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Exploring the Effects of Student Aid on Attrition*

by Jacob O. Stampen and Alberto F. Cabrera

This study explores whether student financial aid reduces or eliminates financial reasons for dropping out of college. The approach uses a new student classification scheme to compare the attrition rates of aided and non-aided students during three successive years of undergraduate education in a statewide public university system. The issue is important for several reasons. First, the overall effects of financial aid on basic behaviors such as attrition are unclear and subject to controversy (Jensen, 1981; Leslie, 1986). Second, federal and state governments invest heavily in student financial aid programs (over $200 billion since 1970)[1] in the expectation that aid will benefit recipients. Furthermore, laws and regulations governing most student aid programs restrict eligibility to students defined by needs analysis systems as economically disadvantaged; the expectation is that aid will narrow the resource gap between economically disadvantaged students and more affluent students who are not eligible to receive aid. Thus, it is reasonable to expect that differences in attrition between the two groups (non-aided vs aided) are reduced commensurately with the reduction in financial differences.

This study focuses on the effects of student aid on attrition because it is logical for policy makers to expect that student aid enhances persistence (Jensen, 1981). Little is known, however, about whether current levels are adequate, whether aid eliminates financial barriers, or what types of students need more or less aid. Moreover, an extensive literature on attrition exists which provides a framework for exploring the effects of student aid, but also reveals that at present no firm basis exists for judging the overall effects of student aid. Nonetheless, important data exist which when combined with powerful analytical methods, may provide a basis for understanding the effects of student aid (Stampen and Fenske, 1984; Stampen and Cabrera, 1985).

The Literature

Attrition among college students is one of the most researched topics in higher education. The extensive literature identifies many factors, including ability, motivation, personal relationships, and a wide variety of demographic and financial variables, affecting attrition (Pantages and Creedon, 1978; Tinto, 1975; Attinasi, 1986). The literature also indicates that, except during major wars, attrition rates have remained stable for at least a century. Now, as in 1885, nearly half of all en-

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tering freshmen drop out before graduating from four-year institutions (Tinto, 1982). However, evidence suggests that student financial aid may have influenced attrition behavior. Several of the most recent studies have found most, if not all, forms of aid to have positive effects on recipients (Astin, 1964, 1975; Astin and Cross, 1979; Iwai and Churchill, 1982; Jensen, 1984; Odutola, 1982; Stampen and Cabrera 1985; Terkla, 1984; Voorhees, 1985).

There are several reasons preventing firm conclusions about the effects of student aid on attrition. First, researchers have generally limited themselves to comparing students receiving various forms of aid (e.g., grants, loans and work-study) with one another in order to determine which form was most effective; these comparisons have generally ignored comparisons between aided and non-aided students (Astin, 1964, 1975; Astin and Cross, 1979; Iwai and Churchill, 1982; Odutola, 1982; Voorhees, 1985). Those studies that do include non-aided students (Jensen, 1981, 1984; Terkla, 1984), give little feel for how these comparisons should be interpreted. Thus, it remains unclear whether aid recipients would be expected to have higher, lower, or the same attrition rates as non-aided students. Surprisingly, there is also a lack of information about whether aid recipients constitute a homogeneous group, receive the same forms of aid over successive years, or differ by their available financial resources.

A series of recent studies have responded to several of the above problems by developing a student classification system which can be used to compare aided and non-aided students (Stampen, 1983, 1985; Stampen and Fenske, 1984; Stampen and Cabrera, 1984, 1985). The system (see description below) defines three categories of aid recipients according to the unique way that students within each category qualify for aid. Tests of the system on data representing a variety of institutions reveal that while aided and non-aided students share similar demographic and academic performance characteristics, non-aided students have substantially higher average incomes. Income differences are also noted among the three types of aid recipients (Stampen, 1985). Furthermore, the results also indicate a high degree of year-to-year consistency in category membership (Stampen and Cabrera, 1985)[2]. This study extends the use of this classification system to attrition.

