

Fertility Intentions, Counterintentions, and Subintentions:

A Theoretical Framework and Graphic Model

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Abstract

Fertility intentions are theoretical constructs of great importance to the fields of family planning and demography. Using a motivational traits-desires-intentions-behavior theoretical framework, I develop a graphic model that demonstrates how the two unipolar dimensions of positive and negative childbearing motivations are transformed via conscious desires and intentions into a single bipolar dimension of conception-oriented behavior. I then use this model to define and discuss the constructs of fertility intentions, counterintentions, and subintentions. I also use the model to clarify how fertility desires affect conception-oriented behavior. Finally, I discuss different ways that the graphic model may be tested and applied.

Fertility Intentions, Counterintentions, and Subintentions: A Theoretical Framework and Graphic Model

Intentions have a long and significant history in the field of fertility research. In the area of family planning, unintended pregnancies have been the focus of considerable interest because the all-too-common unwantedness of the ensuing pregnancy often imposes burdensome consequences on both the parents and the child itself (Brown & Eisenberg, 1995; Santelli et al., 2003). In the area of demography, fertility intentions, and the closely related construct of fertility expectations, have long been viewed as indicators of fertility decisions made and, therefore, as potentially important predictors of future fertility (Hendershot & Placek, 1981; Ryder & Westoff, 1971; Forrest & Singh, 1990). My goal in this paper is to expand upon a theoretical framework about the motivational structure that underlies fertility intentions, as well as the behavioral consequences of those intentions and their antecedent motivations. My hope is that this framework will strengthen the use of intentions and related motivational constructs in both family planning and demographic research and application.

A Theoretical Framework

Intentions and Motivation

In order to fully understand fertility intentions it is first important to consider the

central role that they play in the process through which fertility motivations produce fertility behaviors in humans. In previous work, I have characterized this process in terms of a traits-desires-intentions-behavior sequence (Miller, 1994; Miller & Pasta, 1995a). In this sequence, motivational traits are conceptualized as latent dispositions to be positively or negatively motivated toward fertility-related experiences, including everything from pregnancy and birth, through childcare and child rearing, to interacting with one's partner, family, and friends in the community as a parent. Motivational traits like these are the major source of childbearing desires (Miller, 1994), which represent what the individual would like to do about having or not having a child. When the individual decides to pursue a particular fertility goal, such as getting pregnant or avoiding a pregnancy, those desires are the major source of his or her childbearing intentions, which represent what the individual actually plans to do. Such intentions then lead to instrumental behaviors that are meant either to achieve or avoid the goal of childbearing. In summary then, the TDIB sequence characterizes the process through which latent motivations enter consciousness in the form of specific desires, which then generate specific intentions, which in turn lead to goal-related behaviors.

The TDIB framework proposes that conscious intentions, and the conscious desires that underlie them, derive their motivational force from a system of latent dispositions (traits) that I have called a motivational substrate (Miller & Pasta, 2002). Elsewhere, I have described how this substrate consists of neural-based nurturant schemas (Miller & Rodgers, 2001), which themselves have complex genetic and experiential origins (Miller et al., 1999; Miller et al, 2000; Miller, 1992). The motivational dispositions that are resident

in that substrate have two important features. First, they vary in intensity, which accounts for much of the strength of the desires and intentions that flow from them. Second, and more important for this discussion, they differ in their valence, that is to say, in whether they are positive or negative. These two features correspond to the theoretical model of emotion and motivation developed by Lang, Bradley, and Cuthbert (1998). These authors argue that there are two basic motive systems in the brain, appetitive and defensive, and that each can vary in terms of intensity of activation or arousal. According to Cacioppo, Gardner, and Bertson (1999), the appetitive and aversive (defensive) motivational systems are not reducible to a single valence or good-bad dimension because they are not necessarily reciprocally activated in the relevant brain structures. They conclude that two unipolar dimensions, with one varying from high to low positive valence and the other varying from high to low negative valence, fit the observed facts better than a single bipolar dimension, which varies from a high positive to a high negative valence.

