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A Survey of Student Term-Time Employment: Choosing Subpopulations for Further Study

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Despite substantive research at the national level, local institutional information on students who work off campus while enrolled full time has been sparse. After considering the need for local studies examining the causes of term-time employment and employment's role in persistence, this research explores the appropriateness of using total student cohorts as opposed to subpopulations restricted to financial aid applicants. Distinguishing between residency groups is also considered. The analyses demonstrate that employment was locally substantial, persistence studies are best paired with total populations, and employment studies are best paired with populations restricted to students who have financial aid data on file.

Over the last 20 years, student term-time employment (i.e., students working off campus while enrolled on campus full time) has increased at colleges and universities (King & Bannon, 2002; Mortenson, 2001; Horn & Berktold, 1998; Cuccaro-Alamin, 1997; Horn & Maw, 1994; O'Brien, 1993; Gleason, 1993; Stern & Nakata, 1991; Applied Systems Institute, Inc., 1983). Throughout the 1980s, national data suggests that about 55 percent to 66 percent of postsecondary education students worked while attending classes, i.e., term-time (Mortenson, 1995; Horn & Maw, 1994; O'Brien, 1993; Hansen, Reeves, & Stampen, 1985; Stern & Nakata, 1991). During the early- to mid-1990s, the rate rose to 72 percent and increased to 74 percent nationally by 2000 (King & Bannon, 2002; Cuccaro-Alamin & Choy,1998). When considering those who worked at least one semester while enrolled during the early- to mid-1990's, longitudinal data indicated higher percentages, ranging from 87 percent to 89 percent of undergraduates (Cuccaro-Alamin, 1997; Fitzgerald, Berkner, Horn, Choy, & Hoachlander, 1994).

Term-time work percentages also appeared higher if using cross-sectional instead of longitudinal data, ranging from 75 percent to 80 percent among students attending four-year colleges or universities (High,1999; Horn & Maw, 1994). Smaller percentages have been reported for those attending full time: as low as 47 percent in 1995 at two- and four-year institutions (Orszag, Orszag, & Whitmore, 2001; Cuccaro-Alamin, 1997). The number of hours worked per week also appears to be increasing. Analysts have expressed concern about the growing number of students who are working full time while enrolled full time, which nearly doubled from 5.6 percent in 1985 to 10.4 percent in 2000 (King & Bannon, 2002; Orszag, Orszag, & Whitmore, 2001; Cuccaro-Alamin, 1997).

Throughout the 1980s, statistical increases in paid employment by full-time students were considered less attributable to increases in 18- to 19-year-old students and more attributable to increases by their 20- to 24-year-old counterparts (Stern & Nakata, 1991; Applied Systems Institute, Inc., 1983). Census Bureau data covering 1987 to 1999 indicate annual part-time employment rates (including summer as well as term-time employment) of full-time college students ages 18 to 19 increased from 36.7 to 38.1 percent over the 12 years spanning 1987 to 1999 (Mortenson, 2001). Part-time rates for 20- to 21-year-old and 22- to 24-year-old students, though having peaked in the mid 1990s, similarly showed modest net increases from 40.5 to 41.0 percent and 39.2 to 44.2 percent, respectively. Concurrent increases in full-time employment were, for ages 18 to 19, 4.8 to 7.0 percent; for ages 20 to 21, 5.9 to 9.4 percent; and for ages 22 to 24, 8.2 to 15.1 percent (Mortenson, 2001). These data indicated greater increases in full-time employment than part-time, and greater annual employment increases for 20- to 24-year-old students than for 18- to 19-year-old students (Mortenson, 2001).

This study examines a local institution—North Carolina State University (NC State)—to help understand and address questions that remained unanswered by earlier national and regional research. On one hand, previous research suggests that student earnings from term-time employment have become important components of student financing, substantially supplementing the cost of attending college (King & Bannon, 2002; Hansen, Reeves, & Stampen, 1985). On the other hand, previous research also demonstrates that term-time employment can lower students' persistence by decreasing their integration into campus life (Choy, 2000; Horn & Berktold, 1998; Cuccaro-Alamin & Choy, 1998; Horn & Maw, 1994; Gleason, 1993; Hall 1990; Ehrenberg & Sherman,1987; Anderson, 1981; Kohen, Nestel & Karmas, 1978; Astin, 1975).

Method

Assessing the extent to which results from national, regional, and other institutional studies apply at NC State called for supplementary data analysis. Multivariate analyses were required to address research questions about the causes, advantages, and risks of off-campus, term-time employment at NC State. Prerequisite, however, was the need for simpler descriptive and univariate analyses to provide background for further research and to meet immediate informational needs.

Two prefatory needs at NC State were: (a) to determine the overall status of student employment, and in anticipation of further study, (b) to determine appropriate subpopulations for multivariate analyses. Addressing the latter not only facilitates multivariate research design, but also provides background information concerning advantages and limitations of populations and key variables to consider when interpreting the results. These

needs translated into this study's two research questions and their corresponding research hypotheses:

1. What was the status of student employment at NC State?
Given the negative effect of term-time work on persistence indicated in national studies, concern at NC State centered on the freshman class because it had the highest rate of student withdrawal. However, national and institutional studies have shown freshmen tend to work markedly less than upperclass students in two ways. First, work intensity (hours worked per week) generally increases from term to term (Harding & Harmon, 1999). Second, the percentage of students working tends to increase from term to term, generally doubling by the senior year (Hammes & Haller, 1983). With this in mind, while national 72 percent to 89 percent ranges indicated previously for four-year college employment included all grade levels, overall freshman employment at NC State was estimated to be roughly half that range, i.e., around 35 percent to 40 percent. This range could be assumed to be substantially lower if considering only full-time freshmen (Cuccaro-Alamin, 1997) or higher if considering the low unemployment setting of NC State during 1995-96 (see Setter & Schoenecker, 1987). These observations from research in other campus settings suggested three research hypotheses for study at NC State:

> *Hypothesis 1.1:* A substantial number of full-time students work during their freshman year.
> *Hypothesis 1.2:* The percentage of full-time students who work increases each successive semester.
> *Hypothesis 1.3:* The number of hours worked per week by full-time students increases in subsequent semesters.