If laws and regulations governing student aid limit the distribution of aid to economically disadvantaged students and if the only difference between aided and non-aided students is the availability of financial resources with which to pay college attendance costs, then aid would reduce financial reasons for dropping out of college if it fills the resource gap between aided and non-aided students. Thus, if the two assumptions are accurate, the attrition rates of aided students would be expected to be neither higher nor lower but the same as those of non-aided students. The preceding serves to introduce discussion concerning the principal hypothesis to be tested in this study.

The research on unmet need (unmet need = total costs - student resources - parental contribution - student aid) yields mixed support for the first assumption. Hearn, Fenske and Curry (1985) found high levels of unmet need among specific subgroups of students (i.e., older female students with dependents and students attending private colleges and universities). However, they also noted that the concept was subject to a variety of interpretations making it difficult to determine whether levels of unmet need affecting most aid recipients are sufficient to deter persistence. In another study, Hansen, Reeves and Stampen (1985) show that unmet need was in most cases reduced or eliminated when earnings from work (other than work-study assistance) are taken into account. On the second assumption, Stampen and Fenske (1984) found few differences, other than income, between non-aided students and several categories of aid recipients.

There remains the problem of differentiating the effects of student aid from other variables affecting attrition rates. This can be accomplished by incorporating other variables known to affect attrition (e.g., academic ability and demographic variables) and by testing hypotheses specific to them. Additional hypotheses for testing variables unrelated to student aid are presented in the methodology section.

Method

The Sample

This study relies on a random sample of 5,000 student records drawn from the University of Wisconsin System's longitudinal data base. This sample accounted for about 20% of the 1979 freshman class attending any of the 13 public universities affiliated with the system. These students were followed through three successive years of undergraduate education, the last measure being taken after the third year of attendance. The final sample, after eliminating non-degree seeking students, contains 4,980 student records. Comparisons between characteristics of students in the sample and official System reports indicated that the sample accurately mirrors the freshman class of 1979.

Data Analysis

Linear probability models[3], called by the generic name of Logit, were used to test differences in attrition rates between aided and non-aided students, while taking into account the effects of several demographic and academic performance variables. Logit analysis is, to some extent, similar to regression analysis. The principal difference is that the latter is appropriately applied to continuous dependent variables whereas Logit analysis is designed to explore the effects of discrete and continuous variables upon dichotomous dependent variables such as the one in this study (the probabililty of a student either persisting or dropping out).[4]

A Logit additive model[5] was applied to the data for each academic year covered by the study. Variables pertaining to gender, ethnic status, high school performance (HSP) and age were incorporated into the model in order to account for other sources of variance while at the same time contrasting attrition rates for aided and non-aided students. The selection of variables was limited by available data, however. Consequently, variables such as motivation and college grade point, although desirable, could not be included.

The Variables

Attrition. The dependent variable in this study is the probability of a student dropping out during each academic year, provided that the student was enrolled during each preceding academic year. This criterion eliminated about 300 stopouts. Stopouts (i.e., students who dropped out but later reenrolled) were deleted from the study after initially dropping out because previous research indicated that their behavior differs qualitatively from that of persisters (Tinto, 1975; Pantages and Creedon, 1978). Since about half of all students take more than four years to complete their college education (Tinto, 1982), a three year period is too short to explore differences between persisters and stopouts.

Student Aid. The effects of student aid on the attrition rates of recipients is the principal question pursued in this study. It was hypothesized that the attrition rates of economically disadvantaged students (i.e., aid recipients) and economically advantaged ones (i.e., non-recipients) should be similar to the extent that aid eliminates differences between these groups in the ability to pay for college. An ideal test of this hypothesis would control for family income while contrasting attrition

rates between aided and non-aided students. Unfortunately, the data do not contain information about the incomes of non-aided students. However, several recent studies, based on four state based student resource and expenditure surveys which did contain information on the incomes of all students (Stampen and Fenske, 1984; Stampen, 1985; Stampen and Cabrera, 1985), indicated that the student classification scheme used in this study can serve as a reliable proxy for income. This is particularly so for students who either do not receive aid or receive it under the most stringent criteria (see Appendix A). Following this aid scheme, students were classified according to four mutually exclusive categories at the beginning of each academic year. The classifications are as follows:

No-Aid. This category included students who did not receive assistance from any student aid program.