In accord with the two dimensional approach to motivational valence, I have developed a measure of explicit childbearing motivation, the Childbearing Questionnaire (CBQ), that separates motivational traits into separate positive and negative components (Miller, 1995). Positive Childbearing Motivation (PCM) is based on respondent ratings of 27 positive consequences of having a child, whereas Negative Childbearing Motivation (NCM) is based on respondent ratings of 20 negative consequences of having a child. Of particular interest for this discussion and in line with there being two separate dimensions of motivational valence, PCM and NCM tend not to be significantly correlated with each other. Given a sample of sufficient size, it might be anticipated that there would be one

group with high PCM and low NCM -those motivated for childbearing- and one group with low PCM and high NCM -those motivated against childbearing. But, in fact, there would also be a group with both high PCM and high NCM -those ambivalently motivated for childbearing- and another group with both low PCM and low NCM -those indifferently motivated for childbearing (Miller, 2007).

The two unipolar dimensions of motivational traits extend their influence forward through the next three steps of the TDIB sequence to find expression in desires, intentions, and behavior. Thus in the formation of desires individuals with high PCM will tend to have strong desires to have a child, whereas those with high NCM will tend to have strong desires not to have a child. Further, as might be expected, those who are ambivalently motivated will tend to both desire and not desire a child and those who are indifferently motivated will tend not to care one way or the other. When it comes to the formation of intentions, the effect of two separate valences changes because intentions involve a decision and a commitment to action. Cognitively, these two features make it virtually impossible to both intend to have a child and intend to not have one, although one might find a few instances where extremely ambivalent individuals vacillated in their intentions across relatively short periods of time.

Conception Oriented Behaviors

When it comes to extending the two motivational valence dimensions all the way to behavior, a further transformation occurs due to the instrumentality of behavior. Whereas the TDI component of the TDIB framework is related to the motivational push toward the

goal (having or avoiding having a child), the B component has to do with real-world implementation of behaviors that achieve that goal. Congruent with the two motivational dimensions, there are two types of instrumental behaviors that are meant to implement the goal, namely proceptive and contraceptive behavior. Proceptive behavior (Miller, 1986; Miller & Pasta, 1995a; Miller & Pasta, 1996) is behavior that is designed to achieve conception. In terms of both the underlying strength of positive motivation and the probability of achieving conception (Miller, 1986), it has two forms: passive proception, characterized by the initiation of unprotected sexual intercourse with the intent to conceive; and active proception, characterized by efforts to increase the chances of conception by timing sexual intercourse around the time of ovulation, as well as by other, related behaviors. In contrast, contraceptive behavior is designed to avoid conception while continuing to have sexual intercourse and makes use of a variety of hormonal, mechanical, and behavioral methods to achieve that goal. In terms of the underlying strength of negative motivation and the probability of preventing conception, contraceptive behavior has many forms. These can be graded along two primary continua: the effectiveness of the method used and the regularity with which that method is used (Miller & Pasta, 2002).

Even more so than is the case with intentions, the two types of conception-oriented behaviors tend not to be present in the same individual at the same time. It would be highly unusual for someone to be simultaneously behaving in a way that both lead to conception and avoided conception, although as in the case of desires it may happen that someone vacillates between these two behaviors during a some short time interval, especially if the individual is involved with two different partners . This mutually exclusive

feature of conception-oriented behaviors suggests that they may be placed on a bipolar continuum that extends from a highly effective proception pole through a middle point that involves neither proception nor contraception to a highly effective contraception pole. Indeed, both Lang, Bradley, and Cuthbert (1998) and Cacioppo, Gardner, and Berntson (1999) argue that the exigencies of motor systems and reality constraints both act to channel multidimensional motivational systems into bipolar unidimensional behavioral expression. Thus a bipolar conceptualization of conception-oriented behaviors seems entirely appropriate. At the same time, it is important to keep in mind the bidimensional nature of the underlying motivational traits that push individuals toward each of the two behavioral poles. We know, for example, that the desire not to get pregnant is driven primarily by NCM (Miller & Pasta, 2002) and the desire to have a child is driven primarily by PCM (Miller, 1994).

Intensity across the TDIB Sequence

An important feature of conception-related behaviors is that their antecedent intentions are generally stronger, that is to say have greater intensity, than the behavior itself. This is because both proception and contraception require effort which commonly means that some of the motivational intensity gets dissipated between the behavioral intention to act and the act itself. In addition, there are usually disincentives that act to deter the carrying out of intentions. Such disincentives are easiest to identify in the case of contraceptive behaviors, which are almost inevitably associated with a variety of method side effects. Further, the need for behavioral consistency in order to achieve the intended

goal can itself become a disincentive. This is also true of proceptive behavior, as is commonly reported by subfertile couples who must repeatedly try to time sexual intercourse in order to conceive. A complementary feature of conception-related behaviors is that some factors operate to strengthen them even in the face of relatively weak intentions. Examples include internal factors such as personality traits that support planfulness and external factors such as having a partner with strong intentions.

