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# The Relationship Between Use of School-Based Health Centers and Student-Reported School Assets

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A B S T R A C T

**Purpose:** To examine the relationship between student-reported, school-based health center utilization and two outcomes: (1) caring relationships with program staff; and (2) school assets (presence of caring adults, high behavioral expectations, and opportunities for meaningful participation) using a school district–wide student survey. These relationships were also explored across schools.

**Methods:** Using student-reported data from a customized version of the California Healthy Kids Survey from the San Francisco Unified School District (n = 7,314 students in 15 schools), propensity scoring methods were used to adjust for potential bias in the observed relationship between student utilization of services and outcomes of interest.

**Results:** Estimates generally pointed to positive relationships between service utilization and outcome domains, particularly among students using services ≥10 times. Exploratory analyses indicate that these relationships differ across schools.

**Conclusions:** Use of school-based health centers appears to positively relate to student-reported caring relationships with health center staff and school assets. Future research is needed to confirm the robustness of these observed relationships.



**IMPLICATIONS AND CONTRIBUTION**

A small number of empirical studies have examined the relationship between school-based health centers and academically related outcome domains using robust statistical controls; evidence of effects remains limited. Using propensity scoring methods, we found evidence that use of school-based health centers is related to some student-reported academically salient outcome domains.

In the past 20 years, the number of school-based health centers (SBHCs) grew exponentially, from 120 in 1988 to over 1,900 across 45 states as of 2009 [1,2]. School-based health centers also appear to have become more expansive, coordinated, and comprehensive. An increasing number offer behavioral health, dental, enrichment, and/or health education services, which include unique combinations of preventative, tertiary, and/or indicated intervention approaches [1,3,4].

Scholars stress the urgent need to understand and clarify the effects of the SBHC model, particularly in light of evaluation challenges [1,3]. First, this model is not a uniform intervention—often including a mix of services designed to be responsive to local needs and resources, requiring increased scrutiny of type and intensity of use [1]. Second, SBHCs may target multiple levels, from individual students to school organizational practices, which can make it difficult to detect program effects [5]. Third, these models are delivered within distinct school and district organizational contexts, likely contributing to variation in SBHC outcomes [1,6–11]. Finally, this model is less amenable to evaluation via rigorous experimental designs owing to the nature of SBHC development and

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implementation [1]. Studies of SBHCs often must rely on observational data, which complicates causal inference related to model effects. To compensate, a recent, albeit small, body of empirical work in this area draws on propensity score methodological approaches to carefully match schools with and without SBHCs or students who have or have not used services [12,13].

Given pressure on schools to raise student achievement and growing interest in developing sustainable models of integrating SBHCs into the public education system, scholars have sought to clarify the ways in which they may influence student academic outcomes. Nearly a decade ago, Geierstanger and colleagues [14] developed a framework suggesting that SBHCs potentially impact academic student outcomes indirectly, via two potential mechanisms: (1) reducing student health risks that impede educational achievement; and (2) increasing students' developmental assets.

The first mechanism is through the reduction of student health problems and related risk behaviors that may serve as barriers to academic performance. Although the full mediation model has not been tested directly, recent reviews find that SBHC utilization is associated with reductions in students' health and mental health symptoms and with improvements in their attendance and grades, respectively [1,13,15,16].

A second mechanism by which SBHCs may impact academic outcomes is via the promotion of school-related assets. Although these have been conceptualized in a variety of ways, they typically reflect the extent to which students personally perceive access to caring and supportive adults, that they are held to high expectations, and that they have opportunities to participate in activities or decision making in school. These assets robustly link to positive socio-emotional and academic outcomes among youth [17–21]. School-based health centers may provide students, particularly those most at risk, access to caring adults and prosocial activities [1,22–24]. School-based health center staff may also support teacher and administrator responses to student health needs or sensitize school staff to potential learning barriers. Some models directly target the responsiveness of the overall school environment through particular programming (e.g., school-wide awareness campaigns) and/or SBHC staff involvement in school decision making [22]. One carefully designed study found that students and parents in schools with SBHCs were more likely than those in schools without them to report more engaging learning environments and greater home–school communication. Although Geierstanger and colleagues [14] hypothesized that SBHC utilization could have effects on these assets, such relationships have not yet been tested.

