Sick of Our Loans: Student Borrowing and the Health of US Young Adults

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ABSTRACT

We investigated how college loans are related to health during early adulthood, whether this relationship is stronger among those with less parental wealth, and how these relationships vary by type of college attended (e.g. 2-year versus 4-year). We analyzed data from the National Longitudinal Survey of Youth 1997, a nationally representative sample of young adults, restricting our sample to persons who ever attended college (n=4,643). Multivariate regression tested the association between college loans and self-rated health and psychological functioning in 2010, adjusting for adult socio-economic status and other demographic factors. Student loans were associated with poorer self-rated health and psychological functioning. This association varied by level of parental wealth and school enrollment. Our study provides preliminary evidence that college loans negatively impact health, independent of standard socio-economic indicators. The study of student loans is even more timely and significant given the ongoing rise in the costs of higher education.

Word Count: 150 maximum

Over the past three decades, the cost of higher education has increased by threefold adjusting for inflation.[1] Simultaneously, wages for the average family have stagnated or declined.[2] These two trends have made borrowing money for college essential for many students. In 2012, student loans amounted to a staggering $1 trillion dollars in the United States, making it the largest source of loans second only to home mortgages.[3] Yet, unlike mortgages and most other loans, student loans are unique because they are typically not forgiven, even in standard bankruptcy filings.[4, 5] Although all non-student sources of debt fell a combined $1.53 trillion between 2008 and 2012, student loan debt rose by $293 billion during this same period.[6] In 2011, the average student loan balance was $23,300, with 40.1% of persons under age 30 holding some student loan debt.[7]

Student loans are a critically important part of one's socioeconomic profile for two key reasons. First, loans provide important economic capital that makes educational attainment possible.[8] Thus, loans can facilitate social mobility for lower and middle-income students. Because education is strongly linked to improvements in health,[9-12] loans may also be positively associated with health.

Second, student loans also come with obligations for repayment, which may become burdensome and increase stress and worry. Emerging research finds that debt, in general, is related to problems such as psychological functioning,[13] anxiety,[14, 15] physical impairment, and poor self-rated health.[16] A study of 8,500 persons in the United Kingdom found that debt was associated with risk for mental disorders, after controlling for income.[17] Another study of students at a U.S. university found that credit card debt of at least $1,000 was correlated with obesity, binge drinking, and substance use.[18] There is yet very little research that examines student loans and health among a nationally representative sample of U.S. students.

A growing literature has called for more comprehensive studies of socioeconomic position, and the addition of factors such as wealth, loans, and debt.[19-21] In response to these calls, the present study examines how student loans incurred from post-secondary educational expenses are related to health in early adulthood. Our first hypothesis is that student loans will be associated with poorer self-rated health and psychological functioning.

Additionally, the importance and salience of student loans is likely to vary by family wealth. A $1,000 loan may be quite important to a student from a poor family, but inconsequential to a student from a wealthy family. This observation drives our second hypothesis that family wealth moderates the effect of student loans. Specifically, the association between student loans and health will be stronger among individuals from disadvantaged backgrounds than those from wealthier families.

Finally, we examine possible differences in the effect of student loans on health based on enrollment history. Students enrolled at 4-year colleges generally pay higher tuition per credit hour and are more likely to pay residence fees to live on campus than those attending 2-year colleges.[22] Some students may attend a 2-year college because they do not have the preparation to attend a 4-year college, whereas others may choose a 2-year college to minimize costs.[1, 23] Also, 2-year college students are comprised of both those who desire a terminal 2-year degree and those who wish to transfer to a 4-year college. Hence, our analyses consider variations in enrollment history.

METHODS

Sample

We analyzed data from the National Longitudinal Survey of Youth 1997 (NLSY97), a nationally representative sample of 8,984 individuals born between 1980 and 1984.[24] Respondents were interviewed annually beginning in 1997, with data collection ongoing. At baseline, respondents were 12 to 17 years old; in 2010, the most recent wave of data collection, respondents were 25 to 31 years old. Over 80% of the sample (n=7,470) was retained through this 13-year period. Weights were designed by the NLSY to account for attrition and to ensure that the sample remained nationally representative. We restricted our analyses to respondents who had enrolled in at least one college course by 2010 (n=4,775). We further excluded 132 respondents (2.7%) due to item non-response on selected covariates, resulting in an analytic sample of 4,643 respondents.

Measures

The first dependent variable assessed *self-rated health* in 2010. It is an often-used global measure of health status and highly predictive of mortality in longitudinal studies.[25, 26] Respondents were asked, "How would you rate your health?" with response options 4=excellent, 3=very good, 2=good, and 1=fair/poor.

The second dependent variable, *psychological functioning,* was measured using the 5-item Mental Health Inventory (MHI), which has demonstrated high validity and reliability in prior studies.[21, 27, 28] Respondents were asked how often in the past month they felt 1) nervous; 2) calm and peaceful; 3) downhearted and blue; 4) happy and 5) down in the dumps. Response categories were based on a 4-point Likert scale. Negatively worded items were reverse coded and summed (Cronbach's $\alpha = 0.80$), such that higher values represent better psychological functioning.

Educational loans was our main independent variable. Respondents were asked "Other than assistance you received from relatives and friends, how much did you borrow in government

subsidized loans or other types of loans while you attended this school/institution [during this semester]?" To minimize recall bias, this question was asked for every semester a student was enrolled in post-secondary school. We summed the amount borrowed across semesters to construct our measure of educational loans.

