

# The Final Cut: Assessing gender balance preferences and family size expectations for men using vasectomy data

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## 1 Introduction

Vasectomy data provides an opportunity to study men's fertility desires. Although vasectomies are reversible, most men who undergo vasectomy are likely not planning on reversal at the time of the operation. The following analysis relies on the assumption that a man perceives his family size and gender balance at the time of vasectomy to be his completed lifetime fertility. There are two primary research questions that drive the following analysis. First, are men who have exceeded their fertility expectations more likely to obtain a vasectomy than men who have just met their expectations. Second, controlling for family size, are men who have achieved family gender balance (at least one girl and one boy) more likely to obtain vasectomies than men who have either all boys or all girls. Total fertility will largely be a matter of negotiation between male and female partners, but the choice to get a vasectomy only places a potential lifetime restriction on male fertility.

## 2 Data

The data used for this study comes from the U.S. Bureau of Labor Statistics' National Longitudinal Survey of Youth 1979 (NSLY79). The NLSY79 began in 1979 and has followed a cohort of young men and women aged 14-22 at the

initial survey over time. Data has been collected on use of male sterilization as a form of birth control since 1982. Therefore, the observations used in this analysis began in 1982. Data from the 1982, 1984, 1985, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, and 2004 surveys are used in this analysis. There were 6,088 male respondents to the 1982 survey and 3,677 male respondents to the 2004 survey.

According to the NLSY79 User's Guide, the NLSY79 includes three samples: a cross-sectional sample, a military sample, and a supplementary sample that includes blacks, Hispanics, and economically disadvantaged youths of other ethnicities. Due to funding constraints, fewer participants in the military sample could be interviewed after 1984 and fewer participants in the supplementary sample could be interviewed after 1990. In the exploratory data analysis, all three samples are used; however, the regression analysis is performed on both the total sample and the cross-sectional sample since it is nationally representative. The regression results using all three samples together are included in tables in the results sections, and relevant results using the cross-sectional sample are reported in the text for comparison.

The outcome of interest in this study is whether or not a man is sterilized. There are 769 men in data set who report having a vasectomy on at least one survey. For the data from 1982 to 2000, a man is classified as having had a vasectomy if he states that he uses male sterilization for contraception. In the 2002 and 2004 surveys, males who reported using sterilization as birth control in prior surveys were coded as such. Newly sterilized men answered that they had a vasectomy to the question of whether either themselves or their partners had an operation to prevent pregnancy. The observations after men initially report vasectomy are not used in the regression. This is problematic because men can have vasectomies reversed. If men do have a vasectomy reversal, they will not reenter the pool of those at risk of having vasectomy.

One of the two main exposures of interest in this study is whether men are more likely to have exceeded or just met their expectations for family size at the time they get a vasectomy. Coding men as having met their expectations, exceeded their expectations, or not yet met their expectations is quite complex. The data available in the NLSY79 provides information about whether or not a man was trying to have his last child; however, if a man answers that he was not trying, it is not clear whether the man exceeded his desired fertility or just did not want to have a child at that time. The classification schemes for the 1982 survey and all the surveys

that follow attempt to make a distinction between bad timing and exceeded expectations.

The classification scheme for initially coding men in 1982 relies upon their answers to questions about how many kids they currently have, how many kids they would ideally like to have, how many kids they expect to have, whether they are currently expecting, and whether or not they were trying to have a baby when their partner most recently became pregnant. The actual classification scheme is quite complex and has been included in an appendix. A man is classified as not having yet met his expectation if he says that he expects more than one child or if he expects one child but is not currently expecting a birth. This algorithm is somewhat problematic because it does not take into account men currently expecting multiple births. Men are classified as having met their expectations if they expect no more kids or only their current pregnancy and their actual number of kids is less than or equal to their ideal. If the men have exceeded their ideal, then they are classified as having exceeded their expectations.