Desires, in turn, are generally stronger than their corresponding intentions. This is because, unlike intentions, desires do not require a decision and a commitment to act. As a result, they are more expressive of the underlying motivations and less constrained by what is possible and practical. For example, Miller and Pasta (2002) found that respondents from a sample of mostly unmarried, contracepting couples who were attending a family planning clinic to request a pregnancy test reported that their desires not to get pregnant were stronger during the previous three months than were their actual intentions not to get pregnant. At the other end of the motivational spectrum, Miller and Pasta (1994) found that respondents from a sample of married couples who were yet to have children wanted their first child sooner than they actually intended to have it.

The intensity of motivational traits may be greater than that of the desires that they generate, especially if one compares positive motivations with the desire to have a child and negative motivations with the desire not to have a child. However, the translation between motivational traits and desires is complicated by a number of factors.

One factor is the stability of motivational traits, which tend to endure across long periods of time. For example, Miller (1995) found that the correlation of PCM with itself across three

years was about 0.70 for both husbands and wives who were yet to bear a child at the time of the first measurement. Other research (Miller & Pasta, 1995b) indicates that actual childbearing probably accounted for a sizeable portion of the remaining variance in PCM during the three year interval. Another complicating factor is that implicit motivational traits, which are unconscious and rooted more in the individual's genetic make-up and early life experience (Miller & Pasta, 2000), are much more stable than the self-reported, explicit motivational traits, such as PCM and NCM. A final factor is that motivational traits are relatively general dispositions, whereas desires tend to be closely tied to personal context and influenced by other considerations such as gender role, relationship quality, income, and age. For all of these reasons, the intensity of motivational traits has a less predictable relationship to that of desires.

A Graphic Model of the TDIB Sequences

Having characterized the motivation for childbearing in terms of three groups of theoretical constructs –the TDIB sequence, two motivational valences, and variation in motivational intensity, I am now in a position to develop a graphic model that will further inform our understanding of fertility intentions. In this model, the x-axis represents the two valences of the bipolar dimension of conception oriented behaviors and the y-axis represents the intensity of the motivational elements that are antecedent to those behaviors. The separate motivational elements themselves –the traits, desires, and intentions- are then plotted separately on the graph in relation to these two axes.

Figure 1 presents a graph of the negatively valenced motivational elements. The

bipolar behavioral dimension is indicated across the graph's x-axis using two different notations. Across the top of the graph, I use a notation that has eight categories of behavior going from active proception (1) to passive proception (2) through three categories of non-proceptive, non-contraceptive behaviors (3, 4, and 5) to three categories of increasingly effective contraceptive behavior (6, 7, and 8). Categories 3, 4, and 5 represent three types of behavior that are neither proceptive nor contraceptive but differ from each other with respect to intent. Thus in category 3 there is some proceptive intent, in category 5 there is some contraceptive intent, and in category 4 there is neither intent. The intent that is present in categories 3 and 5 may be thought of as somewhat vaguely directed toward the near future but not yet implemented as behavior. Although these distinctions between 3, 4, and 5 are not behavioral, they serve the useful purpose of highlighting the bipolar continuum between categories 1 and 2 on one hand and categories 6, 7, and 8 on the other. Across the bottom of the graph, I use a notation that captures the two different motivational valences present in the overall bipolar behavioral dimension. Starting in the middle of the x-axis and moving to the left, the proceptive valence goes from no proceptive behavior (0) through no proceptive behavior but with some proceptive intent (0[p]) to two categories of increasingly effective proceptive behavior (P+1 and P+2). Starting in the middle of the x-axis and moving to the right, the contraceptive valence goes from no contraceptive behavior (0) through no contraceptive behavior but with some contraceptive intent (0[c]) to three categories of increasingly effective contraceptive behavior (C+1, C+2, and C+3). Using both the top and bottom notations in the figure serves to reference both the bipolar unidimensional formulation of behavior (top of figure) and the bivalent two-dimensional

formulation of motivation (bottom of figure) that underlies the theoretical framework.