The current study draws on data from an SBHC collaborative that provides a range of health promotion services, prevention programs, enrichment activities, and nursing and behavioral health interventions in high schools within one urban school district. Using propensity scoring methods, we examine the relationship between use of SBHC services and student reports of caring relationships with SBHC staff, and also school assets. Based on the framework and empirical findings described above, we hypothesized that after controlling for potential confounding student and school characteristics, use of SBHC services would positively relate to these indicators. To address limitations of prior research, we estimated relationships as a function of student reports of the frequency with which they used services [1] and explored the extent to which these relationships were similar across schools [6–11].

## Methods

### Study context

The San Francisco Wellness Initiative is a city–county–district collaborative that manages SBHCs (called Wellness Programs) in 15 of 19 high schools in the San Francisco Unified School District, which serves a population of over 15,000 students from diverse cultural and socioeconomic backgrounds (43% of students receive free or reduced lunch; 20% are English language learners; and 49% are Asian, 21% are Latino, 12% are African-American) [25].

The core of each SBHC is a standardized, site-level staffing structure that includes, at a minimum, a wellness coordinator, a school nurse, a community health outreach worker, and a behavioral health therapist. In partnership with community-based organizations, staff members deliver services that incorporate universal, selective, and indicated approaches to addressing a variety of student health and psychosocial needs [26–28]. District archives indicate that services most often accessed are nursing services (44% of all youth served) and general counseling (38%). Universal services include youth- and adult-led health education and promotion activities delivered through school-wide events and classroom presentations, along with drop-in services for students who need first aid or health information. Selective services are provided to students who exhibit moderate needs, usually through support and empowerment groups. Finally, indicated interventions in the form of counseling and case management are offered to students experiencing health or mental health symptoms; the top three presenting issues are anxiety (27%), family issues (21%), and depression (20%). Frequent users (students with $>$ 10 contacts) typically participate in indicated interventions [21].

### California Healthy Kids Survey

In spring 2009, as part of the Wellness Initiative's evaluation, a question about SBHC utilization was added to the California Healthy Kids Survey (CHKS), the largest statewide student survey of risk and protective factors [21]. Administration of the survey included a passive parental consent process. Student participation was voluntary and anonymous, which made it impossible to link survey responses to student academic or SBHC records [21]. The 2009 survey is also notable because it was delivered as a near census of all students in the district. The Wellness Initiative granted permission for the authors to analyze these data and the Committee for Protection of Human Subjects at University of California at Berkeley reviewed the study and deemed it exempt from institutional review board review.

### Sample

The 2009 CHKS was administered concurrently with the Youth Risk Behavior Survey (YRBS) in the San Francisco Unified School District. After a random sample of 2,500 students was drawn for the YRBS, all remaining high school students in grades 9–12 were asked to complete the CHKS. There were 13,901 students who were offered the CHKS survey; 12,329 of those students attended schools participating in the Wellness Initiative (15 of 19 sites). The survey completion rate was 69%, yielding a final sample of 8,466 students. Of these, 7,314 responded to the single, customized item asking about SBHC utilization.

A total of 42% of the sample reported accessing an SBHC at their school, which is consistent with administrative data. The final sample was 62% Asian, 13% Latino, and 7% black; 12% identified with Pacific Islander, multiple, or other racial groups (Tables 1 and 2). Compared with the district population, the sample was more likely to be Asian and less likely to be Latino or black. Consistent with prior research, students using SBHCs and using services frequently were less likely to be male and more likely to be Latino or black, and reported greater early-onset substance use than did students who did not use SBHC services [1,29–31].

### Analytic approach

To examine the relationship between SBHC use and outcomes using this observational data source, we utilized propensity scoring to compensate for potential bias, particularly owing to confounding, in our estimates. Propensity scoring methods generate estimates of "true" propensity scores denoting the probability that a subject will receive treatment (in this case, whether a student reports using SBHC services) [32,33]. In theory, matching treated and untreated subjects on these "true" scores helps equalize subjects on both observed and unobserved variables [32]. In practice, estimates of these scores are generated based on observed pretreatment covariates. Methodologists underscore the key role played by careful selection of pretreatment covariates, and that variable selection should be informed both by prior conceptual and empirical work [32]. Previous studies of SBHCs implicate several student characteristics as key covariates, including age, grade, gender, free-lunch status, race/ethnicity, English proficiency, special education placement, and student behavioral risk [13,29,31]. School-level compositional factors, and performance indicators, along with program characteristics (i.e., longevity of Wellness programs and overall utilization rates) also relate to service use in this district [30].