Enrollment history refers to the type of colleges respondents attended. For every month, from 1997 through 2010, respondents' enrollment status was recorded. This produced the following categories: (1) attended a 2-year college only; (2) attended a 4-year college; or (3) attended both a 2-year and 4-year college. The latter two categories also include those who attended graduate school; graduate school enrollment comprised only 11% of the sample. For ease of presentation, we refer to those attending both a 2-year and 4-year college as "transfer students." It should be recognized that transfers occur in either direction – students transferring from 2-year to 4-year or from 4-year to 2-year colleges.

Educational attainment was assessed as the highest degree attained as of 2010 and categorized as no degree or GED, high school diploma, an associate's degree, or a bachelor's degree or higher (students with a GED are placed into the same category as those with no degree given recent research that finds that these two groups have similar health profiles).[29, 30]

We also adjust for other socio-demographic characteristics that might confound the relationship between student loans and health. *Poverty* in 2010 was calculated as a function of total family income and household size and compared to the federal poverty level in 2010. We categorized respondents as 0-100% poverty, 101-180% poverty, 181% of poverty of more, and missing poverty information.

Current or most recent *occupation* in 2010 was operationalized with 2002 Census Occupation Classification codes (professional or managerial; sales, service, or technician; labor, production, farmer; active military; and not working, which included unemployed and out of the labor force).

Marital status in 2010 was categorized as never married; married; or other (divorced, separated, or widowed). We also include the *region* of the country where the respondent lived in 2010 (south, northeast, north central, west, or outside the US), and urbanicity in 2010 (urban, rural, and undetermined).

To partially control for selection effects arising in youth, we include indicators of *parents' net worth*, a parent reported indicator that subtracts the amount of parental debt from the amount of parent assets (home equity, bonds/CDs/stocks, life insurance policies, pension and retirement savings, car values, etc.), which we categorized as negative net worth (<$0), low net worth (~5th to <25th percentile), mid net worth (≥25th to <75th percentile), top net worth (≥ 75th percentile), and missing net worth.

We also controlled for *self-rated health in 1997* (psychological functioning was not assessed in 1997); self-reported *race/ethnicity* categorized as non-Hispanic white, non-Hispanic black, Hispanic, and other; *nativity* dichotomized as born a US citizen or not; *gender;* and *age* in 2010 (in years).

Analytic Approach

To test our first hypothesis, we employed linear regression for psychological functioning and ordered logistic regression for self-rated health to examine the association between student loans and our health outcomes. Tests of assumptions were conducted as appropriate (e.g., proportional odds). We weighted all analyses and specified robust standard errors to adjust for the complex

sampling design and respondent attrition using the 2010 sampling weights and the cluster sandwich estimator in Stata version 12.0.[31] To make interpretation of the regression coefficients for student loans more meaningful in our multivariate analyses, we divided by 10,000. Thus a one-unit change in student loans represents a change of $10,000.

To test our second hypothesis, we tested the statistical interaction between parental wealth and student loans.

To consider the effect of enrollment history, regression analyses were first estimated for the full sample, and then estimated separately for students enrolled only in 2-year colleges, enrolled in both 2-year and 4-year colleges, and those enrolled only in 4-year colleges.

RESULTS

Sample Characteristics

Table 1 presents sample characteristics by college enrollment history. The average amount of student loans acquired was $5609.9 for our full sample. Approximately 31% attended only a 2-year college, whereas 44.1% attended only a 4-year college. Over 44% of respondents completed a bachelor's degree or higher, 35.7% worked in a professional or managerial occupation in 2010, 18.5% were from families in the highest wealth category. Most respondents were non-Hispanic white (69.6%), female (52.9%), unmarried (53.9%), and were born US citizens (95.7%). The average age of respondents in 2010 was 27.9. Approximately 27% rated their health as excellent in 2010, and the average score on the MHI was 15.7 (min=5, max=20; higher values indicate better psychological functioning).

Respondent characteristics varied by enrollment history. Loans were lowest among those attending 2-year colleges ($1,760), compared to transfer students ($7,487) and those attending 4-

year colleges only ($7,199). Two-year college students were also the most socioeconomically disadvantaged; poverty rates were 10.6%, 8.6%, and 6.8%, for 2-year, transfer, and 4-year students, respectively. Self-rated health in 2010 also followed this pattern, with rates of fair/poor health being 11.7%, 7.2%, and 4.7%, respectively; the patterns for psychological functioning followed this trend, albeit modestly (means of 15.5, 15.6, and 15.9, respectively).

Multivariate Analyses

Table 2 examines the multivariate associations between student loans and health for the full sample. Consider the left panel, which reports the results for self-rated health. Model 1 includes socio-demographics. These measures were associated with self-rated health in expected ways; individuals from families below the top quartile of net worth had poorer health; blacks reported poorer health (b=-0.27) than whites; and attaining no degree or a GED (b=-0.53) or attaining a high school diploma (b=-0.49) was associated with poorer health than attaining a bachelor's degree or higher. Students attending 2-year colleges (b=-0.24) showed poorer health than those attending 4-year colleges only.

Model 2 adds student loans. Inclusion of these loans did not substantively alter the estimates seen in Model 1, but significantly improved model fit (Δ-2LL -8.2, df 3; Model 2). Consistent with our hypothesis, increasing amounts of student loans were associated with poorer self-rated health (b=-0.10); however, this relationship leveled off around $30,000 of student loans (b=0.02; see Figure 1A). Further, student loans were not moderated by parental net worth (Model 3).