At this point I should mention several caveats . First, although eight separate categories have been identified, there is an implied continuum (Bachrach & Newcomer, 1999) that underlies them and the categories only represent useful points for purposes of grouping. For example, depending upon a given population's stage in the reproductive

	1	2	3	4	5	
6	7	8				
	P+2	P+1	0(p)	0	0(c)	C
+1	C+2	C+3				

life course or the particular contraceptive methods they employ, researchers or practitioners might want to distinguish only two or, perhaps, more than three categories of contraceptive effectiveness behavior. Second, although there is an equal distance between each adjacent category, there is no implication that there are equal numbers of cases in each category.

Such numbers would again depend upon the population under consideration. For example and using the top-of-the-figure notation, among teenagers during the first few years after sexual debut there might be many 4s and 5s, among unmarried young adults with a regular sexual partner there might be many 6s, 7s, and 8s, and among young married couples there might be 1s, 2s, and 3s as well as 6s, 7s, and 8s. Third, it is assumed that individuals move in both directions along the implied continuum across time. For example, some will move from 4 to 8 as they become more concerned with pregnancy prevention and more sophisticated about contraception, whereas others will move from 3 to 1 as they become more intent upon achieving conception. However, jumping from one category to another non-proximate category is also assumed. Perhaps the best example of this is married couples who jump directly from 8 to 1 in order to time a pregnancy and then back again shortly after childbirth. This type of jump is easiest to understand if Figure 1 is visualized

as rolled into a hollow tube along the y-axis so that category 8 is immediately adjacent to category 1. Other types of jumps also occur, both upwards towards 8 and downwards towards 1, typically in response to some meaningful life-course event such as the death of a parent, an advancement at work, or a change in the relationship with the sexual partner.

In Figure 1 the intensity of the motivational elements is represented along the y-axis in terms of percentage and is shown as having a range of 0% to 100%. The three motivational elements of traits, desires, and intentions are then each represented along this axis. Because of the complex relationship between motivational traits and the other two elements, as discussed in the previous section, I have represented high negative motivational traits (NMT) in the top half of the intensity axis on the right side of the figure and low NMT in the bottom half. The implication of this arrangement is that the intensities of desires and intentions are conditional upon the intensity of NMT. Because of this dichotomous handling of negative motivational traits, I have drawn two sets of curves for negative desires (D-) and negative intentions (I-). What I mean to capture with each set of curves is the mean intensity of contraceptive desires and intentions (y-axis) one would expect to be associated with different conception-oriented behaviors (x-axis) in a reproductive age population, conditional upon high or low motivational traits.

Let me consider first the negative desires (D-) that result from high NMT. These are represented by a bold line that begins near the 100% intensity point among those who are effective contraceptors (category C+3) and decreases steadily across the eight behavioral categories to where it is approximately 50% among those who are actively procepting. Keep in mind that this is just an estimated slope that serves as an initial value

for modeling purposes and that empirical data will need to be gathered to determine how accurate it is. However, considering that these negative desires are a product of high negative motivations, it seems reasonable to assume that the decline is only to about the 50% level. In keeping with the previously discussed postulate that desires generally have higher intensities than their corresponding intentions, the negative intentions (I-) that result from high NMT are represented by a bold line that begins a little lower than their corresponding D-. Further, this line decreases sharply across the two less effective group of contraceptors (categories C+2 and C+1) and the

	1	2	3	4	5	
6	7	8				
	P+2	P+1	0(p)	0	0(c)	C
+1	C+2	C+3				

group who do not manifest contraceptive behavior but do have some contraceptive intent (0[c]) in order to reach a zero level among the group with neither contraceptive behavior nor intent.

A similar pattern is observed with the lines that represent the negative desires and intentions that result from low NMT. These lines are represented by bold dashed lines and, in keeping with the weaker motivation behind them, they start just below the 50% intensity point. In this case, the D- line extends to near the 0% intensity point among those who are active proceptors (category P+2), which seems about right for those with low NMT who are trying hard to get pregnant. The I- line again begins a little lower than the D- line and extends to the same point as the I- line that is associated with high NMT, that is to the point

where the group with no intentions (category 0) is located.

Figure 2 is similar to Figure 1 in basic design but presents a graph of the positively valenced motivational elements using non-bold lines. High and low positive motivational traits are represented respectively in the top and bottom half of the intensity axis on the left hand side of the figure and two sets of curves for positive desires (D+) and positive intentions (I+) are drawn following the same principles outlined for Figure 1. Because the number of categories for procreation is one less than for contraception, the steepness in the decline of the intention curves is somewhat greater in Figure 2.