Given emerging research suggesting the importance of both school factors and program features in shaping utilization effects, we also describe within-school estimates of the relationship between SBHC use and student outcomes.

### Variables

*Independent variables.* To assess SBHC use, we used the single, customized question to code student responses in two ways: "During the past school year, how often have you visited your school's Wellness Program for information or services?" Responses included "Never," "One or two times" "Three to five times," "Six to 10 times," and "More than 10 times." First, we created a dichotomous variable, indicating whether a student used school-based services at least once versus "Never." To analyze differences in frequency of service utilization, we created

**Table 1**
Student sample (n = 7,314) characteristics

| | All students | Never used SBHC (58%) | Used 1–2 times (26%) | Used 3–5 times (9%) | Used 6–10 times (3%) | Used > 10 times (4%) |
|---|---|---|---|---|---|---|
| Caring adult in SBHC[a] | 2.02 (1.05) | 1.78 (.97)$^{***}$ | 2.15 (1.01) | 2.55 (.97) | 2.37 (1.19) | 3.31 (.97) |
| School assets[a] | 2.68 (.66) | 2.63 (.66)$^{***}$ | 2.74 (.63) | 2.79 (.67) | 2.72 (.73) | 2.81 (.73) |
| Caring relationships with adults | 2.82 (.75) | 2.77 (.74)$^{***}$ | 2.87 (.73) | 2.93 (.76) | 2.83 (.83) | 3.01 (.82) |
| High expectations | 2.99 (.75) | 2.94 (.76)$^{***}$ | 3.05 (.73) | 3.09 (.74) | 3.02 (.79) | 3.12 (.81) |
| Meaningful participation | 2.24 (.82) | 2.19 (.81)$^{***}$ | 2.30 (.79) | 2.33 (.85) | 2.30 (.89) | 2.31 (.89) |
| Age | 15.89 (1.23) | 15.89 (1.25)$^{**}$ | 15.84 (1.20) | 15.94 (1.22) | 16.00 (1.21) | 16.08 (1.23) |
| Grade level, % | | | | | | |
| Ninth | 25 | 26$^{**}$ | 26 | 23 | 20 | 19 |
| 10th | 23 | 22$^{*}$ | 25 | 26 | 25 | 25 |
| 11th | 27 | 27 | 27 | 29 | 29 | 30 |
| 12th | 24 | 25 | 22 | 23 | 25 | 25 |
| Male, % | 44 | 48$^{***}$ | 40 | 39 | 43 | 32 |
| Race/ethnicity, % | | | | | | |
| Asian | 62 | 70$^{***}$ | 57 | 38 | 37 | 32 |
| Black | 7 | 4$^{***}$ | 8 | 13 | 12 | 21 |
| Latino | 13 | 9$^{***}$ | 15 | 22 | 28 | 24 |
| Pacific Islander | 3 | 2$^{***}$ | 3 | 5 | 3 | 5 |
| Other racial identity | 9 | 8$^{***}$ | 11 | 13 | 15 | 14 |
| White | 6 | 6$^{+}$ | 7 | 8 | 5 | 4 |
| Not living with two parents | 31 | 27$^{***}$ | 33 | 41 | 41 | 48 |
| First use at least 1 year before current age, % | | | | | | |
| Alcohol | 32 | 26$^{***}$ | 34 | 41 | 47 | 61 |
| Tobacco | 15 | 12$^{***}$ | 16 | 25 | 28 | 27 |
| Smokeless tobacco | 4 | 3$^{***}$ | 4 | 7 | 14 | 8 |
| Marijuana | 13 | 9$^{***}$ | 14 | 22 | 31 | 33 |
| Other illegal drug | 6 | 5$^{***}$ | 6 | 10 | 16 | 10 |
| Internal resilience assets[a] | 3.24 (.68) | 3.19 (.69)$^{***}$ | 3.30 (.63) | 3.34 (.63) | 3.19 (.78) | 3.30 (.74) |
| Received mostly D's and F's, % | 2 | 1$^{***}$ | 2 | 5 | 5 | 8 |
| Truant at least a month of school during the past 12 months (%) | 9 | 7$^{***}$ | 11 | 14 | 15 | 23 |

Data are mean (standard deviation) or percentage. SBHC = school-based health center.
SBHC = school-based health center.
[a] Mean (standard deviation) of 4-point scale.
$^{+}$ $p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$ from one-way analysis of variance models comparing all student variables by their reported SBHC use.