The right panel of Table 2 presents results for psychological functioning. The findings were comparable to those found for self-rated health in the sense that socioeconomic disadvantage was associated with poorer psychological functioning. In Model 1, the data show that individuals with no degree or a GED reported poorer psychological functioning (b=-0.45) than those with a

bachelor's degree or higher, whereas those at 181% of poverty or higher reported better psychological functioning (b=0.35) than those at or below poverty.

Model 2 includes student loans. These loans were significantly associated with poorer psychological functioning (b=-.09). Again, inclusion of loans did not substantively change the findings related to the covariates in Model 1, but significantly improved model fit (Δ-2LL -6.9, df 2; Model 2).

Model 3 shows that parental net worth moderated the association between student loans and psychological functioning. Among individuals whose parents had negative or low net worth, psychological functioning increased with increasing amounts of student loans (b=0.28 (-0.19+0.47) and b=0.08 (-0.19+0.27), respectively). In comparison, individuals from wealthier families experienced worsening psychological functioning with greater amounts of student loans (b=-0.19, p=.06), although this effect was only marginally significant. Figure 1B illustrates these interactions.

Table 3 presents the models stratified by enrollment history. For each outcome and strata, two models are estimated. Model 1 displays student loans and parental net worth (covariates such as race are included in the analysis, but not shown). Model 2 includes the statistical interaction between student loans and parental net worth.

Among 2-year college students, student loans were marginally related to poorer self-rated health (Model 1), and this association was moderated by parental net worth (Model 2); however inclusion of interactions with parental net worth did not improve model fit. There was no association between student loans and psychological functioning (Models 1 & 2).

Among transfer students, the association between loans and self-rated health was marginally significant as a main effect (Model 1), and showed no moderation with parental net worth (Model 2). By contrast, student loans were marginally associated with psychological functioning as a main effect (Model 1) and significantly associated when moderated by parental net worth (Model 2).

Finally, among students who attended only 4-year colleges, student loans were unrelated to self-rated health, regardless of model specification. However, student loans were inversely associated with psychological functioning (b=-0.10; Model 1). Inclusion of interactions between parental net worth and student loans significantly improved model fit (Δ-2LL -10.8, df 4); individuals whose parents had negative net worth experienced better psychological functioning at higher amounts of student loans (b=0.59 (-0.07+0.66)).

Sensitivity Analyses

Additional analyses were performed to determine if our results were sensitive to model specification. We modeled parental net worth in several ways to determine if our analyses were sensitive to choice of cut points, but the results were robust to specification. Additionally, some models tested loans as a cubic function, but we do not use those results due to concerns about reliabilities at the tails of the sample distribution. We also tested additional interactions as follows.

Certain occupations require a specific course of study and typically incur high levels of debt, as in the case of physicians and lawyers, making the experiences of these professions qualitatively different than most others. We tested whether occupation moderates loans, but found no evidence of such an effect.

We also tested moderation between student loans and gender because women graduate at higher rates[32] and earn less than men at equivalent levels of education.[10] This interaction was not significant.

Finally, we tested moderation between student loans and educational attainment because the effects of student loans may be more consequential for those of low attainment compared to those of high attainment. We found no support for this interaction.

DISCUSSION

There is growing concern about the burden of student loans on the social and economic well-being of young adults.[33-35] Surprisingly, little research has investigated the implications of student loans on health. Our study is one of the first to do so using a nationally representative sample of over 4,000 young adults. Our overall finding is that student loans are associated with poorer self-rated health and worse psychological functioning. This basic finding is tempered by some important nuances related to the shape of the curve, parental wealth, and enrollment history.

First, we find some evidence that the shape of the curve is non-linear with regards to self-rated health. Student loans are related to poor health, but this relationship appears to level off around $30,000. This observation should not be taken as a fact, but rather, as a call for future investigation. Certainly, non-linear associations are seen between socioeconomic factors across a variety of health conditions[36-38] and it would be worthy to consider whether the effects of student loans plateau after a certain threshold for some, but not all, health outcomes. Indeed, we did not detect a non-linear shape for psychological functioning.

Second, the association between student loans and health appears to vary by parental wealth. As expected, increasing loans were related to worse psychological functioning among students from wealthier families. Yet, this association was reversed among students from the poorest families.

Why would higher amounts of loans be related to better psychological functioning among disadvantaged students? We speculate that this relationship may be due to selectivity into higher education. Compared to wealthy families, students from poor families are less likely to enroll in college.[39-41] Those who are able enroll in college despite their early-life disadvantages may be healthier than their peers.

The healthy selection effect would be presumably more evident among those with greater achievements, and in this case, more evident among those attending 4-year instead of 2-year colleges. The findings are consistent with this line of reasoning: the interaction between student loans and low family net worth is seen among transfer and 4-year college enrollees, but not among 2-year college enrollees. In sum, the positive association between loans and psychological functioning might be related to improvements of social standing via access to educational attainment among the most resilient youth from disadvantaged families. While plausible, we caution that these findings are preliminary.

Importantly, all of our analyses control for a wide selection of socioeconomic indicators. Further, the model fit improves with the inclusion of student loans. These findings buttress recent calls in the literature to measure alternative indicators of socioeconomic conditions.[19-21]

Our study observed that students received about $5500 in loans, a value that seems modest in comparison to recent headlines in lay media.[42-44] That said, these loans are comparable to those reported elsewhere. For example, data from the National Postsecondary Student Aid Study

estimates the average cumulative amount of student loans acquired for the entering freshmen class of 2003 was $6300 [45] (restricting our data to the same period yields an average of $5600).