Need 1. This category included students who received aid from at least one federal, state or institutional program governed by either the Pell or Uniform Methodology need analysis systems. The types of aid included are Pell grants, Supplemental Educational Opportunity Grants, State Student Incentive Grants, National Direct Student Loans, and College Work Study as well as numerous smaller programs.

Need 2. This category included students who received Guaranteed Student Loans, but did not receive aid from any programs serving Need 1 recipients.

Non-Need. This category included students who received aid from non-need based categorical programs, but not from programs serving Need 1 or Need 2 recipients (e.g., merit scholarships and veterans and employee benefits). Roughly half of the students in this category received merit scholarships.

Gender. This variable was selected because prior research found attrition rates to differ by gender (Bean, 1982; Austin, 1975, Tinto, 1975). Consistent with these findings, it was hypothesized that males would be less likely to dropout than females.

Ethnicity. This variable contained two subcategories. The first represented students who were of Caucasian or Asian extraction, while the second represented students of African, Hispanic or American Indian extraction. Caucasians and Asians were combined because University of Wisconsin System records indicated that the attrition rates of these groups were similar to one another, but markedly lower than those of the ethnic groups comprising the other category. Similar findings by Voorhees (1985), Tinto (1975) and Astin (1975), supported the hypothesis that Caucasians and Asians would be less likely to dropout than the other students.

High School Performance. The literature frequently cites precollege ability as an important variable explaining success in college (Pantages and Creedon, 1978; Tinto, 1975, Astin, 1975). Tinto (1975) argues that high school grade point average is a good predictor of college performance, since it reflects both ability and motivation. In accordance with Tinto (1975), this study employed percentiles summarizing grades earned during the four years of high school. Even though the same high school graduation percentile may represent different levels of performance in different schools, we assume the standard can be applied to the entire sample because roughly nine out of ten students attended high school in Wisconsin, a state which has sought to establish uniform educational standards.

The high school percentile scale ranged from a low of 0 to a high of 100, but was divided into quartiles according to the actual scores of students in the sample. The quartiles were as follows: low (less than 53), medium low (54-72), medium high (73-86) and high (more than 87). Consistent with recent research findings (Pascarella, Terenzini and Wolfle, 1986; Voorhees, 1985), it was hypothesized that low high school performers would be more likely to drop out than higher performing students.

Age. The average age of college students has increased substantially over the past decade. Also, it is known that large proportions of independent students who receive student aid are beyond the traditional college age (Stampen, 1985). Both of these factors justified including age among the independent variables. Consequently, in the beginning of each academic year, students were divided into three age categories. During the freshman year, these were 17-19, 20-22 and 23 or older. One year was added to each of these categories during each successive year of college attendance.

Previous studies have generally not reported age as a factor affecting attrition (Pantages and Creedon, 1978). Consequently, it was hypothesized that older students would exhibit similar attrition rates as compared to their younger counterparts.

The Procedure

Given our large sample relative to the actual student population, all relevant contrasts were tested at the .01 level of significance. It was assumed that by setting the test at this level, the probability of finding spurious significant effects due to large sample sizes (type II error) would be reduced (Hays, 1981). Out of the 192 possible combinations among the five independent variables, 139 were identified for the first academic year. For the second academic year, 129 were available. For the third academic year, 119 were identified. The small number of observed combinations relative to the potential, prevented us from testing for higher order interactions among independent variables when contrasting the attrition rates of aided and non-aided students.

Results

The results indicate that during each academic year aided students, regardless of recipient type, displayed similar attrition rates compared to non-aided students (see the Appendix Table for basic statistical results). Overall, aided students seemed slightly less likely to drop out than non-aided students. However, this pattern is not significant either in statistical or absolute terms (see Table 1).

