

# KNOWLEDGE OF THE OVULATORY CYCLE AND COITAL FREQUENCY AS FACTORS AFFECTING CONCEPTION AND CONTRACEPTION

ROBERT G. POTTER, JR.<sup>1</sup>, PHILIP C. SAGI<sup>1</sup>, AND  
CHARLES F. WESTOFF<sup>2</sup>

## INTRODUCTION

ONLY during a relatively short period, approximately in the middle of the menstrual cycle, does a woman have an appreciable chance of conceiving. The average duration of this "fertile period" is not known precisely but almost certainly averages under 48 hours.<sup>3</sup> Since the time period is so brief, coital frequency has a bearing on conception ease. This relevance is the more assured because of evidence, furnished primarily by the studies of MacLeod and Gold,<sup>4</sup> indicating that coital frequency can be increased without jeopardizing virility, except possibly in cases where the increase is to very high levels or the male is oligospermatic. Any relationship of coital frequency to contraceptive effectiveness is more speculative. Strong libido, reflected in high levels of sexual activity, may contribute to less effective contraception by generating more occasions for chance-taking and, in the case of rhythm, by making continence more difficult to maintain during the unsafe period.

Having a less direct but potentially important bearing on conception ease and contraceptive effectiveness is knowledge of the fertile period with reference to its timing within the

<sup>1</sup> Office of Population Research, Princeton University.

<sup>2</sup> New York University.

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<sup>3</sup> See C. Tietze, Probability of Pregnancy Resulting from a Single Unprotected Coitus, *Fertility and Sterility*, xi (September-October, 1960), 485-488 and R. G. Potter, Length of the Fertile Period, *Milbank Memorial Fund Quarterly*, xxxix (January, 1961), 132-162.

<sup>4</sup> Of special relevance, among several pertinent articles by these authors, is J. MacLeod and R. Z. Gold, The Male Factor in Fertility and Infertility: Semen Quantity in Relation to Age and Sexual Activity, *Fertility and Sterility*, iv (January-February, 1953), 10-33. For brief comment on this work and the related work of E. J. Farris, see R. G. Potter, Length of the Fertile Period, *op. cit.*, p. 140, fn. 18.

monthly cycle. Efforts to hasten pregnancy are not likely to succeed unless the couple have realistic ideas about when to increase their sexual activity above customary levels. Then, too, beliefs about the timing of the fertile period govern a couple's judgment about when they may omit contraception with greater or lesser risk of pregnancy. The correctness of such beliefs should be especially crucial for rhythm users and for users of chemical or mechanical methods who regularly omit contraception when they feel it safe to do so.

It is the purpose of this paper to test the above hypotheses on the basis of data collected in the Family Growth in Metropolitan America study—a longitudinal survey being conducted at the Office of Population Research,<sup>5</sup> under the sponsorship of the Milbank Memorial Fund with grants from the Population Council.

### SAMPLE

In this survey, 1,165 wives were initially interviewed shortly after their second delivery and were reinterviewed approximately three years later. The original panel constituted a probability sample of native-white, once-married couples residing in one of the seven largest Standard Metropolitan Areas and having a second birth in September of 1956.<sup>6</sup> At this time the wives averaged 26 years of age and a little longer than 5 years of marriage.

Compared with the total panel, wives successfully reinterviewed three years later tended to be slightly older, married at a later age, more concentrated in the white-collar occupational class, of higher education, and included proportionately fewer Catholics. The importance of these biases is modified by the fact that this paper will be concerned with relationships rather than means or distributions.

<sup>5</sup> The results of the first interviews are reported in C. F. Westoff, R. G. Potter, P. G. Sagi, and E. G. Mishler, *FAMILY GROWTH IN METROPOLITAN AMERICA*, (Princeton: Princeton University Press, 1961).

<sup>6</sup> For details of the study design, see C. F. Westoff, *et al.*, *FAMILY GROWTH IN METROPOLITAN AMERICA*, chapter 2.