**Table 2**
School sample characteristics

| | All students | Never used SBHC (58%) | Used 1–2 times (26%) | Used 3–5 times (9%) | Used 6–10 times (3%) | Used > 10 times (4%) |
|---|---|---|---|---|---|---|
| Students eligible for free or reduced lunch, % | 47 | 46* | 46 | 49 | 50 | 50 |
| Student body black or Latino, % | 26 | 23* | 27 | 33 | 34 | 38 |
| Student body at or above proficiency in reading, % | 56 | 58* | 56 | 48 | 47 | 44 |
| Student body who used SBHC, % | 36 | 34* | 36 | 41 | 43 | 46 |
| Years SBHC has been operating, n | 6.50 (2.43) | 6.74 (1.94)* | 6.29 (2.10) | 5.99 (2.22) | 6.27 (2.22) | 5.61 (2.43) |

N = 7,314 students; 15 schools. Data represent mean (standard deviation) or percentage.
SBHC = school-based health center.
*$p < .001$, from one-way analysis of variance models comparing school characteristics by reported SBHC use.

four dichotomous indicators reflecting each of the response categories (vs. "Never used"). Surveys captured neither the type nor the nature of the service utilized by respondents.

*Dependent variables.* Our first dependent variable was a single item indicator asking students to report their level of agreement, on a 4-point scale, with the following statement: "There is an adult in the Wellness Program who really cares about me." School assets were measured using a composite variable, from the CHKS Resilience Youth Development Module. It included three subscales (nine items): (1) caring relationships (three items, e.g., "At my school there is a teacher or other adult who really cares about me"); (2) high expectations (three items, e.g., "At my school there is a teacher or other adult who believes that I will be a success"); and (3) meaningful participation (three items, e.g., "At my school I do interesting activities"). These three subscales show favorable internal consistencies (Cronbach alpha of .80, .86, and .80, respectively) and construct validity [33–35].

*Control variables.* Specific pretreatment controls fell into three categories: student socio-demographic background, early alcohol and substance use, and school attended. Demographic characteristics included continuous measures of age and three dichotomous variables indicating grade level (10th, 11th, and 12th, vs. ninth). Others included a series of dichotomous variables indicating whether a student was male (vs. female), Latino, black, white, Pacific Islander, or of another racial background (vs. Asian), and living with biological parents (vs. not). Prior alcohol and substance abuse was measured using five items. Using their reports of their current age as an index, students were classified, via effects coding, as either reporting use at least 1 year before their current age (coded 1), current use (coded 0), or never having used (coded −1). Finally, to capture all time-invariant characteristics of school attended, a series of dichotomous variables reflecting 14 of the 15 schools were utilized.

Three additional variables (grades, school attendance, and internal assets) that could not be plausibly classified as occurring before SBHC utilization, but were possible confounders of the relationship between use and school assets, were included in final models. Indicators of student self-reported academic performance were dichotomized into two variables reflecting whether the student (1) reported grades of mostly D's and F's and (2) skipped more than 1 month of school. This decision was based on prior research suggesting that receiving F's and missing > 10% of a school year are salient indicators of future academic performance [36,37]. Internal assets were measured using an additional Resilience Youth Development Module composite incorporating student (1) cooperation and communication (three items); (2) self-efficacy (three items); (3) empathy (three items); (4) problem-solving (three items); (5) self-awareness (three items); and (6) goals and aspirations (three items). These also show favorable psychometric properties, with Cronbach alpha ranging between .79 and .89 [33–35,38].

For analyses exploring school-level outcome differences, we considered: percentages of the student body that were (1) black or Latino; (2) receiving free or reduced lunch; and (3) reading at or above proficient on standardized tests, as well as the overall utilization rate and longevity (in years) of each SBHC. Tables 1 and 2 present sample student and school descriptive characteristics, respectively. They include results of one-way analysis of variance models comparing all variables by levels of student SBHC use, confirming initial differences among students on variables of interest by reported SBHC use.

## Data analyses

*Propensity scoring techniques—overall use.* We estimated students' propensities to report using SBHC services using logistic regression, including all pretreatment controls, as well as interaction terms among pairs of all variables. We compared SBHC use estimates across multiple matching procedures; ultimately using estimates generated from one-to-one nearest neighbor within calipers procedures [31]. The matched sample included 5,962 students, encompassing 97% of SBHC users (2,981 of 3,075). As seen in Table 3, there were no significant differences between users and nonusers on any pretreatment covariates after matching.