Table 1
*Non-Aided vs. Aided Students
Propensities to Withdraw During First Three Years of College*

Academic Year	Non-Aided	Need 1	Need 2	Non-Need
First	.341	.335	.290	.271
Second	.243	.249	.218	.231
Third	.160	.147	.152	.078

Note: These probabilities were computed from the estimated parameters (i.e., beta weights) shown in the Appendix Table.

The most important contrast among students in the sample is between non-aided students and Need 1 recipients because the latter average substantially lower incomes than non-aided students (see Appendix A), and constitute the principal beneficiaries of federal, state and institutional student aid programs (Stampen, 1985). However, despite income differences, the results indicate that both types of students share similar demographic and academic profiles (see Appendix B) and virtually identical attrition rates during each academic year. To the extent that similarities extend to

other variables such as those included in Tinto's theory of attrition (e.g., college performance and motivation), it is reasonable to assume that similarities in attrition rates can be attributed to aid.

Table 1 also shows that Non-Need recipients were less likely to drop out than other students. This tendency may be attributed to the fact that roughly half of the Non-Need recipients graduated in the top 15 percent of their high school graduating classes (see Appendix B). Also, since financial aid for this group was most often awarded on the basis of academic merit, student aid may not only have encouraged persistence because it improved the student's ability to pay for college education, but also, as suggested by Tinto's (1975) theory, because it enhanced motivation. Given the past academic performance of a large percentage of its members, it is perhaps surprising that the attrition rates on Non-Need recipients were not significantly lower than those of non-aided students.

Need 2, a group composed mainly of GSL only recipients, also displays attrition rates similar to that of non-aided students (see Table 1). This finding, to some extent, disputes previous research suggesting that reliance on loans correlates with high attrition rates (Odutola, 1982; Jensen, 1981). If this were true, Need 2 students, who rely primarily on loans, would be expected to display higher attrition rates than other aid recipients who rely primarily on grants. A plausible explanation is that Need 2 recipients, like non-aided students, are essentially from middle income backgrounds (Stampen, 1985; also see Appendix A) and therefore potentially less reluctant than other types of aid recipients to assume debt (Stampen, 1980). Thus, generalizations based on the behavior of Need 2 recipients should not be extended to other types of aid recipients.

A finding which is consistent with prior research, and pertains to all types of students, is that the longer students remain in college, the less likely they are to drop out. Tinto (1975) and others (Pantages and Creedon,1978) argue that students become increasingly committed to completing their degrees as their investment of time and money in higher education increases.

Gender. Consistent with our hypothesis, significant differences between the attrition rates of males and females were observed during the first academic year. Males were significantly less likely to drop out than females (see the Appendix Table). In this respect, being male accounted for an almost 8% better chance of persisting than being female. However, gender differences disappeared after the first year. Tinto (1975) suggested that females are less committed than males to the goal of obtaining an academic degree. Bean (1982) on the other hand, found lower levels of confidence among female students and argued that this factor explains their higher attrition rates. Whatever the cause, the results of this study indicates that gender differences only affect attrition during the first academic year.

Ethnicity. Consistent with our hypothesis, significant differences were found between the attrition rates of students in the Caucasian and Asian category and students of African, Hispanic and American Indian category in both the first and third academic years of college (see the Appendix Table). In this respect, the former were substantially more likely to persist than the latter during the first and third years of college (a 10% and 16% better chance respectively). However, differences were not significant during the second year. Altough prior research provides evidence indicating that ethnicity affects attrition (Astin, 1975), the literature is silent concerning the pattern observed in this study.

Age. In contrast to our hypothesis, age displayed a significant relationship with attrition during the freshman year. Results indicate that younger students (17-19 years) were 15% more likely to persist than 20-22 year olds and 18% more likely to persist than students 23 years old or older (see the Appendix Table). In short, the

older the student, the higher the propensity to withdraw. Previous studies have not found differences in attrition rates attributable to age, and theory does not provide any guidelines for interpreting the results. It should be remembered, however, that the sample population only indicated students who were first time freshmen in 1979. It may be that age is a relevant factor because older students may have outdated academic skills, families of their own, or other responsibilities which make it difficult for them to adapt to college life, thus hampering their ability to persist. Also, these findings may not apply to stopouts who enroll for specific courses or return to complete a degree.