## DATA

In both interviews detailed data were collected on conception delays and contraception. In addition, during the second interview, information was obtained about such topics as:

- I. current frequency of marital intercourse.
- II. belief about the timing of fertile and infertile periods in the menstrual cycle,
- III. practical use made of this belief either to hasten or to avoid pregnancy,
- IV. time when belief was acquired, and
- V. frequency of skipping contraception.

Data on the last item are available only for the 673 respondents practicing contraception at the time of the second interview, whereas reports on all other items embrace the entire sample.

## FREQUENCY OF COITUS

The coital frequencies reported by the respondents are tabulated in Table 1.<sup>7</sup> As in most other studies, these frequencies decline with advancing age. The correlation with wife's age is  $-.21$ , to be compared with a corresponding correlation of  $-.33$  obtained by Terman.<sup>8</sup> Within an age control, the present data correspond fairly well to re-

Table 1. Coital frequency at time of second interview.

RATE PER WEEK	FREQUENCY
Less Than Once per Week	48
Once	140
One and a Half Times	142
Twice	254*
Two and a Half Times	81
Three Times	117
Three and a Half Times	60
Four Times	37
Four and a Half or More	26
TOTAL	905

\* 31 indeterminate frequencies are assigned to this modal category.

<sup>7</sup> Roughly one-third of the women indicated monthly frequencies and these frequencies were multiplied by 7/23 to convert them to a weekly rate. Twenty-three days was viewed as a typical intermenstrum—i.e., 28 days minus 5 days for flow. No strong bias appears to have resulted from this procedure inasmuch as a nonsignificant difference is found between the distributions of converted frequencies and those not requiring conversion.

<sup>8</sup> L. M. Terman, *PSYCHOLOGICAL FACTORS IN MARITAL HAPPINESS*, (New York: McGraw-Hill, 1938), p. 271.

sults from the female sample of Kinsey *et al.*<sup>9</sup> Another point of agreement with the latter study is the absence of significant class-religious differences with respect to coital rates, a result also obtained by Terman.<sup>10</sup>

#### BELIEFS ABOUT THE OVULATORY CYCLE

A series of questions were used to elicit opinions about the timing of the fertile period in the monthly cycle. After preliminary queries about typical flow and cycle length, the respondent was asked to indicate, on a chart representing her typical monthly cycle, the cycle days she believed to be especially fertile. Often more than one fertile period was alleged and each of these periods might include one day or several.

All responses have been classified into three categories: "correct," "incorrect," and "don't know." Replies designating a single fertile period in the middle of the cycle were rated as correct. More specifically, this fertile period must overlap with at least one of the three most fertile days as judged by the Ogino-Knaus and/or Farris rhythm calculations, predicated on the cycle length which the respondent reports as most typical for her.

Altogether, 49 per cent of the replies have been labeled correct, 23 per cent "don't know," and 27 per cent incorrect. Thus about half the sample have a realistic view of the ovulatory cycle; another quarter hold inaccurate opinions; and the remaining quarter do not pretend to know. Class-religious differentials exist (see Table 2) with persons of higher socio-economic status possessing more knowledge on the average and, within class, Catholics having an advantage over non-Catholics. This religious difference is related to the Catholics' greater emphasis upon the rhythm method. As will be shown later, most rhythm users have correct opinions about the timing of the fertile period.

<sup>9</sup> A. C. Kinsey, *et al.*, *SEXUAL BEHAVIOR IN THE HUMAN FEMALE*. (Philadelphia: W. B. Saunders Company, 1953), p. 394.

<sup>10</sup> *Ibid.*, pp. 355 and 360; Terman, *op. cit.*, p. 275.

CLASS AND RELIGION	NUMBER OF COUPLES	KNOWLEDGE ABOUT THE FERTILE PERIOD			
		Correct	Incorrect	Don't Know	Total
White-collar Catholic	179	60.3	21.2	18.4	99.9
White-collar Protestant	191	53.9	22.5	23.6	100.0
Jewish	110	48.2	20.9	30.9	100.0
Blue-collar Catholic	244	44.7	32.0	23.4	100.1
Blue-collar Protestant	181	40.9	32.0	27.1	100.0
TOTAL	905	49.4	26.5	24.1	100.0

Table 2. Information about the positioning of the fertile period, by class and religion.

