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EDUCATION, MODERNITY, AND FERTILITY IN COSTA RICA

J. Mayone Stycos
International Population Program
Department of Sociology and Center for International Studies
Cornell University

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The inverse relation between educational level and number of births must be ranked among the most reassuringly recurrent findings of fertility surveys in developing nations. "A number of recent reviews...have suggested that the inverse relationship...is one of the strongest, best researched and most stable relationships in the demographic literature" (Viederman, 1978: 50). At the policy level, it has provided educational enthusiasts with a new justification for heavy expenditures on schooling, and has even supplied a rationale to opponents of family planning for failing to attack high levels of fertility with direct programs of birth control. On the other hand, an up-to-date review has concluded that "despite a tradition of post-Enlightenment faith in education as a producer of progress and a heavily weighted received wisdom about the educational contribution to fertility behavior, the empirical results and the explanatory formulations are less than satisfactory. ...there is indeed an education-fertility relationship, but its level of significance and strength are not impressive" (Graff, 1979: 124, 128). At the very least, the education-fertility generalization requires refinement, since "the degree of this association and sometimes even the direction seems to vary among different countries at different stages of economic development..." (Timur, 1977: 466). Further, even assuming that fertility affects education, "little is known of...the way in which it does so" (Department of Social and Economic Affairs, 1979: 150). In other words, "the causal mechanisms that link the two have yet to be specified adequately and submitted to systematic empirical testing" (Holsinger and Kasarda, 1976: 154).

MODERNITY

In an effort to explicate and test some of the linkages between education and fertility, this study concentrates on the concept of modernization, or, more specifically, on its psychological counterpart, modernity. This "strong and persuasive...paradigm" (Graff, 1979: 121) has been subject to considerable controversy, both with respect to its nature and to its implications for fertility related attitudes and behavior. Certainly, there is general agreement that the broad societal transformations termed modernization (urbanization, industrialization, increased social mobility, the diffusion of secular norms, etc.) are almost invariably accompanied by fertility declines, but there is no agreement on the necessity or the weight of any of the ingredients. The conclusion reached in a recent United Nations review of research on education and fertility is typical: "Modernization is known to be associated with lower birth rates. However, it is difficult to isolate education from the rest of the variables that make up the modernity complex" (Department of Social and Economic Affairs, 1979: 150).

Difficult though it may be, we will attempt this isolation of variables at the individual level, trying to trace the pattern of psychic changes initiated by education and resulting in fertility. This difficulty at the societal level is compounded at the individual level, where there have been various efforts to isolate the syndrome of psychological modernity. Some authors go so far as to suggest that psychic change precedes the social transformations. Thus, Seeley (1975: 32) argues that European

economic development was spurred by a "change in outlook" involving rationalistic individualism and control over one's fate. Lerner has written that "Modernization...can only be accomplished by the transformation of individuals...the painfully complex process which W.H. Auden epitomized as a 'change of heart'" (Lerner, 1968: 388).

Whatever the sequence, what is this change of heart? Inkeles and Smith attempted empirically to identify the modern personality by means of four-hour interviews with approximately 900 men in each of seven countries; and concluded that "a truly cross-national or trans-cultural" syndrome exists. It describes a man "actively engaging his environment in an attempt to master it, intellectually or physically, or both, and constantly striving to influence change or mold it to his design. The man who scores high on the OM scale tends to be active in thinking, discussing, doing, interacting. He is knowledgeable, and yet he is open to new ideas and ways of doing them. He is also seeking to increase and utilize this knowledge to control his destiny.... By contrast, the traditional man tends not only to be less knowledgeable and less verbally fluent, but also to have a more closed mind and to be more passive in his relation to the world and his immediate environment" (Inkeles and Smith, 1974: 113).

Assuming that a modern personality can be identified, is it really distinct from other well-known psychological syndromes, or indeed, from socio-economic characteristics such as education or social class? In a paper entitled "Measuring Individual Modernity, A Near Myth", Armer and Schnaiberg concluded that "measures of anomie and alienation appear to

predict modernity scores almost as well as do other modernity scales (thus casting) serious doubt on the discriminant validity of modernity scales" (1972: 310).*

Several years later Schnaiberg took a position favoring modernism as a unitary concept in certain situations, but suggested that in others, its "disparate aspects" should be stressed (1971: 419-20). Among others who have reached positive conclusions concerning the modernity syndrome are Inkeles and Smith who refer to "the definitive syndrome of individual modernity, now empirically established " (1974: 109); Suzman, whose study of Boston blacks led to the conclusion that "the modernity syndrome is not merely a reflection of SES but is a partially independent entity" (1973: 279); and Portes, who concluded an empirical study and review with the statement that "a hypothetical modernity syndrome can be empirically isolated" (1973: 23).

Assuming an independent existence for modernity, which of its many characteristics are critical for fertility? Inkeles and Smith provide a long list stressing personal efficacy, belief in social change, and "seeing the virtues of planning, including family planning"; but insist that "no one element is indispensible...even the more central ones can be

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*Cohen and Till replied that these conclusions were unwarranted, since at least one of the scales had evidenced "a psychological modernity phenomenon that is distinct from socio-economic states, anomia and alienation" (1977: 377). Armer and Schnaiberg then reported that measures of SES and anomie account for most of the variation in three different scales of modernity (Inkeles', Kahl's, and Armer's) and that the remaining variation could easily be confused with "intelligence, social desirability or acquiescence response sets, authoritarianism, conservatism, etc." (1977: 379).

compensated for by other elements which, in a sense, step in to take their place" (1974: 109). Goldberg argues that the "themes of modernism most relevant for fertility are located in family organization" (1975: 92). He identified six themes such as husband power, sex segregation, female freedom, and size of world, whose scores were summed and comprised Modernism Index. From similar data (Schnaiberg: 1970) produced six different modernism measures (mass media, extended family ties, nuclear family role structure, religiosity, extra-local orientation, and home production or consumption) that he did not attempt to sum.

Portes and Cobas (1976) identified and summed eleven modernity variables with high loadings on a first factor. No less than six of the eleven items referred to an area included among the many listed by Inkeles and Smith but ignored by most authors: attitudes toward family size, contraception, and population. In a subsequent study, Portes concluded that "an egalitarian orientation toward family is probably the most stable component of modernity uncovered by cross-national research" (1973: 26). He distinguished a cognitive or informational dimension (urban experience, general information, and ideal size of family) from an expressive or emotional one (intra-family orientation, religiosity, and reproductive orientation). Specifically addressing himself to the multi-dimensionality question, Schnaiberg (1971) grouped 46 items into six separate but summable indices derived from modernism theory: extended family ties; mass media; family role structure; consumption of manufactured goods; religiosity; and extension of the environment. The mean intercorrelations of each measure with the others varied from .19 (extended family ties) to

mass media exposure (.45). Although a factor analysis led the author to conclude that "Emancipation appears to be at the root of modernism, at least female modernism" (419), the data show mass media exposure to be at least as important. Cohen and Till criticize Schnaiberg for overemphasizing these aspects and ignoring "orientations toward change and custom, rationality and planning, work, and independence from one's family. These dimensions...have been found empirically, both by Kahl (1968) and by Armer and Youtz, to be central to individual modernity" (1977: 377). Suzman identified ego involvement, abstract thought, and field independence as critical to the modern personality; and concluded that the OM scale, intellectual achievement, field independence, and ego level measures" form a moderately coherent syndrome which we might speculatively label psychological modernity" (1973: 280).

Another controversial question about modernity concerns its ability to predict fertility or fertility related attitudes any better than education or socio-economic status; or its capacity to account for the negative relation often found between education and fertility in developing countries. Based on Inkeles' original data and using attitude toward birth control as the dependent variable, Williamson found that a short scale of modernism stressing subjective efficacy compared "very favorably with even the best social predictors" (1970: 333). After a multiple regression analysis, he concluded that "the psychological variables have a major role as intervening variables in the Indian sample, an important role...for Pakistan and Israel, some role...for the Nigerian sample, and...

no role for the Chile sample" (335). He concluded that the modernism variables function "more as independent determinants of favorability toward birth control than as intervening variables" (336).

Working with the same data, Miller and Inkeles constructed a scale of "modern experience" that combined education, occupation, mass media experience, urban residence and living standard. A path model showed that the "direct effects of modern experience on acceptance of fertility limitation are much lower than the indirect effects in three of the four country samples, and the direct effects are near zero in two countries whereas the indirect effects of modern experience are significantly positive in all four" (1974: 180). In a path analysis of background variables, modern attitudes and family size, Rosen and Simmons support "the inclusion of wife's role-attitudes, participation in decision, and preferred family size as intervening variables between education, labor force participation, and husband's occupation on the one hand, and actual family size on the other" (1971: 66). Kahl (1968) found modern values to be his best predictor of family size in a Mexican sample. A multiple regression analysis by Goldberg found that such intervening variables as media exposure and modernism considerably reduced the relation between education and expected fertility among urban Mexican and Turkish women; and in the case of birth control use, caused education to reverse its sign. Of four intervening variables, modernism emerged as "the most central component and the most powerful predictor of fertility behavior under a wide range of specifications" (1975: 99). Michielutte _et al_. (1973) sampled 1500 Costa Rican households in areas near family

planning clinics. Although the performance of psychological variables (internal-external control, self-concept) was not impressive, the authors were able to conclude that "women who feel more in control of their lives are more likely to attend classes and to remain active once they have begun participation."

Other researchers have had less positive findings. A poll of 3000 Indian males disclosed that the relation between attitudes toward religion, marriage, and divorce on the one hand, and use of birth control and ideal family size on the other, largely disappeared when education and income were held constant, supporting, according to the authors, "a number of analyses which have failed to demonstrate the viability of psychological and social psychological variables in the explanation of fertility behavior" (Poston and Singelmann, 1975: 428). Two recent studies of modernism in Central American countries also reached rather negative conclusions about its utility for predicting behavior. In a study of Guatemalan couples, Portes and Cobas concluded that "modernism is not an efficient mediator of status effects on behavior...the impact of objective social position on 'modern' behavior is not solely or even predominantly due to the subjective orientations it produces..." (1976: 264). A study of Costa Rican males found that R^2s for most of 15 behavioral measures of modernity (including birth control and fertility) were not improved when measures of psychological modernity were added to several background variables. "The most liberal interpretation is that psychological modernity may be an important channel or way of interpreting the influence of education and other background determinants on some modern behaviors. On

the more conservative side, the results suggest that modernity as measured here may be merely a measure of social class values" (Armer and Isaac, 1978: 331).

In summary, we may say that there has been some disagreement about whether modernity exists at all, more disagreement about its critical components, and substantial disagreement about its implications for fertility. Although the research literature leaves one with a sense of promise, it is hard to disagree with Graff's verdict that "despite these elegant formulations and the promise with which they have been trumpeted, attitudinal-modernization explanations of fertility have yet to reveal their worth in specific tests" (1979: 123).

To some extent the inconsistent findings may be spurious, since they are based on samples that are difficult to compare. Thus, the studies emphasizing modernity tend to be confined to males and those emphasizing fertility tend to be limited to females. Further, a number of the studies reported here are based on small or non-representative samples. Of even greater significance for our particular concerns has been 1) the weakness and lack of consistency in the fertility measures used in the studies stressing modernity; 2) the paucity of fertility studies with adequate attention to modernity variables; and 3) the general inadequacy of measures dealing with attitudinal and cognitive aspects of contraceptive behavior.

Concerning fertility measures, students of modernity have used a wide variety of dependent variables: attitudes toward family size, attitudes toward birth control, use of birth control, clinic attendance

or defection, and number of births. Moreover, rarely do two studies use the same measure of any of these concepts. Sometimes the fertility variable (e.g., attitudes toward family size or contraception) is even used as part of the definition of modernity. In most cases, complex or elusive dependent variables are measured by a single question. In the Inkeles and Smith surveys, e.g., the questionnaires contained only a few attitude items on birth control or family size; and nearly all the studies measure attitude toward family size with a single direct question concerning number of children desired or preferred.

The typical KAP (Knowledge, Attitude, and Practice) survey, on the other hand, is almost devoid of useful independent or explanatory variables. Concentrating heavily on fertility, marital, and contraceptive histories, it rarely strays beyond such traditional census-type measures as residence, income, education, and occupation. Further, in contrast with its wealth of detail on fertility and reproductive wastage, the typical KAP survey employs only a few crude and direct items to assess knowledge and attitudes.*

A proper test of the education-modernity-fertility thesis then would seem to require improved measurement of both dependent and indepen-

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*A KAP researcher of the early 1950's whose time capsule enabled him to visit the World Fertility Survey a quarter of a century later would feel totally at home. He would find knowledge and attitude being measured by such questions as these: "One way a woman can delay the next pregnancy, or avoid getting pregnant, is to take a pill every day. Have you ever heard of this method?" "If you could choose exactly the number of children to have in your whole life, how many children would that be?" (World Fertility Survey, 1975).

dent variables; a sample large and representative enough to permit generalization as well as complex statistical manipulation; concentration on or at least inclusion of females in the sample; and a country where the education-fertility relation is unambiguous. Why Costa Rica fills the latter bill and how we strove to meet the other requirements will now be explained.

THE COSTA RICAN SURVEY

Costa Rica was chosen as the site for the first phase of our project because of the recent and extraordinarily rapid pace of its fertility decline. It was felt that a better understanding of the process might be useful to other nations seeking to precipitate or accelerate declines in the birth rate, and might add to a growing body of information explicating the dynamics of the demographic transition. A multiple regression analysis demonstrated that both prior to and during the early phase of the decline, variation in fertility among the nation's 68 counties was largely explained by literacy level, a characteristic much more critical than the canton's level of urbanization, infant mortality, or agricultural employment (Stycos, 1978a). Costa Rica had for some time been investing more in education (both in absolute terms and as a proportion of national budget) than other Central American nations, and around the early 1960's a major breakthrough had been achieved in terms of the proportions of women completing primary school. These tantalizing findings led directly to the question guiding the present inquiry: What are the psychological

states or processes intervening between education and fertility?

A review of the literature suggested a large number of potentially productive measures of modernity and of attitudes toward family size. In an effort to test their feasibility in the Costa Rican setting and to reduce the number of items in the final survey, we carried out what amounted to a four hour questionnaire in 1976 with a Test Survey group of 206 Costa Rican women. The Test Survey, summarized here in Appendix B and more fully described in Seeley and Stycos (1978), made it clear that doing justice to independent, intervening and dependent variables would require more than the maximum one hour of interviewing we considered feasible for a national sample. For this reason we decided to take advantage of the Costa Rican National Fertility Survey (Dirección General de Estadística y Censos, 1978), conducted in 1978 as part of the World Fertility Survey. Since this study had collected detailed data on the KAP variables (with the limitations already noted), our survey, by reinterviewing the same women, could better concentrate on modernity and on some of the less effectively measured attitudes. Both data sets would then be joined on a single tape and, with luck, yield the kind of data missing in most other studies of modernity and fertility: a nationally representative sample of women with detailed measurement on both dependent and independent variables.

In 1976 a formal agreement was reached between the Instituto de Investigaciones Sociales en Población (IDESPO) of the National University of Costa Rica and the International Population Program of Cornell University. The agreement spelled out the various rights and duties of

the two parties with respect to data collection, analysis, and publication, giving major responsibility for field work and analysis of economic data to IDESPO; and major responsibility for analysis of social psychological variables to Cornell. A draft questionnaire was prepared at Cornell and was pretested and revised in Costa Rica.

IDESPO reached an agreement with the Costa Rican Office of Statistics and Census involving a close collaboration in sampling design and interviewer training. The Statistical Office had carried out a national survey in 1976 as part of the World Fertility Survey, and kindly provided sampling and cartographic assistance, as well as a copy of the magnetic tape containing the survey data.

The Statistical Office had selected a stratified area sample of 4563 dwelling units representative of all but three percent of the population living in twenty-five remote and sparsely populated districts (Dirección General de Estadística y Censos, 1978). From these households, 4021 women between the ages of 20 and 49 had been interviewed, of whom 2626 were currently married or living in consensual unions. The maps and dwelling units lists necessary for locating these women were made available, as well as the respondent's age and education, to help in correct identification. If there were discrepancies (e.g., more than two years difference in age), the supervisor visited the woman and decided whether or not she should be interviewed. Although the field work for the follow-up survey was carried out about one and one-half years later, 86 percent of the eligible women were actually contacted and 77 percent reinterviewed* --

*The percentage of completed interviews ranged from 72 percent in the rural areas outside the Central Valley to 86 percent in the non-metropolitan urban area of the Central Valley. The metropolitan area of San José also had a relatively low reinterview rate -- 75 percent, and the other two strata, rural Central Valley and other urban, had rates of 81 percent.

a tribute to the precision of the Statistical Office's records, the IDESPO's diligence, and the tolerance of the interviewees. Further details on interviewing problems and on reliability and validity of the data are given in Appendix A.

A NOT-SO-NEW CONCEPTUAL MODEL

We are now ready to investigate the causal chain between education and fertility. In addition to modernity, this chain contains many links -- cultural, social, psychological, and biological -- but we will single out several that are of particular interest to social scientists and policy makers, even though some of them will receive little attention in this research.

Age at Marriage. Because of norms against marrying while in school, education can affect age at marriage more or less directly. It can also do so via other structural variables such as employment, or through more attitudinal shifts with respect to marriage and childbearing. In the latter case, the attitudinal change might be mediated by modernity. We will assume that the principal effect of age at marriage on fertility is through its consequences for exposure to conception; i.e., marital duration.

Birth control, the use of sterilization, abortion, or contraceptive techniques for preventing a conception or birth.

Knowledge of and attitudes toward birth control and sources of birth

control supply. Birth control behavior depends in part upon the degree of knowledge about methods and their availability, and upon the extent to which such methods and supply sources are favorably regarded.

