# The Kit: Undergraduate Students Identifying and Mitigating Barriers to their Sexual and Reproductive Health Needs

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## Abstract

# Background

Many U.S. colleges and universities offer access to a healthcare center that provides sexual and reproductive health (SRH) resources, services, and products. The importance of health centers in college and university settings in reducing sexual health disparities in student populations cannot be stressed enough. This article evaluates a student-led, mutual-aid, grassroots health promotion strategy for students with limited access to healthcare services, supplies, and tools, via an anonymous and discrete distribution of SRH resources without charge.

# Methods

In partnership with faculty, undergraduate students worked to address their SRH needs by providing and increasing access to comprehensive, evidence-based, and sex-positive resources. Referred to as *The Kit*, this student-led, grassroots health promotion program aimed to provide contraceptives, sexual health wellness products, and basic hygiene supplies to students in 2022–2023. This pilot study aimed to assess student-perceived availability and barriers to contraception and desired SRH services on campus, implement a low-cost and sex-positive intervention, and elucidate perceptions of the program's availability, use, and impact. Association rules mining identified associations between the types of SRH products that were requested in tandem by students.

# Results

Our findings highlight students' perception of access to services and resources and the implementation of an anonymous and discreet SRH supplies distribution strategy to meet the articulated needs of undergraduate students. Students reported cost, privacy, and confidentiality as significant barriers to acquiring sexual health products and supplies. *The Kit* was made available for one academic year and has gained student popularity and growth in awareness of what it provides. Survey data reveals that before the implementation of *The Kit*, 42% of students reported contraceptives being available on campus, and one-year post-intervention, that number grew to 71%. Similar observations were made for student access to sexual health education (29% and 72% report access, respectively) and services (35% and 72% report access, respectively) pre-and post-intervention.

# Conclusion

A student-led SRH supply and resource delivery strategy may immediately reduce SRH inequities and decrease barriers to contraceptive use for students with limited access to on-site SRH product availability.

# BACKGROUND

Sexual health disparities—such as sexually transmitted infections (STIs) [1], unintended pregnancies [2], and relationship-based [3, 4] and sexual violence [5, 6]—significantly impact U.S. post-secondary students' educational trajectories and outcomes [7, 8]. For instance, risky sexual health practices [9], inconsistent or incorrect use of contraceptives [10], lack of access to sexual and reproductive health preventive services [11, 12], resources, and information [13], and gaps in sexual health knowledge due to differential access to comprehensive and scientifically-based sexual health education in K-12 contexts [14, 15], among others, have been connected to unplanned pregnancies, which can impact timely degree completion [16–18]. As more than  of students in U.S. colleges and universities are sexually active [1, 19], it is crucial to focus on and understand the impact of the health service provision context in place at their institutional homes [13].

Studies have stressed the importance of health centers in college and university settings in reducing sexual health disparities in student populations [20]. Students are more likely to visit a university health care center for their sexual health and family planning needs than other settings [11]. In addition, access to on-campus health services has been associated with students' increased sexual health preventive behaviors such as STI testing [13, 21] and birth control use [9, 11]. A survey of 2- and 4-year post-secondary colleges in Minnesota found that sexually active students whose institutions provided access to on-campus sexual health services were less likely to report engaging in unsafe sex behaviors than those whose institutions did not have health centers [9]. Institutional factors, such as the size of the college, have been found to impact the use of barrier methods during sex, with students attending larger college campuses more likely to consistently use barrier methods during anal or vaginal sex compared to those enrolled in smaller campuses [22].

Research indicates that college students see their institutional home as responsible for providing sexual health knowledge, resources, and services [23] to the student body. This perspective of responsibility for service provision also includes students' desires for their university health services to address issues of sexual and reproductive health in a supportive and affirming way [24]. However, universities and colleges vary in how they provide students with sexual health care services and resources. A nationally representative survey of colleges and universities in the U.S. estimates that approximately 70% had a healthcare center that provided sexual and reproductive health resources and services to their student body [25].

