff.	SE Beta	Wald F/ t-Test	P-value / t-Test	P-value / Wald F
Hispanic					
Amb/Ind Desires Interaction			7.30		0.000
Less than HS diploma	-0.05	0.22	-0.23	0.818	
HS diploma	0.10	0.09	1.08	0.284	
Some college	0.31	0.09	3.62	0.001	
BA or above	0.54	0.07	7.66	0.000	
Age < 22	-0.03	0.13	-0.21	0.836	
Black					
Amb/Ind Desires Interaction			0.16		0.957
Less than HS diploma	0.07	0.16	0.45	0.652	
HS diploma	0.06	0.08	0.74	0.464	
Some college	0.10	0.11	0.89	0.376	
BA or above	0.14	0.14	1.02	0.311	
Age < 22	0.09	0.11	0.84	0.406	
White					
Amb/Ind Desires Interaction			1.32		0.269
Less than HS diploma	-0.09	0.11	-0.78	0.436	
HS diploma	0.03	0.09	0.32	0.752	
Some college	0.10	0.08	1.17	0.244	
BA or above	0.15	0.05	2.86	0.005	
Age < 22	0.00	0.10	0.05	0.964	
	Overall three-way interaction		4.14	0.000	

<sup>a</sup> We report a Wald F for the effect of the overall interaction of Ambivalent/Indifferent Desires with Education and a t-test for the effect of the specific interaction of Ambivalent/Indifferent Desires with each category of Education. We include the three-way interaction of Ambivalent/Indifferent Desires, Race/Ethnicity, and Education at the bottom of the table.

Source: CDC/NCHS, National Survey of Family Growth, 2006–2010.

Table 6 gives the results for two-way interaction between ambivalent/indifferent desires and income calculated in separate regressions for each of the three primary race/ethnicity groups. For the Hispanic women, the Wald F test of two-way interaction is highly significant and, consistent with our hypothesis, the category specific t-test for those living at 300% of the poverty level (beta=0.52) is also highly significant. For the black women, the same pattern holds but with a smaller effect for those living at 300% of the poverty level (beta=0.26). For the white women, a somewhat different pattern is observed. The overall Wald F test of two-way interaction is again highly significant but the category specific t-tests for those living at both 150–299% (beta=0.02) and over

300% (beta=0.14) of the poverty level are significant. No tests of linearity were conducted for this three-category variable.

**Table 6: The results of linear regression analyses showing the effects on postconception pregnancy wantedness of the interaction of ambivalent/indifferent (Amb/Ind) desires with income within each major race/ethnicity category**

Race/Ethnicity					
Interaction Variable					
Income Category	Beta Coeff.	SE Beta	Wald F/ t-Test	P-value / t-Test	P-value / Wald F
Hispanic					
Amb/Ind Desires Interaction			9.51		0.000
<150% of poverty level	0.10	0.06	1.76	0.081	
150%- 299% of poverty level	-0.02	0.25	-0.06	0.953	
≥300% of poverty level	0.52	0.06	8.27	0.000	
Age < 20	-0.10	0.21	-0.50	0.618	
Black					
Amb/Ind Desires Interaction			2.86		0.410
<150% of poverty level	0.12	0.07	1.74	0.085	
150%- 299% of poverty level	-0.06	0.11	-0.55	0.584	
≥300% of poverty level	0.26	0.11	2.43	0.017	
Age < 20	-0.10	0.21	-0.49	0.623	
White					
Amb/Ind Desires Interaction			6.85		0.000
<150% of poverty level	-0.11	0.07	-1.57	0.120	
150%- 299% of poverty level	0.20	0.05	4.27	0.000	
≥300% of poverty level	0.14	0.05	2.69	0.009	
Age < 20	0.10	0.15	0.65	0.516	
		Overall three-way interaction	5.90	0.000	

<sup>a</sup> We report a Wald F for the effect of the overall interaction of Ambivalent/Indifferent Desires with Income and a t-test for the effect of the specific interaction of Ambivalent/Indifferent Desires with each category of Income. We include the three-way interaction of Ambivalent/Indifferent Desires, Race/Ethnicity, and Income at the bottom of the table.

Source: CDC/NCHS, National Survey of Family Growth, 2006–2010.