In the survey years that follow 1982, there are no more questions about a man's ideal family size. The post-1982 classification scheme relies instead upon questions about whether a man has had a child since the last interval or is expecting and whether the man was trying to have a baby when his partner became pregnant. When this information is not available, the classification from the previous round is adopted unless the man expects more than one child or just one child and he is not currently expecting. These men are classified as not having yet met their expectations. Again, the entire classification scheme is included in the appendix. In both the 1982 and post-1982 classification schemes, men who can not be coded by the algorithm are labeled as unclassified. The observations for unclassified men are still included in the regression analysis.

The other main exposure of interest is gender balance within the family. Coding this variable is much easier. For each year that a man with children is surveyed, he is classified as either having all female children, all male children, or having gender balance.

There are six control variables: age, number of children, education, race, marital status, and female sterilization. Age is a matching variable in the conditional logistic regressions. This means that men who report being sterilized on a survey at age  $x$  are compared to other men age  $x$  with regards to expectations and gender balance. It is questionable whether age is the most appropriate time variable to match on in this analysis. It might be better

to use time since first birth or duration of marriage if this would be a better measurement of time at risk for vasectomy. Whatever time measure is used, it would be helpful to know at exactly what age sterilization took place. Just using age when the men report sterilization on a survey is problematic because men who miss surveys could have actually undergone vasectomy more than two years prior to their reporting it.

Number of children is not included as a control variable in the analysis related to expectations, but it is included as a control variable in the analysis related to gender balance within the family. It is necessary to take into account family size when examining gender balance because family size is strongly associated with both gender balance within a family and the choice to get a vasectomy. For instance, a man who has only one child can not achieve family balance and a man may choose to get a vasectomy because he can not afford more than three children.

Education is categorized as less than high school, high school degree, and more than high school. Race is also a categorical variable (Hispanic, black, and non-Hispanic, non-black). Marital status is controlled for by classifying men as either married or not married. Finally, female sterilization is a dichotomous variable coded as one if males report using female sterilization as a method of birth control. The percentage of men reporting using female sterilization as a form of birth control in any given year of the survey is usually about twice the percentage of men reporting using male sterilization as a form of birth control. The percentage of males reporting sterilization as a method of birth control increases over time as illustrated in Figure 1.

### **3 Ideal vs. Expectation**

As mentioned above, the 1982 classification scheme relies heavily on questions about men's expected family size and men's ideal family size. In coding the expectation variable, it became obvious that men's ideal number of children did not always align with the number of children they actually expected to have. In a few cases, men surveyed said that their family size was larger than their ideal family size. While more men might have felt this way upon facing an unplanned pregnancy, they might later include this child in their ideal number because their feelings change or because they don't want to call their child unwanted. The following table illustrates how the men's expectations and ideal number of children failed to align in their responses to the