Students at colleges and universities lacking access to student-based healthcare services are at a disadvantage. Brindis and Reyes [26] reflect how students without access to campus-based health services often find themselves "visit[ing] emergency rooms for routine medical care…" [26], which puts them in an economically precarious situation that could threaten their educational outcomes. Taken together, we can see how students attending U.S. post-secondary settings without health care services bear a higher burden of sexual and reproductive health disparities than those enrolled in settings with services and resources at hand. As a response, universities and colleges with no campus-based health

centers often attempt to meet this gap by referring students to outside providers [26, 27], outsourcing services [28], providing access to vending machines with health and wellness supplies [29], partnering with community-based organizations to provide health promotion and education [30, 31], and collaborating with health department settings to provide condoms and other supplies [32], among others. However, these responses and alternative avenues to health service provision are insufficient to address the apparent health disparity affecting populations enrolled in post-secondary settings without on-site student-based health care services.

This article presents the findings of a student-led, grassroots health promotion strategy at a health sciences undergraduate campus. Named *The Kit*, this strategy is part of a larger grassroots and mutual-aid initiative between faculty and undergraduate students working together to address the sexual and reproductive health needs of undergraduates attending post-secondary settings with limited access to SRH resources by providing and increasing access to comprehensive, evidence-based, and sex-positive resources, and tools. This article evaluates the impetus, design, and use of this anonymous and discreet sexual and reproductive health supplies distribution strategy designed by undergraduate students and faculty supporters.

# METHODS

[NAME OF CAMPUS BLINDED FOR REVIEW] is an undergraduate health and medical sciences campus in the U.S. Midwest. At the time of writing, the population comprised less than 1,000 students. The student body encompasses various college-aged identity subgroups where 43% self-identify as non-white [33], 67% are from underrepresented groups, including low-income, first-generation, and those students identifying as racial/ethnic minorities [34], and approximately 80% are people self-identifying as women of reproductive age [33] (Table 1). The students at this campus have free access to a Family Medicine clinic [34, 35] that provides care to patients of all ages, contingent on paying a student services fee each semester [34, 35]. This clinic is available to the students and the general public, Monday through Friday between 8 am and 5 pm, except for an hour between noon and one [34, 35]. This clinic does not offer an embedded pharmacy or sell health supplies. *The Kit* began as a student-led, mutual-aid initiative and immediate response to students reporting inadequate access to sexual health services, including education and products at [NAME OF CAMPUS BLINDED FOR REVIEW] (Fig. 1). *The Kit* was designed to provide contraceptive and reproductive resources and education to students on campus by delivering SRH items with easy-to-read instructions directly to students by trusted student peers. The items available for request included condoms, *My Way* (a Levonorgestrel/emergency contraception brand), pregnancy tests, and essential hygiene products, including tampons, pads, razors, toothbrushes, and toothpaste.

Table 1

Population-level and group-level demographic characteristics. *Demographic characteristics are included at the population level (campus is referred to as HSI) and at the group level (Pre-Survey and Post-Survey). Values of (*) correspond to data unavailable at the population level. Population-level demographics were obtained from email communication between AM and the campus's director of data and analytics.*

| **Demographics** | **HSI *(n = 561)*** | **Pre-Survey *(n = 95)*** | **Post-Survey *(n = 73)*** |
|---|---|---|---|
| Female-identifying | 81% | 77.9% | 83.6% |
| Non-Female identifying | 29% | 22.1% | 16.4% |
| *Male-identifying* | * | *18.9%* | *13.7%* |
| *Non-binary identifying* | * | *3.2%* | *2.7%* |
| White | 57% | 60.0% | 67.1% |
| Non-White | 43% | 40.0% | 32.9% |
| *American-Indian or Native Alaskan* | * | *1.1%* | *0%* |
| *Asian/ Pacific Islander* | * | *11.6%* | *12.3%* |
| *Black or African American* | * | *9.5%* | *13.7%* |
| *Two or more races* | * | *7.4%* | *0%* |
| *Hispanic or Latino* | * | *8.4%* | *1.4%* |
| *Other* | * | *2.1%* | *5.5%* |

Participants completed surveys to understand student perceptions on on-campus contraceptive availability; access to sexual health education, services, and on-site resources for obtaining contraceptives; barriers to obtaining contraceptives at school; and desired on-campus services (Fig. 1). Students were surveyed twice, once before the implementation of *The Kit* intervention and once post-intervention in a between-subjects study design, with potentially overlapping but distinct survey sample groups (Fig. 2). Students were also surveyed during *The Kit's* implementation to address reported barriers to family planning and sexual health services, tools, and resources and elucidate the use and trends of *The Kit* (Table 2).