High School Performance. Consistent with our hypothesis, significant differences were noted in the attrition rates of low and high performing students in high school during all of the years studied. As shown in Table 2, there is a strong linear effect whereby lower quartile performers are significantly less likely to persist than those in the next highest quartile. However, the effects of high school performance decreases over time, so that by the end of the third year the gap between the bottom and top quartiles is quite small.

Table 2
*Effects of High School Performance on
Propensities to Withdraw During First Three Years of College*

Academic Year	Low HSP	Med. Low HSP	Med. High HSP	High HSP
First	.341	.215	.181	.104
Second	.243	.190	.132	.100
Third	.160	.121	.070	.089

Note: These probabilities were computed from the estimated parameters (i.e., beta weights) shown in the Appendix Table.

This finding plausibly supports Tinto's (1975) argument that high school performance is a useful predictor of persistence in college because it reflects both motivation and ability. Similar findings were also reported by Astin (1975), Jensen (1981), Voorhees (1985).

Discussion

This study examined the role of student aid, gender, ethnic status, academic performance in high school, and age on attrition rates, showing how each of these variables affects attrition rates during each of the three successive years of undergraduate education. It is important to note that this study is based on a single type of institution, public universities, located in a single state, and limited to a small number of relevant variables. Until this study is replicated for other types of institutions in other settings and includes a broader range of variables, generalization of the findings should be approached with caution.

The results of this study indicate that the overall effect of student financial aid seems to eliminate financial reasons for dropping out of college. Differences between aided and non-aided students in propensity to withdraw were not statistically significant during any of the years studied. Given the sample's homogeneity in terms of tuition and living expenses (roughly nine out of ten students were state residents), it may be that student aid narrowed the gap between aided and non-aided students

enough to negate the effect of unmet need on students' decisions to withdraw from college. Thus the results of this study, might not be replicated in situations where financial support is not sufficient to substantially offset the effect of unmet need.

It is also clear from the findings that student aid is only one of several factors affecting attrition rates. Therefore, aid by itself should not be expected to overcome other effects such as those associated with gender, ethnic background, academic performance prior to college, and age. In this respect, the variable most predictive of attrition was academic performance during high school. Students who graduated in the lower half of their high school classes faced a constant struggle throughout the years of undergraduate education to keep up with better prepared students. This finding is not surprising considering the fact that over half of the students in the sample graduated in the top thirty percent of their high school classes.

The findings also indicate the need for institutions to consider other ways to assist important, but under represented, constituencies. Particularly disturbing is the fact that students who were of African, Hispanic, and American Indian origins were significantly more likely to drop out after both the first and third years of college than were Caucasians and Asians; by contrast, differences in attrition based on gender and age disappeared following successful completion of the first year. Since the purpose of this study was limited to exploring differences between aided and non-aided students, the research design prevented uncovering factors underlying the effects of ethnic background. However, findings do indicate the need for future research on this important topic.

This study also emphasizes the importance of employing classification systems that differentiate among different types of aid recipients. The classification scheme employed in this study enabled us to establish a reasonable basis for contrasting truly needy students from others and to differentiate the effects of aid from other variables affecting attrition. Without such a scheme it is difficult to establish any basis for evaluating the overall effects of student aid. With few exceptions (Voorhees, 1985), attrition studies incorporating student aid have been limited to exploring the effects of individual programs. That approach overlooks the facts that individual types of aid are combined in aid packages and that students tend to retain their original classification over time (Stampen and Cabrera, 1985). In addition, this study highlights the importance of using research designs and statistical techniques consistent with the nature of attrition. As this study demonstrates, studies assuming that the effect of demographics, financial aid and prior high school performance can be extrapolated beyond the beginning of the first semester of college (Astin, 1975, Iwai and Churchill, 1982) may not be able to single out relationships that are recurring from those that occur only during the first academic year.