The present study raises key questions about potential mechanisms for future investigation. Extant research suggests that stress and worry may be a key mechanism linking student loans to health. Additionally, student loans may generate other circumstances that alter and constrain one's life circumstances, sometimes known as "stress proliferation".[46-48] For example, some studies find that access to credit encourages compulsive buying among college students.[49] Simultaneously, loans may also cause some students to forgo particular expenses or to choose certain jobs in response to these loans (such as in the case of lawyers choosing to work at private companies rather than for public interest),[50, 51] which then may be related to issues of person-environment fit.[52, 53] Thus, the study of loans raises numerous avenues for future work.

A few additional limitations should be noted. First, the current study is focused on student loans, which represents the amount borrowed, but does not focus on *debt*, the amount owed. Unfortunately, the NLSY97 does not have reliable measures of student debt. The investigation of such debt would be an important extension of the present study, as presumably, the association between debt and health would be even stronger than that of loans. Second, the NLSY97 is representative of persons born between 1980 and 1984, and thus, generalizations can only be made to this cohort. To our knowledge, however, the NLSY97 is one of the only studies to assess student loans *and* health among a nationally representative sample. Further, this cohort is an important one to study because they were entering college in the late 1990s and early 2000s, when student loan debt began to grow exponentially.[1] Third, although the NLSY97 is a longitudinal study, our analysis assessing health is conducted cross-sectionally because student loans are accumulated over a significant period of time and we wanted to assess health once most

respondents were finished with schooling. However, our analyses did control for self-rated health in 1997 as well as early-life conditions. Finally, although our study compared students by college enrollment history, we were unable to further examine enrollment in graduate schools due to small samples (550 respondents were ever enrolled in graduate school). It would be important to study these distinctions since graduate training can simultaneously incur large amounts of loans as well as greater (or sometimes less) earning potential compared to college enrollment only.

Conclusions

This study provides initial evidence that student loans are associated with poor health outcomes in early adulthood, and that these associations vary by enrollment history and parental wealth. These associations persist even after controls for standard measures of socioeconomic position, and suggest that studies are incomplete without further considering factors such as student loans. The present findings raise provocative questions for further research regarding student both loans debt, and possible spillover effects on other life circumstances, such as occupational trajectories and health inequities.

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Contributors

K.M. Walsemann conceptualized the study, and led the data management, analysis, and writing.
G.C. Gee assisted with the conceptualization of the study, the interpretation of the data, and writing.
D. Gentile assisted with the conceptualization of the study and writing.

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Human Participation Protection

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Table 1: Sample characteristics by college enrollment history, NLSY97, Weighted estimates.

Characteristic	**Any College** **n=4,643** Mean (SE) or % [a]	**2-Yr College** **n=1,542** Mean (SE) or %	**2 & 4-Yr College** **n=1,187** Mean (SE) or %	**4-Yr College** **n=1,914** Mean (SE) or %
Student loans ($)	5609.9 (160.4)	1760.3 (137.9)	7487.2 (340.3)	7199.7 (271.2)
Self-rated health (2010)				
Excellent	27.2	20.9	26.6	31.8
Very good	39.5	34.3	42.2	41.6
Good	25.9	33.2	24.0	21.9
Fair/Poor	7.5	11.7	7.2	4.7
Psychological functioning (2010)	15.7 (0.04)	15.5 (0.07)	15.6 (0.07)	15.9 (0.05)
Race/ethnicity				
Non-Hispanic white	69.6	62.4	68.0	75.6
Non-Hispanic black	13.3	16.0	13.5	11.3
Hispanic	11.2	16.2	12.3	7.2
Other	5.8	5.4	6.2	5.9
Female	52.9	50.6	56.0	52.6
Born US citizen	95.7	96.0	95.6	95.5
Age in 2010 (years)	27.9 (0.02)	28.0 (0.04)	28.0 (0.05)	27.9 (0.03)
Enrollment History (1997-2010)				
2-year college only	30.6	---	---	---
2-year & 4-year college	25.3	---	---	---
4-year college or more	44.1	---	---	---
Degree attained by 2010				
No degree or GED	5.9	14.7	1.9	2.0
High school diploma	38.9	66.4	33.1	23.2
Associate's degree	10.8	18.2	17.5	1.8
Bachelor's degree or higher	44.4	0.7	47.5	72.9
Occupational status (2010)				
Professional or managerial	35.7	13.5	38.0	49.6
Sales, service, or technician	42.0	52.5	41.3	35.1
Labor, production, farmer	11.1	19.1	8.0	7.4
Active military	2.6	2.3	3.8	2.0
Not working	8.7	12.6	8.9	5.9
Poverty status (2010)				
0-100%	8.4	10.6	8.6	6.8
101-180%	11.3	15.4	11.3	8.5
≥ 181%	70.1	61.9	69.5	76.0
Missing poverty	10.2	12.1	10.5	8.7
Marital status (2010)				
Unmarried	53.9	52.2	53.2	55.6
Married	39.4	38.7	39.9	39.6
Other [b]	6.7	9.1	6.9	4.8

(Table 1 Continued)