# Pre- and Post-intervention Surveys

Participants were recruited from the entire campus undergraduate study body to examine perceptions of the availability and access to SRH education, services, and resources. The designed survey instrument was disseminated to students through campus-wide advertisements, including print and social media advertising, word-of-mouth, flyers posted in residence halls, bathroom stalls, and by student service staff during on-campus socio-academic events. A 12-question survey was designed and administered to expound participant demographics, perception of campus provision of sexual health education, services, and resources, student comfort in product acquisition, a feeling of a safe and supportive environment on

campus, and to elucidate desired resources and barriers. The pre-survey was concluded in April 2022, and the post-survey was conducted one year later in April 2023. Institutional Review Board (IRB) approval was sought and obtained before dissemination of the Qualtrics survey (Fig. 1).

# The Kit Initiative

Undergraduate students, with the guidance of faculty (AM and RO), designed *The Kit* to be a student-centered, anonymous, and discreet intervention. Online and in-person product acquisition options were available to students wishing to receive a kit. Q.R. codes to a google-form were readily accessible to the student body. The availability of *The K*it was made public through campus-wide advertisements, including print and social media advertising (supplement examples below). Students could opt for a "standard" order containing specific products and quantities or tailor the request to their particular needs. Optimization of product availability has taken place through the duration of *The Kit* as student stakeholders have made specific product requests. The university's Family Educational Rights and Privacy Act (FERPA) staff was consulted by faculty (AM and K.O.) before initiation to ensure this student initiative, including product distribution and research activities, was FERPA compliant.

Initially, the undergraduate student founders performed activities to sustain the day-to-day operations of *The Kit*: product acquisition, inventory, monitoring of student requests, fulfilling orders placed, and general staffing and management of referrals to outside health resources. Shortly after the inauguration of this student-driven sexual health initiative, student volunteers and student engagement groups from a required community-engaged learning course worked to support the mission of *The Kit.* All individuals supporting *The Kit*'s activities received Health Insurance Portability and Accountability Act (HIPAA) and Research Ethics for Human Subjects training. Deliveries of *The Kit* were made available before the first day of classes, with unlimited opportunities for those students wishing to replenish products throughout the year.

# Data Analysis

To elucidate student use and trends in product acquisition through *The Kit's* delivery strategy, we summarized total orders from Fall 2022 and Spring 2023 with descriptive statistics, where the frequencies and proportions of requestable products were calculated (Fig. 2). We employed association rules mining to identify associations between the types of sexual and reproductive health products requested in tandem by students. Association rules analysis, used in epidemiology and bioinformatics research [36, 37], identifies patterns of items that co-occur in a dataset. Itemset rules, expressed as $A \rightarrow B$, establish the likelihood of a consequent item *(B)* occurring, given the presence of an antecedent item *(A)*. The strength of rules is evaluated via measures of support and confidence. Support is defined as the probability of an itemset *(A & B)* occurring in the full dataset; this study refers to the proportion of orders where an itemset is found. Confidence is defined as the conditional probability of *B* occurring, given the presence of *A*; in this study, it refers to the proportion of *A*-containing orders that also contain *B*. Given the limited sample size of orders *(n = 182)*, minimum thresholds were set for support (20%) and confidence (80%). These thresholds managed the number of rules generated, focusing on the most prevalent and

reliable itemset patterns. This allowed broader generalizations about this sample, minimizing the likelihood of spurious findings.

To examine the effectiveness of the designed intervention, we administered a 30-question post-survey, which concluded in April 2023. Institutional Review Board (IRB) approval was sought and obtained before dissemination of the Qualtrics survey.