### Males in NLSY79 using sterilization as method of birth control 1982–2000

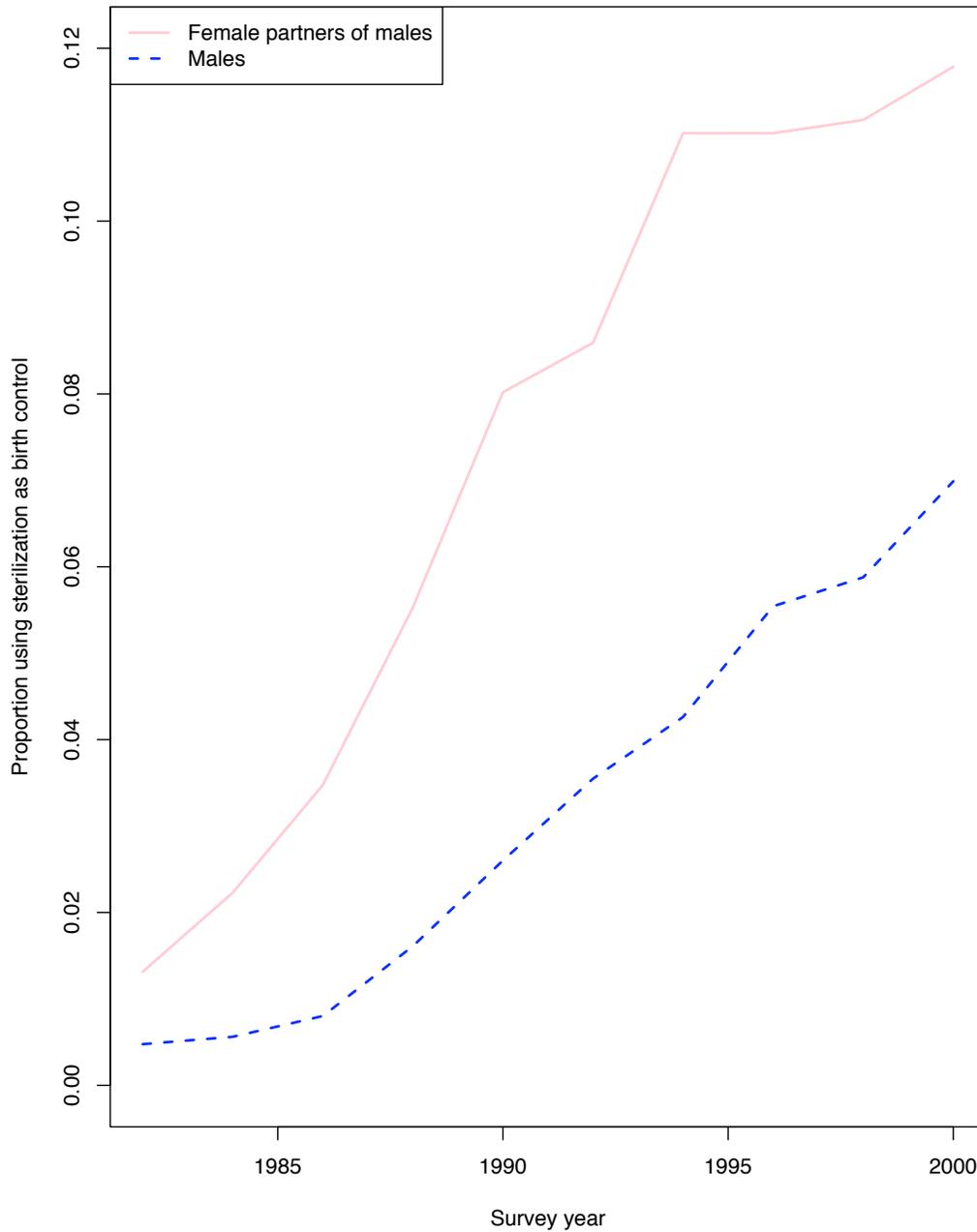


Figure 1: Comparison of use of male and female sterilization by men in NLSY79

1982 survey:

		<b>Expected number of children '82</b>						
		0	1	2	3	4	5	6
<b>Ideal '82</b>	0	341	37	36	4	1	0	0
	1	10	282	42	10	2	1	0
	2	68	82	2679	151	27	12	2
	3	11	19	107	1053	43	6	5
	4	10	5	59	47	518	18	7
	5	0	2	8	22	17	85	7
	6	2	0	2	3	13	2	49

Expectation and ideal also come into conflict when men say that they expect to have less children than their ideal. This discrepancy between ideal and expectation could be explained by a number of factors. Perhaps the man in question does not think that he could afford to have as many children as he would like or his partner desires to have fewer children than the man's ideal. It could also be the case that man does not expect to find a partner. According to the classification scheme, men who say that they expect no more children but whose ideal number of children is higher are classified as having met their expectations. In contrast, men who fail to answer the question about expectation, but who have yet to meet their ideal are classified as not having yet met their expectation. As illustrated by this example, the classification scheme is not always consistent. Perhaps those that fail to answer the expectation question or say that they are unsure about the number of kids they expect to have should be coded as unclassified.