### USE OF INFORMATION ABOUT THE OVULATORY CYCLE

Only 18 per cent of the sample report ever trying to hasten pregnancy by deliberately increasing coital frequency during particular times of the month. In this connection it should be kept in mind that in the absence of contraception or after deliberately interrupting it, a majority of couples conceive within six months and a very large majority within a year. No important class-religious differences are found. On the other hand, as one might expect, couples who report a past problem in becoming pregnant are much more likely also to report that they tried to hurry at least one pregnancy. About half these latter couples have sought to hasten a conception, as compared to 15 per cent among the remainder who remember no conception problems.

Women in the present sample report using their beliefs about the timing of the fertile period more often to avoid pregnancy than to hasten it. All told, 35 per cent of the respondents mention avoiding intercourse at particular times of the month as a precaution against pregnancy. These 35 per cent do not coincide exactly with the 39 per cent who report ever using rhythm. Some of the latter combine rhythm with another method by practicing no method during supposedly safe days and the supplementary method during unsafe days. Class-religious differentials are found with respect to avoiding inter-

course at particular times of the month and follow the pattern of relative emphasis upon the rhythm method.

### INFLUENCE UPON CONTRACEPTIVE EFFECTIVENESS

To what extent does low coital frequency and correct information about the safe and unsafe periods of the menstrual cycle facilitate effective contraception? Since little or no association exists between coital frequency and information about the ovulatory cycle, the two factors may be considered independently. A crude measure of contraceptive effectiveness will be used, namely the per cent successful in any single pregnancy interval. By 'successful' is meant deliberately interrupting contraception in order to conceive and by 'failure,' experiencing pregnancy either while practicing contraception or omitting it to take a chance. This crude index does not take into account time with contraception preceding success or failure and therefore becomes liable to bias if either coital frequency or knowledge of the ovulatory cycle are appreciably correlated with intended length of pregnancy postponement. However, there is little reason to surmise such links.

Interestingly enough, coital frequency fails to discriminate contraceptive success or failure when all methods of contraception are considered jointly, and even when use of rhythm is taken alone. An important reason for this unexpected result is that coital frequency is only weakly correlated, if at all, with frequency of chance-taking, contrary to our original hypothesis. Of the 673 respondents using contraception at the time of sec-

Table 3. Proportions successful with the rhythm method used alone, by accuracy of information about the fertile period.\*

CONTRACEPTIVE EXPERIENCE	KNOWLEDGE OF THE FERTILE PERIOD			
	Correct	Incorrect	Don't Know	Total
Failure	73	25	14	112
Success	81	24	9	114
TOTAL	154	49	23	226

\* The associated significance level falls between .3 and .5.

ond interview, the 211 wives who acknowledge skipping contraception "once in a while" or "quite often" do not differ significantly in their mean coital rate from the 462 wives who claim never to omit contraception.

Worth examining next is the relationship between knowledge about the ovulatory cycle and the contraceptive effectiveness of rhythm. Use of rhythm alone (Table 3) is distinguished from use of rhythm in combination with another method (Table 4). To increase sample size the experiences of first, second, and third pregnancies preceding second birth have been pooled. As a result, one couple may contribute experience from as many as three intervals, so that the observations are not strictly independent and the accompanying chi square values are only approximate.

