

Health Insurance Literacy and Graduate Student Healthcare Expenses

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Introduction

There are 3.2 million graduate students in the U.S. (National Center for Education Statistics, 2023). Beyond their contributions to innovation, research, and the skill-based workforce, they generate substantial fiscal returns, contributing 31% more in lifetime taxes than those with a bachelor's degree as their highest degree (Trostel, 2015). Despite their economic significance, graduate students are often an overlooked consumer group, particularly in relation to their unmet healthcare needs (Willey et al., 2024). The present study sheds light on graduate students' healthcare financial burden and its implications for their economic well-being.

Although most graduate students are insured through university-sponsored health plans, these policies often require students to bear expenses through co-payment, high deductible, and annual premiums for uncovered services such as dental care (Gaulee et al., 2015; Zhou, 2023). Students perceived university health plans as too costly (Azubuike et al., 2025; Gaulee et al., 2015), with coverage gaps, particularly for mental health needs (Gaulee et al., 2015; Willey et al., 2024), and unaffordable for family members (Gaulee et al., 2015).

Compounding these challenges, graduate students represent a unique population with minimal experience managing health insurance independently. This group comprises international students who are not familiar with the US healthcare system and domestic students who manage their own health insurance for the first time in college (Azubuike et al., 2025; Institute of International Education, 2024). Both groups demonstrate low health insurance literacy, which hampers their ability to make informed decisions (Azubuike et al., 2025). Comparable to these findings, qualitative literature highlights students' dissatisfaction with overly complicated insurance procedures, unclear policies, inadequate university communication, and a general lack of knowledge, all of which make their healthcare experience challenging and financially burdensome (Gaulee et al., 2015). These issues affect not only students' economic well-being but also their overall health and academic success.

Despite empirical findings on unmet healthcare needs due to high costs and gaps in health insurance literacy, there is limited quantitative research on the actual out-of-pocket (OOP) healthcare expenses incurred by graduate students. Moreover, the relationship between health insurance literacy and OOP expenses lacks a clear understanding. The present study attempts to fill this gap by quantitatively examining the economic burden of OOP health expenses and their determinants for graduate students. This study aims to:

- 1) quantify the out-of-pocket (OOP) healthcare expenses incurred by graduate students.
- 2) identify major determinants of OOP healthcare expenses for graduate students, with special focus on health insurance literacy.

To guide our analysis, we adopt Anderson's Behavioral Model of Health Services Use to investigate determinants of healthcare costs, which identifies literacy as a predisposition that facilitates access to care (Gelberg et al., 2000), thus influencing the healthcare costs. Extant literature suggests that health insurance literacy, particularly proactive use of insurance, is associated with students' healthcare use and resulting healthcare cost (Gaulee et al., 2015; James et al., 2020). When individuals understand their health insurance, they are more likely to make cost-effective choices, such as visiting an urgent care over an emergency department, or seeking care from an in-network provider rather than an out-of-network provider (Mbah & Perrault, 2025; Yagi et al., 2022). High health insurance literacy also increases the use of primary and preventive care, reduces health risks, subsequently leading to greater cost savings (Yagi et al., 2022). Accordingly, we derive two hypotheses.

H1: There is a negative association between health insurance literacy and the likelihood of incurring out-of-pocket healthcare expenses.

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H2: Among students who incur out-of-pocket expenses, there is a negative association between health insurance literacy and level of out-of-pocket expenses.

Significance

Understanding the graduate students' actual cost of care and its determinants is necessary not only to make effective healthcare choices but also to mitigate long-term economic setbacks. For instance, when confronted with high healthcare costs, students might delay or avoid care, despite experiencing significant healthcare needs (Azubuike et al., 2025). Consequently, this may lead to severe illness and costly medical procedures such as surgeries and Emergency department (ED) visits. Such services remain costly even with insurance coverage. The resulting financial stress may exacerbate both mental and physical health problems over time, compromising students' academic success and overall well-being (Mbah & Perrault, 2025). Corroborating these findings, a notable 32.4% of all graduate students with chronic medical conditions, and 32.2% experiencing a financial challenge in the last 12 months, showed lower academic performance and delayed progression toward a degree (American College Health Association, 2025). These crippling effects may place an additional strain on institutional resources and on the U.S. healthcare system. It underscores the urgent need to explore how healthcare expenses impact this economically significant yet underserved graduate student population.