This analysis is not about wantedness of the child after birth, which makes the use of ideal births to classify men as having exceeded expectations in 1982 a bit problematic. The post-1982 classification scheme does a better job at judging whether men have exceeded their expectation for family size without relying on the father saying he has had more children than his ideal family size.

## 4 Changing Expectations over Time

One of the major strengths of this analysis is that it relies upon a rich longitudinal data set. Using longitudinal data to assess whether a man has

exceeded or just met his expectations when he gets a vasectomy is ideal because men's expectations change over time. A man's expectation might change if he revises his family size expectation downward after his first birth when he realizes the enormity of the investment involved in raising a child, or a man might suddenly expect to have more children upon remarriage. Whatever the reason, in the overall data set, it is obvious that the average of men's expectations changes over time.

Fitting a regular linear regression to the data on age and expectation reveals a overall downward trend in total number of children expected as men get older. One gains new insights about changes in expectations, however, when the data is stratified by age at first birth. In Figure 2, plots of age versus expectation are stratified by age of first birth into six categories. Splines have been fit to the data to show non-linear trends in expectation as men age.

One of the most interesting features of the graphs is that the average number of children expected at the youngest ages is almost the same for all men who actually have their first birth above age 18. All of these men expect on average somewhere between two and three kids. The average expected number of children for men who have births before age 25 rises as these men age. In contrast, the average expected number of children for men who have births after age 24 seems to decline until around the time the men reach the age of their first birth. Then, the average expected number of births either rises a bit or remains flat.

As the following table illustrates, men in the different categories of age at first birth not only expect on average to have nearly the same number of births in 1979, they also expect on average to have their first birth at nearly the same age. This table is restricted to data from men who have not yet had a first birth when interviewed for the 1979 survey. Clearly, not all of these men in the later categories of age at first birth are planning on delaying their first births for so long. One theory to explain the men revising their expectations downward until around the age of their first birth would be that these men take longer to find a partner to mother their child. One way to assess the plausibility of this theory is to see if the men in the different age of first birth categories have different mean ages of first marriage. The data in the age at first marriage column supports the view that men who have births later also marry later; however, it is not clear whether these men delay marriage because they have not found a suitable partner or are just unwilling to settle down. From the data in the last column of the second table, it appears that in 1979 the men do not differ much in regards to the percentage

