

Sample Attrition in the Baltimore Study

Baltimore Study Working Paper Series 98-2

Kathleen A. Foley

University of Pennsylvania

August 11, 1998

Introduction

To date, the Baltimore Study spans 29 years over seven surveys. While sample attrition for the Baltimore mothers (referred to as the G2s)¹ has been described through 1984, following the fifth survey (Furstenberg, Brooks-Gunn and Morgan, 1987), many of the respondents who had dropped out by 1984 returned to the study to complete the sixth and seventh interviews. Furthermore, non-respondents have been tracked to the best of our ability to determine the major reasons for non-response over time. Thus, this working paper updates previous attrition analyses by including a separate analysis of the G3 attrition, documents correlates of attrition post-Time 5, accounts for the non-respondents and clarifies past uncertainties about sample size.

Before describing the attrition patterns and correlates for the Baltimore Study, it is necessary to clarify the starting size of the original sample of mothers. Although 404 women were interviewed in 1966 at Time 1 for the study, five of these women were later found to be ineligible and were not actively pursued as respondents in 1968 at Time 2. Of these five cases, four were still pregnant at Time 2, while the fifth was found to have been previously pregnant. Because it was an administrative decision not to include these five cases at Time 2, the original sample should be considered 399. Previous work with the Baltimore Study frequently quotes the original sample size as 404 largely due to the fact that the 1966 data contained information on these five ineligible cases.

Table 1 below describes the Baltimore sample attrition at each survey for the 399 eligible mothers (G2s) and shows that the greatest loss of participants came between the fourth and fifth surveys which were 11 years apart, in 1972 and 1983, respectively. Thus, the overall retention rate for participants in the Baltimore Study from 1966 to 1995 is 57 percent, with 228 of the original 399 respondents answering the final survey in 1995. This rate compares quite favorably with the National Longitudinal Study of Young Women (NLS-YW) in which the overall retention rate from 1968 to 1995 was 59.7 percent

¹ There are 3 generations of respondents in the Baltimore Study. Generation 2 (the G2s) are the original sample members. Generation 1 is the mothers of the G2s and Generation 3 (the G3s) is their children.

(Center for Human Resource Research 1997-a). For Black and other non-white women, the NLS-YW retention rate to 1993 was somewhat lower at 52.8 percent.²

Table 1: Sample Attrition By Survey Period for All G2 Respondents³

Drop Outs	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7
Number	7	21	29	59	15	40
Cumulative	7	28	57	116	131	171

Of the 171 participants who dropped by Time 7, 27 percent were known to be alive at Time 7. Reasons for non-participation include unable to contact (n=31), refusal by either the G2 respondent or by the child (G3) on the G2's behalf (n=10), and respondent was in jail (n=2). Twenty-three percent of the drop outs were known to have died. Deaths were established by the G3 or other contact person and by using Social Security Death Index at the Ancestry.com⁴ internet site where individuals were searched for by name, date of birth and social security number. No information was found on the remaining 60 percent, including information from the Social Security Death Index search.

Bivariate Analyses

Earlier analyses (Furstenberg et al. 1987) indicated that particular variables were related to attrition through 1984. These included length of residence in Baltimore prior to the study's beginning, race and church attendance. In addition to these variables several others were examined with regard to attrition through 1995, the final survey of the study. These variables include whether or not the respondent was living with their child by the time of the second survey (if the child had died, been given up for adoption, or was placed in foster care then the respondent was not living with their child), whether or not the respondent was married at the first survey, their educational attainment at the first survey and whether or not they had participated in the special Adolescent Family Clinic (AFC) program at Sinai hospital.

Although race was found to be significantly related to attrition by 1984, this was no longer the case by 1995. By 1995, 54 percent of the whites had dropped out of the study compared to only 42 percent of the Blacks, but the difference was not statistically significant. One reason for this discrepancy may be that some of the people who dropped out prior to the 1984 survey were picked up again in the 1987 and 1995 surveys. Figure 1 presents the survival curves for continued participation

² See table 3.7.1 for actual number of respondents in 1968 and 1993 (Center for Human Resource Research, 1997).