*Propensity scoring techniques—frequency of use.* For SBHC frequency of use or "dose," we utilized methods recommended by Guo and Fraser [32] and Imbens [39]. We first estimated a multinomial logit model predicting the dose categories (i.e., "never," vs. "one or two times," "three to five times," "six to 10 times," and "> 10 times") using the model specification discussed above. In this method, the inverse of the propensity score for students' reported use level is used as a propensity weight in subsequent regression analyses.

*Multivariate estimates.* Final regression models included all pretreatment and other controls and used cluster-corrected standard errors to account for the nestedness of students within schools.

*Missing data.* Several survey items had varying but usually small proportions (e.g., < 5%) of missing responses. We experimented with a variety of imputation techniques to recover data, and confirmed that all estimates were robust to alternative missing data specifications. We report results based on a data

**Table 3**
Propensity matched sample characteristics

| Pretreatment control variables | Used SBHC (n = 2,981) | Did not use SBHC (n = 2,981) |
|---|---|---|
| Individual level | | |
| Age | 15.89 (1.21) | 15.93 (1.22) |
| Grade level, % | | |
| Ninth | 24 | 25 |
| 10th | 25 | 24 |
| 11th | 28 | 27 |
| 12th | 22 | 24 |
| Male, % | 40 | 39 |
| Race/ethnicity, % | | |
| Asian | 51 | 52 |
| Black | 10 | 9 |
| Latino | 18 | 17 |
| Other racial identity | 12 | 12 |
| Pacific Islander | 3 | 3 |
| White | 7 | 7 |
| Not living with two parents | 36 | 36 |
| First use at least 1 year before current age, % | | |
| Alcohol | 38 | 38 |
| Tobacco | 19 | 18 |
| Smokeless tobacco | 6 | 5 |
| Marijuana | 18 | 16 |
| Other illegal drug | 8 | 8 |
| School characteristics | | |
| Students eligible for free and reduced lunch, % | 47 | 47 |
| Student body black or Latino, % | 29 | 28 |
| Student body at or above proficiency in reading, % | 53 | 54 |
| Student body who used SBHC, % | 38 | 37 |
| Years SBHC has been operating, n | 6.20 (2.16) | 6.29 (2.12) |

Data represent mean (standard deviation) or percentage. N = 5,962. There were no significant differences ($p < .10$) between users (and frequency of use) and nonusers after matching.
SBHC = school-based health center.

set including all 7,314 students who reported their SBHC utilization, using a combination of conditional mean imputation and dummy variable flags indicating that a variable was imputed.

## Results

Table 4 presents estimates of the relationship between student-reported SBHC utilization, frequency of utilization, and student reports of a caring relationship with an SBHC staff member, and total school assets (and three component subscales). The top rows present results from multivariate ordinary least-squared regression estimates using propensity scoring methods. We also include multivariate ordinary least-squared regression estimates for comparison.

Any versus no reported SBHC use was positively related to student reports of a caring relationship with an adult SBHC staff member ($\beta = .48$, $p < .001$, $d = .50$), their total school assets ($\beta = .09$, $p < .001$, $d = .14$), specific school assets including caring relationships with adults ($\beta = .08$, $p < .01$, $d = .10$), high expectations ($\beta = .08$, $p < .001$, $d = .10$), and meaningful participation ($\beta = .11$, $p < .001$, $d = .12$).

Based on post hoc *z*-tests, there was evidence of a linear dose-response relationship between students who used an SBHC one to two times, three to five times, and > 10 times (vs. no reported use) and their reports of caring adults in the SBHC. A linear dose-response relationship was not found for school assets. Post hoc *z*-tests revealed that for each asset subscale—caring relationships with adults, high expectations, and meaningful participation—students who reported use of the SBHC > 10 times reported significantly stronger assets than did students who either used it one to two times, three to five times, or six to 10 times. These latter three groups did not differ from each other.

Effect sizes were largest for student reports of caring relationships with SBHC staff (for each dose category, $d = .28, .78, .52$, and 2.84, respectively). Effect sizes for total school assets and assets subscales were generally modest ($d = 0–20$). Among students who used SBHC services > 10 times versus not, medium effect sizes were observed for total schools assets, caring relationships, high expectations, and meaningful participation ($d = .57, .52, .53$, and .48, respectively).