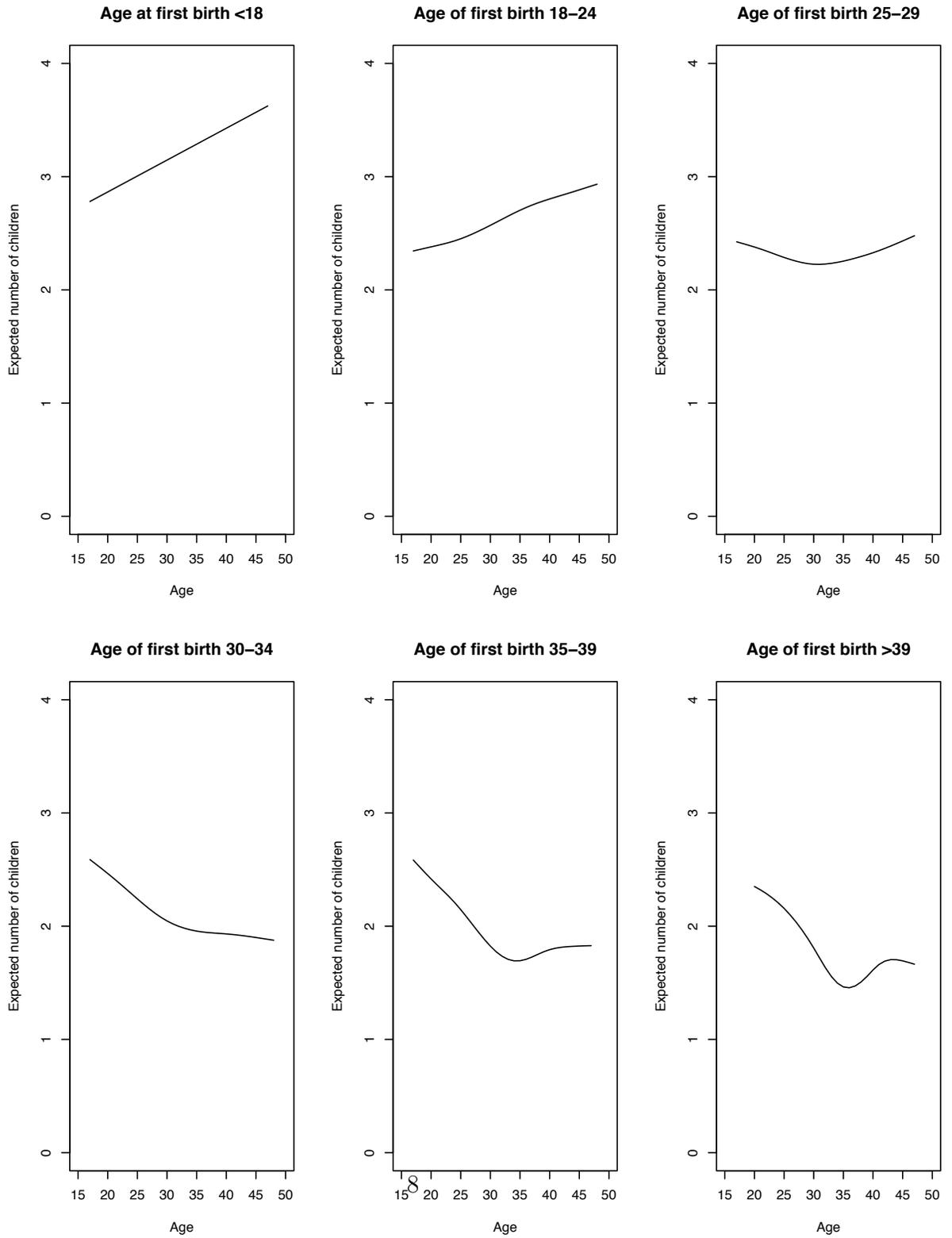


Figure 2: Total number of children expected by age

who expect to marry within the next five years. It could also be the case that these men delay marriage and childbearing until after completing their education or advancing their career. The comparison of men's average years of schooling in the four categories reveals that men with later ages of first birth have higher education on average.

Age first birth	Age '79	Expected AFB	Expected # kids
18-24	17.38	22.97	2.81
25-29	17.71	24.17	2.7
30-34	17.61	24.54	2.69
35-39	17.27	25.05	2.51

Age first birth	Educ	Age first marriage	% expect to marry in next 5 years
18-24	12.07	22.06	40.1%
25-29	13.52	24.62	43.9%
30-34	14.41	27.66	41.3%
35-39	14.95	30.46	41.3%

## 5 Family gender balance

By comparing the fertility patterns of men in the NLSY who report having a vasectomy, one can investigate whether gender balance influences a man's decision to stop childbearing. One way to do this is to build upon the basic idea of a parity progression ratio. Instead of just focusing on births, these more complex parity progression ratios also include sex distribution within the family (whether men have all girl children, all boy children, or both boy and girl children). After men have had their first birth, one compares the proportion of men having a son who go on to have a second birth to the proportion of men having a daughter who go on to have a second birth. If the proportion of men with one son who go on to have a second birth is lower than the proportion of men with one daughter who go on to have a second birth, then one could argue that the men prefer to have sons. In the NLSY79 data set, the proportion of men who have a son and go on to have a second birth is approximately equal to the proportion of men who have a daughter and go on to have a second birth (86.1% vs. 85.3% respectively).