³ Given the sizable number of respondents who drop in and out of the survey over the 29 years, this tables describes the timing of attrition for those respondents who did not answer the Time 7 survey in 1995.

in the study by race. From the curves, it is clear that the attrition among the White respondents was somewhat greater than among the Black respondents. The White respondents were also more likely to leave the study early on than were the Black respondents. Length of residence in Baltimore for fewer than five years prior to the beginning of the study was significantly related to attrition through 1995. While 71 percent of those who had resided in Baltimore for fewer than five years dropped out of the study, only 41 percent of those who had lived in Baltimore for more than five years became drop outs (Chi-sq significant at $p=.002$ level). Whether or not the G3 was residing with the G2 at the time of the second survey was highly related to attrition. Of those who were without the G3, 76 percent dropped out compared to only 41 percent of those who continued to live with the G3 child (Chi-sq significant at $p=.001$ level). The survival curves for continued study participation according to whether the G3 was residing with the G2 during the second survey are presented in Figure 2. While the status of the G3 did not influence attrition immediately, it had a clear impact following the time 4 (1972) survey. Those respondents not residing with the G3 child were much more likely to drop out between Times 4 and 5 (1984) than were those who were residing with the G3. Overall, marital status at the beginning of the study had little relation to attrition with 50 percent of the married persons dropping out by 1995 compared to 42 percent of the non married. High school grade at the beginning of the study, however, was related to attrition, with 54 percent of those who had completed fewer than 9 years of school dropping out compared to 39 percent of those with 10 to 12 years and 38 percent of those who had graduated by the start of the study (Chi-sq significant at the $p=.013$ level). Figure 3 shows the survival curves for continued study participation by whether or not the respondent had completed at least nine years of schooling at the time of the first survey (1966). The curves demonstrate that those with nine or fewer years were more likely than those with more schooling to drop out, and that the likelihood of dropping out becomes somewhat greater over time. Finally, those who participated in the AFC were somewhat more likely to drop out (46%) than those who had not participated (37%) (Chi-sq borderline significant at the $p=.086$ level).

Because they represent a small, but important sub-group of the overall sample and because the reasons for attrition differ slightly than for the Black participants, we devote some attention specifically to the attrition of the white respondents.

At the beginning of the study, there were 52 White participants. By 1995, 28 had been lost to follow up. Due to the small initial sample, it is difficult to discuss the correlates of attrition in terms of statistical significance. Several factors, however, stand out as important to understanding the attrition among the White respondents. Of the six white respondents who had lived in Baltimore for fewer than five years, five dropped out of the study. While only 47 percent of those who were married at the beginning of the study dropped out, 10 out of 14 (71%) of were *not* married became drop outs. These results are

⁴ The web site address is: <http://www.ancestry.com/ssdi/advanced.htm>

similar to those found for attrition by 1984 (Furstenberg et al. 1987). High school grade at the beginning of the study was also somewhat related to attrition, with 59 percent of those with less than a 10th grade education dropping out compared to 50 percent of those with more than a 10th grade education. Those who participated in the AFC were also more likely to drop out than those who had not participated (58% vs. 42%).

Table 2: Sample Attrition By Survey Period for White Respondents

Drop Outs	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7
Number	3	3	6	10	3	3
Cumulative	3	6	12	22	25	28

Multivariate Analyses among Black Respondents

The probability of dropping out of the study by 1995 is examined using logistic regression. Table 3 shows the results of a multivariate model including all of the variables examined at the bivariate level. Although significant at the bivariate level, residential mobility is not significant in the multivariate model. One reason may be that the inclusion of AFC participation results in the loss of approximately respondents due to loss to follow up by the time this variable was collected. Whether or not the G3 child was residing with the G2 remains a highly significant variable. Having the G3 at home has a large protective effect against dropping out of the study. In other words, those whose child had either died, been given up for adoption or was living in foster care were approximately 10 times more likely to drop out of the study than those who were residing with their child. Although marital status is not significantly related to the probability of dropping out, the direction of the effect is interesting in that it is opposite of that for whites. In the bivariate analysis for the White respondents, it was clear that the non-married were more likely to drop out than the married respondents. In this multivariate analysis for the Black respondents, however, the married are more likely to drop out than the non-married. Thus, the effect of marriage on attrition works in opposite directions for the Black and White respondents. The significant bivariate effect of education on attrition remains in the multivariate model, such that those who had received nine or fewer years of schooling by the start of the study were almost twice as likely to drop out as those who received 10 or more years. Finally, participation in the AFC remains related to the probability of dropping out, although the p-value is only borderline significant.