Characteristic	**Any College n=4,643** Mean (SE) or %	**2-Yr College n=1,542** Mean (SE) or %	**2 & 4-Yr College n=1,187** Mean (SE) or %	**4-Yr College n=1,914** Mean (SE) or %
Region (2010)				
South	35.5	36.1	37.7	33.7
Northeast	16.2	14.2	13.1	19.3
North Central	24.1	21.8	22.1	26.8
West	23.4	27.4	26.3	19.0
Outside US	0.9	0.4	0.8	1.2
Urbanicity (2010)				
Urban	77.7	75.3	76.7	80.0
Rural	20.5	22.9	21.9	18.0
Undetermined	1.8	1.8	1.4	2.0
Parents' Net Worth (1997) [c]				
Negative	4.0	5.7	4.0	2.7
Low	14.4	21.9	14.8	8.9
Middle	37.1	38.2	35.7	37.2
Top	18.5	10.1	17.5	24.9
Missing	26.0	24.1	28.1	26.2
Self-rated health (1997)				
Excellent	41.3	34.7	41.1	46.0
Very good	37.3	35.4	38.1	38.2
Good	18.3	24.0	18.5	14.1
Fair/Poor	3.1	5.9	2.3	1.6

[a] Percentages may not add to 100 due to rounding. [b] Divorced, separated, or widowed. [c] Low = ~ 5th to 24th percentile; Middle = 25th to the 74th percentile; Top = 75th percentile and higher.

Table 2: Estimated regression coefficients from ordinal logit regression (self-rated health) and multivariate regression (psychological functioning), Weighted analysis with robust standard errors, NLSY97, 2010, (N=4,643)

	Self-Rated Health [a]			**Psychological Functioning**		
	Model 1 [b]	Model 2 [b]	Model 3 [b]	Model 1 [b]	Model 2 [b]	Model 3 [b]
	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)
Student loans (in 10K) [c]		-0.10 (0.05)*	0.01 (0.12)		-0.09 (0.04)*	-0.19 (0.10)
Student loans squared		0.02 (0.01)*	0.03 (0.04)			
Race/Ethnicity						
NH white (ref)	---	---	---	---	---	---
NH black	-0.27 (0.09)*	-0.26 (0.09)*	-0.25 (0.09)*	0.28 (0.11)*	0.28 (0.11)*	0.28 (0.11)*
Hispanic	-0.17 (0.09)	-0.17 (0.09)*	-0.17 (0.09)*	0.25 (0.10)*	0.25 (0.10)*	0.26 (0.10)*
Other race	-0.51 (0.15)*	-0.51 (0.15)*	-0.53 (0.15)*	0.38 (0.17)*	0.39 (0.17)*	0.38 (0.16)*
Parents' Net Worth [d]						
Negative	-0.41 (0.17)*	-0.37 (0.17)*	-0.34 (0.19)	-0.38 (0.22)	-0.35 (0.22)	-0.36 (0.22)
Low	-0.27 (0.12)*	-0.24 (0.12)*	-0.30 (0.13)*	0.07 (0.14)	0.10 (0.14)	0.11 (0.14)
Middle	-0.22 (0.09)*	-0.19 (0.09)*	-0.20 (0.09)*	-0.00 (0.10)	0.03 (0.11)	0.04 (0.11)
Top (ref)	---	---	---	---	---	---
Missing net worth	-0.07 (0.09)	-0.05 (0.09)	-0.04 (0.10)	0.09 (0.11)	0.10 (0.11)	0.11 (0.11)
Highest Degree						
No degree/GED	-0.53 (0.16)*	-0.56 (0.16)*	-0.57 (0.16)*	-0.45 (0.20)*	-0.48 (0.20)*	-0.46 (0.20)*
High school diploma	-0.49 (0.09)*	-0.52 (0.09)*	-0.53 (0.09)*	-0.14 (0.10)	-0.17 (0.11)	-0.16 (0.10)
Associate's degree	-0.12 (0.12)	-0.13 (0.12)	-0.14 (0.12)	-0.08 (0.14)	-0.08 (0.14)	-0.08 (0.14)
≥Bachelor's degree (ref)		---	---	---	---	---
Enrollment History						
Only 2-year college	-0.24 (0.09)*	-0.27 (0.10)*	-0.28 (0.10)*	-0.11 (0.11)	-0.15 (0.11)	-0.14 (0.11)
2-year & 4-year college or more	-0.11 (0.08)	-0.11 (0.08)	-0.11 (0.08)	-0.19 (0.09)*	-0.19 (0.09)*	-0.19 (0.09)*
4-year college or more (ref)	---	---	---	---	---	---
Poverty Status 2010						
0-100% poverty (ref)	---	---	---	---	---	---
101-180% poverty	-0.02 (0.14)	-0.01 (0.14)	-0.00 (0.14)	0.14 (0.17)	0.15 (0.17)	0.15 (0.17)
≥ 181% poverty	0.18 (0.12)	0.19 (0.12)	0.20 (0.12)	0.35 (0.14)*	0.37 (0.14)*	0.37 (0.14)*
Missing poverty	0.14 (0.15)	0.15 (0.15)	0.16 (0.15)	-0.03 (0.18)	-0.02 (0.18)	-0.02 (0.18)