2. What populations and subpopulations are best suited for multivariate research into employment and persistence?
After addressing research question 1, the most advantageous directions for further local research were: (a) determining employment's relationship in lowering persistence (persistence is the dependent variable) and (b) determining why students work during the term (employment is the dependent variable). A key issue in research design was whether to use total populations (i.e., all residents or all commuters) or to use subpopulations restricted to only those students submitting financial aid forms, which for the remainder of this paper will be referred to as "FAF" populations (e.g., "FAF residents" and "FAF commuters"). Each approach offered advantages and disadvantages.

• *Total Populations and Persistence Studies.* Using total populations appears to be the most appropriate method for multivariate persistence studies because the dependent variable is

Given the negative effect of term-time work on persistence indicated in national studies, concern at NC State centered on the freshman class because it had the highest rate of student withdrawal.

dichotomous (i.e., persist versus dropout) with persisters outnumbering withdrawals many times over. If using FAF subpopulations, these low numbers of withdrawals would be further decreased and underrepresented. Using total populations would keep withdrawals at a maximum. That financial aid variables were restricted to FAF populations was not considered a serious drawback. Missing data for aid-amount variables (e.g., loan, gift, work-study, and total aid) could be replaced with zeros and thereby made available to non-FAF students.[1]

The most serious drawback was that the only family income figures available for *all* students were student reported. These figures tend to be less reliable than the parent-reported figures available with FAF populations. This was problematic because family income was considered as a possible key control variable. If the family income variable was substantial enough to justify this concern, parent-reported figures would have to be used to ensure accuracy. However, student-reported figures for non-FAF students (the rest of the total population) would also have to be included. Whether this was feasible with any methodology depended on the strength of agreement between the two measures of family income. These issues formed the basis for two research hypotheses tested:

Hypothesis 2.1: Family income has a high degree of correlation with other variables likely to be used in future analyses.
Hypothesis 2.2: Student-reported and parent-reported family income figures have a reliable one-to-one correspondence.

• *FAF Populations and Employment Studies.* Pairing multivariate employment studies with FAF populations appeared appropriate and preferable to imputing missing data into total populations. Additionally, it was assumed that financial variables, in particular, would play key roles in predicting employment. FAF populations would have financial data from the financial aid database, which included variables not available for all students in total populations (e.g., need, unmet need, and expected family contribution [EFC]). Also, the FAF population would have available parent-reported family income figures for each student in the population, which could be used in preference to the less reliable student-reported figures. Further, there would not be a proportional disparity favoring either workers or non-workers. The dependent variable would likely be continuous (e.g., hours worked per week) or, if dichotomous, workers and non-

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[1]Aid amount figures (loan, gift, work-study, and total aid) for FAF populations closely approximated those of total populations with respect to Pearson correlations and *p*-values within semesters when blanks or missing data were replaced with zeros (for non-FAF students). However, blanks or zeros could not be justified for need, unmet need, and EFC.

workers would be comprised of about the same numbers of students.

However, FAF populations might represent their total-population counterparts disproportionately with respect to employment or family income. The decision to use FAF populations could be strengthened by establishing that financial aid form submission did not vary significantly with employment despite its dependence on family income. It could be further strengthened if financial aid variables were substantially consequential in predicting employment. These issues formed the basis for three of the research hypotheses tested:

> *Hypothesis 2.3:* Employment is dependent on financial aid variables.
> *Hypothesis 2.4:* Employment is independent of financial aid form submission.
> *Hypothesis 2.5:* Financial aid form submission is dependent on family income.

• *Residency as a Subpopulation.* This study distinguishes between residents and commuters because the two populations are determined to be dissimilar with respect to employment and other key variables, thereby warranting separate treatment. Reaching this determination began with a question: Were the relationships of these two groups to employment and other key variables different enough to justify forming subpopulations based on residency? This question then formed the basis for a general research hypothesis:

> *Hypothesis 2.6:* Employment and other key variables vary substantially with residency.

The Sample
The population used for this study was the entering freshman class of summer/fall 1995 at NC State.[2] Subsets of this final population were established based on two variables: semester of enrollment and residency.[3] This resulted in six populations of residents and commuters across three semesters: fall 1995, spring 1996, and fall 1996. For a given semester, students who resided in a residence hall, fraternity house, or sorority house

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[2]Total enrollment of the entering freshman class of summer/fall 1995 was 3,528. This number was diminished by the inclusion criteria (i.e., new, full-time freshmen in degree programs, in-state residency (NC), United States citizens, under 20 years of age, not married, and completed and returned a usable freshman survey), which excluded 1,227 students. As a result, the total population for this study was 2,301, or 65.2 percent of the total freshman class.

[3]Students with extremes in employment were considered atypical and not in keeping with the purpose of this study. Examination of off-campus income ranges prompted a final elimination decision to exclude students who earned more than $4,000 per semester (which translated into 75 hours per week at minimum wage). The number was low (6 total) and their removal was thus a minor adjustment made to reduce controversy.

were considered "residents," while all other students were considered "commuters." For each of these six residency subsets, a corresponding population was developed based upon FAF submission. Thus, over three semesters, submission status considered with residency status formed four basic categories of students per semester: all residents, residents with financial aid data (FAF residents), all commuters, and commuters with financial aid data (FAF commuters).

Data and Variables
Data were obtained from four campus sources: (a) a freshman survey,[4] (b) student records, maintained by the Office of University Planning and Analysis, (c) financial aid data from the Office of Scholarships and Financial Aid,[5] and (d) North Carolina wage and salary data from the University of North Carolina system database.[6]

Student-reported family income was arranged into low, medium, and high categories based on a combination that considered natural breaks in income ranges of the resident population, and balancing the three categories so that there were about the same number of students in each category. Student-reported family income for 2,038 of 2,299 freshmen (261 missing values) was grouped into income categories of low (less than $40,000), medium ($40,000 to $60,000), and high (greater than $60,000). Parent-reported family income was also distributed into categories in the same way.

Figures 1-4 examine research hypotheses 1.1, 1.2, and 1.3. These figures show the percentages of students in categories of work intensity (i.e., estimated hours of work per week) during fall 1995, spring 1996, and fall 1996 for all residents, FAF residents, and commuter populations.

Table 1 addresses research hypothesis 2.1. The table displays estimates, *t*-statistics, and *p*-values, measuring linear association with family income of selected variables, as determined by a series of univariate *t*-tests using fall 1995 residents.[7]

To address research hypothesis 2.2, we made comparisons between student self-reported parental income and

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[4]The freshman orientation survey, conducted by the Office of University Planning and Analysis, provided student-reported measures of parental income, parental educational attainment, and intention to work.