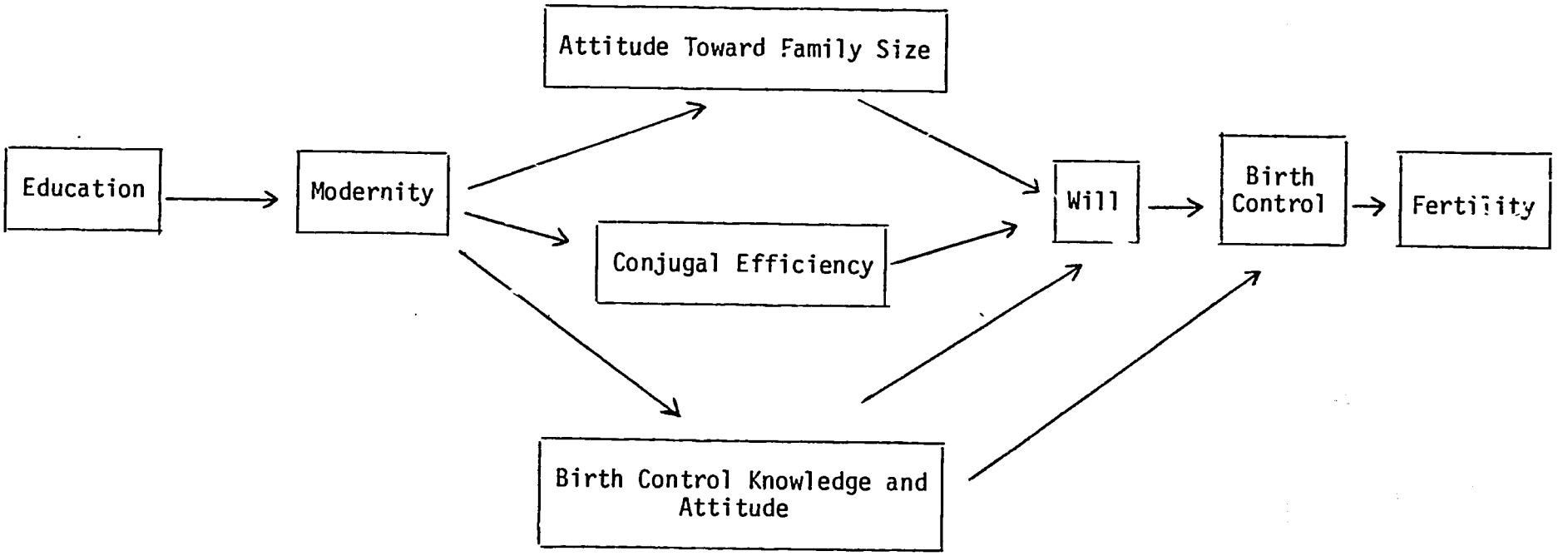
Will to have or not to have a child. In order to act on one's knowledge of birth control, it is necessary to want to act. At any point in time, such as at the time of interview, the degree of motivation or indifference toward having another child should be a crucial factor in determining whether or not birth control will be used.

Attitude toward family size. Whether or not one wants to have or not have an nth child should depend in part on one's evaluation of large versus small families and whether one would like to have many or few children.

Conjugal efficiency. Since most of the above aspects may involve both husband and wife, the degree of empathy, communication, consensus on family size and birth control could be important in determining how effectively individual knowledge and attitudes become translated into behavior.

Figure 1 shows how the education-fertility chain might look. Sophisticated readers may note a certain lack of novelty in the model. Indeed, the writer and his colleagues published a similar though more elaborate paradigm for Puerto Rico two decades ago, including a block of variables termed "General Value System" that covered "Traditionalism-Modernism" (Hill, Stycos, and Back, 1959: 220). The difference lies less in the basic concepts than in their measurement. In the last twenty years there has been considerable empirical research on modernity and a

FIGURE 1: AN EDUCATION-FERTILITY MODEL



fair amount on the cluster of variables proximate to birth control behavior. Another difference is that we will assume that "will" is not a static variable, but is one that changes radically over the life cycle, affected independently by age, number of births, and marital status. We first look at the start and finish of the chain.

EDUCATION AND FERTILITY

As a first step in our general model relating education and fertility, we need to know whether a relation between the initial and terminal variables exists, and if so, to what extent it can be attributed to variables or paths extraneous to the model. According to published findings of the initial Costa Rican World Fertility Survey, wives who never reached the third grade have had three times as many live births as those who completed high school,* and in our sub-sample of these women, the correlation between education and number of live births is -.40. Among the possible explanations for this relation are three in which we have only a minimal interest: that better educated women are younger, marry later, or are more urban and more likely to enter the labor force. To the extent that these are verified, the appropriate variables will need to be statistically controlled in our study, since our primary interest is in psychological links such as modernity and attitudes relat-

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*More precisely, ever mated women between the ages of 20 and 49 with less than three years of schooling had a mean of 6.6 births; those with eleven or more years only 2.1.

ing to family size. We will first draw on published data from the Costa Rican WFS.

Age at Marriage

Among women over 25 who married before age 25, the average high school graduate married or began a consensual union 2.7 years later than the woman who had less than three years of schooling (Dirección General de Estadística y Censos, 1978: 44). Actually, no difference is observed until completion of sixth grade; but between those who had three to five years of primary and those who completed the sixth year, there is a whole year's difference in age at first union; and another year and a half is added if secondary school was completed (ibid.: 51). Further, single women with less than six years of schooling are much more likely to have had sexual relations than better educated women (ibid.: 210). Thus, better educated women, both within and outside of marriage, are exposed to the risk of conception later than are less educated women.

*Age**

Since educational opportunities for Costa Rican women have grown rapidly in recent decades, younger women tend to be better educated. However, when age is held constant by cross tabulation, age at first

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*See pp. 66-68 for a more detailed consideration of age and marital duration.

union still varies as much by educational group;* and when years of marriage are crudely controlled (Table 1B), it is still the case that women who had less than three years of schooling have had twice as many births as those who completed secondary. The degree of decline in births between those who had three to five years of schooling and those who finished primary is at least as large as between the former category and those who never went to school at all (Table 1B). Differences appear within the first five years of marriage (Table 1C).

Social Characteristics

In Table 1, D and E, "extreme" categories have been selected to show the relative dominance of education over two other theoretically powerful social characteristics: urban residence and female labor force participation. Among metropolitan women (31 percent of ever-mated women) and women who were working prior to their marriages and have continued to do so (20 percent of the ever-mated women), the inverse relation between education and number of births continues to be strong. Moreover, comparison of these groups with all women (Row A) shows that work status is of little significance by itself, and that metropolitan residence is of some importance only for women who did not complete elementary school.

Finally, by the crude measure of whether or not birth control has

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*For women aged 25-34 who married prior to age 25, e.g., those who did not complete primary, married at 18.2 years; those who completed secondary married at 21 (Dirección General de Estadística y Censos, 1978: 44).

Table 1

Fertility and Contraceptive Practice by Education and Other Social Characteristics

	Education							
	None	1-2	3-5	6	Secondary Incomplete	Secondary Completed	University	Total
A. Mean Live Births, ever married women[a]	7.3	6.3	5.0	3.2	2.6	2.2	2.1	4.2
B. Mean Live Births, ever married women 10-19 years ago[a]	6.4	5.9	5.0	4.0	3.6	3.0	2.9	4.6
Mean Live Births, ever married women 20-29 years ago[a]	9.3	9.0	7.9	6.3	5.0	4.6	4.0	7.7
C. Mean Live Births in first five years of union (of fertile women married five or more years)[b]	2.9	2.7	2.6	2.3	2.0	1.9	1.8	2.4
D. Mean Live Births, metropolitan ever married[a]	(6.6)	5.3	4.3	3.3	2.5	2.2	2.0	3.3
E. Mean Live Births, ever married working and who worked before marriage[c]	(7.1)	6.0	5.0	3.2	1.6	1.9	2.0	3.5
F. Percent ever married who have never used birth control[d]	30	27	21	15	11	10	10	18
G. Percent ever married aged 40-49 who have never used birth control[d]	36	36	34	26	18	16	12	30

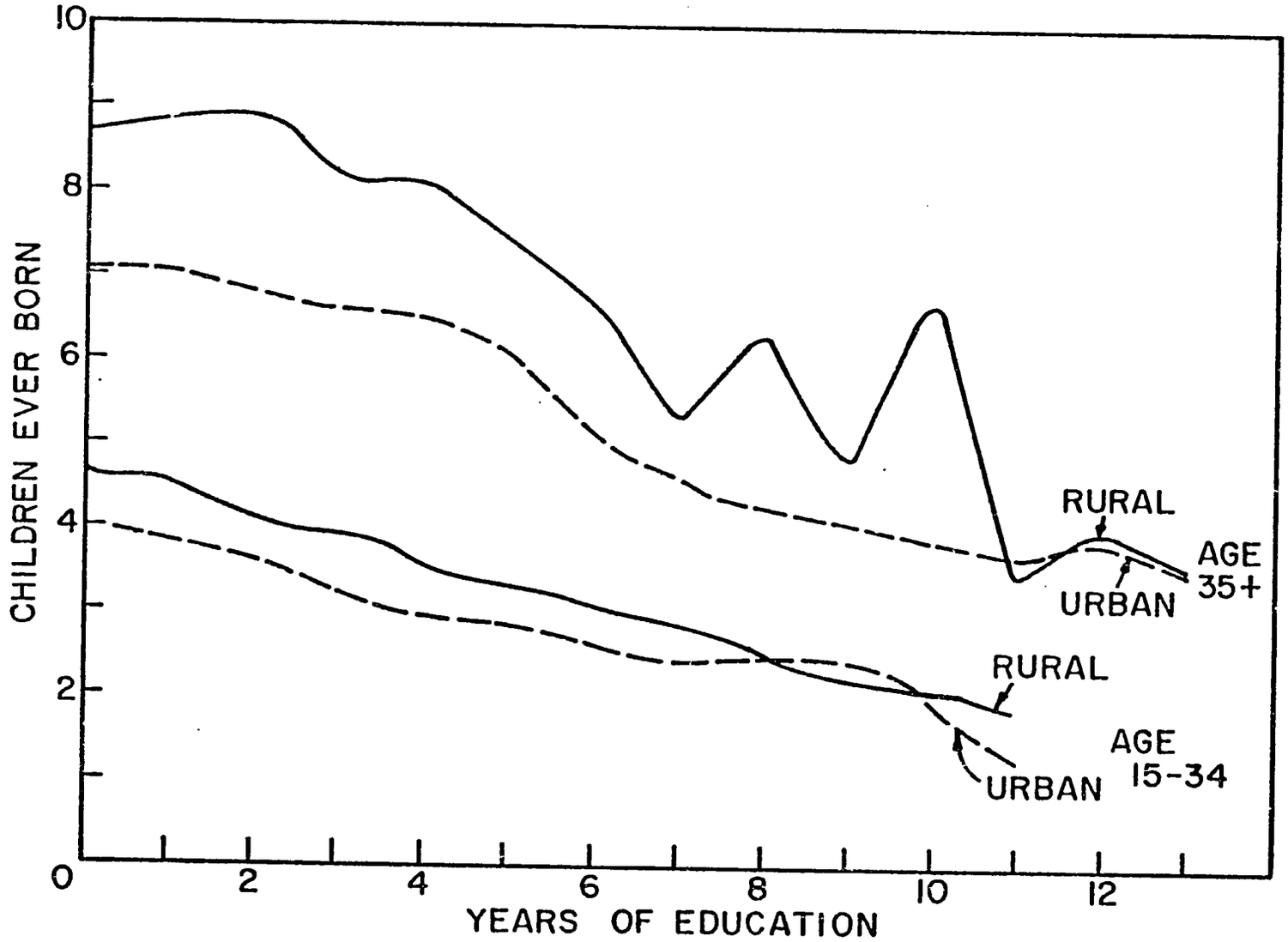
Source: Dirección General de Estadística y Censos, 1978: a, 188; b, 170; c, 189; d, 258.

ever been used (Table 1F), differences are in the expected direction, though less striking than variations in fertility itself. For example, the difference between university educated women and those who only completed primary is not substantial. Among the older women, completion of primary school had to have been achieved before a perceptible change in birth control practice occurred (Table 1G).

In addition to data from the National Fertility Survey, the Cornell International Population Program obtained a tape containing a 10 percent sample (28,000 currently mated women) of the 1973 census of Costa Rica. Figure 2 shows the more or less linear decline of births as education increases, in both urban and rural areas. Further, a partial correlation analysis was carried out, in which education and fertility were correlated within each five year age group, holding constant the respondent's residence and employment status. Table 2 shows that the correlations between education and fertility (ranging from about -.30 to -.40) decline about ten points when residence and employment status are controlled, but by no means disappear. In a multiple regression analysis, a third of the variance was explained by these variables, with age accounting for 24 percent. The standardized regression coefficient for employment status was zero; that for residence, modest but statistically significant (-.14); and that for education, still reasonably strong (-.24).

We may conclude that although age, age at marriage, and residence all help to explain the education-fertility relation, even taking them into account leaves most of the relation unexplained. Further, the current employment status of women as such drops out as a possible explanation.

Figure 2: Mean Number of Children Ever Born, by Education, Age, and Residence of Mated Women



Source: 10% Sample, Censo de Población, República de Costa Rica, 1973

Table 2

Correlations Between Children Ever Born and Years of Education, by Age, Currently Married Costa Rican Women, 1973

	Zero Order	Betas[a]
20-24	-.31	-.31
25-29	-.42	-.34
30-34	-.41	-.31
35-39	-.36	-.27
40-44	-.33	-.22
45+	-.28	-.19

Source: International Population Program special tabulations of a 10 percent sample of the Costa Rican 1973 census.

[a]Controlling residence and employment status, in each case by assigning a 0 or 1 to the status.

We hypothesize that most of the variance can be explained by deliberate control of marital fertility, and that this control is affected by a series of mental processes that will now be explored, using data from the 2009 reinterviews.

THE MEASUREMENT OF MODERNITY

Based on the Test Survey analyses and a factor analysis of the Final Survey data, four components of modernity were identified and appropriate indices created:[1]

1) MASSINFO. The sum of three information questions concerning the identity of the North American President, a popular Costa Rican ex-Minister of Sports, and a Costa Rican southern city; and two communications items (extent of newspaper readership and television watching).

2) SEXROLES. The sum of six items from Rosen and Simmons' Female Role Attitudes Scale (1971), four items from Goldberg's Sex Segregation Scale (1974), and three items concerning sexuality norms.

3) HUSBPOWR. The sum of nine items concerning who usually decides or resolves various domestic problems -- the husband, wife, or both. "Both" received the highest, i.e., most modern score; "husband" the lowest score.

4) INKELES. The sum of fourteen items stressing "instrumental activism" drawn from Inkeles and Smith's (1974) OM Scale.[2]

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[1]See Appendix B for details on item selection and index construction.

[2]The personality reflected by these items is described on page 3 in the citation by Inkeles and Smith.

The latter three scales will sometimes be added together to form MODPSYCH, to distinguish these attitudinal items from the more behavioral and cognitive items of the MASSINFO scale.

An overall measure of modernity (here termed MODRNSUM) was derived from the sum of the standardized or Z scores of the four component measures.* Tables 3 and 4 give further information about the various indices. Table 4 shows that the six correlation coefficients for the component scales range from .30 to .54, high enough to justify the use of combined scales such as MODRNSUM and MODPSYCH, but not so high as to render individual scales superfluous.

MODERNITY AND EDUCATION

Inkeles and Smith found education to be the most critical factor in modernity among males in most of the countries they studied, the correlations ranging from .41 in East Pakistan to .71 in India. When ten independent variables were held constant, the median partial correlation between education and modernity in the seven countries was .34. The average gain on the modernity scale for every year of schooling was "almost five items that for each year in the factory" (1974: 269). The authors concluded that education "was by far the single most impor-

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*Each item was converted to a Z score and the mean of these Z scores was used to create the scale. In this way, an item with missing data was assigned the mean Z score of the scale. In cases where more than two items in a scale were missing, no scale value was assigned.

Table 3

Summary Statistics, Modernization Variables

	Range	Median	Mean	Standard Deviation
INKELES[a]	14-35	26.1	26.0	3.6
SEXROLES[a]	13-65	35.0	36.0	9.1
HUSBPOWR[a]	10-50	31.0	30.5	12.3
MASSINFO[a]	5-14	9.6	9.6	2.8
MODPSYCH[b]	-3.4 - 4.0	-.0	0.0	1.3
MODRNSUM[b]	-4.2 - 5.0	-.1	0.0	1.8

[a]raw scores

[b]sum of Z scores

Table 4

Intercorrelation of Modernization Indices

	INKELES	MASSINFO	SEXROLES	HUSBPOWR	MODPSYCH
MODRNSUM	.68	.75	.77	.61	.95
INKELES	-	.51	.51	.30	.70
MASSINFO	-	-	.54	.30	.58
SEXROLES	-	-	-	.45	.84
HUSBPOWR	-	-	-	-	.80

tant determinant of a man's modernity" (284).

In a study of 816 Brazilian women Rosen and LaRaia concluded that "neither the degree of industrialization of the community in which a woman lives nor the occupational status of her husband...is the best predictor of a woman's modernity; if we wish to predict how high a woman in this sample will score on the modernity index, it is more important to know her level of education" (1972: 359).

Goldberg (1975) reported correlations of .72 and .67 between his modernity index and education in Ankara and Mexico City, respectively. Based on a regression analysis of modernity involving five background variables among a sample of Costa Rican males, Armer and Isaac concluded that "education was the most important explanatory variable...a finding also reported by previous research" (1978: 324). For a sample of 591 adolescent Nigerian males, Armer concluded that "formal education does indeed have a strong, direct, and independent resocializing influence on value orientations of the Kano respondents" (Armer and Youtz, 1971: 615). Suzman (1973) reported a correlation of .41 between education and the OM scale among Boston blacks, and found the former variable to be critical among fifteen demographic and social variables used in a multiple regression analysis. Further, he found education to be both the most important correlate of ego level and of the various IQ scales.