Table 2 (continued)	Self-Rated Health			Psychological Functioning		
	Model 1	Model 2 [b]	Model 3 [b]	Model 1	Model 2 [b]	Model 3 [b]
Occupation 2010						
Professional or managerial (ref)	---	---	---	---	---	---
Sales, service, or technician	0.00 (0.07)	0.00 (0.07)	0.00 (0.07)	-0.07 (0.09)	-0.07 (0.09)	-0.07 (0.09)
Labor, production, or farmer	-0.13 (0.13)	-0.14 (0.13)	-0.13 (0.13)	-0.09 (0.14)	-0.08 (0.13)	-0.08 (0.13)
Active military	0.53 (0.18)*	0.50 (0.18)*	0.50 (0.18)*	0.54 (0.19)*	0.51 (0.19)*	0.52 (0.19)*
Not working	-0.33 (0.14)*	-0.34 (0.14)*	-0.33 (0.14)*	-0.36 (0.15)*	-0.37 (0.15)*	-0.36 (0.16)*
Interactions						
Student loans x negative net worth			0.24 (0.31)			0.47 (0.20)*
Student loans x low net worth			-0.32 (0.19)			0.27 (0.13)*
Student loans x middle net worth			-0.20 (0.14)			0.07 (0.12)
Student loans x missing net worth			-0.07 (0.15)			0.09 (0.12)*
Student loans sq x negative net worth			-0.04 (0.12)			
Student loans sq x low net worth			0.06 (0.05)			
Student loans sq x middle net worth			0.01 (0.04)			
Student loans sq x missing net worth			-0.02 (0.04)			
Intercept				15.87 (0.71)*	15.85 (0.71)*	15.81 (0.71)*
Intercept (Fair/poor)	-3.00 (0.62)*	-2.99 (0.62)*	-3.05 (0.62)*			
Intercept (Good)	-1.05 (0.61)	-1.03 (0.61)	-1.09 (0.61)			
Intercept (Very good)	0.78 (0.61)	0.80 (0.61)	0.74 (0.62)			
R-sq [e]	0.045	0.046	0.047	0.068	0.069	0.071
Δ -2LL (df) [f]		-8.2* (3)	-12.3 (8)		-6.9* (2)	-9.4* (4)

[a] Log-odds presented for ordinal regression models. [b] Models 1-3 adjust for nativity, gender, self-rated health in 1997, marital status (2010), region (2010), urbanicity (2010), and a flag for item non-response on student loans. [c] Student loans divided by 10,000 and centered at grand mean. [d] Low = ~ 5^{th} to 24^{th} percentile; Middle = 25^{th} to 74^{th} percentile; Top = 75^{th} percentile and higher. [e] For ordered logit, this is pseudo R^2. [f] Compares model 2 to model 1; model 3 to model 2. *p<0.05

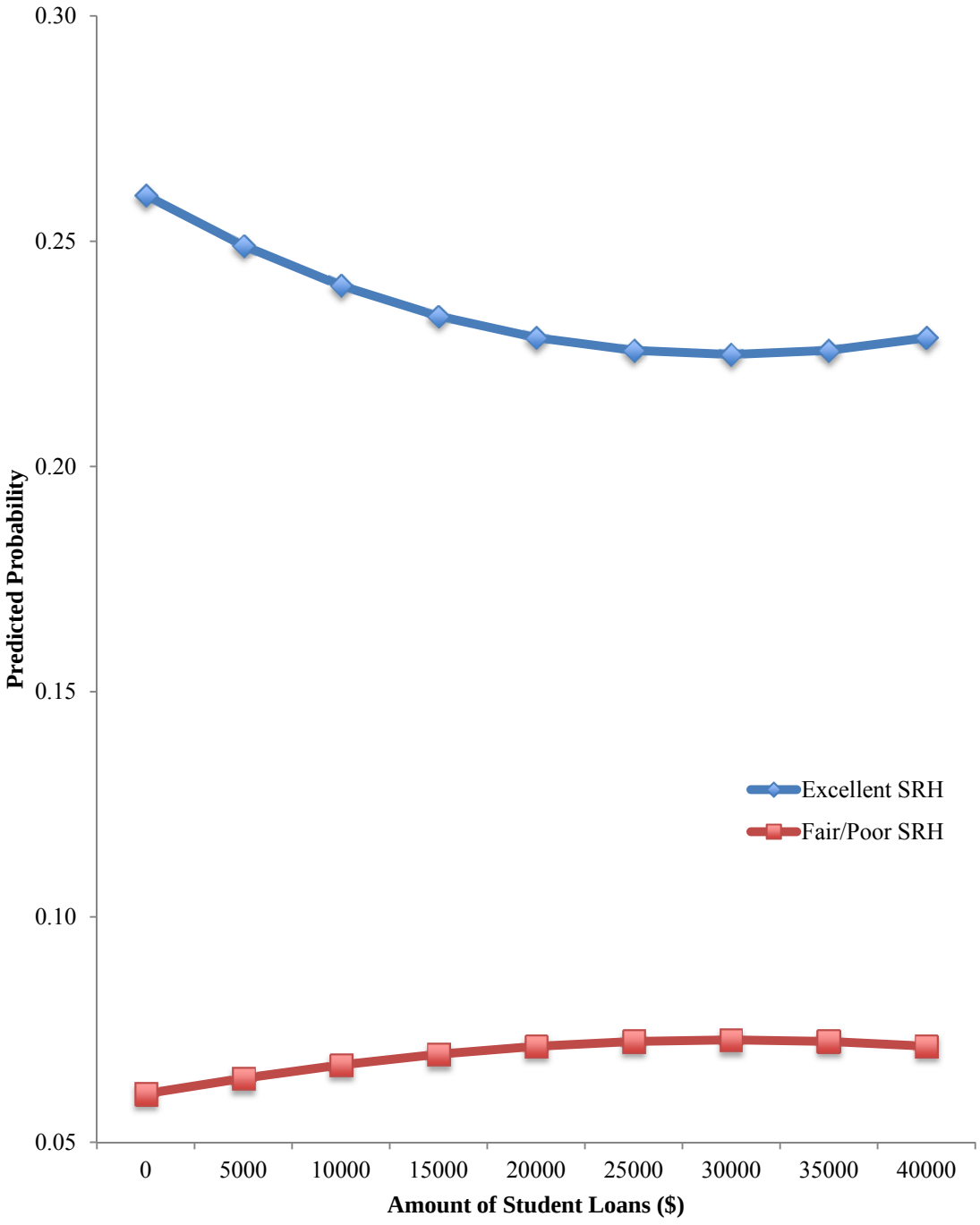
Table 3: Estimated regression coefficients for student loans from ordered logit regression (self-rated health) and linear regression (psychological functioning) stratified by enrollment history, NLSY97, 2010, Weighted estimates with robust standard errors.[a]