[5]These data included, for academic year 1995-96, parent-reported measures of family income. A similar set of data were received for academic year 1996-97 with a 1995 student adjusted gross income figure.

[6]Earnings were reported quarterly and thus indicated the individual earnings of students during one of four annual quarters, which were then adjusted to semester earnings figures. Conversion of this adjusted earnings figure to hours per week per academic semester was estimated by dividing it by minimum wage and determining a range of error based on the average number of hours the student may or may not have worked over the December holidays. The biggest assumption in this conversion was assuming employment at the minimum wage.

[7]Estimates indicated the direction of the relationship and the steepness of the slope. The null hypothesis was that the regression coefficient (slope of the least squares line) equaled 0, i.e., the suspected dependent variable was actually
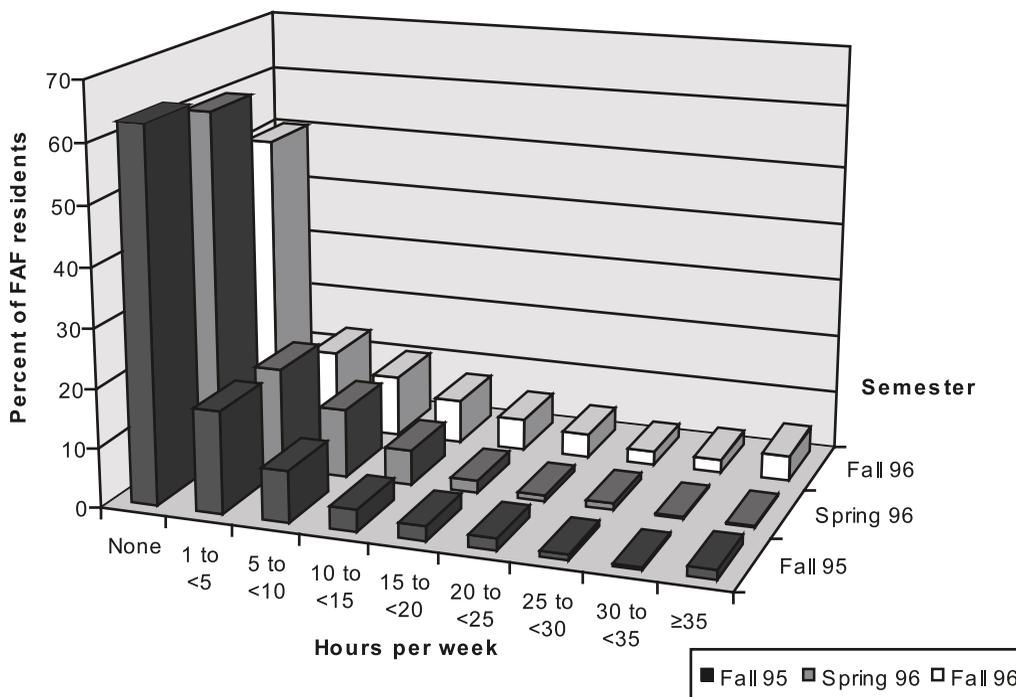
Figure 1
Distribution of All Residents in Hours-per-Week Categories
over Three Semesters
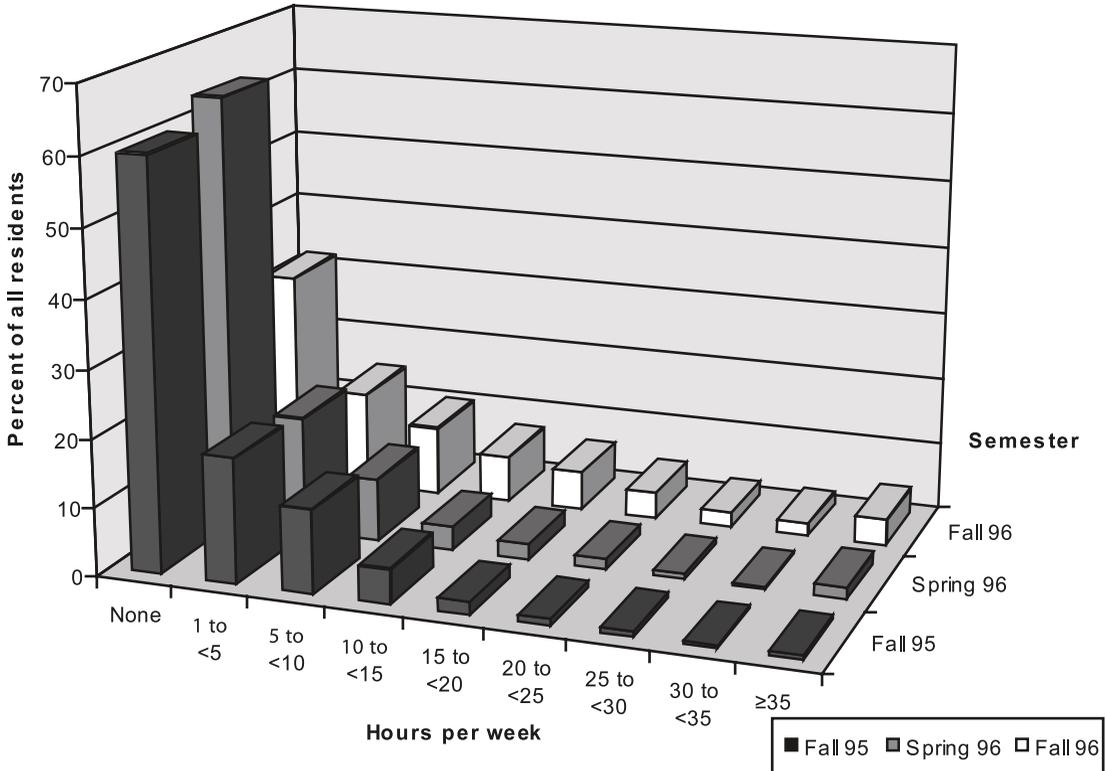
parent-reported parental income figures from the financial aid database using the 1,123 students who had both figures on record. A first approach matched these different data formats in ordinal income categories of $10,000. We developed a grid and determined percentages of self-reported figures that fell into matched cells. A second approach distributed parental-reported income figures from the financial aid database into low, medium, and high categories, using the same method used to distribute student-reported figures. To test research hypothesis 2.3, a series of univariate *t*-tests for fall 1995 and spring 1996 semester residents and commuters determined interval-level

independent of the independent variable. The *p*-value was for the two-sided alternative hypothesis that the slope of the independent variable was not zero. The *p*-value was the probability of observing a *t*-statistic at least as large as the observed *t* if the null hypothesis were true.

variables' strengths of relationship with employment.[8] Pearson correlations and *p*-value ranges were provided for those variables whose *p*-values were less than 0.10 (see Tables 2 and 3).[9]

Percentages of students who worked were calculated for FAF and total resident and commuter populations by family income over the first three semesters of enrollment. Figure 5 displays first semester results for these populations, i.e., percent-

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[8]Univariate R^2 values with significant *p*-values for ordinal and dichotomous variables were few.