In our Costa Rican survey, with a female sample that is larger, more representative nationally, and with greater range in socio-economic status than is characteristic of most of the studies cited above, the correlation between modernity (MODRNSUM) and education is .68. The

correlations between education and the components of MODRNSUM are also high: SEXROLES .61, MASSINFO .60, INKELES .51, and HUSBPOWR .33. Average modernity scores for seven educational categories show the regular and powerful influence of each increment of education (Table 5).

Prior to completion of primary school, modernity is also related to urban residence; but for women who have reached secondary school there is virtually no difference in modernism by residence. Several other socio-economic characteristics are positively related to modernity (consumer durables , education of parents, education of husband, and being in the labor force*), while number of siblings is negatively related. An analysis (not shown) in which MODRNSUM and each of its four components were regressed on six socio-economic variables showed that (1) these variables account for about one-third of the variance in SEXROLES and INKELES; (2) while four of the five other socio-economic variables maintain a statistically significant relation with SEXROLES and INKELES, the Beta for wife's education is much larger than any other;** (3) in the case of MASSINFO, 51 percent of the variance is explained, and the Betas for wife's education and consumer durables are both strong and roughly equivalent. Unlike the other socio-economic measures, however, consumer durables could be as much a consequence as a determinant of education and modernity. In any

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*See pages 53 and 54 for definitions of these variables.

**This is also true for HUSBPOWR but the total R^2 is only .13. Betas for education range from .26 to .42 and are significant at the .001 level.

Table 5

Mean Z Scores (x 100) of Modernity Measures, by Education

Years of Schooling	INKELES	MASSINFO	HUSBPOWR	SEXROLES	MODRNSUM*
0-1 (Primary)	-28	-66	-24	-40	-160
2-3	-16	-42	-16	-27	-100
4-5	-10	-20	-11	-17	60
6 (Primary completed)	- 1	14	1	2	14
7-10 (Some secondary)	19	45	8	23	95
11 (Secondary completed)	37	73	42	52	200
12+ (University)	53	83	58	86	280

*sum of Z scores of components

event, it is clear that although several other socio-economic measures are related to modernity, they detract little from its strong and independent relation to education.

MODERNITY AND FERTILITY

Controlling age, the partial correlation between education and live births is -.35. When we include MODRNSUM as a control, the correlation is halved (-.18), showing that much of education's influence on fertility is mediated by modernity. Not all the ingredients of modernity are equally important, however. Holding INKELES or HUSBPOWR constant barely affects the relation; SEXROLES is more influential, reducing the education-fertility relation to -.25; but MASSINFO reduces it to -.19. As indicated by the regression analysis summarized in Table 6, it is the Mass Media and Information component of the modernity scale that explains the variance in fertility, rather than the three psychological measures summarized by MODPSYCH.

MASSINFO is even more important than education itself, as seen by the much smaller standardized regression coefficients for the latter. For women who have largely completed childbearing (i.e., those aged 35 and over), a fifth of the variance in number of live births is attributable to the number of years they have been married. An additional 14 percent is explained by education and modernity; but the latter is more critical than the former and is essentially a matter of media exposure and information about the world beyond the community.

Table 6

Multiple Regression for Live Births, by Age Group

	<35		≥35	
	Beta	R^2	Beta	R^2
Years married	.49***	.28	.40***	.21
Education	-.06	.32	-.16**	.31
MASSINFO	-.16***	.35	-.24***	.35
MODPSYCH	-.08**	.35	.07	.35
Number	(1042)		(966)	

Our first hypothesis has been demonstrated: Modernity, especially one aspect of it, goes a long way toward explaining the relation between education and fertility. We next look at two other components in the model -- birth control and conjugal efficiency -- to see to what extent they intervene in the modernity-fertility relation.

BIRTH CONTROL AND CONJUGAL EFFICIENCY

If modernization affects fertility, how does it do so? We have already proposed knowledge of and attitude toward birth control as plausible links between modernity and effective fertility control; but in the case of Costa Rica, these links are less relevant than in other developing countries. This is so because knowledge of contraception, and in the crude sense, use of contraception are approaching maximum levels and cannot therefore help to explain fertility variation. According to the National Fertility Survey, 100 percent of ever-mated women aged 15-49 knew at least one efficient contraceptive* (Dirección General de Estadística y Censos, 1978: Table 56). Our reinterviews further disclosed universal knowledge of supply sources: 99 percent knew at least one place to get the pill, and 97 percent knew at least

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*Knowledge of older methods of contraception (withdrawal, rhythm, and condom) is much higher among Costa Rican women than among those sampled in World Fertility Surveys in Colombia, Panama, or the Dominican Republic (Brackett, 1978: 120). For the significance of the condom in the Costa Rican fertility decline, see Stycos (1978b).

one place to get a sterilization.* Finally, there is little variation in use of contraception, at least as judged by the broadest definition. Fully, 81 percent of the women have already used a contraceptive. By this crude measure there is no relation between contraceptive practice and fertility. With age and education held constant, the Beta for birth control use (0 = ever used, 1 = never used) and live births is -.04 among the total sample and .03 among non-sterilized women. Variations in fertility probably result from variations in contraceptive timing, regularity, and method effectiveness rather than from sheer use or non-use, but much measurement goes beyond the scope of this study. At any rate, it seems clear that we are dealing with a population where fertility variation cannot be explained by gross ignorance or opposition to birth control, and the study of other sources of fertility variation is thereby simplified.

We have termed a second possible intervening variable conjugal efficiency; i.e., the degree to which spouses communicate and reach decisions efficiently and effectively. Since this area failed to account for much variance in either fertility or contraceptive behavior in the Test Survey of 206 women (Seeley and Stycos, 1978), only two questions concerning whether or not the respondent had ever discussed

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*An index of when the respondent first learned about family planning and modern contraceptives is correlated .25 with education, -.12 with age, and .23 with urban residence, showing that better educated, younger, and urban women learned earlier about family planning. A multiple regression analysis showed all three of these variables to be significant at the .001 level. Neither modernity nor length of employment had a significant relation when the other three variables were held constant.

desired family size or contraception were included in the Final Survey. When an index combining these questions was added to the regression for live births shown in Table 6, its Beta failed to reach significance in either age group. However, it is of interest that this communications measure is positively related to both education and MODRNSUM (r's = .35 and .32) and negatively to age (-.35).*

Thus, neither conjugal efficiency nor knowledge and attitude toward birth control seem to be promising leads in accounting for the contemporary relations of modernity to fertility in Costa Rica. We next turn to attitudes toward family size.

ATTITUDES TOWARD FAMILY SIZE

Partial correlation coefficients linking education and desired family size in nine Latin American cities sampled in the mid-1960s showed that "female education has significantly negative coefficients in only two cities and a significantly positive coefficient in Buenos Aires" (Cochrane, 1979: 112). Based on a review of these and other empirical studies, Cochrane concluded that although "education affects the demand for children by altering preferences...the effect of education on per-

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*A multiple regression analysis showed that economic level and the psychological aspects of modernity (MODPSYCH) have no significant relation to communication; that husband's education is just significant at the .05 level; that the MASSINFO component of modernity is more important than education (Betas = .20 and .12, respectively); and that age has the greatest impact (Beta = -.27).

ceived benefits was more uniform than that on preferences" (ibid.: 114-115).

The literature relating modernity with family size preferences is even less clear-cut than was the case for modernity and fertility. Using a measure of modernity that drew on Kluckhohn's scheme of value orientations, Clifford (1971) found a correlation of -.23 with ideal family size and -.10 with desired family size among 240 Southern U.S. white non-farm women. However, controls for socio-economic status showed that modernity _per se_ was unimportant or less important than the status measures. Kahl (1966) reported a correlation of -.22 between modernity and ideal family size among a national sample of Mexican men. Godwin (1972) reported -.27 for a sample of adolescent Mexicans, but concluded that "Neither in the U.S. nor in Mexico did this analysis explain much of the variance in score on Desired Family Size for self. In the U.S. all eleven independent variables could explain only 19 percent of the variance and in Mexico, only 16 percent" (121).

In part, the weakness of such correlations may be explained by the low reliability and validity of the attitude questions, that often attempt to tap a complex and perhaps latent attitude with a single blunt question. Traditional KAP questions on expected, wanted, and ideal numbers of children have met with considerable criticism (George, 1973; Haas, 1974; Hauser, 1967; Kiser, 1967; Stycos, 1964; Stycos and Back, 1964; Westoff _et al_., 1957). Rationalization of existing family size, courtesy bias (giving socially acceptable answers), and the encouragement of

fantasy are among the bases for criticisms that have been leveled at such questions. On the other hand, even so abstract a concept as "ideal family size" has been of value in analyzing fertility trends (Blake, 1974); and Ware (1974) has argued convincingly that questions on "the best number of children for a family to have" are useful in large surveys.

In the present survey, although we included several traditional items, other approaches, reputed to be superior, were also utilized. The traditional items were as follows:

> If you were about to marry and could choose exactly the number of children you would like, how many children would you have? (CHLDWANT)
>
> When you think of a small family, how many children make up this family? (LRGEFAM)
>
> And when you think of a large family, how many children are there? (SMALFAM)

Among the less traditional measures was the Coombs' IN Scale, which "reflects not only an individual's first choice (first in a hierarchical sense), but his response to deviation from this first choice, because the scale takes into account preferences beyond the first" (Coombs, Coombs, and McClelland, 1975: 275). Among a sample of American women, the scale predicted subsequent fertility even when "controls are introduced for initial parity, stated first preferences, additional children expected, religion, income and wife's education,

either separately or in combination" (Coombs, 1974: 609). In an island-wide sample of 5588 Taiwanese wives conducted in 1973, Coombs and Freedman found a correlation of -.35 between education and the IN scale. They also found a substantial negative relation between a scale measuring modernism of roles and activities and the IN scale that was not explained away when education, income, urbanization, and marriage duration were simultaneously controlled (1979: 365-366). In Costa Rica we used a short form of the scale in which respondents were asked: "If you could have an equal number of girl and boy children, how many children would you prefer in all: 0, 2, 4, or 6?" (followed by successive paired comparisons until the respondent chooses 0 or 6).*

In a modified projective technique following Stycos (1964) and Simmons (1971), respondents were presented with two pairs of photographs of Costa Rican families (one pair with two and three children, the other with three and seven) and asked which of the two families in each pair they preferred and why. Responses to the latter question were coded as "related to size of family" or "not related." Respondents were then asked to rank the three families of different size in order of preference. Responses to the pairs of photos were scored from one to four, according to whether the smaller or larger family was chosen and whether or not the reason for the choice was explicitly related to the number of

---

*If the respondent chose 0 or 6 initially, she was scored as 1 or 8, respectively. If 2 were chosen, she was then asked if she would prefer 0 or 4; and if 4 were then chosen, she was asked to choose between 0 and 6, etc. (See Coombs, 1974: Figure 2)

children. For example, a respondent who preferred the three child to the two child photograph and gave family size as the reason for her choice was given a score of four on the first pair of photographs. A similar scoring was applied to the second pair and the two scores were summed and termed FOTOSUM. In addition, the rank ordering of the three families, regardless of reason, was scored; e.g., a preference ordering of two, three, and seven children photos was given a score of one, while a ranking of seven, three, and two was assigned a score of six (termed PREFORDR).

Another approach was in terms of Value of Children, and four items were taken from Arnold et al.'s (1975) core questionnaire. Each involved a statement about children with which the respondent was asked to agree or disagree on a five point scale. The items refer to the general benefits of having children at all; i.e., family size is not explicitly involved. The sum of the four items is termed ARNOLD. Three other items tapping general attitudes refer to the expectation of future help from one's children: whether the respondent expects to rely on them for financial assistance and whether she expects to live with them when she is old. The sum of these items is termed EXHELP. We also adapted Kothapani's (1971) version of the Semantic Differential Scale to family size attitudes, by means of three five point scales for describing a small family ("empty-full, selfish-selfless, and sober-happy"). The sum of these items is called SEMANTIC.

Conceptually different from these general attitudes toward having children and toward the preferred size of family are specific desires

and intentions about having additional children. Three blocks of items were directed toward these areas: 1) The respondent was asked whether or not she wanted more children, and if so, how many. She was asked the same question about her husband's wishes. A six point scale ranging from "neither wants more" to "both want two or more additional children" was termed HUWIMORE. 2) The respondent was asked whether or not she intended to have a child in the next two years and how sure she was of this intention. A four point scale ranging from very sure about having a child to very sure about not having one was called CHLDSCLE. 3) The respondent was asked to what extent she agreed or disagreed with three possible consequences of having another child in the next two years: that their marriage would be more stable, that companionship would be provided for their children, and that they would feel more like a mother. The sum of the three items was termed CHDIMP.

Table 7 presents summary statistics on the twelve measures of family size attitudes defined above. A factor analysis was carried out to determine whether these twelve scales could further be reduced. Six factors were found to explain 89 percent of the total variance, and led to the delineation of the six new measures shown in Table 8.

Table 7

Summary Statistics, Family Size Attitude Scales

		Range	Median	Mean	Standard Deviation
CHLDWANT	(ideal size)	0-8	3.7	4.2	1.9
LRGEFAM	(def. of large family)	2-29	8.1	8.9	3.7
SMALFAM	(def. of small family)	1-9	2.9	3.1	1.4
COOMBS	(Coombs forced choice)	1-8	6.1	6.0	1.6
FOTOSUM	(photo choices)	2-8	4.8	4.7	1.8
PREFORDR	(photo ordering)	1-6	3.0	3.1	1.6
ARNOLD	(value of children)	4-20	14.6	14.3	3.1
EXHELP	(expect child help)	3-7	5.1	5.0	1.3
SEMANTIC	(semantic differential)	3-15	7.1	7.5	3.1
HUWIMORE	(couple desire for more children)	1-6	2.3	3.1	2.0
CHLDSCLE	(intention more children)	1-4	2.1	2.2	1.1
CHDIMP	(implications of another child)	3-15	11.7	11.0	2.6

Table 8

Rotated Factor Analysis of Family Size Attitudes

Factor	Percent of Variance	Two Highest Loadings	Next Highest Loading	Concept	New Measure
1	28	HUWIMORE .89 CHLDSCLE .87	CHDIMP .41	Desire for more children	HUWISCLE
2	18	FOTOSUM .88 PREFORDR .90	COOMBS .25	Latent family size preference	FOTOPREF
3	13	ARNOLD .89 CHDIMP .60	EXHELP .33	Value of $children_1$	ARNIMP
4	8	SEMANTIC .74 EXHELP .69	CHDIMP .28	Value of $children_2$	SEMEXH
5	11	COOMBS .77 CHLDWANT .80	LRGEFAM .53	Family size preference	COOMBS
6	10	LRGEFAM .53 SMALFAM .87	EXHELP .32	Size tolerance	LRGESMLL

HUWISCLE (Factor 1): This measure combines wife and husband's desire for more children (as reported by the wife) with degree of wife's certainty about having a child in the next two years. it is composed of the sum of the Z scores of these two items, and correlates .94 with Factor 1.

FOTOPREF (Factor 2): The sum of the two Z scores of size preference based on photos of families of differing size correlates .97 with Factor 2. Since it may represent a somewhat less conscious preference for family size than those elicited by direct questions, we will consider it a latent family size preference.

ARNIMP (Factor 3): Z scores of the four Value of Children items plus the Z scores of three items measuring how an additional child would affect the family can all be viewed as reflecting the value of children. That the expectation of help from children also loads highly on this factor, further supports this interpretation. The sum of ARNOLD and CHDIMP correlates .98 with Factor 3.

SEMEXH (Factor 4): The semantic differential concerning the small family and the expectation of help from one's children largely comprise this factor. This seems like a variation of the Value of Children concept. The semantic differential asks the respondent to evaluate a small family; and the other items ask whether one's children can be expected to help in one's old age. The measure correlates .82 with Factor 4.

COOMBS (Factor 5): This factor reflects a preference for number of children, but since we believe the Coombs measure is less subject to rationalization than the simple preferred family size question, we will normally use the Coombs scale alone as the measure of family size preference.*

LRGESMLL (Factor 6): This factor may be viewed as reflecting the acceptable limits on number of children; i.e., a floor and ceiling. The sum of the Z scores for definition of the small and the large family correlates .84 with Factor 5.

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*The COOMBS scale correlated .59 with the single question on preferred family size (CHLDWANT) suggesting that the single item may be used as a rough proxy for the scale if necessary. The projective technique (FOTOSUM) correlated .36 with COOMBS and .34 with CHLDWANT, suggesting, as confirmed by the factor analysis, that somewhat different dimensions are being tapped.

The factor analysis has helped us to see more clearly which variables should be grouped and to interpret the combinations. Nevertheless, with the exception of COOMBS, we will use the sums of the scales in each pair of items rather than the factor scores, since we feel that interpreting the scales is more straightforward than interpreting the factor scores. Moreover, as seen from the magnitude of correlations between factor scores and sum of pair scores, the two measures are nearly identical.

The intercorrelation matrix of the six measures shows positive but generally weak relations. The HUWISCLE is correlated only with ARNIMP (Table 9). In general, then, more so than in the case of the measures of modernity, it can be said that the scales measuring attitudes toward family size are tapping different dimensions.