	2-Year College Only n=1,542		2-Year & 4-Year College n=1,187		4-Year College Only n=1,914	
	Model 1 [b] b (SE)	Model 2 [b] b (SE)	Model 1 [b] b (SE)	Model 2 [b] b (SE)	Model 1 [b] b (SE)	Model 2 [b] b (SE)
Self-Rated Health						
Student loans (in 10K) [c]	-0.33 (0.19)†	1.22 (0.70)†	-0.07 (0.08)	-0.06 (0.23)	-0.09 (0.07)	-0.01 (0.15)
Student loans squared	0.10 (0.05)*	-0.65 (0.36)†	0.03 (0.01)†	0.09 (0.08)	0.01 (0.01)	0.02 (0.04)
Parents' net worth [d]						
Negative	-0.32 (0.29)	-0.45 (0.31)	-0.34 (0.31)	-0.11 (0.35)	-0.32 (0.31)	-0.46 (0.36)
Low	-0.02 (0.21)	-0.21 (0.22)	-0.08 (0.22)	-0.04 (0.27)	-0.49 (0.20)*	-0.55 (0.22)*
Middle	-0.07 (0.17)	-0.30 (0.19)	-0.06 (0.18)	-0.00 (0.22)	-0.29 (0.13)*	-0.26 (0.14)†
Top (ref)	---	---	---	---	---	---
Missing net worth	0.02 (0.18)	-0.15 (0.20)	0.01 (0.19)	0.11 (0.23)	-0.07 (0.14)	-0.09 (0.15)
Interactions						
Student loans x negative net worth		-0.71 (1.19)		0.54 (0.42)		0.14 (0.55)
Student loans x low net worth		-1.79 (0.79)*		-0.19 (0.33)		-0.01 (0.30
Student loans x middle net worth		-1.99 (0.76)*		-0.13 (0.26)		-0.09 (0.18)
Student loans x missing net worth		-1.18 (0.84)		0.08 (0.28)		-0.15 (0.19)
Student loans sq x negative net worth		0.44 (0.49)		-0.22 (0.21)		0.09 (0.28)
Student loans sq x low net worth		0.76 (0.37)*		-0.02 (0.14)		0.03 (0.06)
Student loans sq x middle net worth		0.91 (0.37)*		-0.05 (0.08)		-0.04 (0.05)
Student loans sq x missing net worth		0.62 (0.42)		-0.09 (0.08)		-0.01 (0.04)
Intercept (Fair/poor)	-0.90 (1.03)	-1.00 (1.05)	-4.86 (1.18)*	-4.68 (1.21)*	-2.81 (1.03)*	-2.88 (1.03)*
Intercept (Good)	1.04 (1.04)	0.95 (1.06)	-3.00 (1.17)*	-2.82 (1.20)*	-0.71 (1.01)	-0.77 (1.01)
Intercept (Very good)	2.70 (1.05)*	2.61 (1.06)*	-1.07 (0.36)	-0.88 (1.20)	1.22 (1.01)	1.17 (1.01)
Δ -2LL (df) [e]		-10.6 (8)		-6.2 (8)		-10.6 (8)
Psychological Functioning						
Student loans (in 10K) [c]	0.11 (0.12)	0.09 (0.54)	-0.16 (0.09)†	-0.49 (0.17)*	-0.10 (0.05)*	-0.07 (0.12)
Parents' net worth [d]						
Negative	-0.41 (0.41)	-0.41 (0.41)	-0.75 (0.38)*	-0.76 (0.39)*	0.05 (0.40)	-0.07 (0.39)
Low	0.06 (0.29)	-0.05 (0.29)	0.25 (0.26)	0.28 (0.26)	0.07 (0.21)	0.05 (0.21)
Middle	-0.03 (0.25)	-0.03 (0.25)	0.19 (0.22)	0.25 (0.22)	-0.03 (0.14)	-0.03 (.14)
Top (ref)	---	---	---	---	---	---
Missing net worth	0.18 (0.27)	0.18 (0.27)	-0.05 (0.23)	0.01 (0.23)	0.11 (0.14)	0.10 (0.15)