[9]The Pearson correlation (*r*) was a measure of the strength of linear association, ranging from -1 to +1, and carried the sign of the slope, indicating the direction of the relationship. The higher its absolute value, the stronger the degree of association. Thus, if *r* =0 there was no increasing or decreasing trend in the relationship between an independent and dependent variable. The *p*-value was for the two-sided alternative hypothesis that the slope of the independent variable was not zero. The *p*-value was the probability of observing a *t*-statistic at least as large as the observed *t* if the null hypothesis were true.

Table 1
**Table 1
Independent Variables Significantly Related to
Parent-reported Family Income for
Entering FAF Residents in Fall 1995**

Variable	All Residents		Residents from Low-income Families	
	Estimate	*t*-value	Estimate	*t*-value
SAT total score	21.76	8.36****	5.96	3.62***
1994 income	-0.43	-2.44*	0.19	-1.90**
Anticipated work	-214.74	-3.57***	--	--
Unmet need	-2.14	-5.16****	-0.91	-2.54*
EFC	2.55	41.70****	1.26	6.56****
Total aid	-3.43	-11.27****	-1.06	-5.01****
Loan amount	--	--	0.09	3.25**
Gift amount	-5.73	-15.08****	-1.93	-8.54****
Work-study amount	-26.12	-7.78****	-2.88	-1.70

*p<.05, **p<.01, ***p<.001, ****p<.0001 corresponding to right-hand tail areas.

ages of total freshmen and freshmen employed fall 1995 in triads of family income. These calculations were used to test research hypotheses 2.4, 2.5, and 2.6.

Further tests on research hypotheses 2.5 and 2.6 were created by using total-population percentages of students, which determined the categories of student-reported family income by residency. These data were complemented by development of FAF population percentages of students in categories of student-reported family income by residency, specifically for those students submitting financial aid forms. Submission rates of financial aid applications were determined for categories of student-reported family income levels by residency.

Results and Conclusions

The Status of Student Employment
• *Hypothesis 1.1 was confirmed.* A substantial percentage of freshmen worked off campus while attending full time. In the first semester of their freshman year, 36.4 percent of 1,822 residents worked and 41.9 percent of 477 commuters worked. Of the total population, 37.5 percent worked. The total freshman second-semester figure was 41.5 percent.[10] That compared well

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[10]It was difficult to determine from secondary sources if full-time freshmen have been predominantly non-workers in other studies. Generally, attention to all relevant variables (e.g., full-time, dependent undergraduates age 16-19 at

Figure 3
Distribution of all Commuters in Hours-per-Week Categories
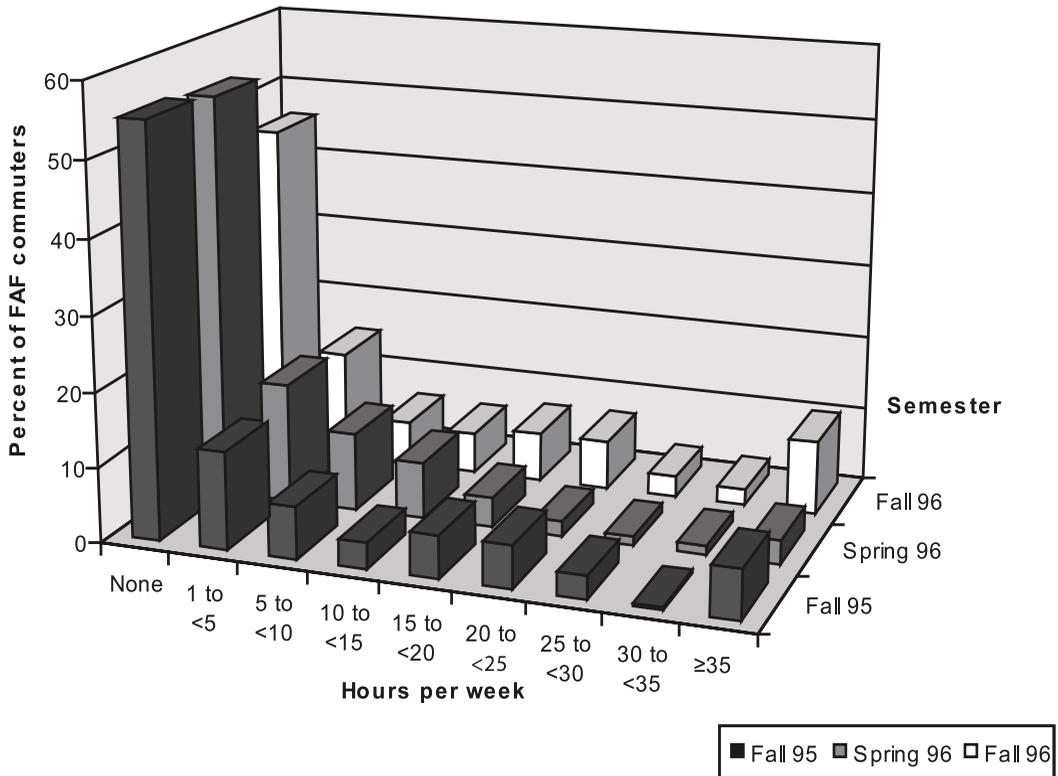**over Three Semesters**
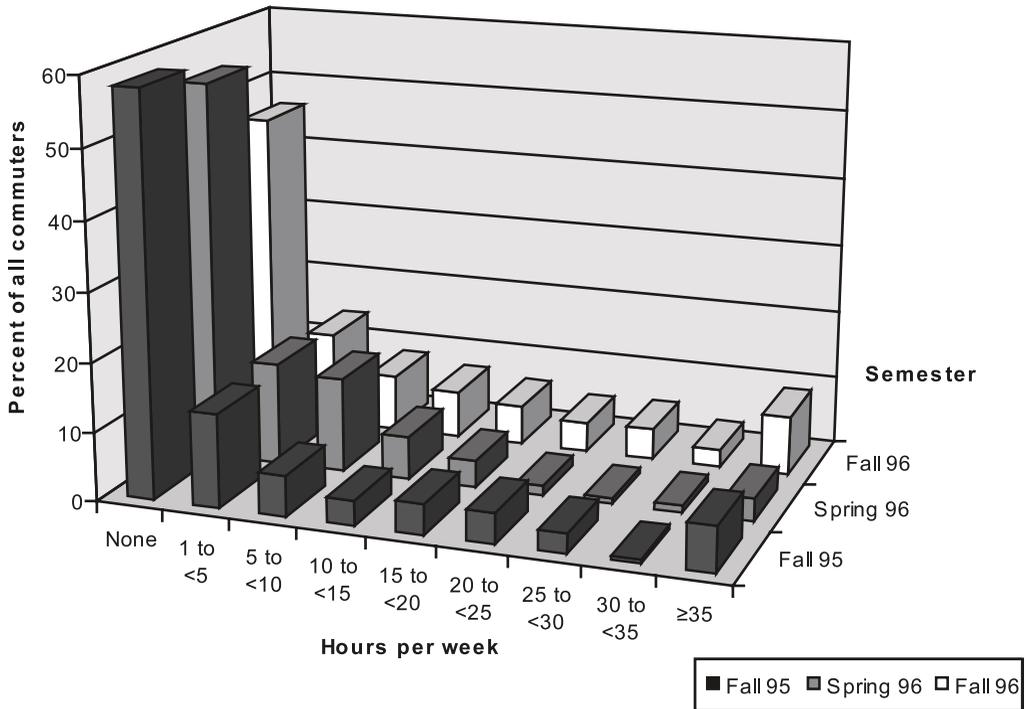
with the 1994 University of California at Los Angeles Freshman Survey, which found 42.8 percent employment among full-time freshmen at public universities, 90 percent of whom were 18-19 years old (Mortenson, 1995).