Table 3: Maximum Likelihood Estimates for the Probability of Dropping Out By 1995

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	1.4130	0.7840	0.0715	
Residential Mobility	0.6486	0.5750	0.2593	1.913
G3 in home - Time 2	-2.3804	0.7792	0.0023	0.093
Married at Time 1	0.4399	0.3846	0.2527	1.553

Less than 9 yrs School	0.5861	0.2569	0.0225	1.797
AFC Participation	0.4048	0.2382	0.0892	1.499

To re-examine the influence of residential mobility on dropping out in the multivariate model, the model is rerun without the variable for participation in the AFC. The results of this model are shown in Table 4, which shows that residential mobility has a moderately significant effect on dropping. The magnitude of the effect, however, is quite strong with those who lived in Baltimore for fewer than five years prior to the start of the study being more than two and a half times more likely to drop out than those who had resided in Baltimore for more than five years.

Table 4: Maximum Likelihood Estimates for the Probability of Dropping Out By 1995 Without AFC Participation

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	1.4846	0.7758	0.0557	
Residential Mobility	0.9397	0.5035	0.0620	2.559
G3 Status at Time 2	-2.2045	0.7720	0.0043	0.110
Married at Time 1	0.5202	0.3725	0.1625	1.682
Less than 9 yrs School	0.6315	0.2526	0.0124	1.880

G2 Attrition From Time 5 to Time 7

Given the large amount of time between the Time 4 and Time 5 surveys and the change in focus of the surveys by Time 5, many of the current research questions focus on the data from Time 5 forward. Thus, it is helpful to understand whether particular factors are related to sample attrition following the Time 5 survey. Tables 5 through 8 present the results of several analyses which looked at whether health status, socioeconomic status, and psychosocial resources influenced the likelihood of dropping out after the Time 5 survey.

Table 5 shows that health status at Time 5 has little relation to attrition by Time 7. Although those who reported poor health at Time 5 are more than twice as likely to drop out, the result is not statistically significant. The magnitude of the result, however, suggests that some caution should be taken when looking at long term health outcomes.

Table 5: Maximum Likelihood Estimates for the Probability of Dropping Out By Health Status

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-1.6013	0.3936	0.0001	
Poor Health	0.7954	0.8101	0.3262	2.215
Fair Health	0.3006	0.4976	0.5458	1.351
Good Health	-0.2413	0.4412	0.5844	0.786
Very Good Health	0.4293	0.4081	0.2929	1.536
Income < \$21,000	0.4981	0.3185	0.1179	1.646
Income \$21,000-31,000	0.3126	0.4317	0.4690	1.367

Similarly, there is no relation between mental health status at time 5 and attrition. Measures examined included whether the respondent had received mental health treatment, the frequency of being nervous and the frequency of being sad.

The effect of Time 5 socioeconomic position on attrition is described in tables 6 and 7. Employment status at time 5, as shown in Table 6, has a significant effect on attrition. Both manual laborers and those in blue collar jobs were much less likely to drop out of the study compared to those who were unemployed at the time of the Time 5 survey. An unemployed person, for example, was 4 times (1/.247) more likely to drop out of the study than someone with a blue collar job. Economic well-being, which is measured by 5 questions on whether the respondent owned a car, had a savings or a checking account, owned a credit card, and had a driver's license, is also related to attrition. A person with only one of the above items, for example, is about 20 percent less likely to drop out than someone with none of the mentioned items. Someone with all five items, however, is almost 3 times less likely to drop out (1/ 5*-.2137) than someone with no items. Additional analyses found no evidence that educational attainment by Time 5 had any relationship with later attrition.

Table 6: Maximum Likelihood Estimates for the Probability of Dropping Out By Employment Status*

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-0.6512	0.3311	0.0492	
Laborer	-1.0606	0.3668	0.0038	0.346
Blue Collar	-1.3993	0.4941	0.0046	0.247
White Collar	-0.4658	0.4141	0.2607	0.628
Income < \$21,000	0.1058	0.3357	0.7526	1.112
Income \$21,000-31,000	0.1300	0.4431	0.7692	1.139

* Unemployed is the reference category

Table 7: Maximum Likelihood Estimates for the Probability of Dropping Out By Economic Well-being*

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-0.5398	0.4616	0.2423	
Economic Well-being	-0.2137	0.0995	0.0317	0.808
Income < \$21,000	-0.1374	0.4078	0.7363	0.872
Income \$21,000-31,000	0.1620	0.4335	0.7087	1.176

* Measured on a scale of 1 (low well-being) to 5 (high well-being)

Lastly, measures of psychosocial support, as described in Table 8, appear to have little relation to dropping out of the study. Bivariate analyses, however, suggest that greater family participation has a slight protective effect (p-value = .07) against dropping out. Whether or not the number of people the respondent provides support to, as opposed to received support from, was also tested in a separate model not shown here. The results were similar to those reported below and indicated that there is no relationship between providing support and sample attrition.