# RESULTS

Figure 1: Student-perceived barriers to sexual health product acquisition. *Students were surveyed before the development and establishment of The Kit and subsequently surveyed one year later. The Euler diagrams show reported barrier(s) to acquiring contraceptives based on the question: "What would stop you from getting contraceptives at school?". Percentages are listed as a proportion of the survey group that selected a given barrier. Overlapping circles indicate the relative proportion of students who selected multiple barriers.*

Students reported cost, privacy, and confidentiality as significant barriers to acquiring sexual health products (Fig. 1). Survey data reveals that before the intervention implementation, 42% of students reported contraceptives being available on campus, and one-year post-intervention, that number grew to 71% (Fig. 2). Similar observations were made for student access to sexual health education (29% and 72% report access, respectively) and services (35% and 72% report access, respectively) pre- and post-intervention (Fig. 2).

Figure 2: Pre- and post-intervention analysis of contraceptive, education, and sexual health service access perceptions. *Students were asked to rate "How does HSI provide access to.." (1) "on-site resources of contraceptives that do not require a prescription (ex. condoms, spermicides, etc.)?", (2) "sexual health education?" and (3) "sexual health services?".*

Preliminary data from an ongoing campus needs assessment revealed a services gap impacting [NAME OF CAMPUS BLINDED] students' sexual and reproductive health practices. A survey of 95 students revealed that 50% were uncertain if sexual health services are available on campus, and 14% and 23% indicated minimum to no access to sexual health services, respectively. 65% of students indicated that privacy concerns would prevent contraceptive attainment on campus (Fig. 1). When queried about the campus provision of non-prescriptive contraceptive access, 50% of the respondents indicated no or uncertain access (Fig. 1). Sixty-seven percent of the students surveyed suggested cost, privacy, and a combination of cost and confidentiality as significant barriers to obtaining contraceptives on campus (Fig. 1). The preliminary survey results were underpowered, yet evidence in undergraduate students' sexual and reproductive health knowledge, attitudes, and perspectives in the context of health behaviors in college support these findings. For instance, even when attending campus context providing comprehensive health resources and services, undergraduates do not maximize the use of campus health services for their sexual and reproductive health needs [13].

Supplies included in *The Kit*, the wages of a part-time student coordinator, and general program costs were funded by student-initiated, faculty-mentored, institutionally-reviewed and managed grants (RO and AM), faculty research and development funds (AM and K.O.), and community monetary and in-kind donations. An essential component of this initiative's success is the ability to analyze data to determine optimal purchasing of *The Kit's* supplies. Students can request items ranging from reproductive health products such as over-the-counter contraceptives, barrier methods, emergency contraception and pregnancy tests, female hygiene products, and other personal hygiene supplies (Table 2). Currently, the highest items in demand include (listed in descending order):

- Family planning (86.8%) & Sexual health (84.1%)
- Condoms (74.7%), emergency contraceptives (74.2%), and pregnancy tests (73.6%)
- Menstrual products (61%) and lubricants (54.4%)
- Dental dams (21.4%) and dental hygiene kits (8.2%)

Table 2
Items requested during The Kit initiative. *Proportions of total order requests are listed for each item, with composite item groupings listed in italicized bold.*

| **Requestable Item** | **Proportion of Requests (n = 182)** |
|---|---|
| ***Sexual Health*** | ***84.1%*** |
| Condoms | 74.7% |
| Dental Dams | 21.4% |
| Lube | 54.4% |
| **Family Planning** | **86.8%** |
| Emergency Contraception | 74.2% |
| Pregnancy Test | 73.6% |
| **Menstrual Products** | **61.0%** |
| Menstrual Pads | 29.7% |
| Midol | 16.5% |
| Panty Liner | 13.2% |
| Tampons | 39.0% |
| **Personal Hygiene** | **22.5%** |
| Personal Wipes | 14.3% |
| Razors | 12.1% |
| Toothbrush/ Toothpaste Kit | 8.2% |