• *Hypothesis 1.2 was confirmed.* The percentages of students working while attending full time increased each semester. The percentage of working students increased among residents from 36.4 percent in the initial fall 1995 semester, then to 40.5 percent in the spring 1996 semester and 48.8 percent in the fall

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four-year public institutions, in freshman year, etc.), would have produced subsets too small to find statistical significance when making comparisons among subsets (e.g., Horn & Maw, 1994). The 1993 BLS report that 46 percent of full-time college students were employed (Mortenson, 1995) appeared applicable, but it included proprietary and less-than-two-year institutions as well as students of all ages.

1996 semester. Among commuters, the percentage of working students grew from an initial 41.9 percent to 44.9 percent in the spring 1996 semester, then to 54.1 percent in the fall 1996 semester. (These increases can be seen as reductions in non-working students, i.e., the "none" categories, over three semesters for total resident and commuter populations in Figures 1 and 3 respectively.) The increasing percentage of students working in later semesters was consistent with similar reports from various times and settings (Mortenson, 2001; Carroll & Chan-Kopka, 1988; Hammes & Haller, 1983; Astin, 1975).[11]

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[11]Astin (1975) was one of the first to note at the national level that freshmen worked fewer hours than in subsequent years. Carroll & Chan-Kopka (1988) reported a leveling-off, i.e., the percent employed increased during sophomore year but decreased afterward. From this study, it appeared a more comprehensive understanding would require some accounting of those students who worked the highest hours the preceding semester and subsequently dropped out.

Table 2
Interval-level Independent Variables Significantly Related to Employment Intensity for FAF Residents over Three Semesters

| Independent Variable | Pearson Correlations | | |
	Fall 1995	Spring 1996	Fall 1996
Unmet need	0.17700****	0.11935*	0.21062****[b]
Total aid	-0.05143[a]	-0.09924***[b]	-0.07663*
SAT total score			-0.11432***[c]
Academic index			-0.11591***[c]
Gift amount	-0.05920*	-0.08053**	-0.07823*
Need		-0.06672[a]	
Loan amount[d]		-0.05243[a]	
Family income			-0.06300[a]
Work-study amount[d]			-0.05566[a]

Note: Variables in the fall 1995 column were all freshman-year variables: in all cases they were the best predictors of fall 1995 employment intensity. Sophomore-year variables were better predictors for spring 1996 and fall 1996 employment intensity and were the versions used in the spring 1996 and fall 1996 columns, with 2 exceptions: for need and work-study amounts for spring 1996 and fall 1996 respectively, only the freshman-year versions were significant (at p<.10).
[a]Variables were significant at the p<.10 confidence level.
[b]Cumulative form of variable is significant but not as significant as sophomore year form. Cumulative unmet need: 0.11887 at p<0.0049, cumulative gift amount: -0.06606 (1193) at p<0.0225, total aid amount: -0.06228 at p< 0.0315.
[c]Univariate statistics were also available for total resident population: academic index: -0.0777 at p<0.0024, and total SAT: -0.0545 at p< 0.0331.
[d]Expressed as "percent of cost" yielded similar figures. Work-study as percent of cost: 0.05532 at p<0.0879, loan amount as percent of cost: -0.05454 at p<0.0597.
$*p<.05, **p<.01, ***p<.001, ****p<.0001$ corresponding to right-hand tail areas.

• *Hypothesis 1.3 was only partially confirmed.* Only from year to year, rather than semester to semester, did employed students appear to work greater numbers of hours per week. Figure 1, for example, shows working residents in the 1- to 5-hours-per-week category decreased from 18.4 percent as freshmen to 14.2 percent as sophomores, while those working greater than 35 hours per week increased from .06 percent as freshmen to 3.9 percent as sophomores. Total population year-to-year decreases of workers in low-work hours categories also held when the low-work-hours categories were extended to range from 0 to 10 hours per week (from 72.4 percent as freshmen to 49.7 percent as sophomores), 0 to 15 hours per week (from 81.9% to 63.6%), or 0 to 20 hours per week (from 88.0% to 75.6%).