## 4. Discussion

In this study we began by noting the marked heaping of responses at the two extremes of the NSFG's bipolar preconception desires scale and the considerable heaping at the mid-point of that scale. We suggested that the mid-point heaping indicates that preconception desires are better represented by two unipolar scales, one positive and one negative, rather than by a single bipolar scale, and we then developed a theoretical framework based on this premise. This framework pointed to the existence of an ambivalence/indifference dimension of preconception desires that was implicit in the bipolar scale results but inadequately measured by the scale itself. We next proposed a way of measuring this dimension by folding the bipolar scale on itself and combining its categories so that the two original poles were merged together at one pole of the new variable and the original mid-point fell at the other pole. Finally, we tested the effect of this new variable on postconception feelings about the pregnancy with regression analyses, while simultaneously controlling for the effect of the original preconception desires scale.

Our general hypothesis in these analyses was that U.S. women with ambivalently/indifferently conceived pregnancies would tend to bond with their unborn fetus whenever not seriously constrained by contextual factors, and therefore would tend to resolve their preconception mixed feelings about getting pregnant into postconception feelings that were generally more positive and more reflective of greater postconception pregnancy wantedness. We then tested this hypothesis on National Survey of Family Growth data gathered from women during 2006–2010. Our base model shown in Table 4 fully supports this hypothesis. It also supports our decision to control for preconception desires in the base model, given the highly significant negative correlation between ambivalent/indifferent desires and preconception desires, as well as the change in the beta coefficient of ambivalent/indifferent desires from a negative non-significant value when the preconception desires variable was omitted from the base model to a positive significant value when it was included.

We additionally proposed seven context-specific hypotheses that represent potentially important exceptions to the general rule of the base model. Results of the regression models are generally supportive of these hypotheses and informative regarding which aspects of women's lives promote or hinder the resolution of an ambivalently/indifferently conceived pregnancy in the direction of greater postconception wantedness. In the case of relationship status, our results show that both being married and cohabiting may more frequently lead to the resolution of women's feelings about an ambivalently/indifferently conceived pregnancy in the direction of greater postconception wantedness, a shift in feelings that will likely create a more beneficial emotional environment for the growth and development of the baby. As we

suggested when outlining our hypotheses, these contexts tend to have a positive effect because they involve a committed partner who can provide emotional and material support. We had expected to see a stronger effect for married women because of the greater instability of cohabitation unions. However, recent evidence suggests that the nature of cohabitation relationships has been evolving in recent decades (Manning and Smock 2005), with less implication of instability (Manning and Cohen 2012), and this change may potentially account for the more or less equal effect of these two statuses on postconception pregnancy wantedness following an ambivalently/indifferently viewed conception.

Our evidence lends tentative support to the hypothesis that women in their prime reproductive years, age 21–30, are more likely to resolve a conception that resulted from ambivalent/indifferent motivations into a pregnancy that is more wanted after conception, and that this occurs independently of factors such as relationship status, parity, income, or race/ethnicity. It would of interest to determine what factors might contribute to a positive resolution during this developmental time period. A first step might be to divide the age at conception variable into smaller categories so that any underlying curvilinear pattern could be more accurately mapped.

We had expected that the number of prior births would produce a different significant effect for the lower and higher birth numbers. However, the data do not bear this out. Even though the ‘none’ and ‘one’ categories, as hypothesized, are positive and significantly different from zero, the higher order birth numbers are not significant. It may be that a number-of-children-at-home variable would perform somewhat more in line with expectations. It may also be that disaggregation of the three-or-more pregnancies category would provide more insight.

In our hypothesis about the potential effect of education on the resolution of preconception ambivalent/indifferent feelings, we conjectured that more educated women would resolve these feelings in the direction of postconception wantedness because they were more organized, planned more, and had more social resources. Our results do not confirm this hypothesis for the whole sample but are highly significant for the Hispanic subsample when using both categorical and linear analyses and only just significant for the white subsample when using the linear analysis. In the NSFG, about half of Hispanic women of reproductive age (15–44 years) and living in households are foreign born (Daniels, Mosher, and Jones 2013; Jones, Mosher, and Daniels 2012), so it may be that, as a recent immigrant group, Hispanics are especially attentive to the importance of higher education and what it can mean for family welfare (Lopez 2009; Rong and Grant 2005).

