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A number of studies have documented the large increases that have occurred in the educational attainment and labor force participation rates of American women in the 20th century, Cf. (Bancroft, 1958, Durand, 1948, Folger and Nam, 1967, Jaffe and Steward, 1951, Oppenheimer, 1970, Ridley, 1971, Sweet, 1968). Also, well documented is the fact that the more education a woman has the greater her propensity to work (Bowen and Finegan, 1969, Cain, 1966). Indeed, one common explanation for the increased labor force participation of American women in recent decades has been the improvements in educational attainment women have experienced.

This paper investigates the question of how much of the observed increase in labor force participation of American women can be attributed to their increased educational attainment. Our analysis of this question has been confined to the 40 year period between 1930 and 1970 and to only white women.

In the first part of the paper we attempt to measure the direct influence of increased educational attainment on labor force participation. We then turn to a more detailed consideration of the changes that have occurred in the labor force participation rates of the various educational groups. Finally, as a possible explanation for our findings regarding educational attainment and labor force participation, we examine changes in fertility. Obviously, many factors have in the past and are at present influencing the extent to which American women participate in the labor force. We are not attempting to explore or measure all of these factors. Rather we are concerned with the interrelationships of educational attainment and labor force participation.

THE DATA

For our analysis we have drawn on data from the decennial censuses of 1930 to 1970. Our analysis is restricted to this 40 year period for a number of reasons. First, census data on educational attainment and labor force participation are available only from 1970 onward. Prior to 1940, the decennial census did not ask a question on educational attainment. Also, in 1940 the labor force concept replaced the gainful worker concept. We could, however, derive for 1930 educational attainment and labor force participation rates and thus obtain labor force participation rates by level of education in 1930. We obtained the educational level of white women by "younging" the 1940 population. We then adjusted the rates in accordance with the known totals in the labor force in 1930

which we estimated for each age group (Deming 1943). To obtain the labor force numbers in 1930 the gainfully occupied numbers were converted to agree as closely as possible to the 1940 labor force definition (Edwards, 1943). We are aware that the data on educational attainment and labor force participation are not completely comparable from census to census. Since, however, we are concerned with overall trends we did not attempt to correct for what appeared to be slight incomparabilities.

Note should be made that an important change occurred in the 1970 census data on children ever born. Prior to 1970 the question of children ever born was asked only of women who had ever been married; in 1970 this question was asked of all women. This change added somewhere between 10 to 20 children per 100 women (U. S. Bureau of the Census, 1970). Such a change we judged did not markedly affect the fertility trends discussed in this paper and therefore we did not adjust for this change.

The analysis reported here is restricted to white women for the simple reason that white and black women differ greatly in their labor force behavior. We hope to extend our analysis to black women in the near future.

RESULTS

The Influence of Education

Table 1 presents the results of standardizing the labor force participation rates on the educational distributions of 1930 and 1970. By standardizing we are attempting to answer the question: what would have been the age specific labor force participation rates if the educational level of women had remained unchanged over the entire 40 year period? Since there is no uniquely correct educational distribution to use as a standard we used both dates. This provides a range within which the influence of education can be said to lie. In the upper panel of Table 1, the labor force participation rates standardized on the 1970 educational distribution are shown and in the lower panel the rates standardized on the 1930 distribution are shown. The last three columns in Table 1 show: the observed change in the labor force participation rates, column (a); the absolute change in the standardized rates, column (b); the change attributable to increased educational attainment, column (c). Thus, the total change in labor force rates has been subdivided into two components, that due to other factors and that due to increased educational attainment.

Table 1. Standardized Labor Force Participation Rates for White Women by Age, United States: 1930 to 1970

Age	1930	1940	1950	1960	1970	Change 1930 to 1970 (a)	(b)	(c)
Standardized on 1970 distribution of educational attainment								
20 to 24 years	50.0	55.0	47.7	48.1	56.2	14.5	6.2	8.3
25 to 29 years	34.0	40.2	34.1	34.9	44.1	16.1	10.1	6.0
30 to 34 years	24.7	33.2	30.4	33.9	42.6	21.3	17.9	3.4
35 to 39 years	23.2	30.3	34.6	39.2	47.6	28.0	24.4	3.6
40 to 44 years	21.9	27.4	35.7	44.1	50.9	32.2	29.0	3.2
45 to 49 years	20.9	25.5	35.7	47.4	52.7	35.0	31.8	3.2
50 to 54 years	19.9	25.3	33.8	47.3	52.0	35.2	32.1	3.1
Standardized on 1930 distribution of educational attainment								
20 to 24 years	41.7	42.5	38.7	39.8	45.8	14.5	4.1	10.4
25 to 29 years	28.0	32.9	29.2	31.6	39.2	16.1	11.2	4.9
30 to 34 years	21.3	27.7	28.1	33.0	40.6	21.3	19.3	2.0
35 to 39 years	19.7	25.3	31.9	37.8	45.6	28.0	25.9	2.1
40 to 44 years	18.7	23.1	32.2	41.6	48.5	32.2	29.8	2.4
45 to 49 years	17.7	21.5	31.2	43.7	49.6	35.0	31.9	3.1
50 to 54 years	16.7	22.3	29.2	42.8	48.1	35.2	31.4	3.8

(a) Absolute change in unstandardized labor force rates.