Table 8: Maximum Likelihood Estimates for the Probability of Dropping Out By Psychosocial Resources

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-0.5857	0.5705	0.3045	
Church Attendance	-0.2535	0.2676	0.3434	0.776
Close Friend	0.1299	0.4032	0.7474	1.139
Index of Family Participation	-0.1506	0.1152	0.1913	0.860
Receives Support	-0.0554	0.1564	0.7233	0.946
Num. of Stressful Life Indicators	0.1315	0.1574	0.4033	1.141

G3 Attrition Analyses

Direct collection of data about the children of the mothers (the G3s) began in 1972 with the fourth survey when the children were between four and five years old. The analysis of the G3 attrition, thus begins with the 343 eligible children for whom data were ever collected between 1972 and 1995. These 343 children exclude 7 cases where the respondent child was not the first born or original G3 child, 50 cases in which the G3 never responded to a survey between 1972 and 1995 and includes one case which is a twin (thus, $343=399-7-50+1$). Of the 50 G3s who never responded, 35 (70 percent) had mothers who dropped out of the study by 1972. The remaining 15 never respondents are accounted for by infant deaths, late miscarriages, those given up for adoption or in foster care through out the study.

The overall retention rate through 1995, then, is 64.7 percent (222 1995 respondents/ 343 eligibles). The retention rate among survivors is roughly equal to the overall retention rate at 65.7 percent, since there are only 5 known adult deaths among the G3s. Of those who completed the Time 5 (1983) survey, the retention rate is 75.5 percent (222 1995 respondents /294 1983 respondents). This rate is highly comparable to the retention rate of the NLSY respondents between 1983 and 1996 in which 76 percent of all respondents remained in the study and to the 71.5 percent retention of African-american participants between 1979 and 1996 (Center for Human Resource Research 1997-b).

Of the 121 eligible G3s who eventually dropped out of the study, we were able to ascertain that 57 (47 percent) were alive in 1995. Twenty of these 57 refused to participate, 31 were located in or outside of Baltimore but were unable to be contacted and six were either mentally or physically incapable of completing an interview, institutionalized or in jail. Only five of the remaining 64 dropouts were known to have died.

The first set of attrition analyses looks at the influence of the G3's demographic characteristics and the mother's participation in the fifth survey on the G3's likelihood of dropping out following the time 4 survey. The results, presented in Table 8, clearly indicate that the most important factor related to the G3's continued participation in the study is the mother's own participation. When the mother dropped out by the fifth survey, the G3 was almost 12 times more likely than those

whose mothers remained in the study to drop out. Such a finding is not surprising given that the G3s were approximately 16 years at the time of the fifth survey in 1983 and therefore, still likely to be residing with their mothers. Thus, their mothers' participation in the study was bound to determine their own participation. These results also indicate that the boys were almost twice as likely as the girls to drop out.

Table 8: Maximum Likelihood Estimates for the G3 Probability of Dropping Out at Time 7 By Demographic Characteristics

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-1.4270	.2162	.0001	
Mom dropped out by T5	2.4704	.3486	.0001	11.827
White	-.1857	.4261	.6630	.831
Male	.6637	.2634	.0131	1.923

To understand how the G3's own characteristics influenced their study participation, additional analyses were conducted to explore attrition from the time 5 (1983) survey to the time 7 survey. Given that residential status is potentially related to the G2s study participation, the effect of the G3's residential status at time 5 on dropping out is considered in the model presented in Table 9. The variables explored include whether or not the G3 was living with the biological mother at time 5, whether they had lived in their current residence for less than one year, one to four years or five plus years (reference group). Whether or not the mother dropped out by the time 6 survey was included. Table 9 demonstrates that the most important factor for the G3s continued participation in the study was their mother's own participation, even after the time 5 survey when they were reaching adulthood. Furthermore, those G3s who did not live with their mothers in adolescence were more than twice as likely to drop out than those who were living with their mothers. This may be due to our greater ability to locate and interview the G3s who still lived with their mothers as opposed to those who had moved out on their own during their teen years. It may also be the result of the mother's encouragement to participate in the study. Residential stability at the time 5 survey, however, has little to no effect on study participation.