Why the hypothesized effect of more education does not apply to the black subsample is not entirely clear. It may well be related to the fact that their immigrant experience and its effect on family structure have been so very different. During the last



forty years there has been a national shift to an older age of entry into marriage that is far greater for blacks, both men and women, than whites, with individual wealth accounting for a substantial amount of the between-race differences (Schneider 2011). In addition, national data indicate that black women have substantially higher rates of unintended pregnancy -69%- than do white and Hispanic women -40% and 54% (Finer and Henshaw 2006). There is also evidence that the risk of a non-marital conception is less dependent on educational achievement for black women than it is for white or Hispanic women, suggesting a unique relationship between education and fertility for black women (Upchurch, Lillard, and Panis 2002). All of these considerations point towards different racial/ethnic patterns of union formation, childbearing, and educational achievement as possible factors in our educational context findings. However, identifying the actual dynamics that underlie these patterns will require further research.

Income, especially for those above the 300% of poverty level, is a major predictor of the postconception wantedness of a pregnancy following an ambivalently/indifferently conceived pregnancy. This testifies to the potential importance of financial resources in resolving this conflicted situation. The income context is significant for all three racial/ethnic groups but there are some important differences between them. Only Hispanics and blacks above the 300% of poverty level appear to resolve their mixed feelings in the direction of postconception wantedness, whereas for whites that resolution seems to occur at the 150–299% of poverty level as well. It would be of interest to explore further what attitudes and expectations of their financial futures may allow these middle income level whites, but not Hispanics or blacks, to resolve an ambivalently/indifferently conceived pregnancy in the direction of greater postconception wantedness.

We hypothesized that preconception ambivalence/indifference would resolve to greater postconception wantedness in a higher religiosity context. The regression coefficients are increasingly positive moving from low to high religiosity, with the high category coefficient significantly different from zero. This pattern is consistent with our hypothesis, but the overall coefficient falls short of significance. There are many ways to measure religiosity (Kendler et al. 2003; Hill and Hood 1999) and our two-item scale may contain sufficient measurement error and/or tap into a less relevant dimension of this complex domain.

Race/ethnicity is the only context variable where the overall P-value and the P-values for all context categories are non-significant. This is consistent with our hypothesis that race/ethnicity would not have a significant interaction with ambivalent/indifferent motivation. However, this does not mean that race/ethnicity plays no role in the resolution of ambivalent/indifferent pregnancy motivation. We found that the patterns of significant differences across categories for the two context

variables of education and income are different across the three racial/ethnic groups. Specifically, the overall regressions for both education and income are most significant for Hispanics and least significant for blacks. It would be of interest to determine how subcultural differences between these two minority groups may have contributed to these different reproductive patterns.

An important potential shortcoming of the current research is that it relies on retrospective reporting of both preconception childbearing desires and postconception pregnancy wantedness, raising the possibility of a retrospective bias introduced by the presence of a baby (Santelli et al. 2003). Many published reports acknowledge this problem, although very few offer systematic evidence, either for or against the proposition. Williams, Abma, and Piccinino (1999) found some instances in NSFG data where correlates between retrospectively reported intentions to postpone childbearing for three years and subsequent fertility were different from correlates based on prospectively reported intentions. However, they concluded that these differences could be explained by changes in living conditions that altered intentions. Joyce, Kaestner, and Korenman (2002) analyzed National Longitudinal Survey of Youth data and found that when correction was made for respondent differences in the timing of pregnancy recognition, there was no evidence for retrospective bias. In addition to the weak systematic evidence for retrospective reporting bias, there is the difficulty that most of the research that addresses it involves measures that are based on intentions rather than desires in spite of the fact that research has shown that planning or intending to get pregnant and wanting to get pregnant are two distinct phenomena and that many of the important outcomes of pregnancy are more closely related to feelings than to intentions (Trussell, Vaughan, and Stanford 1999).