Our findings will help graduate students to understand determinants of OOP costs, particularly the role of health insurance literacy in managing OOP costs. Accordingly, students can allocate resources, develop contingency financial plans, and make cost-effective decisions when utilizing services. The insights could also assist university health policy makers to identify gaps in health insurance knowledge and eliminate barriers to healthcare access. Overall, these measures can enhance the economic well-being of graduate students, reduce financial stress, and support their academic progression.

Study design

We conducted an anonymous Qualtrics survey among graduate students primarily from a university in the South-central region, between March and April 2025. A total of 8,773 graduate students were invited via university email, followed by two follow-up emails over the course of 6 weeks. Among the 892 respondents who consented to participate in the survey, we retained 626 non-missing responses.

This study primarily examines the annual OOP healthcare expenses for all healthcare services used since becoming a graduate student. In this study, OOP healthcare spending is defined as out-of-pocket expenses incurred for healthcare services used, including, but not limited to, hospital stay, surgery, doctor or emergency visits, dental care, prescribed or over-the-counter medicine, and other services like physical therapy or transportation for care. We exclude insurance premiums as it does not directly relate to service use.

The primary independent variable in this study is self-assessed health insurance literacy (HIL) derived from the Health Insurance Literacy Measure (HILM) (Paez et al., 2014). HILM includes two self-assessment scales: (a) consumer confidence and proactive behavior in selecting an insurance plan, and (b) consumer confidence and proactive behaviors in using an insurance plan (Paez et al., 2014). This study concentrates on consumer confidence and proactive behaviors in using an insurance plan, as it appears to be the only relevant HILM scale for both international and domestic graduate students, who are typically covered by the university-sponsored health plan (USHP). We used five items to measure students' confidence in using insurance (e.g., How confident are you that, you know how to figure out your share of cost for care, after the health plan pays their share?) and four items to measure proactive behaviors when using insurance (e.g., How likely are you to, find out if a doctor is in-network before you see him/her?). We assigned a score to each of the nine items assessing their confidence (score of 1 assigned to responses of not at all confident; 2, slightly confident; 3, moderately confident; 4, very confident) and proactive behavior (score of 1 assigned to responses not at all likely; 2, somewhat likely; 3, moderately likely; 4, very likely). The item scores were summed to create a total scale score ranging from 0 to 36, where higher scores indicate a greater level of literacy.

To minimize potential bias from self-assessed HIL and to validate the self-assessed literacy measure, we included an objective measure of health insurance knowledge (HIK) (Paez et al., 2014). We measured HIK using two multiple-choice questions that assessed respondents' understanding of two basic insurance terminologies (i.e., deductible and PPOs) adapted from Nobles et al. (2019). The two

items were scored dichotomously as correct (1) and incorrect (0). Responses were used to create a categorical variable, HIK (1, zero out of two answers correct; 2, one out of two answers correct; 3, two out of two answers correct). Other factors based on predisposition to use services include marital status and race. Enabling factors were the logarithm of income, availability of income assistance, and sources of insurance. The severity of illness, self-rated health status, and type of services used were identified as need factors.

Results

Out of the total sample, 68.69% were female, 32.05% were married, and 64.48% were non-Hispanic White students, with an average age of 28 ($SD = 7.19$) years. About one-fourth of the sample represented international graduate students. Most students were covered by USHPs (45.44%), followed by employer-sponsored (25.28%) and parent-sponsored plans (18.56%). Students reported an average score of 21.35 ($SD = 5.75$) on the self-assessed HIL scale, indicating a moderate level of literacy.

We conducted a two-part model. First, the logistic regression results (Pseudo $R^2 = 0.14$, $\chi^2 (14, n = 532) = 75.78, p < .001$) on whether to have paid OOP costs indicate that self-assessed HIL, objective HIK, health insurance plan, severity of illness, and self-rated health were statistically significant predictors of OOP incurrence (see Table 1). Specifically, one point increase in self-assessed HIL was associated with 5% lower odds of incurring OOP expenses ($OR = 0.95, p = .032$). In contrast, respondents were three times likely to incur OOP costs if they had correctly answered at least one ($OR = 3.33, p = .001$) or both the HIK questions ($OR = 3.45, p < .001$) compared to those who did not.