Figures 3 and 4 are identical to Figures 1 and 2 except that the areas between the high and low desire lines have been hatched vertically and the area between the high and low intention lines have been hatched in parallel with the upper intentions line. The two hatched areas in each figure indicate the range across which desires and intentions vary, given the model's initial assumptions. Constructed in this way, the two figures call attention to the very large range of

	1	2	3	4	5	
6	7	8				
	P+2	P+1	0(p)	0	0(c)	C
+1	C+2	C+3				

	1	2	3	4	5	
6	7	8				
	P+2	P+1	0(p)	0	0(c)	C
+1	C+2	C+3				

desires that occur in those behavior categories that completely lack any corresponding intentions. Even in those categories with ranges of intentions at relatively low intensities, such as 0(p), 0(c), and C+1, the ranges of corresponding desires is much larger and located, on average, at much higher intensities.

I turn now to an elaboration and clarification of three features of these graphic models. First, there is the question of the spacing of intervals along the x-axis. I have assumed equal spacing but this may not be entirely appropriate, especially if we want to compare the intervals used for proceptive categories with those used for contraceptive categories. Because the chance of conception is so great with any unprotected sexual intercourse, regardless of underlying motivation or category of behavior, it may be more instructive to make the intervals between proceptive categories shorter than those between contraceptive categories. The reason for this can be understood with reference to Figure 5. In this figure I have used a bold line to plot what I hypothesize to be the probability of conception (represented on the y-axis by %) for each of the eight behavioral categories already described. It can be seen that the line for the left-hand set of five behavioral categories (P+2 through 0[c]) is relatively flat compared to that for the right-hand set of four behavioral categories (C+3 through 0[c]). This is because once no contraceptive method is used and assuming a constant and equal level of sexual activity for all categories, the effects of behaviors on the chances of conception are relatively small compared to the effects of using a contraceptive method with different degrees of effectiveness. (In fact, unless one assumes that the intentions that are present in categories 0(p) and 0(c) are subtly expressed in behavior, the line connecting those two categories with the 0 category between them should be completely horizontal.) If, however, one reduces the interval between the left-hand set of



behavioral categories by one half, as indicated by the bold notation along the x-axis at the top of Figure 5, then the two segments of the line that runs across all eight categories converge on a straight line. This is represented in Figure 5 by the dotted line and its solid extension. Thus if one assumes that the motivational system is geared to the probability of conception, then a narrower spacing of intervals between the left-hand set of categories would produce a more instructive model with a better fit.

A second feature of the graphic models that needs clarification is the use of straight lines to represent the different levels of intensity manifest by desires and intentions across the bipolar behavioral continuum. We have already observed in relation to Figure 5 that changes in x-axis intervals can make a non-linear pattern into a linear one. Figure 6 shows a hypothetical curve in which negative desires change in a complex, non-linear way across the eight categories of conception-oriented behavior: the values for D- are at a high plateau for the two categories that involve the most effective contraceptive (C+3 and C+2) behavior, then drop down sharply over the next two categories to a lower plateau defined by the three categories that involve neither contraceptive nor proceptive behavior (0[c], 0, and 0[p]), and then drops sharply down again to an even lower plateau defined by the two categories that involve proceptive behaviors (P+1 and P+2). This is a believable scenario and one that would probably not be readily resolved into a straight line by changing x-axis intervals. What the true pattern is for any given population can, of course, only be determined empirically. I have used a straight line in presenting the graphic models primarily because that is the simplest starting point. However, as indicated earlier, the

straight lines should only be viewed as initial estimates subject to modification when testing the models against real data.

	1	2	3	4	5	
6	7	8				
	P+2	P+1	0(p)	0	0(c)	C
+1	C+2	C+3				

A third and final feature of the graphic models that needs clarification is the use of single points to represent the level of intensity of desires and intentions. For example, in Figure 6 the D- is located near 90% in category C+3 and at about 50% in category 0. However, it is important to keep in mind that these single points represent population means with some more or less normal distribution on each side of them. Thus one would expect to see some individual cases in, for example, a C+3 population falling both over and below the 90% point. Just how far above and below the mean point and how skewed the overall distribution would be is again a matter to be determined by testing the models with real data.