As noted earlier, only a minority of the respondents citing use of rhythm have incorrect or no opinion about the ovulatory cycle. Partly for this reason, the differences obtained in Tables 3 and 4, although in the expected direction, are not statistically significant to a decisive degree. Some of the women who currently possess correct information about the ovulatory cycle acquired it after one or more intervals of rhythm use. Elimination of these intervals does not materially bolster the association in Table 3, but does slightly strengthen the association observed in Table 4.<sup>11</sup> Another reason why the effectiveness of

Table 4. Proportions successful with rhythm used in combination with another method, by accuracy of information about the fertile period.\*

CONTRACEPTIVE EXPERIENCE	KNOWLEDGE OF THE FERTILE PERIOD			
	Correct	Incorrect	Don't Know	Total
Failure	26	14	5	45
Success	28	4	2	34
TOTAL	54	18	7	79

\* The associated significance level falls between .05 and .10.

<sup>11</sup> In 124 intervals of rhythm use preceded by acquisition of correct information, successful contraception is claimed in 67 instances, unsuccessful in 57. When these

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rhythm is not more strongly conditioned by accuracy of opinion about the ovulatory cycle is that chance-taking, acknowledged by roughly one-third of the current users of rhythm, appears to be equally common in the three groups representing correct, incorrect and no opinion about the unsafe period.

When attention is shifted to the other methods of contraception besides rhythm used alone or in combination with another method, no association whatever is found between beliefs about the timing of the unsafe period and contraceptive effectiveness. Presumably, for the women involved here, a failure to mention rhythm as a supplement to the principal method of contraception means that any omissions of contraception are not usually guided by rhythm considerations; and therefore the accuracy of beliefs about the unsafe period becomes largely irrelevant.

#### INFLUENCES UPON CONCEPTION DELAY

If the fertile period is less than 48 hours, then doubling coital frequency at mid-cycle, say from 2 to 4 times per week, should reduce mean conception delay by a factor of one-third to one-half, oligospermatic husbands always excepted.<sup>12</sup> In a previous study by Stix,<sup>13</sup> the empirical relationship between coital frequency and conception delay approaches this theoretical standard. A strong association is also found by Gold and MacLeod, although their data is presented in a form which precludes precise comparison with Stix's results.<sup>14</sup> In a third study by Stix and Notestein,<sup>15</sup> the relationship between reported

figures are substituted into the first column of Table 3, the associated chi square is raised from 1.5 to 1.8 but still fails to reach statistical significance. With respect to Table 4, there are 38 intervals in which rhythm used in combination with another method is preceded by acquisition of correct information. Here, successful contraception is claimed 22 times and unsuccessful contraception admitted 16 times. So revised, Table 4 yields a barely significant chi square between the 2 and 5 per cent level.

<sup>12</sup> Potter, *The Length of the Fertile Period*, *op cit.*, pp. 149-156.

<sup>13</sup> Regine K. Stix, *Birth Control in a Mid-Western City*, Part I. *Milbank Memorial Fund Quarterly*, xvii (January, 1939), p. 82.

<sup>14</sup> MacLeod and Gold, *The Male Factor in Fertility and Infertility*, *op cit.*, p. 29.

<sup>15</sup> Regine K. Stix and Frank W. Notestein, *CONTROLLED FERTILITY*, (Baltimore: The Williams & Wilkins Co., 1940), p. 11.



COITAL FREQUENCY (PER WEEK)	FIRST CONCEPTION		SECOND AND THIRD CONCEPTION	
	No Contraception Used During Interval	Contraception Deliberately Interrupted	No Contraception Used During Interval	Contraception Deliberately Interrupted
Less than Twice	11.0 mos. (158)	7.1 (111)	21.7 (91)	7.0 (185)
Twice	7.1 (144)	4.5 (122)	19.8 (82)	5.2 (197)
Three or More	6.6 (106)	4.4 (85)	12.9 (49)	5.8 (146)
TOTAL	8.5 (408)	5.4 (318)	19.0 (222)	6.0 (528)

Table 5. Mean conception delay as related to coital frequency, by pregnancy interval and contraceptive status.

coital frequency and conception delay proved negligible for reasons that are not entirely clear.