Additionally, respondents who identified themselves as non-Hispanic, White were twice as likely to incur costs compared to their non-White peers who identified themselves as Black/African American, Hispanic/ Latino, Asian American/Asian, or other ($OR = 1.96, p = .016$). Interestingly, 61% of non-White students were international students. Being moderately or severely ill increased the odds of OOP occurrence by 2.48 times ($OR = 2.48, p < .001$). However, parents' insurance plan ($OR = 0.42, p = .013$) or another plan ($OR = 0.30, p = .007$) was associated with 58% to 70% decrease in the odds of incurring expenses relative to USHP. Similarly, respondents with either good ($OR = 0.28, p = .031$) or very good self-rate health ($OR = 0.21, p = .006$) reported approximately 70% to 80% decrease in the likelihood of cost incurrence.

Second, the OLS regression results show key determinants of OOP expenditures among respondents who incurred such costs. The type of health services utilized was a statistically significant predictor of the level of OOP spending. Additionally, being identified as non-Hispanic White, income assistance, and the type of health insurance plan were significantly associated with OOP expenses. Table 2 presents the marginal OOP expenditure based on the results of the two-part model.

Quantitatively, the predicted average OOP cost of a graduate student was \$930 per year. Our results indicate that on average, for one point increase in HIL score, the OOP expense was predicted to decrease by \$26, although this effect was not statistically significant. OOP expenditure varied substantially across different service types: surgeries cost the most, followed by hospital stays and doctor visits. Both surgeries and hospital stay cost 6 times greater than prescribed medicine, the least costly service. The annual OOP cost of a non-Hispanic, White student was two times the cost of a non-White student, and receipt of income assistance increased healthcare spending by about \$309 annually. Notably, employer-sponsored plans were the costliest. Parent-sponsored health insurance followed. Under both insurance plans, respondents incur about 1.5 times more costs than the USHP.

Implications

This study examined the OOP burden on graduate students and its determinants, with special focus on the role of health insurance literacy. Our findings underscore two inferences. First, graduate students face a heightened OOP burden. A substantial 80% of graduate students incurred OOP costs, with a predicted average of \$930 per year. This amount is 48% higher than the average for U.S. young adults in a similar age group (\$629 per year) (KFF Analysis of 2021 Medical Expenditure Panel Survey, 2021). Second, self-assessed HIL plays a dual role: it reduces the likelihood of incurring OOP expenses through informed decision-making, but it has a limited role in lowering the expenses once incurred. In other words, while HIL helps students avoid unnecessary healthcare costs, it cannot alleviate various service costs embedded within the system. Instead, structural factors such as services used, insurance plan, and income assistance shape the magnitude of expenses.

Our findings bring to light the disproportionate healthcare OOP burden on a unique consumer

group. For students, these findings emphasize the importance of enhancing their confidence and proactive behavior (i.e., self-assessed HIL) when navigating health insurance policies. Universities and health policy makers should focus on both knowledge gaps and systemic gaps to protect students' well-being. We suggest three policy implications.

Existing scholarships focus heavily on insurance knowledge (e.g., insurance vocabulary, ability to estimate cost). However, our findings suggest that self-assessed HIL is equally important for cost-conscious insurance navigation. First, universities should strengthen literacy initiatives by integrating both knowledge- and application-based training. Such initiatives should be long-term support, given the naivety of this consumer group managing own health insurance (Azubuike et al., 2025; Mbah & Perrault, 2025). Robust support systems and clear communication channels may further promote opportunities for students to proactively engage with providers (Gaulee et al., 2015; Wildey et al., 2024).

Second, given the substantial cost burden, with average annual OOP costs exceeding national averages, universities should consider broadening insurance coverage, as literacy alone is not sufficient to reduce the healthcare cost burden. While 51% of graduate students nationally use college-sponsored health insurance plans (American College Health Association, 2025), our findings indicate that, compared to alternative plans, students are more likely to incur costs under USHP. These findings reiterate the importance of evaluating and potentially expanding insurance coverage to better align with graduate students' healthcare needs.