(b) Absolute change in standardized rates; i. e., change due to factors other than changes in educational attainment.

(c) Absolute change resulting from increased educational attainment.

The observed change in the total rates for each age group shown in column (a) is simply the observed rates for 1930 subtracted from those for 1970. The observed rates for these two years and the intervening years are shown in Table 2. The influence of all factors except increased education (column (b)) is the difference between the standardized rates for the two dates. Since the influence of education has been held constant by standardization, then any residual must be due to other factors. Finally, the changes in the observed rate (column (a) minus the changes in the standardized rates (column (b) represent the changes due to increased education.

An inspection of column (c) clearly indicates that the direct influence of increased educational attainment has had but little effect on the labor force participation rates of white women. This is true regardless of whether the labor force rates are standardized on the 1930 or 1970 educational distribution. For instance, although at ages 20 to 24 the increase in educational attainment may have accounted for over a half to almost three quarters of the observed increase in the labor force rates, and at ages 25 to 29 almost one third, at ages 30 to 54 the influence of education accounts for less than 20 percent and in most instances less than 10 percent. As can be seen, however, these are precisely the ages at which the largest observed increases in labor force participation occurred.

We also divided the 40 year period into two periods and carried out the same calculations for the period between 1930 and 1950 and between 1950 and 1970. The same pattern of changes were obtained with education having less influence than other factors. Because of limitations of space, these results are not shown.

Labor Force Rates By Level of Education

Table 2 presents the observed labor force participation rates by educational attainment. The most rapid increases in labor force participation between 1930 and 1970 occurred among women with less than a high school education. Only among 20 to 24 year old women did the rate for college graduates (16+ years of education) increase slightly more than those with lower levels of educational attainment. At all older ages, 25 and above, those not having finished high school (under 12 years of education) had the greatest increases. Moreover, with increasing age even larger increases in labor force participation rates are observed for women at the lower educational levels. For example, at ages 25 to 29 among women with less than a high school education, the percentage increases in labor force participation was 51, the comparable percentage increase for women 50 to 54 was 214. For college graduates, the increase was 16 percent for those 25 to 29 and 69 percent for those 50 to 54.

How may we account for the greater increases in labor force participation rates among women having the lower educational attainment? One obvious answer is purely statistical. Increases must be asymptotic; as the labor force rate approaches 100 percent further increases are not possible. An alternative way of measuring the changes between 1930 and 1970 is by expressing the increase in the participation rates as a percent of those not in the labor force in 1930. The results of this approach produced a pattern very similar to that previously observed. To summarize: at ages 20 to 24, the increase was greatest among those with the lowest level of education; at ages 25 to 29, there was little difference by level of education; at ages 30 to 34 up through ages 40 to 44, the increases were larger among those at lower levels of education; at ages 45 to 49 and 50 to 54, there was little difference by level of education.

Educational Attainment and Fertility

The changes in labor force participation rates by educational level tended to be inversely related to the changes that occurred in fertility by education. As may be seen in the following table, the fertility of women with less than a high school education increased less rapidly than the fertility of women who finished high school or went on to college.

Children Ever Born Per White Woman

Age and Educational Attainment	1940	1970
20 to 24 years	.48	.68
Under 12 years	.73	1.39
12 years	.28	.71
13 to 15 years	.12	.26
16+ years	.07	.17
25 to 29 years	1.09	1.74
Under 12 years	1.43	2.38
12 years	.76	1.77
13 to 15 years	.61	1.39
16+ years	.31	.78
30 to 34 years	1.64	2.60
Under 12 years	2.03	3.00
12 years	1.16	2.54
13 to 15 years	1.05	2.32
16+ years	.70	1.75
35 to 39 years	2.11	2.98
Under 12 years	2.50	3.14
12 years	1.46	2.87
13 to 15 years	1.37	2.74
16+ years	.92	2.27
40 to 44 years	2.42	2.93
Under 12 years	2.80	3.03
12 years	1.67	2.77
13 to 15 years	1.60	2.77
16+ years	1.07	2.42

Table 2. Labor Force Participation Rates for White Women by Age and Educational Attainment, United States: 1930 to 1970