Future research should also incorporate theory into the analysis of the effects of aid upon attrition. So far attrition studies have followed two non-overlapping paths, one empirical and the other theoretical. Studies involving student aid are typically empirical and proceed without conceptual frameworks which makes it difficult to establish contexts for explaining and expanding upon findings. On the other hand, those employing theory, while illuminating the role of demographics, academic performance and motivation on attrition, have neglected the effects of ability to pay for college education and as a result, have not provided a great deal of help to policy makers and practitioners concerned about how and to what extent financial aid enhances persistence.

The approach employed in this study contributes to both types of research. It contributes to theory by offering a classification scheme which, when combined with powerful analytical techniques such as Logit, can be used as a basis for describing interactions between finances and behaviors already incorporated into theories of attrition. However, the approach also has immediate practical utility. If, for exam-

ple, policy-makers are made aware of a specific group of students having unusually high attrition rates, such as older women with dependents, institutional researchers can use Logit analysis to verify whether a problem exists and to assess the effects of efforts to reduce attrition rates.

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[1]Estimated from data in Gillespie and Carlson, 1983.

[2]Need 1 recipients, for example, tended to either retain aid or drop out the year following the loss of aid. Also, initially non-aided students rarely became aid recipients. However, when such transitions did occur they were generally limited to students obtaining Guaranteed Student Loans. Conversely, continuing GSL recipients more often moved to non-recipient status than into any other category, perhaps reflecting similarities in the average incomes of Need 2 and non-aided students. Bimodal distributions were observed in the incomes of non-need based aid recipients. This may account for the roughly equal, although infrequent, tendencies to move either into the Need 1 or non-recipient categories (see Appendix A for income related information). Longitudinal stability in the four group classification scheme indicates that these categories constitute a useful tool for analyzing the effects of student aid, and, further, that the categories themselves can serve as a proxy for income (see Stampen and Cabrera, 1985).

[3]The maximum likelihood algorithms, embodied in the Generalized Linear Interactive Modelling package (Baker and Nedler, 1978), were used to implement the logit analysis.

[4]Basically, logit analysis assumes that the observed dichotomous values of the dependent variable follow an unobserved logistic probability distribution. Based on this assumption observations are grouped on the basis of the independent variables. The probability of the dependent variable, then, is estimated for each group, and the log of the odds is employed to transform the probability estimates into a continuous variable. In this respect, logit analysis seeks to assess the effects of a set of independent variables upon the probability function by an iterative process of estimation so as to minimize the difference between the log of the observed frequencies and the log of the expected frequencies. The resulting estimated parameters express the expected difference in the logit between two groups of a given variable (Feinberg, 1980; Hanushek and Jackson, 1977). The selection of Logit over methods commonly used in earlier studies, such as the Ordinary Least Squares (OLS) approach, Discriminant Analysis or other procedures related to OLS, was dictated by the nature of the dependent variable under study. According to Tinto (1975), Logit analysis is an appropriate technique for studying attrition because of ". . . the categorical nature of dropout as a dependent variable" (p. 120). Logit analysis not only captures the probability distribution embedded within categorical dependent variables, but avoids violating the assumptions of functional specification and homoscedasticity that the direct application of OLS to binary dependent variables is likely to generate (Hanushek and Jackson, 1977). Also, Press and Wilson (1978) found Logit analysis to be a better procedure than Discriminant Analysis for both classification or prediction purposes.

[5]This model, known as the additive model, was selected ". . . because the effect on the logit value of any one variable does not depend upon the values for other explanatory variables." (Hanushek and Jackson, 1977 p. 192). The model tested for each academic year was as follows:

$$\text{Log } (p/1\text{-}p) = a + \sum_{i=1}^{3} B_{1.i} \text{ Aid} + B_2 \text{ Gender} + B_3 \text{ Ethnic} + \sum_{i=1}^{2} B_{4.i} \text{ Age} + \sum_{i=1}^{3} B_{5.i} \text{ HSP}$$

Where:

$\sum_{i=1}^{3} B_{1.i}$ represents the beta weights contrasting non-aided students with three categories of aid recipients.

B_2 represents the beta weights contrasting two categories of students on the basis of gender.