EDUCATION, MODERNITY, AND ATTITUDES TOWARD FAMILY SIZE

We may classify the six measures of Table 6 according to three dimensions of increasing specificity regarding the will or "demand" to have or not to have children. The first dimension might be termed a general predisposition regarding the psychic and economic costs and benefits of children. It can range from strong feelings about "big" or "small" families to diffused feelings of attraction, indifference to, or repulsion from "children." Such a predisposition may influence or lead to a more specific numerical preference. Although predispositions

Table 9

Intercorrelations of Family Size Preference Scales

	COOMBS	LRGESMLL	HUWISCLE	ARNIMP	SEMEXH	FOTOPREF
COOMBS	-	.27	.03	.20	.25	.36
LRGESMLL		-	.03	.20	.22	.16
HUWISCLE			-	.20	.02	.01
ARNIMP				-	.35	.09
SEMEXH					-	.18

and numerical preferences may be formulated well before marriage and remain relatively stable throughout a marriage, they need not constitute family size goals. Quite different from these two attitudes are specific desires to have or not to have a child at a particular moment and intentions to have or not to have a child. Both desire and intention may be influenced by the general predisposition and numerical preferences for children, but are much more responsive to changes in the life cycle reflected by age or numbers of children, and to the immediate circumstances of the family economy and the woman's health.

Three of the six meausures will be considered to be predispositions: SEMEXH (combining the semantic differential questions about a "small family" with several questions about expected assistance from children in old age); LRGESMLL (setting broad limits for large and small families); and ARNIMP (combining several value of children items with potential impact of another child).* Two measures will be classified as numerical preferences: FOTOPREF and COOMBS, the former presumably tapping a latent preference via a projective technique, the latter a scale assessing a hierarchy of preferences. Finally, the HUWISCLE will be used to reflect desire/intention to have another child.**

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*The impact questions are hypothetical; they do not ask whether or not the respondent wants another, but what effect another birth would have on the family.

**While desire and intention are conceptually distinct, the factor analysis showed them empirically to be virtually identical. The measure has the added advantage of combining the perception of husband's desire for more children with wife's desire and intention. A separate analysis using only the wife's desire for more children (i.e., eliminating both wife's intention and husband's desire for more children) was carried out and produced results little different from those obtained by using HUWISCLE.

Table 10 reveals that although all six measures are related to education, the pattern differs for the three dimensions just delineated. Predisposition measures have a monotonic negative relation to education;* numerical preferences have a less regular relation, with the critical impact occurring at or just above completion of primary schooling; and the relation of education to the HUWISCLE is negative, weak, and bi-modal: women who completed primary school are more likely to want another child than women who did not. Now let us see how education's relations to family size attitudes compare with those of modernity and age. Table 11 shows that modernity (as education) has strong negative relations with the predispositions, moderate negative correlations with numerical preferences, and little or no relation to desire/intention. Age shows exactly the reverse pattern: little or no relation to predisposition, moderate positive relations with numerical preferences, and a high negative relation to desire/intention. Thus, basic predispositions are much influenced by one's education and degree of modernity, and change little with age. One's desire and intentions to have more children, on the other hand, are very much influenced by one's age, but very little (at least directly) by one's education or degree of modernity. Numerical preferences fall between: they are moderately affected by age, education, and modernity.

The partial correlation analysis shown in Table 12 next shows that

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*The higher the education, the less favorable to children or to large families.

Table 10

Mean Z Scores* (x 100) of Family Size Attitude Measures, by Education

	Predispositions			Numerical Preferences		Desire/ Intention
	ARNIMP	SEMEXH	LRGESMLL	FOTOPREF	COOMBS	HUWISCLE
Years of Schooling						
0-1 (primary)	180	58	72	41	20	-28
2-3	116	61	47	35	28	- 7
4-5	73	35	18	11	12	-13
6 (primary completed)	13	-11	-10	-25	- 7	37
7 (some secondary)	-123	-49	-47	-44	-28	22
11 (secondary completed)	-314	-115	-67	-16	-40	21
12+ (university)	-471	-137	-111	-19	-40	10

*Since each measure represents a sum of Z scores of differing numbers of items or scales, absolute values cannot be compared among measures.

Table 11

Zero Order Correlations Between Education, Modernity, and Family Size Preferences

		Age	Education	MODRNSUM
Predisposition				
ARNIMP:	Value of children, implications of another child	.02	-.43	-.47
SEMEXH:	Semantic differential small family; expectation of help from children	.10	-.41	-.42
LRGESMLL:	Definition of large and small family	.16	-.31	-.33
Numerical Preferences				
COOMBS:	Forced choice preferences: 0, 2, 4, 6	.25	-.22	-.19
FOTOPREF:	Forced choice, photographs of families	.22	-.11	-.12
Desire/Intention				
HUWISCLE:	Number additional children desired by husband and wife, plus intention to have another	-.43	.01	-.08

Table 12

Partial Correlations Between Family Size Preferences, Education and Modernity

	R With education, holding age and MODRNSUM constant	R With MODRNSUM, holding age and education constant
ARNIMP	-.19***	-.26***
SEMEXH	-.17***	-.21***
LRGESMLL	-.10***	-.18***
COOMBS	-.08***	-.07***
FOTOPREF	00	-.07***
HUWISCLE	.01	-.09***

when age and modernity are controlled, education's relations to the family size attitudes decline substantially, more than do those of modernity when education and age are controlled. Moreover, modernity, unlike education, shows a small but statistically significant negative relation to desire/intention. Thus, modernity, more than education itself, helps to determine the general predisposition toward children, though it is not a strong predictor of whether more children are actually wanted.

Desire for more children, however, is closely linked to the number of children a woman already has. If modern women have fewer, they would be more likely than traditional women to want more, other things being equal. When age and number of living children are held constant by partial correlation, the relation between MODRNSUM and HUWISCLE increases to -.13. Better to illustrate the impact of modernity, we divided the sample of non-sterilized women into roughly equal thirds on the MODRNSUM scale. These thirds may be termed traditional, transitional, and modern. Almost all women with only one child want or intend to have more children regardless of their level of modernity; but thereafter, the line for modern women declines more steeply than does the line for traditional women,* indicating their greater disinclination to have additional children (Figure 3).

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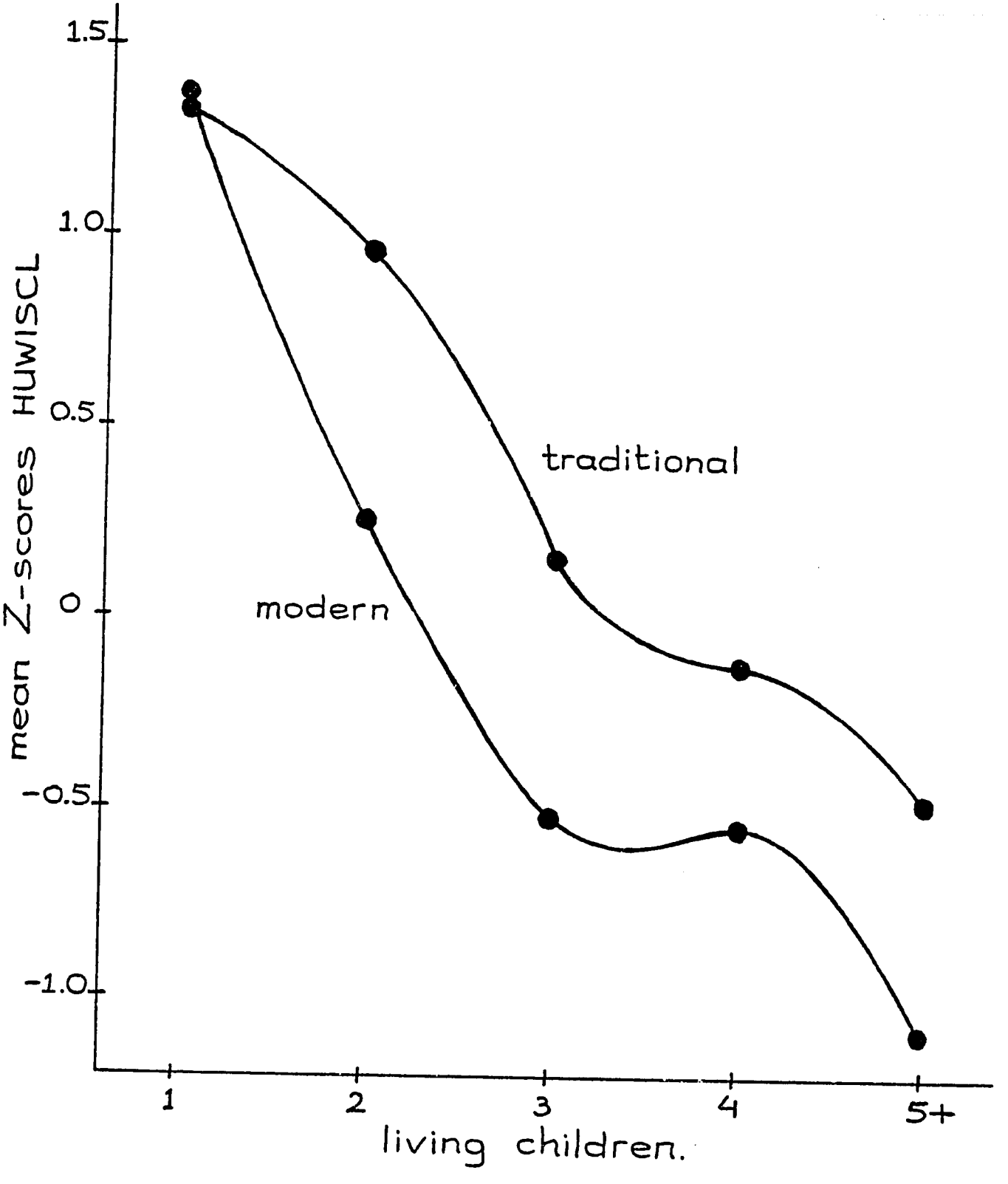
*Only the extreme thirds of the MODRNSUM scale are shown in the figure. Mean HUWISCLE values for the middle third fell between the two extremes at all parities after the first.

FIGURE 3. DESIRE/INTENTION FOR MORE CHILDREN, BY NUMBER OF LIVING CHILDREN AND MODERNITY



Despite this relation, it is fair to say that the closer we get to behavior (i.e., desire/intention), the more attenuated is the relation between the attitudes and education or modernity. The relation that remains, however, is essentially due to modernity rather than to education. To determine whether the modernity relation is "real" or the product of other socio-economic variables related to both modernity and family size preferences, we examined nine socio-economic characteristics.

Current work status	A three point scale: currently working for pay (1); in the labor force but not working (2); and not working (3).
Work history	A six point scale ranging from never worked (6) to currently working and worked prior to first marriage (1).
Current residence	Urban (1) or rural (2).
Wife's education	Single years of schooling
Husband's education*	Single years of schooling
Parent's education**	Single years of schooling for the better educated of the parents

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*Wife and husband's education correlate .67. A preliminary analysis demonstrated that wife's education alone better predicted a number of criterion variables (modernization, live births, value of children) than either husband's education or an average of the couple's education.

**Mother and father's education correlate .61. The means are 3.0 and 3.8, respectively. About 15 percent of the respondents were unable or unwilling to report the educational level of either parent. They averaged lower education themselves (4.5 years) than women who reported parental education (5.9 years).

Consumer Durables (DURGOOD)	An index summing a number of household possessions, weighted by the mean retail price of each article in 1975, as reported by the Costa Rican Office of Statistics and Census: refrigerator, electric iron, radio, clock, shower or bath, and flush toilet.
Siblings	The number of brothers and sisters reported by the respondent.
Religious Attendance	Frequency of attending religious services: never (1), sometimes (2), frequently (3).

A multiple regression analysis was carried out, in which the first three family size attitudes (predispositions) were regressed on the two modernity measures (MASSINFO and MODPSYCH), on age, and on the nine socio-economic variables. The following characteristics were then judged to be of little or no importance:* current work status, work history, current residence, parents' education, consumer durables, and religious attendance. Table 13 includes the three important socio-economic items: education of wife, education of husband, and number of wife's siblings. Even when these best socio-economic indicators are held constant, MASSINFO has a significant relation with two of the three predispositions and MODPSYCH has a significant relation with all three.** When MODPSYCH is broken down into its three components (not shown), it is

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*An item was considered to be important if its relation with at least one of the three predisposition variables was significant at the .05 level. Despite low correlations, age was included as a control.

**This conclusion also holds when all the other socio-economic variables are included in the regression.

Table 13

Multiple Regression: Three Family Size Predispositions
Standardized Regression Coefficients

	SEMEXH	ARNIMP	LRGESMLL
Age	.03	-.06**	.12***
Siblings	.01	.05*	.11***
Husband's education	-.14***	-.05	-.11***
Wife's education	-.13***	-.21***	-.05
MASSINFO	-.14***	-.02	-.13***
MODPSYCH	-.13***	-.30***	-.10***
R^2	.22	.27	.16
N	(1916)	(1538)[a]	(1924)

[a]Sterilized or over-age women were not asked about the implications of having another child. Consequently, N's for ARNIMP are smaller than for other items.

clear that almost all the variance is taken up by SEXROLES. INKELES and HUSBPOWR add nothing to the explained variance.

The model presented on page 16 depicted attitude toward family size as a single dimension. It is now evident from the data analysis that our subsequent conceptual division of this block into predispositions and numerical preferences was justified. Moreover, it seems reasonable to assume that the predispositions might affect the numerical preferences. Accordingly, in carrying out a multiple regression analysis of the two numerical preferences, we added the three predisposition items to the list of independent variables described above. When the numerical preferences (COOMBS and FOTOPREF) were regressed on the nine socio-economic variables, some of the same socio-economic variables dropped out (residence, employment, consumer durables, and parents' education), but so did MASSINFO, MODPSYCH,* and education. The remaining variables are presented in Table 14. Apart from age, only the three predispositions make a difference; though even less total variance is explained that was the case with the predispositions. In sum, neither modernity nor socio-economic variables are able to predict the numerical preferences. Explained variance is a matter of age and family size predispositions. On the other hand, certain socio-economic factors (primary education) and certain aspects of modernity (MASSINFO and SEXROLES) independently help to account for predispositions about family size.

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*MODPSYCH was also divided into its three components, none of which showed any relation to the numerical preferences.

Table 14

Multiple Regression: Two Numerical Family Size Preferences (non-sterilized women)

Standardized Regression Coefficients

	COOMBS	FOTOPREF
Age	.22***	.18***
Siblings	.08**	-.02
SEMEXH	.15***	.13***
ARNIMP	.10***	.02
LRGESMLL	.16***	.10***
R^2	.17	.08
N	(1545)	(1539)

MODERNITY, FERTILITY, AND ATTITUDES TOWARD FAMILY SIZE

Up until the last table, we have tended to assume that attitudes toward family size affect fertility, but have given little consideration to the likelihood that changes in fertility affect attitudes toward family size. For example, instead of the sequence modernity → family size attitudes → fertility, the sequence might be modernity → fertility → family size attitudes. Our next step, therefore, will be to examine the relation between modernity and family size attitudes, holding fertility constant. If the relation persists among women of similar age and parity, we can assume that modernity does not exert its effect on attitudes solely through the medium of fertility. With reference to predispositions, partial correlation coefficients between MODRNSUM and the three variables (LRGESMLL, ARNIMP, and SEMEXH) are still substantial when number of living children are controlled: between -.29 and -.38.* However, to be certain that the relation held for women at various points in the life cycle, the sample was divided into five groups according to age and number of living children. In each of these groups, the negative relation between modernity and the three predisposition variables was maintained even after age and education were held constant by partial correlation (Table 15). Moreover these correlations are considerably

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*Correlation with the other attitudes (COOMBS, FOTOPREF, and HUWISCLE) are also negative and significant at the .001 level, but small: between -.07 and -.13.

Table 15

Partial Correlations Between Family Size Attitudes, Modernity, and Education, for Five Age-Parity Categories

	Age				
	20-29		30-39		40+
Living Children	0-2	3+	0-2	3+	
1) r = between ARNIMP and:					
a) Education, controlling MODRNSUM and age	-.09	-.10	-.12	-.12*	-.13*
b) MODRNSUM, controlling education with age	-.21**	-.24**	-.26**	-.15*	-.16**
2) r = between SEMEXH and:					
a) Education, controlling MODRNSUM and age	-.17**	-.07	-.10	-.22**	-.16**
b) MODRNSUM, controlling education and age	-.24**	-.38**	-.30**	-.15**	-.15**
3) r = between LRGESMLL and:					
a) Education, controlling MODRNSUM and age	-.11*	.06	-.16*	.13**	-.09*
b) MODRNSUM, controlling education and age	-.19**	-.27**	-.18*	-.13*	-.18**

higher than those between education and the predisposition variables, holding MODRNSUM constant. For younger and low parity women, most of the partials for education are not statistically significant. To insure that variation in fertility within the crude parity categories of Table 15 was not responsible for the relationship, we computed another set of partials for non-sterilized women under age 35 and for those 35 and over. Holding education, and exact age and number of children constant, the correlations between MODRNSUM and the three predispositions ranged from -.18 to -.27 for the younger, and from -.10 to -.16 for the older women, all significant at the .01 level or less. Thus, modernity has a substantial direct effect on the family size predispositions irrespective of education, age, and number of children. Moreover, education loses most of its impact when modernity is controlled.