On the other hand, within the freshman year (term to term), an overall increase in the greater hours per week categories was not evident. Instead, there were slight decreases in the high-hours categories and small increases in the low-hours categories. (This was very likely due to withdrawal of fall semester freshmen in higher hours categories, since term-time off-campus work has been shown to decrease persistence.) Nevertheless, this short-term (within academic year) departure from Hypothesis 1.3 was small and did not reflect the overall trend. Year-to-year employment intensity increased for commuters as well as residents and this was evident from both FAF and total populations (see Figures 1-4). This finding was consistent with Harding & Harmon (1999), who found seniors at their study's research university worked twice as many hours as freshmen worked. Because our study defined work intensity as an estimate of hourly work (quarterly earnings divided by minimum wage), the conclusion may be partially a result of increases in pay, not hours. Harding & Harmon (1999) also found hourly pay increased.

Dependent variables and subpopulations
• *Hypothesis 2.1 was confirmed.* Family income showed a high degree of correlation with other variables likely to be used in future analyses. With respect to both total ($t=8.36$, $p<.0001$) and low-income ($t=3.62$, $p<.0003$) populations, family income was significantly related to total SAT score for fall 1995 residents (see Table 1). It was similarly related to most financial variables, which is not very surprising because the financial variables—unmet need, EFC, total aid, gift amount, and work study amount—were derived largely from family income. Loan amount was not significantly related to family income overall but was significant among the low-income student population. Anticipated work intensity and 1994 (previous year) student income were also significantly related to family income, increasing as family income decreased (see Table 1). Interestingly, employment intensity did not appear among the variables reported in Table 1. It was independent of family income throughout the freshman year, but marginally significant ($p<.10$) for first-semester sophomore residents (Table 2).

• *Hypothesis 2.2 was not confirmed.* Student-reported and parent-reported family income figures did not show a reliable one-to-one correspondence. Using the grid approach (see Method), matched hits in each $10,000 income bracket ranged from 31 percent to 54 percent, the latter being in the extreme highest and extreme lowest ranges. It was immediately clear that a wide discrepancy existed. Merging adjacent cells improved the hit range to around 80 percent in high and low ranges, but not so for the middle ranges, due to students marking mid-income ranges more often than parents.

Table 3
Interval-level Independent Variables
Significantly Related to Employment Intensity
for FAF Commuter over Three Semesters

Independent Variable	Pearson Correlations		
	Fall 1995	Spring 1996	Fall 1996
Cost	-0.15049*[b]	-0.26782****[d]	
EFC			0.43422****[c]
Unmet need		-0.22410*[d]	
Loan amount		0.1184[abe]	
Gift amount	-0.1230[abe]		
Need			0.16862[ad]

Note: Variables in the fall 1995 column were all freshman-year (financial aid variables), which in all cases were the best predictors of fall 1995 employment intensity.
[a]*Significant at the p<.10 confidence level.*
[b]*Freshman form of variable.*
[c]*Sophomore form of variable. EFC was also significant at 0.05 level for freshman year version (0.20412) and cumulative version (0.17676).*
[d]*Cumulative form of variable. Cost was also significant at 0.001 level for freshman year version (-0.22220) and sophomore year version (-0.21647). Unmet need was also significant at 0.1 level for sophomore year version (-0.2153). Cumulative need also was significant at the 0.10 level for fall 1996 semester employment intensity.*
[e]*Loan amount as a percent of cost (freshman year version) was actually a better predictor (p<.05) of 1996 semester employment intensity than was loan. Freshman year gift as a percent of cost yielded similar figures (-0.1202 and p<0.0694).*
*p<.05, **p<.01, ***p<.001, ****p<.0001 corresponding to right-hand tail areas.

Using the alternative approach, comparisons between analogous low-, medium-, and high-income groups showed at least a more consistent proportion of hits across family income groups. Percentages in parent-reported income categories (less than $21,000; $21,000 to $33,000; and greater than $33,000) matched well with percentages in the low, medium, and high categories of student-reported family income (less than $40,000; $40,000 to $60,000; and greater than $60,000). There were 807 matched categories for the total of 1,123 students with both figures on record, for an overall hit rate of 71.9 percent.[12] These comparisons suggested the feasibility of using parent-reported data supplemented by student-reported data, but only after having previously converted each to ordinal-scale measurement (i.e., low, medium, and high family income).

[12]There were 705 hits of 974 freshmen residents with both figures on record, with a hit rate of 72.4 percent, and of 149 freshmen commuters with both figures on record, 102 or 68.5 percent were consistent in category assignment.

• *Hypothesis 2.3 was confirmed.* Employment was significantly dependent on financial aid variables. Moreover, these included need, unmet need, EFC, and cost, (for which missing data would need to be imputed if using total populations). For residents (see Table 2),[13] financial aid variables significantly associated with employment intensity ($p<0.05$) were unmet need and gift aid over all three semesters, and total aid in the spring and fall 1996 semesters. For commuters, those significantly associated with employment intensity were cost, unmet need, EFC, gift amount, and need (see Table 3). However, in caution to *t*-tests, multivariate analyses might show stronger or weaker associations when controlling for family income or academic ability.

• *Hypothesis 2.4 was confirmed.* Employment was independent of financial aid form submission, and descriptive data were adequate to demonstrate this research finding.[14] Figures 1-4 indicated FAF populations were in proportion to their total-population counterparts in terms of percentages in categories of work intensity. Figures 1 and 2, for example, show nearly identical percentages in work hours categories between total and FAF residents respectively, with both populations showing similar increases in numbers working and hours worked as discussed previously. Figures 3 and 4 also show similar patterns for commuter FAF and total populations, although not quite as nearly identical as with residents due to lower numbers.

Likewise, Figure 5 shows proportionality between FAF and total populations in terms of overall percentages of working students. While family income levels represented by the populations differed, differences present in total populations were simultaneously present in FAF populations.

• *Hypothesis 2.5 was confirmed.* Financial aid form submission was dependent on family income. Descriptive data were adequate to demonstrate this.[15] Whether resident or commuter, the lower the income, the higher the submission rate of financial aid forms, and vice versa. Overall submission was 89.3 percent from students in the lower-income category, with a 73.9 percent submission rate by middle-income students, and a 43.9 percent

Whether resident or commuter, the lower the income, the higher the submission rate of financial aid forms, and vice versa.