Table 5 describes propensity-adjusted multivariate regression estimates of the relationship between SBHC use and assets for each school. Given the modest number of schools in the sample, we further grouped schools into two categories (those in which there were positive and significant associations between SBHC use and caring relationships with adults in the SBHC and total assets vs. not) and compared these schools in terms of their compositional, performance, and utilization characteristics. Post hoc, Bonferroni-adjusted *t*-tests revealed that the six schools that met these criteria had higher average reading proficiency levels (52% vs. 21%; $p < .01$) and fewer black and Latino students (25% vs. 60%; $p < .001$). Their SBHCs were more established (7 vs. 4 years; $p < .01$) and had lower overall utilization rates (37% vs. 64%; $p < .01$).

## Discussion

We found support for our hypotheses regarding student-reported SBHC utilization and school assets. We found relationships between student reports of SBHC use, a caring relationship with an adult in the SBHC, and school assets. Our findings cohere with emerging literature suggesting a positive relationship between students' SBHC utilization and academic outcomes, by providing evidence of a key mechanism of that relationship, student-reported school assets. Importantly, school assets are linked to reduced student risk behaviors, improved well-being, and positive school outcomes [17–21,25]. We found the strongest relationships for student reports of caring relationships with SBHC staff, which is consistent with literature suggesting that a key contribution of SBHCs is providing youth with access to caring adults, particularly those at risk [23].

We found more modest relationships between overall utilization, utilization frequency levels up to 10 SBHC visits, and school assets. This could be interpreted in at least two ways. First, school assets represent measures of students' perceptions of the relationships and opportunities available in the overall school community, of which SBHC contacts represent a circumscribed set. Second, it is likely that the nature of the contact with the SBHC has a role. It would be unreasonable to assume that casual contact with the SBHC would produce large effects. Even with a higher frequency of visits to the SBHC, the particular type of service and the extent to which it directly or indirectly targets caring relationships, high expectations, or opportunities for meaningful participation likely vary. On the one hand, this finding echoes prior calls for more research to unpack the nature, type, and frequency of service use, and also points to a need to understand subgroups of students who may be more or less

**Table 4**
Multivariate regression estimates of relationship between SBHC use and caring relationships in SBHC, and school assets

| | Caring relationship with adult in SBHC | Total school assets | Caring relationships[c] | High expectations[c] | Meaningful participation[c] |
|---|---|---|---|---|---|
| OLS multivariate regression estimates from propensity matched sample (n = 5,962) | | | | | |
| Used at all | .48*** (.39, .56) | .09*** (.06, .13) | .08** (.03, .13) | .08*** (.03, .13) | .11*** (.06, .15) |
| OLS multivariate regression estimates from propensity-weighted dose-response models (n = 7,314) | | | | | |
| Used 1–2 times | .37***[a,b] (.29, .45) | .07***[a] (.05, .10) | .06**[a] (.03, .09) | .07**[a] (.02, .11) | .08***[a] (.04, .12) |
| Used 3–5 times | .74***[a,b] (.61, .88) | .11***[a] (.06, .17) | .11**[a](.05, .16) | .09+[a] (.05, .16) | .15***[a] (.08, .22) |
| Used 6–10 times | .35***[a,b] (.19, .51) | .04[a] (−.03, .12) | .00[a] (−.12, .11) | .02[a] (−.09, .13) | .09[a] (−.03, .20) |
| Used > 10 times | 1.58*** (1.45, 1.70) | .23*** (.17, .28) | .23*** (.17, .29) | .23*** (.11, .34) | .24*** (.16, .32) |
| OLS multivariate regression estimates from sample (n = 7,314) | | | | | |
| Used at all | .52*** (.43, .61) | .09*** (.06, .12) | .08*** (.04, .12) | .08** (.03, .12) | .11*** (.07, .15) |
| OLS multivariate regression estimates from dose-response models (n = ,7314) | | | | | |
| Used 1–2 times | .36*** (.27, .45) | .08*** (.05, .11) | .06** (.03, .10) | .07** (.02, .11) | .09*** (.04, .14) |
| Used 3–5 times | .71*** (.52, .83) | .11*** (.07, .14) | .10*** (.06, .14) | .09** (.02, .15) | .13*** (.05, .25) |
| Used 6–10 times | .52*** (.36, .67) | .10+ (.02, .20) | .04 (−.10, .19) | .07 (−.07, .20) | .15** (.05, .25) |
| Used > 10 times | 1.46*** (1.32, 1.60) | .16*** (.09, .24) | .19*** (.12. .25) | .14** (.05, .24) | .19** (.08, .30) |