Recall Miller's motivational T-D-I-B sequence that was described in the theoretical framework section. This model indicates that it is intentions that play a major role in the occurrence of intended pregnancies. Although preconception desires play an indirect role (through intentions) in intended pregnancies, they can also play a role in unintended pregnancies, and it is those desires that contribute to how the woman feels once she becomes pregnant, i.e., how happy or unhappy she is or how much she wants or wants not to be pregnant once she is. Intentions actually play a relatively small role in determining those postconception feelings (Miller and Jones 2009). Miller (1994a) has shown that feelings of postconception wantedness do show progressive small increases in net positivity, beginning from the time of conception and extending through the pregnancy itself and the first six months after birth. However that increase in positive feeling is not the same as, and does not necessarily indicate, an increase in the positivity of recalled preconception desires to get pregnant.

What we need in the future are more longitudinal, cross-lagged modeling studies like that of East, Chien, and Barber (2012) that examine how the flow of feelings during

the course of getting pregnant, being pregnant, and having a baby affect the mother's mental state, her parenting behavior, and her other relationships and overall functioning. At an even more basic level, what we need are studies that test for the presence, direction, and magnitude of retrospective bias by means of time-since-pregnancy studies. A recent study by Kost and Lindberg (2015) that is based on NSFG data collected in the 2002 and 2006–2010 surveys has made a good start. First, these authors showed that retrospectively reported preconception wanting does successfully predict selective negative consequences of those pregnancies that were not wanted prior to conception on such outcomes as levels of prenatal care, birth weight, and breast-feeding. Second, they grouped interview data according to whether it had been collected 0–12, 13–24, or 25–36 months after the index pregnancy. They found a minimal and non-significant variation across the three years in scales measuring, among other constructs, preconception wanting to get pregnant and postconception happiness to be pregnant and concluded that there was no evidence for retrospective bias (Lindberg and Kost 2015). In the current study, our measure of preconception desires, with its three peaks and its relatively smooth distribution across the non-peak categories, shows excellent distributional properties, suggesting that the respondents were able to fine-tune their responses in a meaningful way when given a relatively straight forward question about their feelings before they got pregnant.

A clear shortcoming of this study is our inability to measure and test the distinct constructs of ambivalence and indifference. There is good reason to believe, both from theoretical considerations and from prior empirical research, that these constructs are distinct (Miller, Barber, and Gatny 2013), and yet we are forced to lump them together because of the bipolarity of the NSFG preconception desires scale. A related shortcoming is the relatively small explanatory power of the ambivalence/indifference variable relative to the considerable power of its bipolar parent variable. Although these are both important limitations, the major benefit of our study is that it begins to address the motivational antecedents of an important group of pregnancies that result neither from a strong net pronatal desire nor a strong net antinatal desire and, as a consequence, tend to end grouped together in the middle of the bipolar desires scale. This group of pregnancies almost certainly contributes substantially to the national pool of unplanned pregnancies. More importantly, however, they are a group of pregnancies that present a challenging conundrum to the women who carry them, that are at increased risk of becoming unwanted after conception has occurred, and that, ultimately, may well result in births to mothers who have mixed and vacillating feelings about being a parent.

A distinct shortcoming is the absence of any analyses of male data. To date the NSFG has not included the preconception desires question in the male interviews. When this becomes possible, it will be of great interest to see whether there are gender differences in the ambivalence/indifference dimension and its effects.

We believe that this study supports the validity of our theoretical framework as applied to the preconception desires variable and indicates several benefits that would result from the development of a new measure that makes a distinction between positive and negative desires. Such a distinction would allow a more precise and reliable measurement of the ambivalence/indifference dimension, almost certainly increasing explanatory power in fertility and family planning research. It would also make it possible to separate ambivalence from indifference and thus to study to what extent these two constructs lead to different outcomes that require different interventions and policies. Finally, it would also enable a more precise and reliable exploration of the pronatal and antinatal dimensions, allowing those two constructs to be studied separately in parallel with the study of ambivalence and indifference. Miller, Barber, and Gatny (2013) demonstrated the predictive validity of a measure that distinguishes between positive and negative childbearing desires and Miller (2011) has proposed a refinement of that measure, designed to improve content validity as well as to provide practicality of use in survey research. The findings reported here suggest that, pending confirmatory validation, the addition of these types of measures to our survey research toolkit should provide an incremental increase in our ability to predict fertility and the occurrence of pregnancies that are unwanted after conception.

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