While there is no sex selection apparent after the first birth among men

in the NLSY who report having a vasectomy, the same does not hold true for the second birth. After having a second birth that results in gender balance (one boy and one girl), only 37.8% of men with this birth pattern go on to have more children before having a vasectomy. In contrast, 49.7% of men who have two boys go on to have another birth and 55.3% of men who have two girls go on to have another birth. The disparity between the percentage of men with mixed families who go on to have a third birth and the percentage of men with either two boys or two girls who go onto have a third birth suggests preference for family gender balance. This trend also holds for third births but the differences in the percentages are not as large.

Birth		MF	M	F
1st	$N$	-	354	353
	$v$	-	49	52
	$1 - v/N$	-	86.1%	85.3%
2nd	$N$	299	155	152
	$v$	186	78	68
	$1 - v/N$	37.8%	49.7%	55.3%
3rd	$N$	201	41	32
	$v$	127	24	18
	$1 - v/N$	36.8%	41.5%	43.8%
4th	$N$	92	9	4
	$v$	65	6	2
	$1 - v/N$	29.3%	33.3%	50.0%

$N$ - number of men who reach birth category

$v$ - number of men who have a vasectomy after reaching birth category

$1 - v/N$ - percentage of men who go on to have another birth

While this parity progression ratio strategy is quite revealing, a conditional logistic model, which takes into account risk factors for vasectomy, would be useful to test statistically whether men prefer family balance. Using conditional logistic regression, the observations are grouped together by age (the matching variable), and the hazard ratios comparing men with family balance to men with just female children are computed for each age strata. A weighted average of these strata-specific hazard ratios is taken so that the results give an overall hazard ratio, which compares the hazard of having a vasectomy given a man has achieved family gender balance to the hazard of

having a vasectomy given a man has only female children. It is obviously important to include number of kids as a control variable in the regression. In addition, it is necessary to only include observations for men who have children. There are men who have vasectomies without ever having children, but their information does not tell us anything about sex preferences.

The regression results in the table below confirm the results of the parity progression ratio analysis. Men who have a balanced family are more likely to have a vasectomy than men who have either all boys or all girls controlling for family size. The hazard ratio in the full model comparing men who have a balanced family to men who have only girl children is 1.69, and the hazard ratio comparing men who have a balanced family to men who have only boy children is 1.61 (not shown). When only observations from the cross-sectional sample are used in the regression, the hazard ratio for men who have family balance compared to men who have just daughters is even higher, 1.91 in the full model. In contrast, the hazard ratio comparing men with family balance to men with just boys is lower, 1.52 in the full model. It seems from these results that men do not prefer one sex over the other, but they do prefer to have gender balance before getting a vasectomy.

	Model 1			Model 2		
	$\beta$	HR	SE	$\beta$	HR	SE
mf kids	0.5259	1.69	.1107*	0.5211	1.684	.1091*
m kids	0.0744	1.08	.1157	0.0444	1.045	.1157
# kids	0.1261	1.13	.0354*	0.2648	1.303	.0348*
highschool	-	-	-	0.7903	2.204	.1454*
college	-	-	-	0.7704	2.161	.1500*
married	-	-	-	1.1434	3.137	.1226*
f sterilization	-	-	-	-1.9425	0.143	.1831*
black	-	-	-	-1.4888	0.226	.1317*
Hispanic	-	-	-	-0.5092	0.601	.1034*

\* significant at .001 level

## 6 Exceeding expectations

A conditional logistic regression model can also be used to assess whether men who have exceeded their expectations are more likely to get a vasectomy than men who have just met their expectations. In this analysis, the observations

of men who have not yet had children are still included in the regression. Again, the observations are matched on age and the hazard ratios for each age strata are averaged to provide the overall results. It is important to mention that neither this analysis nor the one for gender balance accounts for the fact that there are repeated observations for the same person. This is problematic because the data likely violates one of the basic of assumptions of logistic regression: observations are independent of one another.