If modernity affects the predispositions independently of fertility, can the same be said for the impact of the predispositions on numerical preferences -- COOMBS and FOTOPREF? Table 16 adds living children to the multiple regression shown in Table 14. The addition of fertility increases the explained variance of FOTOPREF and COOMBS by only one or two percentage points, respectively; greatly reduces the impact of age; but scarcely affects the predisposition variables. With age, children, and siblings held constant, all three predisposition variables are positively related to the numerical preferences.*

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*When economic level (DURGOOD), frequency of attendance at religious services, and education were included as independent variables in Table 16, they added virtually nothing to the explained variance, but

Table 16

Multiple Regression: Numerical Preferences (COOMBS and FOTOPREF)
Non-Sterilized Women, Standardized Regression Coefficients

	COOMBS	FOTOPREF
Age	.08***	.10**
Siblings	-.06***	-.03
SEMEXH	.11***	.09***
LRGESMLL	.13***	.10***
ARNIMP	.11***	.03
Living Children	.21***	.13***
R^2	.19	.09

THE DEMAND FOR CHILDREN

The desire/intention for more children has been seen to be very different from the other five measures of family size predispositions and numerical preferences. Table 9 showed the lack of relation between the HUWISCLE and the attitudes other than ARNIMP; Table 10 showed its irregular and positive relation to education; and Tables 11 and 12 showed its strong relations to age and its negative, though weak, relations to modernity. In our model, will or the demand for children is the variable closest to contraceptive behavior and fertility. However, if the demand affects the supply, it is equally true that the supply affects demand. This interpretation is supported by the strong negative relation between HUWISCLE and number of births as opposed to the positive sign between births and all the other family size attitude measures. Age and number of living children together account for 11 percent of the variance in HUWISCLE for women under 35 and 7 percent for those 35 and over. For women with only one or two living children, age by itself accounts for 6 percent of the variance in the HUWISCLE; and for higher parity women from 8 to 15 percent. (At the lower parities, most women want more children regardless of age. At higher parities, the average shifts toward not wanting additional children but the variation around the mean is much greater.

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more frequent religious attendance was significantly related to larger family size preferences (Betas = .07 and .06 for COOMBS and FOTOPREF).

At every parity, older women have lower scores on the HUWISCLE; i.e., they are less likely to want additional children.)

If age reflects generation, we would expect a positive relation between age and the HUWISCLE. Since the opposite is true, it seems safe to conclude that there is a direct relation; i.e., older women are more likely to consider it inappropriate or unsafe to have more children because of their age.*

Though age and parity are critical, they should not be expected to be the only determinants of desire for more children. Accordingly, we carried out a multiple regression on the available structural variables that might be expected to affect the current desire for more children: woman's current employment status, rural or urban residence, household consumer durables (DURGOOD), educational levels of husband and wife, and the number of siblings of the wife. The six variables do not add much to explained variance after age and number of living children are controlled. (R^2 increases from .11 to .14 for women under 35, and from .07 to .09 for those over 34.) Similarly, multiple regression analyses performed separately for each number of living children (1, 2, 3, 4, 5+) show that after age is controlled, the six socio-economic variables add only 2 percent, 5 percent, 1.5 percent, 4 percent, and .06 percent, respectively, to the explained variance.

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*There is a positive relation between age and the numerical preference (Tables 11 and 16), showing that generation may affect the preferences in one way, while biological age affects the intention in another.

Moreover, in only two instances does any one of the six variables have a significant relation to the HUWISCLE in any of the five parity groups.*

Table 11 and Figure 2 showed that modernity had a small negative relation with the HUWISCLE and the model suggests that the latter should be affected by the other attitudes toward family size. Table 17 shows that neither education nor modernity maintain an independent relation to the HUWISCLE, but that the family size attitudes do have a positive relation. The three best items, COOMBS, LRGESMLL, and ARNIMP, add from 10 to 14 percent to the R^2's for the critical parities 2, 3, and 4, and 4 to 6 percent to the others.** In short, the influence of socio-economic variables and modernity on the desire for more children is almost entirely indirect, by way of the predispositions and numerical preferences regarding children.

FERTILITY

According to our model, the psychological variable that directly affects fertility is "will" or demand for children. In a cross sectional study this hypothesis cannot be tested, however, since our measure

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*The significant relations with HUWISCLE were for husband's education among women with one child, and urban residence for women with two (Beta = .16 and -.13).

**At the lowest parity most women want more children; at the highest, the elimination of the sterilized women may have a special group with less consistent attitudes.

Table 17

Multiple Regression: HUWISCLE, by Number of Living Children
Non-Sterilized Women

	1	2	3	4	5
Age	-.25***	-.23***	-.30***	-.26***	-.40***
Education	.02	.12	.08	.05	.07
MASSINFO	-.07	-.05	-.16*	-.00	.00
MODPSYCH	.10	.04	-.00	-.10	-.02
COOMBS	.20**	.23***	.30***	.19**	.06
LRGESMLL	.04	.10	-.07	.18*	.10*
ARNIMP	.04	.27***	.19**	.13	.22***
R^2	.11	.22	.27	.20	.21
Number of Cases	(235)	(351)	(241)	(161)	(554)

of demand (HUWISCLE) is as much affected by fertility as fertility is affected by it. A longitudinal study would be required to untangle the cause-effect sequences. Other measures such as income and employment may also affect and be affected by fertility. Less subject to this problem are modernity, the family size predispositions, and numerical preferences, which are more likely to have been formed prior to marriage. We will proceed to test their impact on fertility, although it would also be preferable to study the relationships by means of longitudinal design. We will first look at demographic, then socioeconomic, and finally psychological variables in relation to fertility.

Age and Marital Duration

After reviewing the demographic literature, Cochrane singled out age as the most important source of spurious correlations between education and fertility (1979: 32).* An equally important source is the

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*A recent "good" example is provided by a paper "Demographic Tendencies and Development" published by the Latin American Demographic Center. In this study CELADE presents sample survey data from the rural areas of seven Latin American countries and from urban and other areas of ten Latin American countries. Purporting to explicate the education-fertility relation, the data on rural areas are unadjusted for age or marital duration; urban and the other data are only crudely corrected for age. A table on rural surveys relates schooling levels ("None, primary, and secondary" in most cases without specification of whether the level was completed) with "average number of children." A second table represents different data for women "at the end of the reproductive period." The crudity of the data does not deter the authors from making far-reaching generalizations and policy implications (CELADE, 1979: 58-60).

number of years married. We can illustrate the importance of age and marital duration by first dividing the sample into six groups: five five-year age groups and one group of sterilized women (who are mostly over age 35). Many studies go no further in controlling exposure, but to do so here would be to ignore the largest source of variance present in the sample -- marital duration. A multiple regression carried out within each of these six groups showed that the major source of variance for number of live births was the number of years married.* The Betas ranged from .30 to .46, two to four times as high as the most important socio-economic variable, and accounted for one-fifth to one-third of the variance in live births.

Another illustration of the way in which marital duration causes spuriously high associations between education and fertility can be provided. Years of schooling have a correlation of -.32 with live births among women under 35, and -.40 for older women; but since educational levels have been rising in Costa Rica, marital duration is negatively correlated with education (-.28 and -.20 within the two age groups). The net result is that when marital duration is held constant, the education-fertility relationship declines from -.32 to -.16 among the younger women and from -.40 to -.31 among the older ones.**

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*The regression included age, several socio-economic characteristics, and family size preferences as independent variables within each five year age group.

**These are non-sterilized women. Among the sterilized, it drops from -.41 to -.31.

Obviously, it is crucial to hold duration constant, over and above or in place of age controls.

Since age at marriage is a principal determinant of marital duration, we will pause a moment to examine its correlates. Among married women under 30, age at first union is positively correlated with parents' education, husband's education, urban residence, consumer durables, wife's education, and a history of employment. The zero order correlations range from .20 and .30. For women aged 30 and over, only education of husband and wife have correlations larger than .15 with age at first union. When these items are entered as independent variables in a multiple regression analysis, only wife's education maintains a statistically significant relation among older women; and among the younger, husband and wife's education and history of employment.* In neither case is the R^2 high -- .14 for younger and .06 for older women.

The relation with modernity was also tested on the assumption that modern women might marry later. Despite initial correlations ranging between .11 and .20 for MASSINFO and MODPSYCH, when these were added to the socio-economic variables mentioned above, their Betas were insubstantial and not significant.

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*Controlling for employment and place of residence prior to adolescence, age at first union rises approximately three months for each additional year of education (Pebley, 1980: 104).

Fertility and the Socio-Economic Variables

We have seen (Table 6) that modernity accounts for much of the relation observed between education and fertility, but there are other potentially powerful socio-economic variables that need to be examined. Table 18 shows the relation between number of live births and nine such variables. All signs are in the expected direction; that is, women with fewer births have been in the labor force longer, tend to be currently employed, have more expensive consumer durables, are more likely to be urban, and have fewer siblings. Correlations are generally higher among the older and the sterilized women, most of whom have completed their reproductive period. The highest correlations are with husband's and wife's educational level and consumer durables. Among the older women, parent's education and urban residence also show substantial correlations.

When number of live births are regressed on all nine variables (Table 19), the latter add only 7 percent to the variance explained by marital duration among women under 35 years of age, but add 19 percent among older women and 13 percent for sterilized women. Of the socio-economic variables, consumer durables stands out in all groups. Once it is controlled, none of the other eight variables is very impressive and all of them together add only 2 to 3 percent to the explained variance. Other than consumer durables, the only variables that show

Table 18

Zero-Order Correlations Between Live Births and Selected Variables, by Age

	Non-Sterilized		Sterilized
	<35	≥35	
DEMOGRAPHIC VARIABLES			
Age	.42	.29	.34
Marriage duration	.62	.50	.44
Age at first union	-.26	-.38	-.32
SOCIO-ECONOMIC VARIABLES			
Education	-.32	-.40	-.41
Husband's education	-.30	-.37	-.31
Parents' education	-.18	-.28	-.25
Urban residence	-.19	-.34	-.31
Consumer durables	-.27	-.41	-.29
Work history	.12	.13	.17
Current employment status	-.16	-.15	-.20
Number of siblings	.17	.19	.05
Attendance, religious services	-.09	-.16	-.10
PSYCHOLOGICAL VARIABLES			
MASSINFO	-.30	-.39	-.32
MODPSYCH	-.28	-.24	-.35
ARNIMP	.08	.18	.00
SEMEXH	.25	.31	.31
LRGESMLL	.16	.30	.20
FOTOPREF	.21	.15	.21
COOMBS	.31	.26	.32

Table 19

Multiple Regression: Live Births by Age, Regressed on Socio-Economic Measures

Standardized Regression Coefficients

	Non-Sterilized		Sterilized
	<35	≥35	
Years since first union	.59***	.46***	.40***
Consumer durables	-.16***	-.26***	-.13
Education	-.03	-.06	-.17*
Siblings	.05	.08*	.00
Urban	-.03	-.06	-.03
Religious attendance	-.06*	-.06	-.08
Husband's education	-.04	-.05	.00
Work History	-.01	.03	-.04
Parent's education	.06	-.02	-.05
Current work status	-.06*	-.02	-.11
R^2	.45	.43	.33
N	(813)	(550)	(267)

a significant (.05 level) relation with fertility are employment status and attendance at religious services among the younger, number of siblings among the older, and education and employment status among the sterilized. The first three of these have Betas below .10. By and large, consumer durables is the only socio-economic variable that relates to fertility after marital duration and age are controlled, but the direction of the relation remains ambiguous.

Fertility, Modernity, and the Family Size Preference

We now return to the initial question of modernity and fertility. Can the relation we saw earlier be better explained by the socio-economic variables? Further, do the family size predispositions and numerical preferences, which appeared to affect desire/intention for children, also affect fertility? Table 18 showed that family size preferences are all positively related to the number of live births, and we saw earlier (Table 6) that MASSINFO was a better predictor of live births than was education. If the family size preference variables are added to the independent variables in Table 6, they contribute an additional 5 percent to the explained variance within each age group. COOMBS has the most substantial Beta and ARNIMP the weakest (and also changes sign). MASSINFO continues to have an independent negative relation significant at the .001 level; but the other components of modernity, the MODPSYCH scale, shows no relation. Since we saw from Table 19 that consumer durables is the only socio-economic measure that

is strongly and consistently related to fertility among the non-sterilized women, we now introduce it into the regression and also decompose marital duration into age and age at first union (Table 20).

The two demographic factors account for one-third of the variance among the younger and one-quarter of the variance among the older women. Among the younger, the three measures of modernity and family size preferences account for another 8 percent, and among the older, an additional 16 percent. All Betas in Table 20 are statistically significant with consumer durables held constant. This shows that modernity (at least the MASSINFO component), family size predisposition, and numerical family size preferences are all independently related to fertility even after the most important demographic and socio-economic indicators are held constant.

The powerful impact of age at first union is also seen, an impact as strong as that of age or years married (not shown) among the older women. The Betas for age at first union show little decline after the three modernity and psychological variables are introduced (7 percentage points among the young and 4 among the older), and not at all when consumer durables is introduced. With both age and number of years since first union held constant, it still shows a strong negative relation to fertility among women over 34 years of age, especially the sterilized. It may be that women who marry later are less fecund; or that those who marry later begin birth control sooner, practice it more effectively or become sterilized earlier. The latter hypothesis is

Table 20

Multiple Regression: Live Births by Age, Regressed on Key Demographic, Economic, and Psychological Measures (non-sterilized women)

Standardized Regression Coefficients.

	<35		≥35	
Age	.55	.56	.30	.32
Age at first union	-.40	-.39	-.37	-.36
MASSINFO	-.17	-.10[a]	-.30	-.15
SEMEXH	.10	.08[a]	.12	.10
COOMBS	.16	.15	.13	.12
DURGOOD	-	-.13	-	-.25
R^2	.55	.56	.45	.45
N	(859)		(675)	

[a]Significant at the .01 level. All others significant at the .001 level.

supported by Pebley's analysis of age at first birth, using the same Costa Rican data we have employed. By means of life-table techniques suggested by Trussell and Menken (1978), Pebley calculated cumulative birth probabilities at different periods of time since the first birth. Women who had their first birth at 20 years of age or younger would have 6.2 births fifteen years later; those who had their first birth at age 21 or older, only 4.8; twenty years after first birth the comparable figures are 6.9 and 5.2 (Pebley, 1980: 153). Pebley shows that the "relationship is not due solely to the influence of socio-economic status...women who are able to delay their first birth more frequently try and succeed at prolonging their second birth by using contraception" (ibid.: 180). Since age at first birth is almost synonymous with age at marriage (r = .94), it follows that age at first union seems to affect fertility not only through marital duration, but also through differential contraceptive practice.

Age also has an independent relation to fertility after age at first union, years since first marriage and the other social and psychological characteristics are held constant. This could be explained if older women started contraception later, practiced it less effectively, or were sterilized later than younger women.* These hypotheses are consistent with the pattern of fertility decline in Costa Rica, which has

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*Among sterilized women, age at first union and age are strongly related to number of births, but years married is not, once the other variables are held constant.

not only been recent, but contrary to patterns more typical of Asian countries, was initiated by younger women (Stycos, 1978a; 1978b).

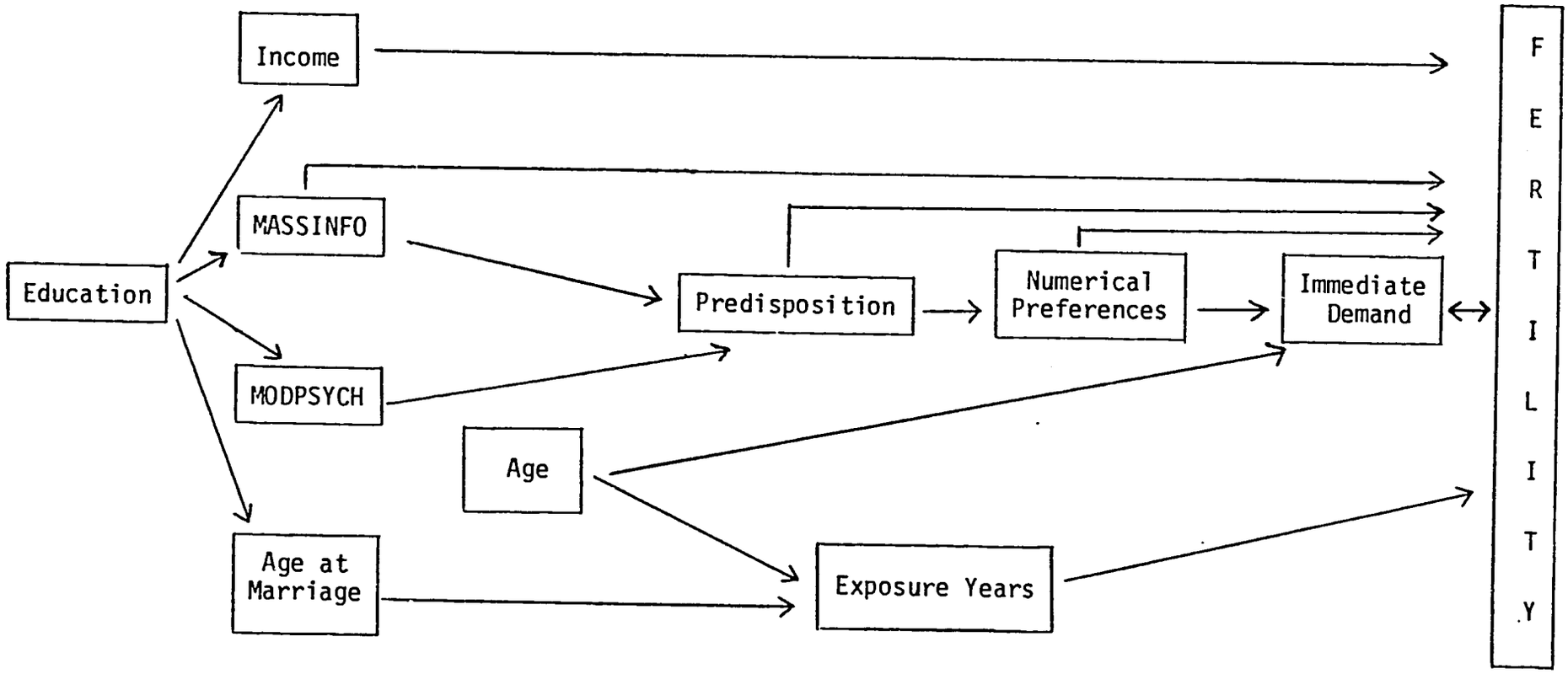
DISCUSSION

We began with a simple question -- how does education affect fertility? -- and set out to test a simple answer: that psychological modernity is the critical intervening variable. In the course of our analysis of Costa Rica survey data, we found that modernity is indeed important but that other variables also play important and complex roles. In short, the proposed answer was not all wrong but much too simple. Education affects several variables critical to fertility: age at marriage, acquisition of consumer durables, exposure to mass media, and attitudes about family relations. These, in turn, affect fertility or other sets of attitudes relevant to fertility behavior; namely, predispositions about children, numerical preferences, and the desire or intention to have a child. Throughout all of this, one cannot ignore the relentless beat of time, which can affect the critical variables and their interrelations through the processes of generational change, bio-social aging, and psychological reactions to life cycle stages. Figure 4 summarizes our findings, omitting variables such as contraceptive behavior and conjugal efficiency that we did not fully test.