Intended, Counterintended, and Subintended Conceptions

Having developed a graphic model of the TDIB sequence, I am now in a position to consider what implications the motivational framework for fertility intentions and related constructs has for fertility regulation and pregnancy planning. One traditional use of the intentions construct within the fields of family planning and demography has been to divide conceptions (or pregnancies) into intended and unintended categories. The latter category is then further divided into a mistimed and an unwanted category (Brown & Eisenberg,

1995). However, this approach has some serious limitations (Bachrach & Newcomer, 1999; Trussell, Vaughan, & Stanford, 1999; Klerman, 2000; see also Miller & Jones, 2009 for a recent review of this literature). The use of a single category of unintended conceptions, although helpful in some ways, is too broad and obscures too many important motivational differences. In terms of the model presented above, this approach means that unintended conceptions include all those that occur as a result of behaviors falling in categories 3 through 8. The further division of unintended conceptions into mistimed and unwanted is a positive step in the sense that it attempts to create two additional categories that are distinguished on the basis of a proxy for motivation, namely whether or not the individual ever wanted a(nother) child. However, that proxy is an indirect indicator of motivation that provides only a very crude reflection of categories 3 through 8.

In applying the hypothesized motivational framework and the graphic models derived from it to fertility intentions, I will pursue an alternative approach by examining three related constructs: intended conceptions, counterintended conceptions, and subintended conceptions. In order to do this, it will be useful to combine the graphic model of negatively valenced motivational structure and behavior with that of positively valenced motivational structure and behavior. This step is vital because, in fact, all individuals have both of these structures operating within them simultaneously. Figure 7 shows such a combination. Although the figure may seem overly complex and somewhat daunting, there is a relatively simple way to examine its implications. Each behavioral category situated along the x-axis is represented by a vertical bar. If one looks at where the various lines cross the bar of any given category, one can quickly see and compare the relative intensities

of different desires and intentions. And by keeping in mind the ranges of different desires and intentions –as shown in Figures 3 and 4- one can see how these ranges compare with each other. Thus Figure 7 readily allows the viewer to perceive the motivational structure that underlies the eight identified categories of behavior.

Consider the four lines shown in Figure 7: the high and low D+ lines that are labeled on the left side and the high and low D- lines that are labeled on the right side. Then when one asks what the various combinations of positive and negative desires mean for individuals whose

	1	2	3	4	5	
6	7	8				
	P+2	P+1	0(p)	0	0(c)	C
+1	C+2	C+3				

behaviors are represented by a given one of the eight vertical bars, it is possible to apprehend key motivational characteristics of those individuals. For example, it is apparent that high D+, low D- individuals in behavioral category 1 (motivational valence P+2) have far greater net motivation to conceive than do low D+, high D- individuals. In fact, as the figure shows, the latter type's D- is even slightly higher than their D+, indicating that they must have partners or other situational factors that are providing the additional motivational boost that gets them into the active proception category. This example raises another issue, which is that the location of the intentions line, I+ in this case, will be contingent to some extent on the location of D- as well as that of D+. Thus one would expect that with high D+, low D- individuals the origin of the I+ line would be even closer to the origin of the D+ line than is shown and with low D+, high D- individuals the origin of the I+ line would be

further away than is shown. A similar example based on individuals from behavioral category 8 (motivational valence C+3) could be developed to illustrate the same set of issues.

Zabin (1999) has presented evidence that ambivalence about parenthood plays an important causal role in the occurrence of unintended pregnancies. A useful feature of Figure 7 is that it clearly shows in which behavioral categories ambivalence of desires occurs. In fact, the figure shows that there are two kinds of ambivalence. Consider first the middle behavioral categories (3, 4, 5, and 6). Both high D+, high D- and low D+, low D- individuals have their positive and negative desires lines crossing between behavioral categories 4 and 5. Such a crossing means that competing positive and negative desires are at near equal intensity, a condition that qualifies well as a definition of ambivalence. For the second type of ambivalence, consider next the extreme behavioral categories 7 and 8. In this case, high D+, low D- individuals have their positive and negative desires approach a crossing point at behavioral categories 8, qualifying them and the adjacent category 7 for ambivalence. The same argument applies for behavioral categories 1 and 2, where low D+, high D- individuals have their positive and negative desires approach a crossing point. Note that the two types of ambivalence act in different ways. Whereas the type of ambivalence present in categories 3, 4, 5, and 6 occurs in the presence of weak or no intentions, suggesting that the desires may directly affect behavior in the middle behavioral categories, the second type of ambivalence occurs in the presence of moderate, near equal intentions, suggesting that in this case desires may affect behavior by weakening intentions among those in the most effective proceptor and contraceptive categories (those with

motivational valences P+2 and P+1, as well as C+3 and C+2).