The results of the present study are tabulated in Table 5. Care has been taken to distinguish first conceptions from subsequent ones and, within these two classes, to separate delays following deliberate interruption of contraception from those occurring before first use of contraception. Thus four trials of the relationship are provided. Nine classes of coital frequency are combined into three to give more stability to the mean conception delays. A consistent tendency for conception delay to shorten as coital frequency increases is evident in three of four trials, though the associations are weaker than the one observed in Stix's data.

Doubtless one factor operating to weaken relationships in the present sample is the reporting of coital frequency at a time point several years after the conception delays being correlated with it. Unfortunately there is no ready way to gauge the importance of this factor.<sup>16</sup>

It remains to consider whether endeavors to hasten preg-

<sup>16</sup> The conception delays occurring since second birth are the most concurrent and for that reason might be expected to yield the highest correlation with reported coital frequency. However there are only 46 completed pregnancy intervals since second birth in which no contraception was practiced. In another 146 pregnancy intervals since second birth, contraception was deliberately interrupted but the ensuing conception delays are strongly selected for brevity, only 6 showing durations greater than 6 months.

EFFORTS TO HASTEN PREGNANCY	FIRST CONCEPTION		SECOND AND THIRD CONCEPTION	
	No Contraception Used During Interval	Contraception Deliberately Interrupted	No Contraception Used During Interval	Contraception Deliberately Interrupted
Yes	30.9 (23)	11.3 (46)	34.0 (23)	9.1 (90)
No	7.1 (384)	4.4 (272)	17.3 (199)	5.3 (438)

Table 6. Mean conception delay as related to deliberate efforts to hasten pregnancy, by pregnancy interval and contraceptive status.

nancy are effective and whether this effectiveness is qualified by knowledge of the ovulatory cycle. Contrary to what one might first expect, couples who strive to speed pregnancy take longer on the average to conceive than those who report no special efforts. According to Table 6, this unexpected relation holds in the initial as well as the following two pregnancy intervals (all preceding second birth) irrespective of whether contraception is deliberately interrupted or not used at all. In 3 out of 4 instances, the relationship is significant beyond the .005 level despite heavy losses of information entailed by the choice of significance test.<sup>17</sup> Obviously this outcome is related to the fact, documented earlier, that women who have experienced trouble conceiving are much more likely to take action toward hastening pregnancy. Doubtless many of these couples did not initiate their special efforts to conceive until several months without pregnancy had elapsed.

Given this selective process, it is impossible to measure directly the effectiveness of deliberately increasing sexual activity as a device to hasten pregnancy. However, women reporting such efforts may be classified according to the correctness of their present opinions about the timing of the fertile period and a check made whether accurate information on this score constitutes an advantage. The differences contained in Table 7 do suggest an advantage. Special attention has been paid to a comparison of conception delays between possessors of correct

<sup>17</sup> To cope with the highly skewed distributions of conception delay, an extension of the median test based on chi square was utilized. Cf. S. Siegel, *NONPARAMETRIC STATISTICS*, (New York: McGraw-Hill, 1956), pp. 179-184.

INFORMATION ABOUT THE FERTILE PERIOD	FIRST CONCEPTION		SECOND AND THIRD CONCEPTION	
	No Contraception Used During Interval	Contraception Deliberately Interrupted	No Contraception Used During Interval	Contraception Deliberately Interrupted
Correct	17.4 (9)	9.4 (32)	29.0 (8)	6.4 (50)
Incorrect	40.9 (9)	21.4 (8)	30.4 (10)	11.1 (24)
Don't Know	39.5 (14)	8.2 (6)	49.2 (5)	14.6 (16)

Table 7. Mean conception delay among couples trying to hasten pregnancy, by pregnancy interval and accuracy of information about the fertile period.

and incorrect information, with respondents claiming no knowledge set aside. Although all differences are in the expected direction, the number of cases involved are so small that only two of the four relationships are significant at beyond the .05 level.<sup>18</sup>

### DISCUSSION

Because of its practical importance, the relationship between coital frequency and conception delay deserves more comment. Table 5 leaves no doubt that higher coital rates generate shorter conception delays *on the average*. Nevertheless the linear correlation between conception delay and reported coital frequency is very low. The four correlation coefficients corresponding to the data of Table 5 are all in the region of  $-.10$ .