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[13]In Tables 2 and 3, *p*-values tested the null hypothesis that the distribution of employment intensity did not depend on the value of a given independent variable. This also could have been expressed as a null hypothesis that the slope of the regression line equaled zero.

[14]Because financial aid form submission was dichotomous, univariate *t*-tests were not appropriate. However, univariate tests using logistic regression confirmed no dependence between submission and hours worked. For fall residents, for example, the Likelihood Ratio Chi-Square was not significant.

[15]Because financial aid form submission was dichotomous, univariate *t*-tests were not appropriate. However, univariate tests of submission versus family income using logistic regression confirmed significance. For fall residents, for example, the Likelihood Ratio Chi-Square was 278.3 with *p*<0.0001.

**Figure 5
Percent of Total and Employed Fall 1995 Freshmen
Per Triad of Family Income**

Legend:
- >$60K
- >$60K and employed
- $40-$60K
- $40-$60K and employed
- <$40K
- <$40K and employed

X-axis categories: Total residents, FAF residents, Total commuters, FAF commuters
X-axis label: Population
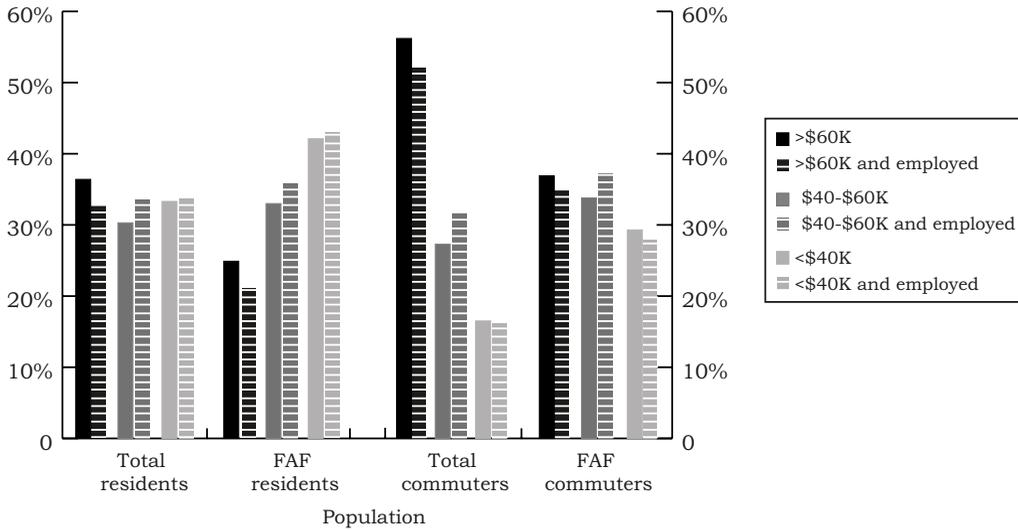
rate by the highest-income students. As a result, fewer higher-income students and more lower income students were represented in FAF populations. Compared to the total resident population, the population of residents submitting forms (i.e., the "FAF residents") contained 10 percent fewer high-income students and 8 percent more low-income students. Similarly, compared to the total commuter population, the population of commuters submitting forms contained 15.9 percent fewer high-income students and 4.5 percent more low-income students.

Figure 5 also shows the combined effect of the dependency of the family income variable on both financial aid form submission and residency. While total residents showed a near equal representation of family income levels, the FAF resident population consisted of a greater proportion of low-income residents and a lower proportion of high-income residents. A reverse situation was true for commuters: disparities in family income were marked in the total population, while the FAF commuter population showed similar family income percentages. The tendency toward lower representation of higher-income students in FAF populations counteracted the top-heavy family income of total commuters, resulting in a fairly even distribution of the three income groups among the FAF commuters. Subsequent semesters reflected these same patterns.

• *Hypothesis 2.6 was confirmed.* Employment and other key variables varied substantially with residency. Employment expressed as percentages of students working varied with residency, with

greater percentages for commuters. As shown in Figures 1-4, the percentages of students in the no work ("none") category are noticeably higher for residents than for commuters across all semesters. Also higher are the percentages of commuters in higher employment intensity ranges throughout the freshman year.

Another key variable, FAF submission, varied substantially with residency. Residents submitted applications at a higher rate than commuters across all student-reported income levels. The 1,285 out of 1,822 residents submitting FAFs (i.e., FAF residents) translated into an overall submission rate of 70.5 percent of residents, while submission was lower from commuters (48.0%). (The total or combined population response was 65.9%.)

As suggested above, family income varied substantially with residency. Family income ranges were selected in order to achieve near equal distributions of fall 1995 residents within three categories (low, medium, and high family income). This is evident from Figure 5, which shows fall 1995 total residents fairly evenly distributed across income groups within a few percentage points of 33.3. In contrast, total commuters were comprised of a much greater percentage of high-income students than low-income students (see Figure 5).

Limitations in the Generalizability of Results

Results of this study should not be applied to other institutions. One institution is not sufficient to represent a population of institutions. Characteristics among institutions that are similar in some obvious respects (e.g., public doctoral-granting institutions) can be extremely dissimilar with respect to other characteristics that bear directly on this study. For example, representation of types and predominance of employment opportunities (on-campus, work-study, off-campus) vary widely among institutions, as do local unemployment rates. While the results of this study were not intended to recommend a universal methodology applicable to all institutions, the study nevertheless could serve to guide efforts on other campuses in resolving similar research questions.

Summary and Recommendations for Further Study

This study compiled a general and preliminary overview of the relationships among student employment and other variables for entering freshmen at a large, public, land-grant, southeastern university during academic year 1995-96. The study determined the status of student employment locally and the subpopulations most appropriate for subsequent multivariate analyses. Methodology was limited to descriptive statistics and univariate analyses (*t*-tests).

About 42% of students were employed during their freshman year, and percentages of students working, as well as the number of hours worked by employed students, increased in subsequent semesters. This finding was in keeping

with estimated national percentages of working freshmen of similar ages at similar institutions. It confirms that at NC State, student employment has become an important component of student life and therefore is an important issue for further research. Student employment's relationships with financial and other key variables were tested in a series of hypotheses, which provided the basis of support for recommendations. In general, analyses show that persistence studies are best paired with total populations, while employment studies are best paired with populations restricted to students who have financial aid data on file.