Prior to conducting the analysis, it is not clear whether men who have met their expectations are more likely to get a vasectomy then men who have exceeded their expectations. It could be that men plan on having vasectomies so they are more likely to do it after meeting their expectations. On the other hand, perhaps men are willing to take more drastic measures to ensure that the will not have anymore children after they have exceeded their family size expectations.

The results of the conditional regression analysis indicate that men who have exceeded their expectations are slightly more likely to have vasectomies compared to men who have just met their expectations. This result is not significant at the .05 level in the restricted model, but it is significant in the full model. The regression results obtained when only using the cross-sectional sample indicate a slightly higher hazard ratio for men who have exceeded their expectations compared to men who have just met their expectations, 1.79 in the full model. It is also worth noting that men who can not be classified by the coding system are significantly less likely to have a vasectomy compared to men who have met or exceeded their expectations.

	Model 1			Model 2		
	$\beta$	HR	SE	$\beta$	HR	SE
not met	-3.117	0.0443	0.213***	-3.179	0.0416	0.2136***
exceeded	0.347	1.4152	0.201	0.488	1.6286	0.2013*
unclassified	-0.942	0.3899	0.246***	-0.788	0.4550	0.2459**
highschool	-	-	-	0.689	1.9912	0.1372***
college	-	-	-	0.751	2.1186	0.1408***
married	-	-	-	1.481	4.3960	0.1049***
f sterilization	-	-	-	-1.831	0.1603	0.1700***
black	-	-	-	-1.112	0.3287	0.1191***
Hispanic	-	-	-	-0.279	0.7562	0.0993**

\*significant at .05 level, \*\*significant at .01 level, \*\*\*significant at .001 level

## 7 Conclusion

The results of this study indicate that men who have exceeded their family size expectations are more likely to have a vasectomy than men who have met their expectations. In comparison to the results of the gender balance analysis, the results of the expectation analysis are much more likely to be biased due to misclassification. The classification scheme would be more likely to misclassify a man as having met his expectations if he has really exceeded them than vice versa. Both analyses might be biased due to confounding by period time since it is not controlled for in either analysis. By not controlling for period time, it is assumed that a man who is 25 in 1982 is comparable to a man who is 25 in 1990. The men being compared in the age strata will never be more than eight years apart in period time since the original survey includes men 14-22. Still, confounding by period time may still exist if changes in prevalence of vasectomy over period time occur independent of changes in age, number of children, marital status, etc.

This study finds that men who have achieved family gender balance are more likely to have a vasectomy than men who have either all girl or all boy children. This result seems rather benign in comparison to a result that would indicate a preference for sons over daughters, but the preference for family gender balance could raise ethical questions in the coming years. Recent advancements have led to the development of medical technology which allows parents to have sperm sorted in order to increase their chances of having either a boy or a girl. Should parents be allowed to have control over the sex of their child? The results of this study indicate that there will likely be demand for the technology. At least among men getting vasectomies, there is a preference for a gender balanced family.

The issues raised in this study open up many other avenues for research. First and foremost, will the same results be observed among women in the NLSY79 who have a tubal ligation? Also, the section on changing expectations over time deserves more development. For instance, what factors precipitate a drop or an increase in the number of expected children? In what other ways besides educational attainment and age at first marriage do men who have first births in their thirties differ from men who have earlier first births? Finally, it would be interesting to compare couples who use tubal ligation as birth control to couples using vasectomy. The NLSY79 data will be useful in examining all of these questions.