Age and Educational Attainment	1930	1940	1950	1960	1970
20 to 24 years	41.7	45.5	43.4	44.8	56.2
Under 12 years	34.5	35.1	31.2	33.2	37.1
12 years	55.4	56.8	51.1	48.7	59.3
13 to 15 years	47.1	47.7	46.7	49.4	56.6
16+ years	63.8	64.8	67.5	71.8	79.6
25 to 29 years	28.0	34.1	31.3	33.3	44.1
Under 12 years	23.4	27.1	25.4	29.1	35.4
12 years	31.9	39.8	33.4	32.9	42.2
13 to 15 years	39.1	44.6	36.7	37.3	46.9
16+ years	53.4	58.9	48.3	48.5	61.7
30 to 34 years	21.3	28.9	29.2	33.5	42.6
Under 12 years	18.7	23.7	26.3	32.3	39.3
12 years	24.0	34.2	29.9	33.5	42.8
13 to 15 years	26.7	35.5	33.1	33.9	41.5
16+ years	40.4	50.4	40.1	39.6	51.1
35 to 39 years	19.7	26.2	33.0	38.9	47.7
Under 12 years	17.3	21.8	30.0	36.9	44.3
12 years	23.3	31.7	34.5	39.1	48.4
13 to 15 years	25.2	33.1	36.7	39.7	46.2
16+ years	39.5	48.6	47.0	46.4	56.3
40 to 44 years	18.7	23.7	33.7	43.2	50.9
Under 12 years	16.5	20.2	29.8	40.0	47.0
12 years	22.6	28.6	36.7	44.9	52.6
13 to 15 years	24.4	31.3	39.6	46.0	50.8
16+ years	38.8	46.9	51.1	55.0	58.4
45 to 49 years	17.7	22.0	33.0	46.0	52.7
Under 12 years	15.5	18.8	28.2	41.3	47.5
12 years	21.8	26.7	38.0	49.1	55.4
13 to 15 years	24.8	31.0	42.0	51.8	55.1
16+ years	39.1	46.5	54.7	63.9	64.5
50 to 54 years	16.7	20.6	30.6	45.6	51.9
Under 12 years	14.5	20.1	26.0	39.8	45.6
12 years	20.9	25.7	36.4	50.0	55.4
13 to 15 years	26.1	31.6	42.2	54.3	56.7
16+ years	40.0	46.4	55.9	69.3	67.6

Thus, at ages 20 to 24 the increase in fertility was 90 percent for those with less than 4 years of high school education while for college graduates the percentage increase was 143 percent. At ages 35 to 39 the increases were 26 percent and 147 percent. A result of these differential increases in fertility has been the convergence of family size among the various educational groups just as there has been a convergence in the labor force participation rates among the various educational groups.

Although neither the changes in the educational attainment or in fertility behavior of white women can be interpreted as the "cause" of the changes in the other, these two changes occurred simultaneously. Since the fertility of women with less than a high school education increased less rapidly than the fertility of women who finished high school or went on to college, it is not surprising that women with less than a high school education entered the labor force in greater numbers. The changes in fertility in fact, parallel the pattern by educational level of those entering the labor force since 1930 noted above. Generally, while fertility was once an important factor in whether or not women were in the labor force, it now appears that childbearing no longer is as an important factor as it once was.

DISCUSSION

Many factors have influenced the labor force participation of white women in the United States over the last 40 years. Increased education is but one. Other factors include the large increase in urbanization, the almost complete disappearance of the rural population, and the increasing availability of jobs for women through the growth in the "paper" work industry. This latter factor, of course, has contributed to the very large increases in the white collar clerical occupations. Additional factors influencing the increased participation of women in the labor force have been the rapid diminution of the foreign born population, the increasing income of large proportions of the changing roles of men and women and of course the feminist movement.

We have concluded that increased educational attainment in and of itself has not had much direct effect on the labor force participation of women. We suspect, however, that it has been an integral part of the overall matrix of interrelated factors. Possibly without the increased educational attainment of women some of the other factors would have had a lesser impact upon the labor force activity of women.

In a 1956 article (Jaffe, 1956) stated: ". . . if women complete their family formation by the late twenties, then they can enter (or reenter) the working force in the early thirties at which age they are more acceptable to

employers. Thus, even without any decrease in the ultimate size of the family, a lowering of the age at which family formation is completed may result in an increase in the proportion of women who leave the home for outside jobs." We suspect that the rapid diminution after age 30 and the completion of childbearing by close to age 35 have been important factors in the entry of older women into the labor force since 1930. It is possible also that the increase in family size during the baby boom period may have propelled many women into the labor force since the differentials in fertility by labor force status decreased between 1940 and 1960 (Ridley, 1971). These fertility differentials have diminished even further in the decade 1960 to 1970. The particularly large increases in labor force participation among younger white women between 1960 and 1970 have, no doubt, further contributed to the declines in fertility since 1960. Generally, the more recent changes in labor force and fertility reflect the increased educational attainment of women together with the other vast socioeconomic changes which have occurred since 1930.

In terms of the future, we expect that further increases in educational attainment of women will not materially affect their future labor force participation rates. Rather, these rates will reflect future job opportunities to a significant degree. Such future job opportunities will depend not only on the state of the economy but the degree of success women achieve in their quest for equal employment opportunities.

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