The basis of this low correlation may be conjectured. Here it is convenient to think of each couple as having, in the absence of contraception, a typical monthly chance of conception, or fecundability. This fecundability is responsive to level of sexual activity and may be raised during a single pregnancy interval if, for instance, the couple suddenly embark on special efforts to hasten pregnancy. However the level of a couple's fecundability is also affected, and perhaps primarily determined, by a host of other, mostly physiological factors.<sup>19</sup> For

<sup>18</sup> The Mann-Whitney U-test has been used, *ibid.*, pp. 116-126. A third of the four tested relationships proved statistically significant at between .1 and .2.

<sup>19</sup> Evidence that fecundabilities vary widely among couples is afforded by two

example, let us imagine that because of reproductive impairments (such as partially occluded tubes, cystic ovaries, etc.) a particular group of couples have only one chance in 20 of conceiving any month, given their customary coital frequencies. By augmenting their sexual activity at mid-month, they manage to double their fecundability from .05 to .10. Yet they still remain at a disadvantage with respect to the majority of couples whose fecundabilities are well above .10. Furthermore, individual conception delays are subject to chance variation, the magnitude of which tends to increase as fecundability decreases.<sup>20</sup> Thus it is plausible to think that coital frequency is only moderately correlated with fecundability which in turn is only moderately, perhaps only weakly, correlated with individual conception delays.

The practical implication for couples wanting a pregnancy and of low fecundability is obvious. By increasing marital intercourse at mid-month, many such couples can materially reduce their expected conception delay but they do not, thereby, assure themselves of prompt conception. They remain subject to a large element of chance and depending on their luck will conceive promptly or only after a frustratingly long wait.

#### SUMMARY

The data of this analysis have come from the Family Growth in Metropolitan America study, a longitudinal survey in which 1,165 couples were interviewed approximately six months after their second birth and then 905 were reinterviewed three years later. During both interviews, detailed histories were collected about contraception and conception delays. In addition, during the second interview, questions were asked concerning beliefs about the timing of the fertile period in the menstrual cycle

models designed to reproduce a criterion series of conception delays: C. Tietze: Differential Fecundity and Effectiveness of Contraception. *The Eugenics Review*, Vol. L (January, 1959), pp. 231-237; and R. G. Potter, Length of the Observation Period as a Factor Affecting the Contraceptive Failure Rate, *Milbank Memorial Fund Quarterly*, xxxvii (April, 1960), pp. 141-144.

<sup>20</sup> This point is justified mathematically by reference to the geometric distribution. Cf. R. G. Potter, Some Physical Correlates of Fertility in the United States, [Mimeographed Paper # 12] International Population Conference, 1961.

and use made of these beliefs either to hasten or delay pregnancy.

About half the responses about the timing of the fertile period were classified as correct; the remainder were fairly equally divided between classifications of "incorrect" and "don't know." Thirty-five per cent of the respondents report ever avoiding intercourse during particular times of the month as a means of avoiding pregnancy and most of these couples are correctly informed about the timing of the unsafe period. Only 18 per cent report ever trying to hasten pregnancy by deliberately increasing coital frequency.

Coital frequency is not correlated with contraceptive effectiveness, partly for the reason that greater sexual activity does not appear to occasion more frequent chance-taking. Coital frequency is moderately correlated with fecundability (a couple's typical monthly chance of conception in the absence of contraception) but only weakly associated with individual conception delays.

Correctness of information about the ovulatory cycle does not appear to affect contraceptive effectiveness except in the case of the rhythm method. The gains in conception ease derived from deliberately increasing coital frequency are difficult to gauge because there are disproportionately many subfecund couples in this group who make special efforts to hurry conception. However, among couples reporting special efforts to hasten pregnancy, those correctly informed about the fertile period average shorter conception delays than those who are misinformed.