B_3 represents the beta weights contrasting two categories of students on the basis of ethnic background.

$\sum_{i=1}^{2} B_{4.i}$ represents the beta weights contrasting three categories of students on the basis of age.

$\sum_{i=1}^{3} B_{5.i}$ represents the beta weights contrasting four categories of students on the basis of academic performance in high school.

Appendix Table

Effects of Student Aid, Selected Demographic Variables and High School Performance (HSP) on Attrition During Three Years of Undergraduate Education

	First Year		Second Year		Third Year	
	B̂	B̂/SD(B̂)	B̂	B̂/SD(B̂)	B̂	B̂/SD(B̂)
Constant	-.658	-8.74	-1.138	-10.99	-1.657	-11.30
Nonaided vs. Need 1 Aided Students	-.0282	-.33	.0332	.32	-.0994	-.67
Nonaided vs. Need 2 Aided Students	-.2351	-1.45	-.1396	-.80	-.0591	-.31
Nonaided vs. Non-need Aided Students	-.3308	-1.88	-.0663	-.28	-.8128	-2.36
Males vs. Females	.3201	4.44**	.2065	2.24	-.0106	-.08
White and Asian vs. Other	.4238	2.44**	.1247	.51	.8991	3.00**
Age 1 vs. Age 2	.5989	5.62*	.2356	1.54	.2333	1.08
Age 1 vs. Age 3	.7441	4.03*	.5962	2.27	.6298	1.70
Low HSP vs. Medium Low HSP	-.6371	-6.88**	-.3095	-2.53**	-.3295	-1.92
Low HSP vs. Medium High HSP	-.8528	-8.91**	-.7498	-5.79**	-.9294	-4.93**
Low HSP vs High High HSP	-1.491	-13.63**	-1.061	-7.88**	-.6703	-3.82**
N	4654		3488		2869	
G^2	150.3		122.7		120.5	
(df)	(128)		(111)		(108)	

*p $\lesssim$ .01 two-tailed; **p $\lesssim$ .01 one-tailed.

[1]Basic statistical results of the application of the aggregate model are displayed as follows: Under each year, the first column shows the beta weight between specific groups within each variable (e.g., males vs. females). The second column shows ratios between the beta weights and standard deviations. The sample size (N) and the scaled deviance (G^2), an indication of the model's goodness of fit are shown at the bottom of each column.

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Appendix A
Average Family Incomes of Dependent Students Attending
Public Colleges and Universities

	Nation[1]	Four States[2]	UW-Madison[3]	UW System
No Aid	N.D.	$32,400	$39,000	N.D.
Need 1	$16,037	$15,450	$21,600	$17,245
Need 2	$23,260	$27.650	$27,000	$25,707
Non-Need	$23,065	$25,000	$29,000	$17,643

Sources and Notes:

[1]Stampen, 1985. Year of Data: 1983-1984.
 Institutions: Public 2 year and 4 year.

[2]Stampen and Fenske, 1984. Year of Data: 1981-82/1983-84.
 Institutions: Public 4 year institutions in Arizona, California, New York and
 Wisconsin.

[3]Stampen, 1983. Year of Data: 1981-82.
 Institution: University of Wisconsin-Madison.

[4]Stampen and Cabrera, 1985. Year of Data: 1979-80
 Institutions: 13 public universities in Wisconsin.

N.D. = No Data.

Appendix B
Percent Distribution of Demographic and Academic Performance
Characteristics by Student Classification
University of Wisconsin System-Freshman Class of 1979

	No Aid	Need 1	Need 2	Non-Need
Gender				
Male	50	44	47	46
Female	50	56	53	54
Ethnic				
Caucasian & Asian	98	92	97	86
African, Hispanic and American Indian	2	8	3	14
High School Performance				
Low	25	28	31	12
Medium Low	24	25	28	25
Medium High	25	25	23	26
High	26	22	19	48
Age				
17-19	88	85	82	89
20-22	9	13	13	9
23 and over	3	2	5	2

Source: University of Wisconsin System Freshman Class of 1979 (thirteen public four-year universities belonging to the system).