Third, university health policymakers should encourage students to engage in personal wellness practices and preventive care to reduce the risk of illness progression and support overall health status. Many are unaware that preventive care is typically covered at no additional cost through insurance (Yagi et al., 2022). Disseminating such information may protect students not only from potential healthcare risks but also from future financial setbacks.

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Tables

Table 1.

Regression results of two-part model for annual OOP expenses

	Logit OR (95% CI)	OLS β (95% CI)
Married	1.20 [0.70,2.08]	0.06 [-0.25,0.37]
Race		
Non-White (Ref)		
Non-Hispanic, White	1.96* [1.13,3.38]	0.58** [0.25,0.90]
Self-assessed HIL	0.95* [0.91,1.00]	-0.02 [-0.05,0.00]
Objective HIK		
0/2 correct answers (Ref)		
1/2 correct answers	3.33** [1.67,6.62]	0.45 [-0.02,0.91]
2/2 correct answers	3.45*** [1.76,6.76]	0.44 [-0.02,0.91]
Log annual income	1.00 [0.75,1.33]	-0.05 [-0.21,0.10]
Use of income assistant	0.88 [0.54,1.44]	0.33* [0.04,0.62]
Primary source of health insurance		
USHP (Ref)		
Parent/guardian plan	0.42* [0.21,0.83]	0.49* [0.08,0.90]
Employer sponsored plan	0.98 [0.47,2.06]	0.53** [0.16,0.90]
Another	0.30** [0.13,0.71]	0.25 [-0.35,0.85]
Severity of illness, %		
Not/mildly ill (Ref)		
Moderate/severely ill	2.48*** [1.54,4.00]	0.03 [-0.25,0.32]
Self-rated health		
Poor (Ref)		
Good	0.28* [0.09,0.89]	-0.21 [-0.64,0.22]
Very good	0.21** [0.07,0.65]	-0.25 [-0.66,0.15]
Type of services used		
Prescribed medicine (Ref)		
Doctor/ emergency room visits	-	0.41* [0.04,0.79]
Surgery	-	1.82*** [1.24,2.40]
Dental	-	0.46 [-0.03,0.95]
Hospital stays	-	1.80*** [1.04,2.56]
Other	-	0.79** [0.32,1.27]
Constant	9.59 [0.40,227.27]	5.30 [3.62,6.98]
Likelihood ratio test statistics (X ²)	75.78***	
Pseudo R ²	0.14	
F test (22, 397)		5.65***
Adjusted R ²		0.17

Note: OOP = Out-of-pocket. OR =Odds ratio. OLS = Ordinary least square. CI = Confidence interval. Ref = Reference category. HIL = Health Insurance Literacy. HIK = Health Insurance Knowledge. USHP = University Sponsored Health Plan.

***p < .001, **p < .01, *p < .05.

Table 2.

Marginal effects on OOP expenses (\$) from two-part model

	OOP (\$)¹
Average	930
Self-assessed HIL	-26
Objective HIK	
0/2 correct answers (Ref)	506
1/2 correct answers	983
2/2 correct answers	986
Race	
Non-White (Ref)²	553
Non-Hispanic, White	1,087
Use of income assistant	
Income assistant not received	828
Income assistant received	1,137
Source of health insurance	
USHP (Ref)	734
Parent/guardian plan	1,060
Employer sponsored plan	1,242
Another	778
Type of services used	
Prescribed medicine (Ref)	445
Doctor/ emergency room visits	673
Surgery	2,754
Dental	704
Hospital stays	2,684
Other	

Note: 1. All costs reported to the nearest dollar (\$). 2. Non-White group consist of students who identified themselves as Black/African American, Hispanic/ Latino, Asian American/Asian, American Indian/ Native Alaskan, Bi-racial/multi-racial or other.

OOP = Out-of-pocket. Ref = Reference category. HIL = Health Insurance Literacy. HIK = Health Insurance Knowledge. USHP = University Sponsored Health Plan.