(Table 3 Continued)	2-Year College Only		2-Year & 4-Year College		4-Year College Only	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Interactions						
Student loans x negative net worth		0.01 (0.73)		0.64 (0.24)*		0.66 (0.28)*
Student loans x low net worth		-0.27 (0.59)		0.59 (0.24)*		0.23 (0.17)
Student loans x middle net worth		0.10 (0.56)		0.25 (0.25)		-0.09 (0.13)
Student loans x missing net worth		0.03 (0.62)		0.50 (0.20)*		-0.12 (0.14)
Intercept	15.07 (1.42)*	15.06 (1.43)*	15.01 (1.33)*	14.85 (1.33)*	16.46 (1.04)*	16.50 (1.04)*
Δ -2LL (df) [e]		-1.1 (4)		-11.5* (4)		-10.8* (4)

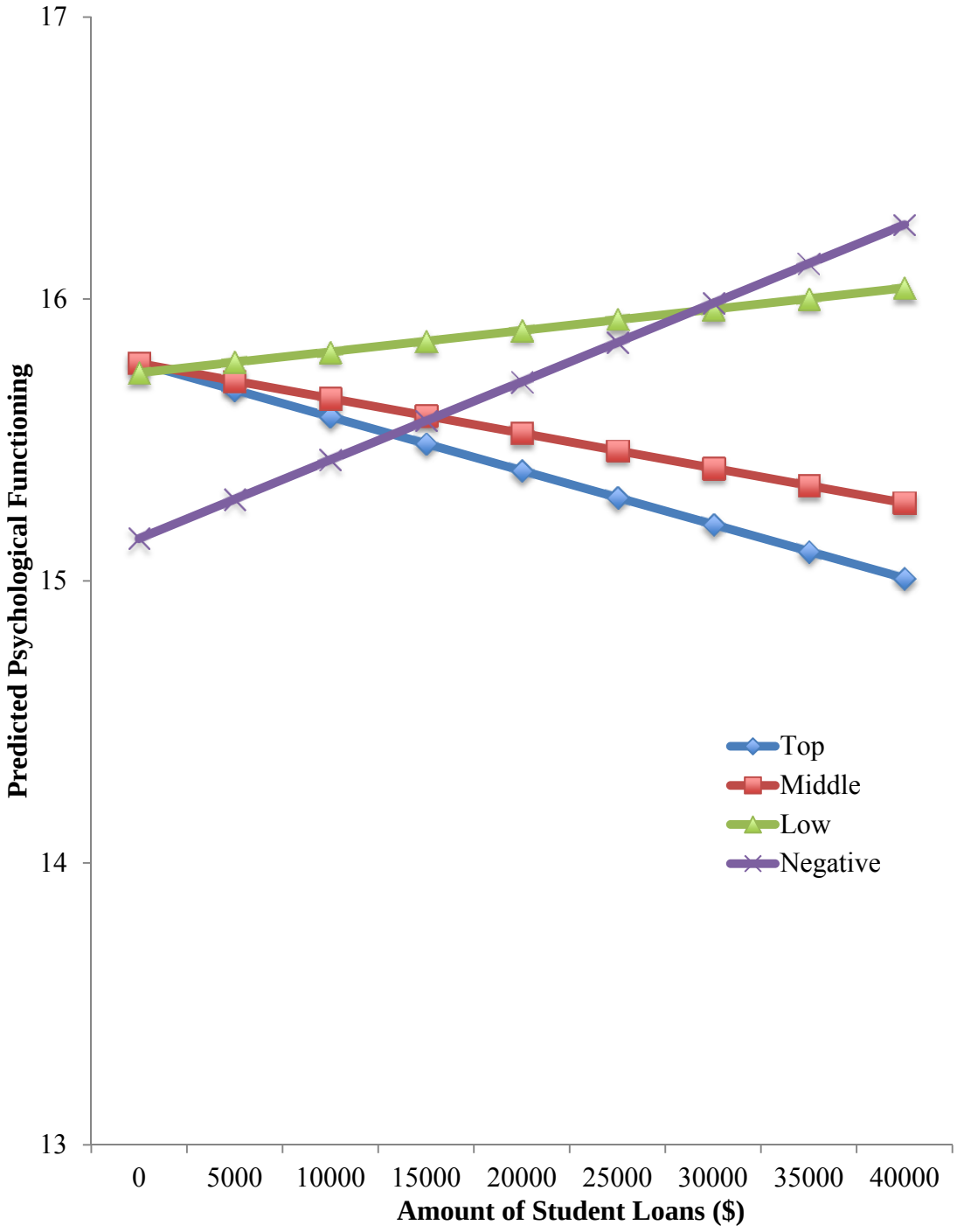
[a] Log-odds presented for ordinal regression models. [b] Models adjust for nativity, gender, self-rated health in 1997, marital status (2010), region (2010), rurality (2010), and a flag for item non-response on student loans. [c] Student loans divided by 10,000 and centered at grand mean. [d] Low = ~ 5th to 24th percentile; Middle = 25th to 74th percentile; Top = 75th percentile and higher. [e] Compares model 2 to model 1. †p<0.10; *p<0.05

Figure 1A: Average predicted probabilities of excellent and fair/poor self-rated health by amount of student loans, NLSY97 (n=4,643) [a]



[a] All covariates grand mean centered. Estimates based on Model 2 in Table 2. Predicted probabilities calculated using the margins command in Statav12.

Figure 1B: Average predicted psychological functioning as a function of student loans and parental net worth, NLSY97 (n=4,643) [a]



[a] All covariates grand mean centered. Estimates based on Model 3 in Table 2. Parental net worth categories: Negative = <$0; Low = ~ 5th to 24th percentile; Middle = 25th to 74th percentile; Top = 75th percentile and higher.