Age

Despite our best efforts, we have been unsuccessful in keeping

FIGURE 4. A REVISED MODEL OF THE EDUCATION-FERTILITY RELATION



age in the background. It has been seen to be important in three ways. First, age reflects generational differences that are critical to our analysis. While literacy in Costa Rica has been unusually high since the latter part of the past century, a qualitative change occurred in the 1950's and 1960's: "Women who were beginning their families in the early and mid-1960's were finishing primary school in greater proportions than ever before" (Stycos, 1978a: 45). In our sample, older women are more poorly educated (r = -.22), a generational shift that affects all the variables influenced by education.*

Age also represents the passing of time, which exposes people to greater opportunities or risks. Thus, in societies where social mobility and capital accumulation are typical, age often brings increasing income. In the present instance, partly because of generational shifts in favor of the younger, it does not: the correlation between age and the measure of consumer durables is only .04. However, the passage of time allows greater opportunities for conception. Among women under 35, age is a more powerful predictor of fertility than any other demographic, social, or psychological characteristic. Even among older women, most of whom have completed their reproductive period, it is among the two strongest predictors of fertility, the other being age at first union.

Finally, aging has psychological consequences that result from life cycle dynamics (e.g., the timing and number of births), combined with

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*Modernity, however, is more weakly related to age than might be expected (r = -.02 with MASSINFO and -.10 with MODPSYCH).

norms about life cycle stages. Among those with the same number of children, older women are less likely to want more than the younger. Moreover, at each parity, the Betas measuring the relation between age and HUWISCLE (desire/intention for children) were higher than those between HUWISCLE and modernity, education, or attitudes toward family size. Thus, age has a strong and direct impact on the demand for children other than that mediated by our particular social and psychological measures. This may have to do with norms about the appropriateness of having children at different ages, or with concerns about health and personal appearance, or with other age-related criteria.*

Age at Marriage

Marriage patterns, although they do not account for the recent decline in national fertility, explain a good deal of the regional variations in contemporary fertility. In a multiple regression analysis of the General Fertility Rates of the 68 cantons in 1968 (at the start of the national fertility program) and again in 1974, the proportion of women single was found to be more predictive of fertility than literacy, percent employed in agriculture or

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*Since drawing these conclusions, I have discovered a similar frame of reference supported by American data. Rindfuss and Bumpass found age to be related to intended fertility independently of parity, education, and several other variables. They also found the relation between age at marriage and fertility to be in part attributable to age effects. "The older the woman, the more likely she is to be involved in non-familial activities; the older the woman, the more likely that her age contemporaries have completed their childbearing; and the older the woman, the less support and urging she will receive from significant others to have children" (1978: 51-52).

income per person; and comparable in predictive power to use of family planning clinics and proportions in common-law unions (Stycos, 1978a: 86). In the present sample we have seen that age at marriage is a powerful predictor of the fertility of both younger and older women (i.e., it affects not only timing, but total number of births), even after age and years of marriage are controlled. Of the possible determinants of age at marriage that we tested (urban residence, parents' education, employment history, consumer durables, and education), education was the most important variable when others were held constant, though the total variance explained was small.* Neither of the modernity measures is related to age at marriage if education is held constant.

Modernity

We applied the best items we could find to measure the rather controversial concept of psychological modernity. With the help of a factor analysis, we divided the items into scales tapping several dimensions of modernity: MASSINFO, exposure to newspapers and TV plus knowledge about places and people beyond one's community; SEXROLES, attitudes about the segmentation of male and female roles; HUSBPOWR, dominance of the husband in decision-making; and INKELES, a slightly

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*Among women under 30, place of residence when young and husband's education is also related to age at marriage, but not among women aged 30 and over.

modified short form of Inkeles' modernity scale.

Although we sometimes used the total of these scales as an overall measure of modernity, it seemed prudent to separate the more cognitive and behavioral scale (MASSINFO) from the others. This proved to be a useful distinction, since it was shown that although both clusters affect the predispositions about children, only MASSINFO has direct effects on fertility. What does a direct connection mean? "Very little empirical work has been done on the effect of...exposure to the mass media on fertility behavior or attitudes," Deborah Freedman has noted; but demonstrates by means of multivariate analysis that "exposure to mass media in Taiwan (is) consistently associated with low fertility behavior, both directly and through intervening variables" (1976: 361, 370). Freedman found a strong relation between contraceptive practice and exposure to mass media, holding income and education of husband and wife constant. Since the measure we are using includes important cognitive aspects* (knowledge of people and places beyond the community), it seems plausible that knowledge of contraceptive supply sources, contraceptive techniques, and sophistication about the use of contraception would be enhanced by media exposure and a more cosmopolitan outlook, but these hypotheses cannot properly be tested in the present study.**

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*If the MASSINFO scale is divided into its two components, mass media exposure and information ($r = .54$), the former is more important than the latter in explaining fertility, though the combination works best.

**In our only measure of early contraceptive knowledge, modernity showed no influence after education was controlled. See page 34 footnote.

Although MASSINFO was also related to predispositions about children, the more psychological aspects of modernity had even stronger relationships with the predispositions. In large part, this is attributable to the SEXROLES component rather than to the INKELES or HUSBPOWR scales, partially supporting Goldberg's contention that "we can most efficiently capture the central themes of modernism which are relevant for fertility by focussing on the family" (1976: 393).

Education is strongly related to all components of modernity and emerges from a multivariate analysis as a more powerful predictor than residence, employment status, parents' education, husband's education, or number of siblings.*

Consumer Durables

Our index of consumer durables is strongly related to education (r = .51), and it is reasonable to assume that the former depends on the latter more than the other way around. When, through multiple classification analysis (MCA), the DURGOOD mean is adjusted for urban-rural residence and husband's education, the Eta drops from

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*Education's Betas are much higher than those of all other variables except the consumer durables measure, which has about the same weight as education in predicting MASSINFO and a substantial weight in predicting the other modernity variables. While it seems more likely, e.g., that MASSINFO affects consumer durables than vice versa, the direction is by no means clear.

.53 to .29 but the pattern of deviations from the grand mean becomes more regular.*

We have seen that the consumer durables variable has a direct relation to fertility, independent of the important psychological and demographic characteristics. Since consumer durables is scarcely related to the predispositions, numerical preferences or demand for children, we suspect that a mechanism complementary to that suggested for MASSINFO applies here. More affluent women have easier access to the most efficient technology. Higher income facilitates transportation to family planning centers, access to private physicians and commercial sources of supply. We would expect less problems about method perseverance, regularity of use, and ability to substitute methods after unsuccessful experience with a given method. We cannot test this expectation at this time.

Attitudes Toward Family Size

The strongest attitudinal correlate of fertility is the cluster of variables we designated the HUWISCLE, composed of the number of

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*It is possible too that modernity is a link between education and the consumer durables. When we add MODRNSUM to the MCA analysis just referred to, the Eta drops from .29 to .14, and there are no differences in average consumer durables once primary school is completed. Since the directionality of the modernity-consumer durables relation is uncertain, however, we have treated it separately.

additional children wanted by the wife and by the husband; the intention of having a child in the next two years; and the degree of certainty about that intention. Since the correlation is strongly negative (-.37), it seems clear that the behavior (births) is producing the attitude rather than vice versa. While past fertility has shaped the current desire for children, we assume, but cannot here test, that current desire for children will affect future fertility. While age and fertility dominate the variance in HUWISCLE, our interest was in whether any other socio-economic or psychological characteristics were of assistance in explaining it. We found this to be true for several attitude clusters: preferred family size, measured by the Coombs abridged IN scale; and, less clearly, the concept of family largeness or smallness and the value of children (ARNIMP). When these are controlled, none of the socio-economic or modernity variables were related to the desire/intention for children.

CONCLUSIONS AND POLICY IMPLICATIONS

We carried out a large and complex study both to trace the missing links between education and fertility, and to give a fair test to the hypothesis that psychological modernity is one of the critical links. We found that education in fact had virtually no relation to the desire for more children; and that its strong negative relation to fertility can be explained as due to its relation to age at marriage, economic level (consumer durables), and certain aspects of modernity. We further found that modernity is not "merely a measure of social class values" (Armer and Isaac, 1978: 331); nor does it fail to be "an efficient indicator of status effects on behavior," (Portes, 1976: 264). However, Schnaiberg's (1971) admonition that we concentrate on the "disparate aspects" of modernity is well taken: neither the Inkeles and Smith measure of modernity nor the measure of husband dominance was of any use in this analysis.* On the other hand, both SEXROLES and MASSINFO played important but different functions in explaining fertility behavior and attitudes.

The implications for population policies or programs are encouraging, for they suggest short-cuts to the education-fertility relationship. According to a regression equation derived from a 20 percent sample of women over 35 covered in the 1973 census, five to six years of schooling are required to effect a reduction of one live birth, holding residence and labor force status constant. If we rule out older age at marriage

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*The Inkeles measure had special problems in the field, many interviewers complaining that respondents could not understand the question. See Appendix A.

and higher income as being no easier to achieve by program efforts than education, would it be more cost effective to attack the other intermediate variables directly?

Had the study fully confirmed the modernity hypothesis, our answer would have been negative, for there are probably no easy ways to create the "modern personality" described by Inkeles and Smith (see page 3), and there is growing evidence that schooling itself may be crucial in its development. The same invulnerability to direct programs probably applies to conjugal power distribution and decision-making, which could require changes in patterns deeply rooted in culture and personality. Fortunately, these were the aspects of modernity that were not found to be especially relevant; those that were, may be more vulnerable to program intervention. The most obvious program target is the numerical preference for children, which may influence the desire for more children as well as the actual number of births. Many family planning programs do attempt directly to affect this variable, on the plausible but untested assumption that it affects fertility. Our research, though it cannot fully confirm the hypothesis, certainly adds to the growing evidence in its favor.

The attitude cluster we identified as family size predispositions might also be affected by programs directed at the value of children and at reduction of the conceptual range between large and small families. However, an even more direct attack would be to work on the cluster of attitudes here termed HUWISCLE -- the intensity of the couple's

desire and intentions to have another child. In this connection, the study points up the need for greater research attention to the psychological links between age, parity, and desire for more children; but in the meantime, family planners might experiment with programs that target different age groups and explicitly utilize age themes in family planning communications.

Finally, there is the possibility of programs that, independently or in conjunction with formal schooling, would increase or accelerate the acquisition of those aspects of modernity seen to be most relevant for fertility attitudes and behavior: MASSINFO and SEXROLES. The latter affects fertility only by affecting family size predispositions and may not be much easier to change than distribution of power between spouses; nevertheless, its consonance with women's liberation and other current movements for reconceptualizing male-female roles make it a reasonably practical program ingredient.

However, the study suggests that the greatest impact on fertility from changes in modernity could result from increased exposure to mass media and greater sophistication about the world beyond the community. This complex affects fertility both through family size preferences and more "directly." Mass communications exposure has often been considered to be the most critical ingredient of modernization. Increasing it, even without increasing family planning communications, might have salutary effects on fertility. This would be especially useful in countries where more direct communications programs are not feasible.

Such conclusions must be tempered by reminding ourselves that the study was a cross-sectional one conducted in Costa Rica at a particular moment in time. It would be erroneous to generalize to societies that are less developed or at earlier stages of the demographic transition. Further, correlation does not establish causation. For all our controls, troubling problems of directionality remain that can best be answered by longitudinal studies and experimentally controlled programs. Finally, some of our critical measures showed disturbing evidence of low reliability. Nevertheless, the research results were positive enough to justify more focussed investigation on the one hand, and more experimental approaches by social programmers on the other.

Appendix A

INTERVIEWS AND INTERVIEWERS

Of the 603 women who were not reinterviewed, only 41 explicitly refused and another 17 terminated the interview prematurely. However, some of the 123 cases that could not be found at home despite repeated call-backs might have been (successfully) trying to avoid reinterview. Women who had moved away and could not be relocated represented the largest category -- 287 or 47 percent of those not reinterviewed. Other reasons included 69 cases where the correct household was identified but no woman fitting the description was known to its members, and a total of 66 assorted reasons including death, sickness, and erroneous first interview.

While the original national fertility survey of 1976 closely matched the 1973 census findings for age, marital status, and place of residence for women aged 20-49, it apparently overrepresented better educated women. Whereas the census reported that only 43 percent had completed primary school, the survey reported 54 percent. The bias is especially marked for women with eleven or more years of education (12 percent in 1973, 18 percent in 1976). We doubt that a difference of this magnitude can be attributed to "a significant increase in the educational level of women" (Dirección General de Estadística y Censos, 1978: 32), as noted by the authors of the survey report;* but in any

*A 1978 survey of contraceptive prevalence found that 58 percent of the women aged 20-49 had completed primary. Comparing their figure with

case, the proportion completing primary in our own sub-sample is closer to the census figure: 49 percent.

Comparing the characteristics of eligible women who failed to be reinterviewed with those of women who were in fact reinterviewed, we see from Table 21 that the former were two years younger, but in terms of education, number of births and residence, the two groups were virtually identical.

Most of the 21 women selected for training as interviewers and supervisors were single, between 18 and 22 years of age, and had some university schooling. They received two weeks of training from the staff of IDESPO and the Statistical Office with emphasis on map reading, use of the questionnaire, and group dynamics in order to foster espirit de corps.

Trainees participated in the selection of their three supervisors, each of whom worked with a small team of interviewers, under the general direction of a field director. Field work was initiated in November 1977 and terminated in March 1978. The average interview was completed in 45 minutes, and, judging from interviewer evaluation, presented no special problems of rapport: In 46 percent of the interviews respondent cooperation was rated as "very good," in 46 percent as "good," and in 6 percent as "fair" or "poor."

However, a number of the psychological-type questions caused irritation or confusion among some respondents. The following comments

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that of the National Fertility Survey, the authors state flatly that "this change reflects improvements in educational level" (Asociación Demográfica Costarricense et al., 1978: 21).

Table 21

Selected Characteristics of Reinterviewed and Non-reinterviewed Women, According to Data from First Interview

	Reinterviewed	Not Reinterviewed
Mean Age	34.7	32.8
Mean Years Schooling	5.7	5.8
Mean Live Births	4.5	4.2
Percent Urban	50	52

refer to items drawn from the Inkeles and Smith OM Scale, and are extracted from the Project Director's final report (Acuña, 1978).

Traditional and modern fathers.	Required great care. Had to be read several times; difficult for respondent to retain the ideas. A substantial part answered just to answer something.
Value of science.	Question and the two examples not understood. The term "beneficioso" not understood.
Empathy with foreigner.	Question not understood. They think of language differences and therefore believe they would not understand foreigner's "way of thought." Many responses were, therefore, forced.
Information items.	When they were unable to answer the knowledge questions, it caused a difficult situation that interfered with the rest of the interview.

The Inkeles items have undergone as much cross-national pretesting and evaluation as any set of social psychological items; and were tried out in Costa Rica both in the test survey and the pretest to the final survey. Unfortunately, in neither case were tape recordings successfully utilized, and, as we have noted, more poorly educated subjects may have been underrepresented in the test survey. Whatever the cause, the fact that such extensive testing procedures failed to filter out major deficiencies in items in a society at the upper bound

of modernism for developing countries suggests that much more attention need be given to question wording in surveys of this kind.

Although specific complaints about the Inkeles items were more frequent, no section of the questionnaire was free of problems. The sex role questions "tired the respondents...one suspected a tendency to 'agree' just in order to respond"; and cards used to expedite comprehension and response "did not work well, basically in rural areas." Even terms as commonly used as "education,"* "method," "religious services," and "united" (unido, i.e., consensually married) sometimes caused confusion. Such deficiencies will lower the reliability of items and scales, and will have to be taken into account in interpreting our findings.

SOME BETWEEN-SURVEYS COMPARISONS

Lack of correspondence between responses to identical questions in the two surveys can be attributed to unreliability, to error in correctly identifying the same respondent for the second interview, or to interviewer cheating on either survey. As judged by more objective type questions, none of these possibilities constituted a major problem. Thus, when asked for their date of birth, 94 percent of the women in the second survey reported a date of birth within 23 months of the date reported on

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*"Education" was sometimes understood to mean moral formation or upbringing rather than formal schooling.

the earlier survey. This compares favorably, e.g., with the figure of 85 percent reported for the Figi World Fertility Survey, where a repeat interview was administered much sooner after the first than was ours (Potter, 1977). However, in the second Costa Rican survey age and education were used by the interviewer as checks on the identity of the respondent; i.e., interviewers were supplied with the respondent's education and age (as reported in the initial survey) in advance, in order to insure that the same person was being reinterviewed. On the other hand, they were not given her precise birth date. In 76 percent of the cases, the same year and month were reported in the two surveys, compared with only 43 percent in Fiji. In 83 percent of the cases, the dates were no more than two months apart.