Table 9: Maximum Likelihood Estimates for the G3 Probability of Dropping Out By Residential Status

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-2.3004	0.3429	0.0001	
Mom dropped out by T6	2.6374	0.3560	0.0001	13.976
White	-0.4520	0.6047	0.4548	0.636
Male	0.2473	0.3154	0.4331	1.281
Not with Bio Mom T5	0.9594	0.3742	0.0103	2.610
Curr Res LT 1 year	0.2300	0.3910	0.5564	1.259
Curr Res 1-4 years	0.4911	0.3733	0.1883	1.634

Tables 10 and 11 below show that neither health, mental health or indicators of behavioral problems were significantly related to the G3's study participation between the time 5 and time 7 surveys.

Table 10: Maximum Likelihood Estimates for the G3 Probability of Dropping Out By Health and Mental Health Status at Time 5

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-1.0461	0.2513	0.0001	
White	-0.5491	0.5199	0.2909	0.577
Male	0.3134	0.2774	0.2586	1.368
Poor Health at T5	-0.2823	0.3604	0.4333	0.754
Sad at T5	-0.1870	0.3364	0.5784	0.829
Nervous at T5	-0.1482	0.3531	0.6747	0.862

Table 11: Maximum Likelihood Estimates for the G3 Probability of Dropping Out By Behavioral Problems

	Parameter Estimate	Standard Error	Pr> Chi-Square	Odds Ratio
Intercept	-1.0430	0.4630	0.0243	
White	-0.5121	0.5189	0.3237	0.599
Male	0.4687	0.3010	0.1194	1.598
Trouble w/Police T5	-0.1874	0.3251	0.5643	0.829
Behavioral Problems T5	-0.0142	0.0353	0.6880	0.986

These results demonstrate that the major factor influencing the attrition of the children over the course of the study has been their mother's own participation or non-participation in the study. The effect of the mother's participation remains the most important determinant of the G3's continued role in the study even at Time 6, when the G3s were well into adulthood.

Conclusions

The attrition analyses presented here update previous analyses which studied the attrition of the Baltimore mothers through the fifth survey in 1983. While race, church attendance and length of residence in Baltimore prior to the study start were found to be associated with attrition through Time 5, these factors were found to be less important for attrition through Time 7. One reason these factors may no longer be as important is that many of the women who had dropped out by the fifth survey returned to the study for the sixth and seventh surveys. Although not significant in the Time 7 analyses, residential mobility prior to the start of the study continued to increase the likelihood of dropping out by two and a half times.

One of the most important correlates of the G2's attrition through Time 7 was whether or not the G3 was co-resident with the G2 mother at the Time 2 survey in 1968. Those whose children had died, been given up for adoption or were in foster care were approximately 10 times more likely to drop out of the study than those whose children still resided with them. Fewer than nine years of education at Time 1 was also found to almost double the odds of dropping out by Time 7, with the likelihood of dropping out increasing over time.

Analyses of attrition from Time 5 to Time 7 indicate that the G2s who were unemployed at Time 5 or had low levels of economic well-being were significantly more likely to drop out than those who were employed or had higher levels of economic well-being. Income level at Time 5, however, had no effect on attrition. Physical health, mental health and measures of psychosocial support at Time 5 were all found to have little to no effect on attrition through Time 7.

Finally, these results show that the attrition of the G3s largely followed that of their mothers, even into their adult years when they were more likely to be living on their own. Although the G3 males are almost twice as likely as the females to drop out, this effect all but disappears when co-residence with the mother and length of current residence are taken into account. Furthermore, poor health, sadness, nervousness, behavioral problems and trouble with the police at Time 5 all had no influence on attrition between Time 5 and Time 7.

References

Furstenberg, Frank, Jeanne Brooks-Gunn, and S. Philip Morgan. 1987. *Adolescent Mothers in Later Life*. Cambridge, MA: Cambridge University Press.

National Longitudinal Survey. 1997-a. *Young Women User's Guide*. Columbus, OH: Center for Human Resource Research, The Ohio State University.

National Longitudinal Survey. 1997-b. *NLSY79 User's Guide*. Columbus, OH: Center for Human Resource Research, The Ohio State University.