Based on our findings, we offer seven recommendations for further study in student employment:

1.   Conduct further research both on the causes of student term-time employment and its relationship to persistence. For NC State students, off-campus employment has been an increasingly important component of student life. Not only were there high percentages of entering freshmen working while enrolled, but there also were increases in both numbers working and weekly earnings over the first three semesters.

2.   Use separate studies to examine employment among commuter and resident populations, because family income, financial aid form submission, and percentage of students working varied substantially with residence (see Hypothesis 2.6). Further supporting separate studies were the contrasting significance patterns between the groups when considering other variables. Residents' *t*-tests (see Table 2) suggested a general pattern of negative associations between employment intensity (i.e., estimated hours per week) and other sources of financing (i.e., total aid, loan, gift, work-study, and EFC), and a strong positive association with unmet need. This finding is consistent with previous research showing that, in general, increases in costs and need amounts encourage employment, while increases in aid amounts discourage employment by offsetting costs and needs. In other words, students worked in response to shortages in other sources of financing (Horn 1998; Horn & Berktold, 1998; Choy & Premo, 1994; Setter & Schoenecker, 1987).

For commuters, however, this overall logic applied to a marginally significant gift-aid amount and need (see Table 3). Employment's significant negative relationships with cost and unmet need appeared counterintuitive, as did its positive relationships with EFC and loan amount. While a number of explanations might apply, (e.g., attrition or increased financial aid data from sophomores submitting FAFs for the first time) only multivariate analyses could produce results to inform such debates.

[For future research we recommend using] separate studies to examine employment among commuter and resident populations, because family income, financial aid form submission, and percentage of students working varied substantially with residence.

3. In all multivariate studies of student employment, use both family income and academic ability as control variables in all model building, and enter these first into models to avoid large fluctuations in partial effects. Family income displayed a high degree of correlation with a number of variables likely to be tested in future multivariate studies, where multicollinearity would be a concern (see Table 1 and Hypothesis 2.1). Measures of academic ability (i.e., total SAT score and academic index) also suggested the potential for large fluctuations in partial effects, as evidenced by their strong negative association with employment intensity during the third semester (see Table 2). Adding family income and SAT first is important because rules routinely used in model building could easily cause these variables to be eliminated. For example, adding GPA would, for the most part, overlap the partial effect of SAT, eliminating it under conventional procedures. Aside from this study's findings, it appears a good idea in general to control for these important variables due to the lack of confidence in research results that could otherwise arise (see Pascarella & Terenzini, 1991).

4. For persistence studies (i.e., where persistence is the dependent variable), use total populations (as opposed to FAF populations) to retain crucial advantages in numbers needed to compensate for the proportional disparity favoring students who persist in the dichotomous dependent variable. This would require, however, a valid total-population family income variable.

5. For persistence studies using total populations, formulate a total-population family income variable that would approach the reliability of parent-reported figures. Attaining such a variable appeared feasible albeit imperfect (see Hypothesis 2.2), if ordinal scales of low, medium, and high are first assigned to both sets of figures, and parent-reported figures are then supplemented with student-reported figures in a reasonable formulation. Such a procedure would retain much of the reliability of parent-reported figures and much of the original sample size. This would produce a variable acceptable for multivariate inferential statistics where scales or units are largely irrelevant in assessing the strength of the relationship.[16]

6. Use FAF populations for student employment studies (i.e., where employment is the dependent variable) if an alternative to imputing data is preferred; employment was significantly dependent upon key financial aid variables, including unmet need, EFC, and cost (see Hypothesis 2.3). Simply replacing missing data with zeros for these variables to accommodate the use of total populations certainly could not be justified as it was with

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[16]However, units must be taken into consideration in interpreting the coefficients and assessing the impact of relationships among variables.

other financial aid amounts. Merely adding these financial aid variables to total-population models eventually would eliminate non-FAF students automatically during model development because they lack sufficient data. However, to do so would cause large fluctuations in partial effects during the process. If using the response variable in dichotomous form (i.e., working versus non-working), logistic regression would require consistent sample size during model development. Thus, students without these FAF variables would likewise be eliminated, but at the beginning of model development. Using FAF populations for employment studies was supported by the finding that employment was proportionately represented in FAF populations (see Hypothesis 2.4).

7. Because FAF populations include more students from lower-income families than their total-population counterparts (see Hypothesis 2.5), be aware of this potential bias when designing and interpreting employment studies. Controlling for family income, while helpful in correcting this bias for multivariate analyses, may not be a complete remedy overall. Further delimiting FAF populations based on family income might be appropriate to compensate for underrepresented high-income groups. In any event, results should be interpreted accordingly to avoid the biased predominance of low-income students in FAF populations from spawning significant but erroneous or misleading linear relationships during analyses.[17]

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[17]An example of how this can happen was evident from the Pearson correlations of this study between employment and family income. First, for residents and commuters, respectively, percentages of students from medium-income families who worked (40.8% and 47.8%) were higher than from high-income (33.2% and 38.2%) or low-income (37.4% and 40.3%). However, the mid-income peaks no longer appeared when using FAF populations. Instead, the percentages working from low-, medium-, and high-income families, respectively, appeared to decrease from 39.0 percent to 36.6 percent to 34.6 percent for residents, and to increase for commuters from 41.0 percent to 48.2 percent to 55.6 percent, creating "artificial" linear relationships. This carried over to the Pearson correlations for residents in Table 2, where the almost-significant negative association between employment intensity (hours per week) and family income during the third semester was attributable to the perceived decrease in employment (yes versus no), with increasing family income that resulted simply from using FAF populations with their biased predominance of low-income students.

This observation is not to indicate that employment and family income were not significantly associated. Peaking in the middle ranges (curvilinear relationship) within the total population using student-reported figures suggested a possibly significant nonlinear relationship that was, however, not expected to be found significant in standard linear regression or ANOVA analyses. Choy & Premo (1996) and Hansen (1985) found low-income students worked less than higher-income counterparts and Cuccaro-Alamin & Choy (1998) and Carroll & Chan-Kopka (1988) found middle-income students worked more hours than did lower- or higher-income students. It should be noted, however, that family income levels in most regional and national reports were based on quartiles or other fractions at the national level, while this study's criterion was within the local student population. Also noteworthy, Hansen (1985) distinguished between middle- and high-income levels, with more high-income students working than middle-income students.

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