Another measure concerning which the interviewer had no advance information was number of children. However, this question is complicated by the possibility of additional births in the year and one-half between surveys. Among the women who reported no pregnancy between surveys, 90 percent reported the same number of live births in both, and an additional 7 percent reported one child more or one child less. Of the 317 women who did report a pregnancy between interviews, 87 percent reported one child more in the second than in the first survey, and 6 percent reported two more (multiple births are, of course, a possibility). Moreover, of 154 women who reported they were pregnant in the first interview, 88 percent reported in the second that they had had a recent (i.e., between surveys) birth. Finally, 92 percent reported the

same number of child deaths in both surveys.* As a kind of summary, there is a correlation of .98 between number of living children in the two surveys (adding one child for those pregnant in the first interview). This degree of relation is all the more remarkable when we consider that fertility data in the first survey were the product of a highly detailed fertility history with many cross-checks, while the second survey relied on simple summary questions without data on individual births. In short, it is safe to assume that we are dealing with the same women in nearly all cases, and that reliability of response on age and fertility is satisfactory.

As we move to factual questions of more complexity and delicacy, we would expect reliability to decline, and we are not to be disappointed. For example, in the first survey, only 300 said they had never used a method; and on the second survey, when one would expect more use reported because of the passage of time, 368 said they had never used a method. One hundred and fifty six or 9 percent of the women who claimed they had used a contraceptive in the first survey said they had never used one in the second. Of these 156 women, 23 initially reported that they were sterilized. Indeed, there are a total of 44 women who reported sterilization (male or female) in the first interview who failed to do so in the

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*These data were prepared by Anne Pebley and are reported more fully in her doctoral dissertation (1980). She further analyzes the reporting of births and deaths in the survey and concurs with an independent evaulation by the Costa Rican Dirección General de Estadística y Censos (1978) that "...the information on birth histories gathered in the survey, while it may contain some errors, does not reveal major omission, nor is it greatly affected by misplacement of births in time."

second.

As with fertility, the second interview relied on a single question to ascertain contraceptive practice. Rather than ask whether or not each of a list of specific contraceptives had ever been used, women were asked, "Have you or your husband ever used a method to keep from getting pregnant?" Only an affirmative reply was followed by a question asking which method had been used. It could be that some women do not think of sterilization as "using a method." It could also be that some women, recalling the first interview, tried to avoid detailed questioning on their contraceptive practices by simple denial. Whatever the reason, it is clear that the detailed questioning characteristic of the World Fertility Survey module on contraception does elicit more admissions of practice than a simple open-ended item.

We now move to the third area of comparable data -- attitudes, where two questions may be compared: (1) "If you could choose exactly the number of children that you want to have in all your life, how many would you have?" and (2) "Do you want to have a child in the future?" The first question was identical in the two surveys and was asked of all women. The second, asked of all women in the second survey, was not asked of sterilized women in the first.*

Comparing survey totals on the desire for more children shows perfect

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*In the first survey this question was asked slightly differently for pregnant and childless women, and for fertile non-pregnant women the wording was, "Do you want to have another child some time?"

correspondence on the proportion who say they want no more children (46 percent). When responses are cross-tabulated, however, the apparent correspondence vanishes: of those who said they wanted more on the first survey, one out of every five said they wanted no more on the second, a not implausible shift given increased and and parity. However, of those who said they wanted no more at the time of the first interview, no less than one-third (301 women) said they wanted more a year and one half later.

The implausibility of this finding suggested the need to check several hypotheses. Gross error in the copying, processing or tabulation of the tapes was ruled out after various checks of the data tapes. Further, interviewer bias seemed unlikely since the problem cases did not disproportionately represent any particular interviewers. However, an examination of the characteristics of the 301 women showed them to be different in several ways.

1) High fertility. Half had five or more children; about the same proportion as women who said in both interviews that they wanted no more children.

2) Large family size preferences. When asked what number of children they would choose if they were about to marry (see p. 37), half chose five or more. Only a third of the women who wanted no more in both interviews and one-quarter of the others preferred so high a number.

3) Positive birth preferences. Half these women say they intend to have another child in the next two years. Only one percent of the

other women who say they want no more intend to have a child in the next two years.

Thus, they are high fertility women with especially high fertility ideals, many of whom plan to have another child. The latter datum in particular distinguishes them from women who said they wanted no more children in both interviews, and casts doubt on the reliability of the negative responses in the first interview.

What about the women who do not intend to have a child in the next two years? In this connection, the most anomalous difference of all has still to be reported: over one-third of the 301 women are sterilized, a higher proportion even than among women who said they want no more in both interviews. We next discovered that in the first interview sterilized women were not asked whether they wanted more children, but they were assumed not to and were so coded. By not making this assumption on the second interview, we found 112 sterilized women who said they wanted more children. We returned to Costa Rica, read each of these interviews, and concluded the following.

1) The responses are not due to recording or punching errors. Not only was a yes or no recorded to the question, "Do you want to have a child in the future?", but a digit had to be written out by the interviewer in response to the question, "How many more?" Indeed, half of these women wanted two or more additional children.

2) Part of the explanation may involve the husbands. In one-third of the cases, the women reported that their husbands wanted no

more children.

3) A large number of these sterilized women are generally opposed to sterilization. In response to the question, "Some women have an operation called sterilization to keep from getting pregnant. Are you very much in favor, in favor, opposed, or very opposed to this type of operation?", just under one-half were opposed or very opposed.

Why then are they sterilized? The answer is provided by comments written in by the interviewers. In 70 out of 112 cases they report that the operation was performed for health reasons rather than as a contraceptive method per se. Unfortunately, there was little probing, but a few examples give the flavor of the responses: "She had an ovarian cyst," "Complications were feared if she had another," "She had four caesareans," "She was sick." In short, the weight of the evidence is that most of these women wanted more children at the time of their sterilization and still do. The sterilization in most cases was regarded as a necessary evil, performed for therapeutic reasons.

What we have learned from this analysis is that one cannot impute attitude from behavior (i.e., many sterilized women in fact want more children); that the attitude itself may be relatively unstable; and that at the very least, the usual procedure of asking a single question to measure desire or intention about more children is likely to be of little reliability. Finally, if the first survey was defective in the reporting and interpreting attitudes, the second was defective with respect to certain questions of behavior, such as use of contraception.

Appendix B

ITEM SELECTION AND SCALE CREATION

Our objectives were to screen, largely empirically but partly judgmentally, the many potential psychosocial variables that might intervene between educational status and fertility; and to incorporate the best of them in an adequate national sample with valid and detailed dependent variables. Given the number and complexity of the variables, it was clear that a single interview would not suffice, but multiple interviews with a large national sample were not feasible from a financial point of view. Consequently, we decided first to pare down the psychosocial measures by trying them out on a small sample similar in characteristics to the national sample ultimately sought. We further decided to take advantage of the detailed dependent variable data (birth control and fertility) collected in the National Fertility Survey of Costa Rica in 1976. By reinterviewing these women and joining the two tapes, we could obtain approximately two hours of demographic and social-psychological data.

THE TEST SURVEY*

With the assistance of a consultant, Dr. Odile Seeley, a literature

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*A further explanation of this phase of the project is contained in Seeley and Stycos (1978). We will use the term "Test Survey" when referring to the sample of 206 women interviewed in 1976, and the "Final Sample" or "Final Survey" to refer to the national sample of over 2000 women re-interviewed in 1977-78.

review revealed such a broad range of potentially useful measures that several criteria were developed to reduce their number. A psychological or attitudinal construct was only included if an instrument had been developed for its measurement; there was empirical evidence of its relationship to modernization and/or fertility behavior; it was feasible to administer in the Costa Rican setting; it had been applied in a developing society; and the analysis included reliability, validity, and normative or standardization data. The measures were classified in four categories: Individual Modernity, Attitudes about Family Size, Interpersonal Relations, and Cognitive Style. Given the number of relevant variables and our financial constraints (a small exploratory grant from AID), we decided to split the questionnaire. About 100 women would receive questions covering two of the four categories, and a second 100 would receive questions covering the other two categories. All 200 would receive a further set of items relating to fertility, birth control, and socio-economic background.

The questionnaire was actually administered in 1976 to 206 currently mated women who had been pregnant at least once. About half the sample was chosen from and interviewed in general clinics of the relatively rural province of Guanacaste and half from clinics in metropolitan San Jose. Both Ministry of Health dispensaries (Unidades Sanitarias, or Sanitary Units) and Social Security clinics were sampled. Since women at the upper and lower ends of the socio-economic scale probably attend public clinics less frequently than the bulk of the population, the sample was inadequate at the economic extremes. However,

there was enough variation on critical variables to serve our purposes.

Our analysis of the test survey consisted of three stages: 1) A factor analysis was performed on the psychological variables contained in each of the two sets of interviews. Scales were utilized rather than individual items, and six factors were identified for each set. 2) Women were given factor scores for each factor, and these scores were then correlated with number of live births and family planning status.* 3) The scales for each factor whose discriminating power on either of the dependent variables approached significance were chosen for further analysis, and those items with the highest item to scale correlations were selected. Thus, the "best items" from the "best factors" were selected for inclusion in the larger survey.

In the following sections we discuss the process of selecting test survey items, the various blocks of items included in the test survey, the manner in which items were selected for use in the final survey, and the distribution of these items in the final survey. In the test survey, about 100 interviews were devoted to items dealing with modernity and interpersonal relations, and another 100 with cognitive style and attitudes toward family size.

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*Women were assigned a "1" if they had never used contraception and values ranging from 2-5 depending on the number of other criteria they met: starting contraception prior to third pregnancy, last pregnancy planned, currently using a method, and currently attending a clinic.

MODERNITY

The test survey included the following scales or sets of items designed to measure modernity:

Gough (1976) - An eight item scale derived in part from Doob (1967).

Clifford (1971) - A Modernism-Traditionalism scale developed from studies of Value Orientation by Kahl (1968) and Kluchhohn and Strodbeck (1961). Four sub-scales measuring orientation toward nature, time, relations, and activity were employed.

Inkeles and Smith (1974)

OM-12. Ten attitudinal and four behavioral and informational items representing a distillate of their larger scales.

A group of fourteen items with the highest item-to-scale correlations in at least three of the six countries studied.*

Items drawn by Williamson (1970) from Inkeles and Smith's themes of Subjective Efficacy and Planning Valuation.

In addition, a number of items were included from Kahl (1968) and

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*Inkeles and Smith reported fifteen attitude items from the OM3 scale that had the highest item-to-scale correlations in at least four of the six countries (1974: 111). Of these, we dropped four that were neither part of the OM-12 scale nor had a history of use in fertility research. However, we added several items from those with the higest item-to-scale correlations in only three out of six countries because these items had previously been used in fertility studies (Williamson, 1970; Miller and Inkeles, 1974).

Goldberg (1974) pertaining to information about national or international matters, since information is often considered as a critical aspect of modernity.

As might be expected, the three Inkeles scales were highly intercorrelated. In a factor analysis of the modernism scales along with eleven other scales of husband-wife communication, dominance, and egalitarianism, the first factor, accounting for 28 percent of the variance, was clearly modernism, and the scale with the highest loading (.92) was the Inkeles and Smith "15 best items" scale. The Clifford scale had a loading of .46, information .29, and Gough .09. Since scores from this first factor were significantly related to number of live births ($r = .23$, $p = .01$) and approached significance ($p = .08$) in an analysis of variance of family planning status, it was selected for inclusion in the final questionnaire, represented by the 15 item Inkeles scale.* Somewhat abridged item translations from the Spanish are given in Table 22 along with the distribution of responses in the Final Survey. In some cases minor changes in the original question wordings were introduced in order to adapt them to local circumstances.

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*One item concerning attitude toward birth control was omitted from the final interview since this was a major dependent variable.

Table 22

Inkeles and Smith Modernism Items, Final Sample

		Percent
1) Accident prevention depends on	Luck	23
	More care than luck	34
	Completely on care	44
2) One's position in life depends	On destiny	15
	Partially on personal efforts	26
	Totally on personal efforts	59
3)* Costa Rica's future depends mainly on	The people's hard work	21
	Good gov't planning	28
	God or good luck	51
4)* Which would you choose second?	People's hard work	23
	Good gov't planning	33
	God or good luck	43
5) Do you tend to	Plan ahead completely	45
	Plan some things ahead	33
	Let things come	22
6) A man both prayed and consulted a doctor for his wife's recovery. Which was more important?	Prayer	27
	Doctor	21
	Both	52
7) Do you prefer an occupation involving	Many decisions	19
	Some decisions	54
	No decisions	27
8) What could you do about an unjust law being debated?	Nothing	37
	Individual action	32
	Collective action	30

*Items 3 and 4 were averaged; as were items 11 and 12, on the assumption that not to do so would overweight the concept represented by each set. Question wording has been somewhat abbreviated here for purposes of presentation; and some of the items with four response categories have here been reduced to three.

Table 22 (cont'd)

			Percent
9)	Have you ever really wanted to do something about a public problem?	Never	56
		Sometimes	29
		Frequently	15
10)	Could you understand a person's way of thinking who lived thousands of miles from Costa Rica?	Yes	33
		No	67
11)*	Which type of news would interest you most.	Local or religious	39
		National	33
		World	28
12)*	Which is your second interest?	Local or religious	44
		National	33
		World	22
13)	Do you think scientific studies (exemplified) are	All good	55
		More or less good	38
		Not good	8
14)	One father counseled his sons to follow traditional ways, another encouraged them to seek new ways of cultivating rice. Which father was wiser?	Traditional	35
		Modern	65

It should be noted that these items are strongly oriented toward the syndrome identified by Inkeles and Smith as "instrumental activism," and that they exclude both information questions and questions reflecting behavior (such as exposure to mass media). Although Inkeles and Smith eliminated information items from their first two scales (OM-1 and OM-2), their addition (along with eight behavioral measures) to a third OM scale caused reliability measures to "jump markedly in all six countries" (93). Moreover, among loadings of nineteen modernization themes on their first factor of a principal-components factor analysis, the information scale showed the highest loading in every country, usually by a good margin (108); and half of the twelve questions with highest item-to-scale correlations in all six countries were information items (111). On the other hand, Inkeles and Smith show that when measures of information and verbal fluency were excluded from the factor analysis, "Some price was certainly paid (but)...the remaining subscales yielded virtually the identical factor structure as before, still unmistakably identifiable as the modern man we had delineated by other methods" (108).

The Test Survey included ten information items from Inkeles and Smith (1974), five from Goldberg (1974), and two from Kahl (1968). The three items with highest item-to-scale scores refer to whether the respondent could correctly identify a Costa Rican city on the border of Panama; the U.S. President; and the Costa Rican Minister of Sports and Culture. Thirty percent, 52 percent, and 42 percent, respectively, gave

correct responses in the final survey. The total score of these items (0 to 3 correct responses) is highly correlated with the sum of the Inkeles items (r = .47).

A related problem refers to mass media exposure, considered critical to modernization by many authorities. As "information," it is also linked in complex and poorly understood ways with economic status, residence, education, and modernization; but it has the additional conceptual disadvantage of being a behavioral measure. In the final survey, 73 percent of the women reported that they listened daily to the radio, 55 percent saw TV daily, and 33 percent read the news every day in a newspaper.

INTERPERSONAL RELATIONS

Since the quality of relations between the sexes has been regarded as a crucial aspect of modernism, we developed measures of sex roles, husband power, and communication.

Sex Roles

A good deal of literature has stressed the importance of more egalitarian and less segregated sex roles as a factor in encouraging fertility decline. Where women are viewed as inferior and subservient to men, and where a double standard of sexual activity highly restricts the female, her roles as child producer and child keeper may be enhanced

and her ability to choose other options restricted. In this connection, the Test Survey included six items from Rosen and Simmons' Female Role Attitude Scale (1971) and four from Goldberg's Sex Segregation Scale (1974). In the factor analysis a fifth factor, accounting for 17 percent of the explained variance, showed loadings of .74 and .87 for these scales, the next highest loading being .50 for information. This factor was not significantly related to fertility, but approached significance ($p = .07$) in the analysis of variance of family planning types. All ten items, plus three original items of special interest to National University of Costa Rica psychologists,* were included in the final questionnaire (Table 23).

Husband Power

In the Test Survey factor analysis of modernity and interpersonal relations the second factor, accounting for 21 percent of the explained variance, had three scales with loadings above .70. All three were composed of items measuring the degree to which the wife participates in household decision-making. (The next highest loading, .50, was for a set of items concerning activities that were prohibited to the wife.)

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*These three items refer to norms concerning sexual relations. Although they were not included in the Test Survey, they are conceptually similar to the other items and correlate well with them: the sum of the three sexual relation scores correlate .62 with the sum of the ten other items in this set.

Table 23

Items Reflecting Sex Roles,* Final Sample

	Percent			
	Strongly Agree	Agree	Disagree	Strongly Disagree
a. Women are less capable than men of making important decisions	9	31	40	19
b. When she disagrees with husband, it is better than woman keep quiet	20	44	24	12
c. A woman will not respect her husband when he doesn't dominate her	8	32	45	17
d. Women are less intelligent than men	6	25	40	28
e. The man has the right to be in command and the woman must obey	30	46	18	7
f. A woman's place is in the home; the less time spent out of it, the better	29	51	15	5
g. The man should make the important decisions in the family	33	43	14	6
h. Certain work is appropriate for the man, other work for the woman. Neither should meddle in affairs of other.	23	45	27	6
i. A woman should not expect her husband to help her in the house when he arrives after a hard day's work	28	54	11	6
j. It is perfectly alright for men to go out alone as much as they like	10	35	33	22
k. The man has more right to deceive his wife than she has to deceive him	-	10	38	30
l. It is more important that the woman be a virgin when she marries than it is the man	38	47	8	3
m. Sexual relations are only for reproduction	4	17	45	34

*A category for "indifferent" was contained in the code but not read to respondents. Only between one and three percent were so categorized on most items, and have been included here with those who disagree.