## 8 Appendix

### 1982 Classification Scheme

It is really important that men be classified correctly as expecting more children, having the number of children they expected, or having exceeded their expectations in the first round of the survey. Classification in future rounds depends in part on codes given in past rounds. This is how men were coded in the first round:

1. Men were classified as not having yet met their expectations in 1979 if
  - (a) The men answered more than one to the question how many more kids do you expect to have (R00153.00).
  - (b) The men answered one to the question how many more kids do you expect to have (R00153.00) and were not expecting a child at the time (R00154.00).
  - (c) The men did not answer the question about how many kids they expect to have, but the ideal number of kids that they would like to have (R00132.00) is greater than the number of kids they have had (R00134.00). (Note: when the number expected is zero and the ideal is greater than number of kids they currently have, men are classified as having met their expectation-somewhat contradictory).
2. Men were classified as having met their expectations in 1979 if
  - (a) The men expected no more children (R00153.00) and their ideal number of children (R00132.00) was equal to or greater than the number of children they already had at the time (R00134.00).
  - (b) The men expected to have one child (R00153.00), and their partner was currently pregnant (R00154.00). Their ideal number of children was equal to the number of children plus the one they were expecting.
  - (c) The men expected to have one child (R00153.00), and their partner was currently pregnant (R00154.00). Their ideal number of children was greater than the number of children plus the one they were expecting

- (d) The men have no children and did not expect to have any kids.
3. Men were classified as having exceeded their expectations in 1979 if
- (a) The men expected no more children (R00153.00), and their ideal number of children (R00132.00) was less than the number of children they already had at the time (R00134.00).
  - (b) The men expected to have one child (R00153.00), and their partner was currently pregnant (R00154.00). Their ideal number of children was less than the number of children plus the one they were expecting.

Using these classification criteria, 5775 men were classified as not yet having met their expectations. 575 men were classified as having met their expectations, and twelve men were classified as having exceeded their expectations (or ideal). 41 men could not be classified using this criteria—largely based on non-response or indifferent responses to questions.

## Post-1982 Classification Scheme

Different criteria are used to classify men in the 1984 survey and beyond since the questions change. Here is a breakdown of the classification scheme:

1. Men are classified as not being interviewed if their response to the question about how many kids they expect is -5.
2. Men are classified as not having yet met their expectations if
  - (a) The men expect to have more than one child.
  - (b) The men expect to have one child and are not currently expecting (pregnant).
3. A man is classified as having met his expectations if
  - (a) The man is currently expecting a child (pregnant). He only expects to have one more child, and he answered that he and his partner were either trying to get pregnant or neither trying or not trying to get pregnant.
  - (b) The man is currently expecting a child. He only expects to have one more child. He answered that he and his partner were not trying to get pregnant, but he expected to have more kids in the last round. This is an attempt to disentangle timing from exceeding expectations.
  - (c) The man is not expecting anymore kids; however, he had a child since the last survey. The man reports that he and his wife were either trying to have the baby or neither trying nor not trying to have a baby.
  - (d) The man expects to have no more children. He has not had a child in the last round. His code in the last round was met expectations or not yet met expectations.
  - (e) The man is currently expecting. He does not answer the question about whether the pregnancy was planned. The total number of kids he expected in the last round is greater than or equal to the total number of kids he expects in this round.
  - (f) The man does not have any children currently, and he does not expect to have any children.

4. A man is classified as having exceeded his expectations if
- (a) The man is expecting a child (pregnant). He expects only one child. He says that he and his partner were not trying to get pregnant. The number of kids he had the last interview plus the one child he is going to have exceeds the number of kids he expected to have in the last round.
  - (b) The man does not expect anymore children. He had a child in the last round. He and his partner were trying not to get pregnant. They did not expect to have the child in the last round or they did expect the child (because they were pregnant) and were coded as having exceeded expectations.
  - (c) The man expects no more child. He has not had a child in the last round. His code in the last round was exceeded expectations.
  - (d) The man is currently expecting. He does not answer the question about whether the pregnancy was planned. The total number of kids he expected in the last round is less than the total number of kids he expects in this round.

## 9 References

Bureau of Labor Statistics, U.S. Department of Labor. National Longitudinal Survey of Youth 1979 cohort, 1979-2004 (rounds 1-21) [computer file]. Produced and distributed by the Center for Human Resource Research, The Ohio State University. Columbus, OH: 2004.

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