Data represent estimate (95% confidence interval). Multivariate models are cluster-corrected and also include pretreatment and other covariates, and school fixed effects. Comparison group = never used SBHC.
OLS = ordinary least squares; SBHC = school-based health center.
[a] Post hoc *z* difference from used > 10 times, < .001.
[b] Post hoc *z* difference from used three to five times, < .001.
[c] Caring relationships, high expectations, and meaningful participation are subscales of total school assets.
+ $p < .10$, ** $p < .01$, *** $p < .001$.

responsive to SBHC services [1,26,29]. On the other hand, these findings raise the question of whether and how SBHC centers can more actively link their programming to school asset development, which likely involves intentional collaboration with school staff to align and integrate their services with core school activities [1,19].

School-based health center effects may be influenced by characteristics of the schools in which they are situated, and are a reminder that schools can exert important influences on both program delivery and student experience of services [6–11]. That schools with overall positive relationships between student-reported SBHC use and school assets had higher reading proficiency levels, lower concentrations of black and Latino students, and lower utilization than their peer schools raises questions about potential interactions between SBHCs and the risk profile of the student body or variation in SBHC capacity or service delivery strategies. Such effects receive little attention in this literature, but are crucial for interpreting potential SBHC benefits to students [6–11] and extending theory in this area [14].

Finally, we observed differential relationships between the number of SBHC visits and assets. The strongest effects, all of which fell in the medium to large range, were observed for students reporting > 10 visits. This is encouraging given that on average, these students showed risky pretreatment characteristics, and it may suggest minimum "doses" at which SBHC utilization shows effects on these outcome domains. Alternatively, we cannot rule out that students' school assets have a role in selecting students into SBHC utilization and levels of use. This suggests more intensified efforts to understand correlates of SBHC utilization, such as staff referral practices, beyond prior socio-demographic and health and behavioral risk factors [30].

In summary, our findings must be interpreted in light of the limitations of this data source in generating accurate estimates of these relationships. Use of this cross-sectional data set also complicates our ability to understand the direction and nature of the relationship between SBHC use and assets. We cannot be certain that SBHC use precedes student-reported outcome domains. As we discussed, we cannot rule out that other omitted variables may account for the relationships we observed, such as other types of service use at school or in the community.

Given these limitations, our results support the promise of further exploration and expansion the framework of Geierstanger and colleagues [14] for SBHC effects on student academic functioning. Our findings also underscore that nuanced understanding of both users and the nature and type of services used, as well as the implementation of designs that can be informative of school effects on SBHCs and their users, could add to the development of this knowledge base [1,6–11].

**Table 5**
Multivariate regression estimates of relationship between SBHC use and caring relationships in SBHC, and school assets, by school

| School | Caring relationship with adult in SBHC | Total school assets | Caring relationships | High expectations | Meaningful participation |
|---|---|---|---|---|---|
| 1 (n = 60) | .42 | −.30 | −.17 | −.17 | −.37 |
| 2 (n = 400) | .33*** | −.05 | −.08 | −.07 | .03 |
| 3 (n = 49) | .45 | −.04 | .06 | .11 | −.27 |
| 4 (n = 76) | .10 | −.35 | −.28 | −.29 | −.45 |
| 5 (n = 59) | .52+ | −.08 | −.25 | −.01 | .13 |
| 6 (n = 299) | .52*** | .12 | .10 | .10 | .16 |
| 7 (n = 359) | .39*** | .18*** | .27*** | .20** | .05 |
| 8 (n = 156) | .34+ | −11 | −.05 | −.09 | −.06 |
| 9 (n = 245) | .43*** | .20** | .17+ | .16 | .21+ |
| 10 (n = 521) | .69*** | .17** | .21*** | .22*** | .06 |
| 11 (n = 869) | .45*** | .10* | .02 | .03 | .19*** |
| 12 (n = 1,219) | .57*** | .08* | .06 | .08* | .08+ |
| 13 (n = 292) | .58*** | .14 | .16 | .13 | .16 |
| 14 (n = 200) | .50*** | −.04 | −.02 | −.08 | .15 |
| 15 (n = 1,158) | .36*** | .10** | .08+ | .05 | .15** |

SBHC = school-based health center.
+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

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