It is now possible to characterize intended, counterintended, and subintended conceptions in terms of the graphic model that has been described. Intended conceptions are those that result from the proceptive behaviors included in categories 1 and 2. Those behaviors are intended to achieve a conception, hence any conception that occurs is called an intended conception. In contrast, counterintended conceptions are those that result in spite of the contraceptive behaviors that are included in categories 6, 7, and 8. Those behaviors are intended to prevent a conception, hence any conception that occurs is called a counterintended conception. As already noted, the low D+, high D- type of ambivalence are associated with intended conceptions and the high D+, low D- are associated with counterintended conceptions. In such cases, these types of conceptions would properly be called ambivalently intended and ambivalently counterintended conceptions, respectively.

Finally, there are the subintended conceptions that are associated with behavioral categories 3, 4, 5, and 6. The construct of subintended conception was originally introduced (Miller, 1974) to account for conceptions that were not fully intended yet seemed motivated to some degree because efforts to avoid them were consistently inconsistent and because they were so readily described as wanted pregnancies. The prefix “sub” was meant to imply that the motivation for them lay below the level of intentions in the sense that it was antecedent to and formed the basis for intentions, even though none had yet been formed. It was not meant to imply that the intentions were necessarily “subconscious”, although that certainly might be the case. In terms of the graphic model shown in Figure 7, these types of conceptions occur in the four behavioral categories where

ambivalence tends to be strongest. The competing desires involved in this type of ambivalence commonly are at least moderately intense and, in almost all cases, associated with either intentions or counterintentions of considerably lesser intensity or with no intentions at all. It is this feature that gives desires a critical influence over behavior and, therefore, over the occurrence of conception.

Three points should be made about this explication of subintention. First, the construct of subintention implies that the part of the motivational structure that underlies the formation of intention plays a direct role in driving behavior. According to the TDIB framework, desires constitute that part of the motivational structure. Second, a question might be raised about the overlap of the constructs of subintention and counterintention in their application to behavioral category 6 (motivational valence C+1). In other words, how can a conception be both subintended and counterintended? The answer is that there is no conflict inherent in such an overlap because of the two separate motivational valences. Conceptions resulting from category 6 behaviors are counterintended at relatively low intensity but the associated relatively high intensity ambivalence of desires associated with this category can at the same time override those counterintentions in ways that promote the probability of conception. Third, the same kind of question might be raised about why conceptions that occur as a result of behavioral category 3 (motivational valence 0[p]) should be called subintended. After all, in this case the intentions are proceptive, so why should the conceptions not be called intended? The answer here is that these intentions are, by definition, not implemented as behavior, whereas the ambivalence of desires may be sufficiently strong to affect behavior. Calling such conceptions subintended, therefore, is to

say that the positive side of this ambivalence appears to be making a difference in the probability of conception.

This discussion of the three types of fertility intentions is not meant to imply any necessary connection between the motivational structure that underlies childbearing and the occurrence, or not, of conception. For example, clearly some conceptions occur solely as a result of contraceptive method failure, even in the presence of strong contraceptive intent. Just as clearly, some conceptions fail to occur as a result of infertility, even in the presence of strong proceptive intent. In the middle range of the graphic model, i.e., in categories 3, 4, and 5, lack of knowledge about or indifference to the risks of conception may be the determining factor in whether a conception occurs. For these reasons, any conclusions about the connection between a person's motivational structure for childbearing and the occurrence, or not, of a conception must be drawn with appropriate qualifications, especially when it comes to the more inferential construct of subintention.

Testing and Applying the Graphic Model

There are a number of features of the graphic model that need to be tested both in small focused studies and in broad national surveys. Before discussing these, however, it is important to recognize certain measurement issues. It is rarely the case that data are collected in which both positive and negative motivational valences are measured. More commonly the investigator asks about the desire or intention to have a child if the focus is on predicting fertility (e.g., Miller & Pasta, 1995a) or about the desire or intention to avoid pregnancy if the focus is on predicting contraceptive use (e.g., Miller & Pasta, 2002).