They were drawn from Goldberg's Husband Power Scale (1974); from Mitchell's Distribution of Influence Scale (1962); and from Rosen and Simmons' Wife Participation Scale (1971). Scores for this factor, termed Husband Power, were related to fertility ($r = .24$, $p = .007$), and the nine items with the highest correlations to the total scale were included in the Final Survey. Distributions are given in Table 24. While joint decision-making on these items is characteristic of one-quarter to one-half of the families, it is rarely the case that the wife is the major decision maker on any matter other than food purchases. Even here, the husband usually makes the decision in a third of the cases. Since it can be argued that a "both" response is more modern than a "wife only" response, each of the items was scored from 1-5 in two different ways: with "wife only" scored most modern and "husband only" most traditional; and with "both" scored as most modern, "husband only" as most traditional. Since the latter scoring system proved to be more highly correlated with both dependent and independent variables, it is the form reported here and used throughout the report.

Communication

Inter-spousal communication has been identified by various authors as a critical variable in family planning behavior (Rosario, 1970; Hill et al., 1959; Goldberg, 1975). In the Test Survey, we drew six items from Hill, Stycos, and Back's Communication Scale (1959) and two items

Table 24

Husband Power Items,* Final Sample

	Percent		
	Husband	Both	Wife
Who decides about:			
a. paying bills	61	28	10
b. where to live	50	44	5
c. loaning money to relatives	54	39	6
d. whether to visit relatives	34	54	11
e. which friends will visit	39	48	11
f. money to spend on food	39	32	28
g. which parties you may attend alone	50	36	11
h. whom to invite to dinner	32	53	14
i. from whom to borrow money	60	32	6

*Items a to c are from Rosen and Simmons (1971); d to f from Goldberg (1974); and g to i from Mitchell (1962). Five response categories from "husband always" to "wife always" were structured into each question but are here grouped into three. "Husband always" responses were three to four times as frequent as "husband usually."

from Mitchell's Husband-Wife Communication Scale (1962). In the factor analysis, these two items essentially comprised a third factor (13 percent of the explained variance), with loadings of .85 and .86. Although this factor showed no relation either to fertility or to family planning status, because of its conceptual importance to our explanatory model, in the final questionnaire we asked whether the respondent had ever spoken to her husband about the desired number of children or about methods to keep from getting pregnant. Fifty-two percent of the Final Sample had spoken about both topics, 30 percent about one, and 18 percent about neither.

There are now two basic questions about the measures we have created. First, do the items cluster together empirically in the same way that we have put them together conceptually? Second, can they all be considered measures of a general modernity factor, i.e., is there justification for lumping them together into a single scale?

Reliability coefficients are one way of answering the first question. Table 25 shows high coefficients for husband power, sex roles, and information; and moderate to low coefficients for mass media and the Inkeles modernization items.*

Despite the low reliability of the Inkeles scale, all the component items relate positively to the total sum of item scores. Even when corrected for auto-correlation, the five lowest correlations range between

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*Smith and Inkeles (1966) reported reliabilities of .68 and .70 for Chile and Argentina on their ten item short form; and Armer and Schnaiberg (1972) reported reliabilities ranging from .54 to .76 for a variety of modernity scales applied in Boston.

Table 25

Reliability Coefficients (alphas) for Modernity Variables

Husband Power	.87
Information	.73
Sex Roles	.82
Mass Media	.42
Inkeles	.57

.15 and .20; and since the elimination of any single item hardly affected the alpha measure, we decided to maintain all the items. Although addition of the information items to the Inkeles scale did cause its reliability to "jump markedly" (from .57 to .67), we decided to keep them separate. Since the elimination of radio from the mass media scale markedly improves its reliability, the scale as used contains exposure only to newspapers and television.*

We next subjected all forty-one items of these five scales to a factor analysis. The first unrotated analysis shows that twenty-eight of the items have loadings of .40 or more on the first factor, and only nine (exposure to radio and eight Inkeles items) have loadings under .30. Communalities fall below .30 for only eleven items. For some purposes, therefore, we may use all or most of the variables as a general measure of "Overall Modernity."

On the rotated matrix, husband power clearly emerges as the first factor. Its nine items had an average loading of .61 with a range of only .53 to .70. No other item had a loading as high as .25 on this factor. On the second factor, the sex role items had a mean loading of .44, with about half the items above this and several between .20 and .30. Factor III picked up the items from the sex role scale that had the lower loadings on the second factor. The six items with lower loadings on

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*Only 5 percent report they never listen to radio, and this variable shows little relation to education or to modernism variables.

Factor II (mean = .26) had a mean loading of .44 on Factor III. (Two items in the Inkeles scale also had loadings this high.) A fourth factor had high loadings for mass media and information items. The five items, excluding radio, had a mean loading of .59, ranging from .46 to .65. The fifth factor had moderately heavy loadings on a number of the Inkeles items. Six of the thirteen had loadings above .30, and excepting one negative and one zero loading, the ten remaining items average .32.

Since both the Inkeles and the Sex Role scale showed evidence of multidimensionality, we factor analyzed the items in each of these scales and assigned the factor scores suggested by the first unrotated factor. However, in both instances, the correlations of the factor scores with education, household possessions, live births, and ideal family size were at least 50 percent lower than that obtained when the simple sum of the items was used. Next, we dichotomized each variable as close to the median as possible, assigned a zero or one, and summed these scores for each index. The reliability coefficients based on this scoring system were similar or slightly lower than those shown in Table 25 , based on the raw scores. Consequently, we have usually used the sum of the Z scores for each item in a scale divided by the number of items; i.e., the mean Z score of scale items.*

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*As a check, we also ran reliability coefficients for the Z score based scales, and these were essentially the same as those shown in Table 25.

COGNITIVE STYLE

The second set of roughly 100 interviews in the Test Survey covered cognitive style and family size preferences. Twenty-three scales and individual measures were factor analyzed to get at underlying dimensions in these two areas.

Cognitive style refers to the way in which an individual conceptualizes his experience: at one extreme the individual is fatalistic about a world he is helpless to control; at the other he regards his environment as subject to change and feels competent to change it. While not dissimilar to modernization in concept,* the cognitive aspects lie more deeply embedded in the personality and are reflected in the degree of analysis and control the individual experiences in visual perceptions. The Embedded Figures Test (EFT) (Witkin et al., 1962) had been used successfully by Seeley (1976) in predicting family planning behavior among a sample of North American women. For Costa Rica items were chosen from the Children's EFT and from the short form EFT developed by Witkin. While the selection of items from the Children's EFT was based on cultural acceptability and recognizability of the items, those selected from Witkins's EFT had demonstrated the highest item-to-scale correlations in Seeley's study.

The factor analysis of Cognitive Style and Family Size Attitude

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*Excessive length of the questionnaire precluded inclusion of Cognitive Style and Modernity items in the same questionnaire.

items delineated six factors that accounted for 53 percent of the variance. A fourth factor, accounting for 15 percent of the explained variance, contained three cognitive style items with high loadings -- two Child EFTs (Triangle, .78; and House, .87), and the adult EFT, .47. No other variable loaded higher than .24. Scores for this factor, however, showed no statistically significant relation to parity or to birth control status. The EFT also loaded highly (.52) on a fifth factor that was related to fertility, but three other highly loaded variables (Best number of children, Coombs Sex Preference, and definition of a large family) suggested that this factor was heavily composed of attitudes toward family size. Both as a consequence of the relatively poor showing and the difficulty of administration, EFTs were not included in the Final Survey.

Four traditional direct questions were included in the Test Survey: If you were about to marry and could choose exactly the number of children you would like, how many children would you have? In your opinion, what is the best number of children in a family? When you think of a small family, how many children make up this family? And when you think of a large family, how many children are there?

In addition, a short form of the Coombs items on preferred family size was used. The questions assumed an equal sex ratio, and the top number of preferred children was six.* This was followed by a series of

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*"If you could have an equal number of girl and boy children, how many children would you prefer in all: 0, 2, 4, or 6?" (followed by successive paired comparisons until the respondent chooses 0 or 6). In the

questions on preferred sex distribution, "If you could only have exactly three children in all." Thus, two scales were produced: one measuring the bias toward large or small families, controlling for sex ratio, the other measuring sex preferences, controlling for size.

Obviously, such controls introduce a degree of unreality to the question. Moreover, the sharp, if not harsh, focus on number and number distinctions may also be somewhat "unreal in situations where women have not given much thought to the question,* even though some latent, dormant, or sub-conscious inclinations may be tapped. In order to get at such inclinations by more indirect means that do not push the respondent into a highly structured response, several other measures were included.

1) Peterson's (1975) Draw-A-Family Test. In a higly non-directive approach, respondents were asked to "make a drawing of your idea of the ideal family." The number of children in the drawing was then coded.

2) TAT. In an adaptation of the Thematic Apperception Test (Murray, 1943), an ambiguous photograph of a woman holding a baby was shown and respondents were asked "What is she thinking and what is her situation?"

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light of other data on preferences, this range seems adequate for most Costa Rican women. E.g., in the Final Survey, only 16 percent stated that (if they could have exactly the number they wanted), they would choose more than six.

*In both the test and Final Survey, about one-third of the women admitted they had never "thought about the number of children (they) want to have" but all cheerfully replied to the Coombs scale question. In the Test Survey, they were then asked "whether the number of children seems important" and 63 replied in the negative.

The responses were coded for whether the situation and affect reported were positive or negative, and whether or not the respondent mentioned the child.

3) As a more directive projective technique following Stycos (1964) and Simmons (197.), two pairs of photographs of Costa Rican families with two and three children and with three and seven children were presented and respondents asked which of the two families they preferred and why. Responses to the open-ended question were coded as "related to size of family" or "not related." Respondents were then asked to rank all three families in order of preference.

4) Value of Children. Sixteen items were chosen from a 45 item portion (Opinions about children) of Arnold et al.'s (1975) core questionnaire on the Value of Children, with preference given to items that had higher item-to-scale correlations cross-culturally. These questions tap non-numerical inclinations for and against children, in terms of costs and benefits.

5) Semantic Differential. Kothandapani (1971) compared the efficacy of several attitude toward birth control scales in discriminating users from non-users. While intention to use was the most predictive of behavior, a five item evaluative Semantic Differential Scale "correlated highly with the intention measure (r = .43)...(and) with the overt behavior" (57). We adapted the scale to measure attitudes toward family size, toward a married woman without children, and toward birth control.

ITEMS ELIMINATED FROM THE FINAL SURVEY

Analysis of the Test Survey findings led to the elimination of several items:

1) Questions concerning the ideal ("the best number") and the preferred number ("if you were about to marry and could choose exactly...") were apparently indistinguishable to respondents and the distribution of responses was virtually identical. Consequently, only the preferred number question was included in the final survey.

2) The "Draw-A-Family" test showed a bias toward the small family. Whereas only 8 percent said the best family had one child or no children, 16 percent drew such an "ideal family"; and whereas 11 percent said the best family had six or more, only 7 percent drew that many children. Otherwise, the two distributions correspond very closely. Had this test indicated a high ideal number of children, it would have supported the arguments of those who suspect a concealed or sub-conscious bias toward large families. The fact that the measure produces an even smaller sized preference than do traditional questions renders this hypothesis unlikely. However, both because a fatigue factor may produce an underestimate of the true ideal (it is easier to verbalize a number of children than to draw them), and because it is difficult to administer in the field, the Draw-A-Family item was not included in the Final Survey.

3) The TAT type item is also difficult to administer, and even more difficult to interpret. In the factor analysis of Test Survey

items relating to preferred family size, it essentially constituted a sixth factor accounting for 13 percent of the explained variance. It may merit more research, but we could not justify it for the Final Survey.

4) The Coombs Sex Preference items showed a bias toward males, but not a powerful one. When asked what sex distribution they would prefer if they could have just three children, 3 percent chose all females and another 39 percent chose two females. Only 6 percent chose all males. The overall score loaded moderately on Factors V and VI (.43 and -.35). This set of questions was eliminated from the Final Survey.

ITEMS RETAINED IN THE FINAL SURVEY

Since "best number" and "preferred number of children" were essentially synonymous, only one of these was included in the factor analysis of Set II - Family Size Preference variables. It loaded highly (.68) only on Factor V, where an equally high loading was found for the numerical definition of a large family. The EFT and Coombs Sex Preference Scale had moderately high loadings, and the factor itself was the only one of six that was strongly related <u>both</u> to family planning status and to fertility. Consequently, both preferred size and definition of the large family* were included in the Final Survey (Table 26).

The Coombs scale loaded highest (.57) on the first factor, along

*Although definition of the small family had only moderate sized loadings on several factors, it was included to complement the definition-of-large family item.

Table 26

Preferred Number of Children and Definition of the Large and Small Family -- Final Survey
(in percent)

	Preferred	Large Family	Small Family
0-1	2	-	4
2	17	-	34
3	27	1	30
4	21	5	21
5	10	6	5
6	9	23	4
7-8	16	25	2
10+	0	40	1

with two other projective type questions: Draw-An-Ideal-Family, and the preference rankings of the photographs with two, three, and seven children. Since this factor was significantly related to number of living children, we included both Coombs and the photo preferences, dropping the Draw-A-Family test for reasons already described.

The pairs of photos were first scored from one to four, according to whether the smaller or larger family was chosen and whether or not the reason for the choice was explicitly related to the number of children (Table 27). These scores were then summed, giving a range of 2-8. In addition, the rank ordering of the three families, regardless of reason, was scored; e.g., a preference ordering of two, three, and seven children photos was given a score of one, while a ranking of seven, three, and two was assigned a score of six. The two scales correlate .69.

The Value of Children items loaded moderately (-.34 and -.31) on two factors that predicted fertility: III and VI. Factor III, which had strong loadings on Semantic Differential items dealing with the small family and with attitude toward a working woman with children, had been conceptualized as "Valuation of Mothering" and seemed reasonably promising as a variable distinct from desired family size. However, more because of its importance in cross-national research than because of its showing on the Test Survey, we decided to include seven items that had shown the best item-to-scale correlations in the Test Survey (Table 28).

Table 27

Photo Preferences and Reasons
(in percent)

	Number of Children	
	2 or 3	3 or 7
Prefers lower number, size reasons	19	57
Prefers lower number, other reasons	12	10
Prefers larger number, other reasons	37	10
Prefers larger number, size reasons	30	21

Table 28

Arnold Value of Children Items
(in percent)

	Agree			Disagree	
	1	2	3	4	5
a. It is important to have children so that a family's traditions survive.	21	61	1	15	3
b. The people respect one more when you have children.	24	46	3	22	5
c. A girl becomes a woman only after becoming a mother.	14	33	2	39	13
d. A person who has no children can never be truly happy.	39	41	1	13	6
e. A couple should seriously consider the inconveniences which children bring, before having them.	3	12	1	58	25
f. It is not right that a couple go against nature, deciding to limit the number of children they are going to have.	10	34	2	41	13
g. Before having a child, a couple should consider whether it would be an obstacle to the woman's working.	11	33	2	42	12

However, the reliability of this group of seven items was unacceptably low (alpha = .34). While the first four items correlated .22 or higher with the total scale (adjusted for auto-correlation), the last three had correlations below .05 and have been removed from the scale. The remaining four have an alpha of .53.

Of the five Semantic Differential scales used in the Test Survey, two (attitudes toward a working woman with children and attitudes toward a small family) loaded strongly (.78 and .67) on Factor III; along with Arnold's Value of Children (-.34) and definition of a small family (.43), neither of which loaded more highly on any other factor. Since Factor III was significantly related to fertility, the two Semantic Differential items were included in the Final Survey. Simple additive scales were used, e.g., based on responses to the three characteristics describing a small family:

1.	Very empty	31	Very selfish	24	Very sober	45
2.		23		37		23
3.		2		12		3
4.		26		21		20
5.	Very full	18	Very selfless	6	Very happy	0
	Total	100	Total	100	Total	100

Items that were not in the Test Survey but that were added in the Final Survey include expectations of future help from one's children, the desire for future children, and the implications of having another child. In the first instance a scale was constructed from responses to

three questions: (1) Do you expect to live with one or more of your children, or have one or more of them living with you when you are old? (69 percent said yes); (2) What means of financial support do you think you might have when you and your husband are old and your husband can no longer work? (31 percent said "Help from children"); and (3) Do you expect to rely on your children for financial support a great deal, a little, or not at all? (31 percent said "a great deal," 42 percent "a little," and 24 percent "not at all").

Respondents were asked, "Do you want to have another child in the future? (If Yes) How many more?" They were also asked whether or not their husbands wanted more children (only 9 percent said they did not know), and if so, how many. Finally, they were asked whether or not they intended having a child in the next two years and how sure they felt about it: very sure, more or less sure, or not very sure. The responses to these questions were combined in the two scales named HUWIMORE and CHLDSCLE:

		Percent
HUWIMORE		
1.	Neither spouse wants more children	38
2.	One wants no more, the other one more	14
3.	Both want one more	6
4.	One wants no more, the other two or more	4
5.	One wants one more, the other two or more	21
6.	Both want two or more	17
	Total	100

CHLDSCLE*		
1.	Do not intend to have child in next two years, very sure	34
2.	Do not intend, less sure	27
3.	Intend another, less sure	19
4.	Intend another, very sure	19
	Total	99

*420 infertile and sterilized cases were not asked this question.

These two measures of immediate intention and longer range desire to have more children correlate .60.

Non-sterilized women were also asked to what extent they agreed or disagreed with a series of statements about the consequences of having another child in the next two years.

	Percent				
	Agree			Disagree	
	1	2	3	4	5
If you were to have a child in the next two years:					
Your economic problems would worsen	11	27	2	52	7
You would feel more like a mother	22	47	6	22	4
It would provide a companion to your other children	25	60	2	11	2
Your marriage would be more stable	19	44	6	28	4

The text contains further details on the construction and utilization of these measures.

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