Figure 1: Survival Curves for the Baltimore Study by Race

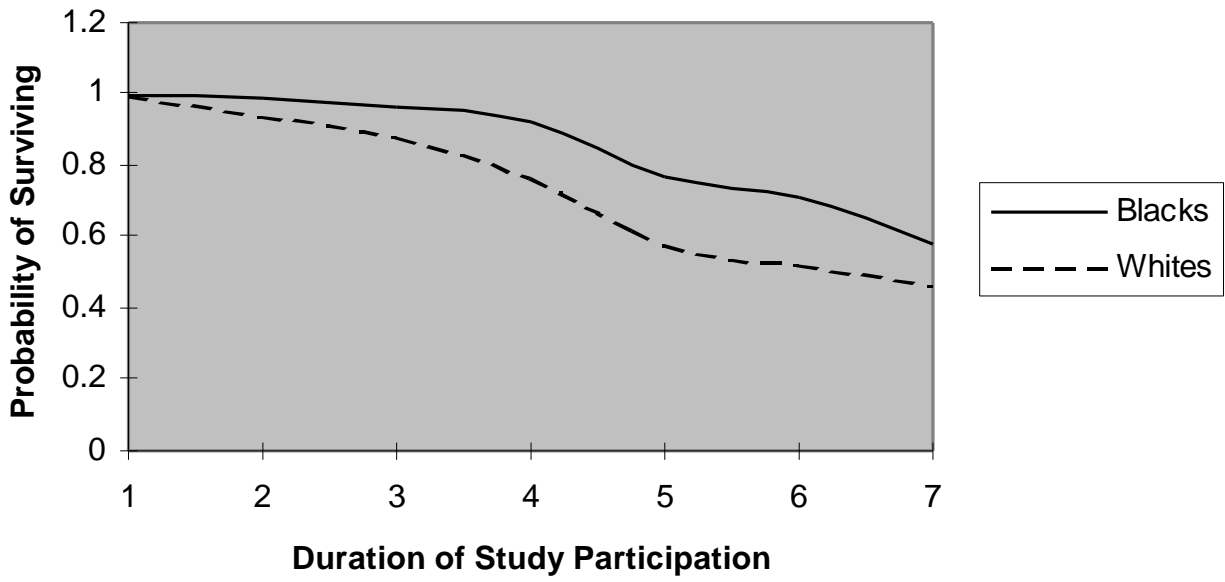
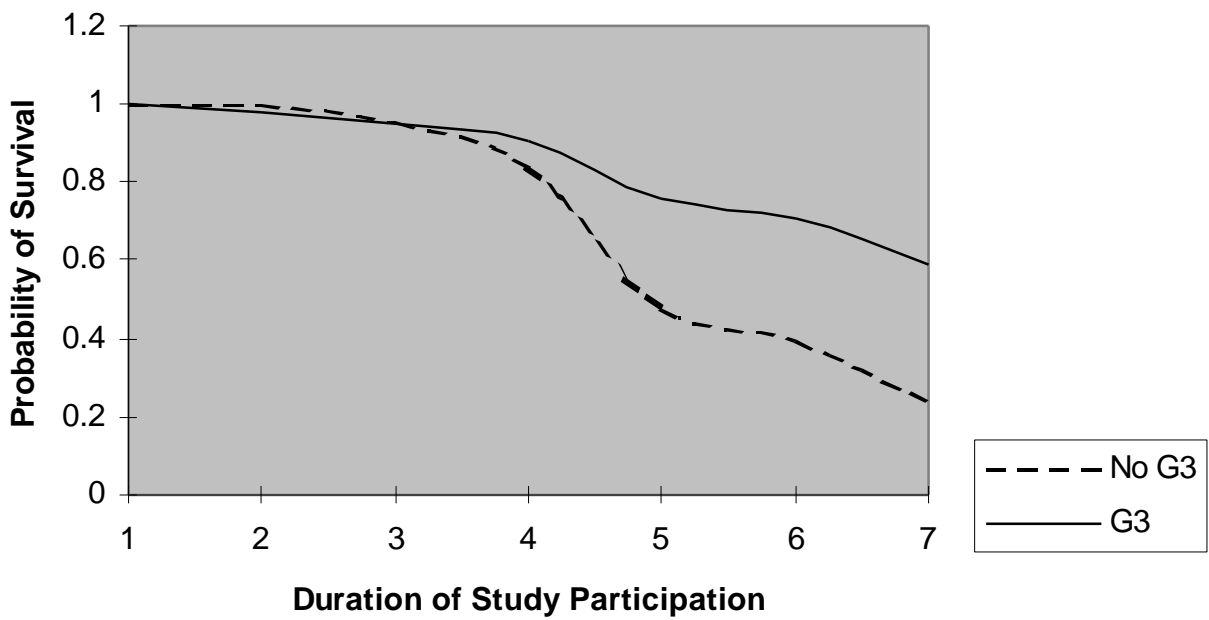


Figure 2: Survival Curves by the Status of the Child



**Figure 3: Survival Curves for the Baltimore Study
by Educational Attainment**