Although it requires careful instrument development, the collection of data about both valences –not necessarily in the same part of the instrument- would be better. Still, it may be possible to deal adequately with the two valences when a bipolar, unidimensional instrument has been used.

An example of such an approach comes from the 2002 National Survey of Family Growth (NSFG, 2004), which included a question for respondents who had experienced a recent pregnancy asking them to indicate on an eleven-point scale how much they had wanted to get pregnant or avoid a pregnancy just before that pregnancy had actually occurred. The survey also included a question for the same respondents asking them to indicate on a similar scale how hard they were trying to get pregnant or to avoid a pregnancy just before their pregnancy occurred. These two questions may be conceptualized as bipolar measures of preconception desires and intentions, respectively (Miller & Jones, 2009). By analyzing data from these questions only for respondents who were trying to conceive or who were using no method but with no contraceptive intent, one would expect responses to cluster largely at the pronatal pole of the scales. Similarly, by analyzing data from these questions only for respondents who were using some form of contraception, regardless of how effectively, or who were using no method but with no proceptive intent, one would expect responses to cluster largely at the antinatal pole of the scale. This approach attempts to address the bipolar structure of the desires and intentions data by selecting those respondents who are expressing one particular valence through their behavior. It may not be as satisfactory as constructing and using a more precise measurement instrument to collect new data, but it has the advantage of using existing data

from a very large, nationally representative sample.

Another measurement issue is the absence of data on motivational traits in many smaller studies and virtually all large surveys, usually because of the impracticality of administering the multiple questions that reliable measurement of a trait generally requires. Short-form trait measures, which give up some reliability in exchange for fewer items, can be used. However, an alternative solution, especially when analyzing existing data, is the use of proxies for motivational traits. Miller and Pasta (2000) successfully used a four-variable composite as a proxy for implicit childbearing motivation. The four variables included age at menarche, age at first sexual intercourse, age at first pregnancy, and number of pregnancies. It may also be possible to construct valid proxies for explicit childbearing motivation with such variables as respondent's age, education, religion, religiosity, ethnicity, marital status, parity, work status, and gender role, although again careful instrument development is required.

Once measurement issues have been resolved, basic features of the proposed graphic model need to be determined. To this end, studies need to be conducted on the optimal clustering of behaviors along the x-axis. For example, with respect to contraceptive behavior, it is important to determine the optimal clustering of degrees of effective use according to contraceptive method. Normative studies of positive and negative childbearing desires and intentions need to be conducted, with careful attention paid to the life course stage of the population under consideration. Further, it is also important to conduct normative studies of intended, counterintended, and subintended conceptions in order to establish the frequencies with which they occur in different populations. In conjunction

with this, it is also important to establish the frequency of the different types of ambivalence as defined in the graphic model. Combining these last two steps would allow an examination of the relationships that exist between ambivalent desires and the three types of conception intendedness.

Once studies of the model's features have been conducted, practical applications can be examined. Some of the more important of these involve demographic issues. For example, demographers have long lamented the relative weakness of fertility intentions in the prediction of actual fertility. With fuller measurement of respondents' motivational structures and behavioral categories, it may well be possible to predict future fertility with greater accuracy. A related issue is that it may be possible to improve the classification and quantification of unwanted fertility by using the constructs of intended, counterintended, and subintended conceptions, as well as by using the different constructs of ambivalent desires. Some of the important practical applications of the model involve clinical family planning issues. For example, it should be possible to create a dynamic approach to contraceptive counseling by using a four-part typology of desires, namely high positive and high negative, high positive and low negative, low positive and high negative, and low positive and low negative (Miller, 2007). It may also be possible to enhance abortion/live birth counseling by incorporating the three intendedness-related constructs and the construct of motivational ambivalence into clinical procedures.

One important issue not fully addressed in this paper concerns how the motivational structure of the individual's sexual partner affects his or her childbearing intentions. Motivational traits, desires, and intentions are individual-level phenomena, but within any

intimate dyad there is almost inevitably a strong reciprocal influence between their motivational structures, as well as a combined influence of those structures on their conjoint behaviors. Recent work by Miller, Severy, and Pasta (2004) has mapped out some of the major pathways through which those dyadic influences occur. Their model suggests useful ways of capturing the dynamic effects of two individuals' fertility intentions, counterintentions, and subintentions on their conjoint conception-oriented behavior.

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