Table 3

Association Rules Mining of *The Kit* Order Requests. *Thresholds for support and confidence were set at 20% and 80%, respectively. Values of support >50% were bolded, indicating a rule appeared in most order requests; values of confidence > 90% were also bolded, indicating a very high likelihood that if an antecedent was requested, so too would the corresponding consequent.*

| Antecedent | Consequent | Count | Support | Confidence | Coverage | Lift |
|---|---|---|---|---|---|---|
| Dental Dams | Condoms | 37 | 20.33% | **94.87%** | 21.43% | 1.270 |
| Emergency Contraception, Lubricant | | 65 | 35.71% | 83.33% | 42.86% | 1.115 |
| Emergency Contraception, Pregnancy Test | | 92 | **50.55%** | 82.88% | 60.99% | 1.109 |
| Lubricant | | 83 | 45.60% | 83.84% | 54.40% | 1.122 |
| Lubricant, Pregnancy Test | | 71 | 39.01% | 83.53% | 46.70% | 1.118 |
| Lubricant, Tampons | | 43 | 23.63% | 81.13% | 29.12% | 1.086 |
| Condoms, Pregnancy Test | Emergency Contraception | 92 | **50.55%** | 86.79% | 58.24% | 1.170 |
| Condoms, Tampons | | 43 | 23.63% | 81.13% | 29.12% | 1.094 |
| Lubricant, Pregnancy Test | | 72 | 39.56% | 84.71% | 46.70% | 1.142 |
| Lubricant, Tampons | | 44 | 24.18% | 83.02% | 29.12% | 1.119 |
| Menstrual Pads, Pregnancy Test | | 40 | 21.98% | 85.11% | 25.82% | 1.147 |
| Pregnancy Test | | 111 | **60.99%** | 82.84% | 73.63% | 1.117 |
| Pregnancy Test, Tampons | | 50 | 27.47% | 84.75% | 32.42% | 1.142 |
| Condoms, Tampons | Lubricant | 43 | 23.63% | 81.13% | 29.12% | 1.492 |
| Emergency Contraception, Tampons | | 44 | 24.18% | 80.00% | 30.22% | 1.471 |
| Pregnancy Test, Tampons | | 48 | 26.37% | 81.36% | 32.42% | 1.496 |
| Condoms, Emergency Contraception | Pregnancy Test | 92 | **50.55%** | 88.46% | 57.14% | 1.201 |
| Condoms, Lubricant | | 71 | 39.01% | 85.54% | 45.60% | 1.162 |
| Condoms, Menstrual | | 37 | 20.33% | **90.24%** | 22.53% | 1.226 |

| | | | | | |
|---|---|---|---|---|---|
| Pads | | | | | |
| Condoms, Tampons | 46 | 25.27% | 86.79% | 29.12% | 1.179 |
| Emergency Contraception | 111 | **60.99%** | 82.22% | 74.18% | 1.117 |
| Emergency Contraception, Lubricant | 72 | 39.56% | **92.31%** | 42.86% | 1.254 |
| Emergency Contraception, Menstrual Pads | 40 | 21.98% | **95.24%** | 23.08% | 1.294 |
| Emergency Contraception, Tampons | 50 | 27.47% | **90.91%** | 30.22% | 1.235 |
| Lubricant | 85 | 46.70% | 85.86% | 54.40% | 1.166 |
| Lubricant, Tampons | 48 | 26.37% | 90.57% | 29.12% | 1.230 |
| Menstrual Pads | 47 | 25.82% | 87.04% | 29.67% | 1.182 |
| Tampons | 59 | 32.42% | 83.10% | 39.01% | 1.129 |

Table 2 shows the left-hand side (if - support) and the right side (then - coverage) to determine the likelihood (confidence) of students requesting both items. For example, if a student requests emergency contraception, there is an 83% chance of them also asking for a pregnancy test. Furthermore, the Lift column is a ratio between adding the support and coverage and dividing by the confidence to create a score. If a lift value is greater than one, then the request of the primary and secondary together will occur more often than these items being requested separately. This information provides greater insight into bundling purchases for items instead of focusing on the purchase history of each item individually.

Part of the larger project aims to understand personal behaviors to advise future programming and demand for *The Kit*. For example, 68% of students who received at least one of *The Kit*'s boxes were sexually active at least once in the last six months, with 34% engaging in sex at least once a week (Table 2). Also, educational materials within *The Kit* support informed decision-making, such as 12% of the students were motivated to get tested for STIs from the information sources contained within *The Kit.* With most students comfortable obtaining *The Kit* at no cost or purchasing contraceptives online at their own expense, The Kit's popularity will probably grow as more students become aware of the program (data not shown).

# Using The Kit: Pre- and Post-Analyses

*The Kit* usage increased students' perception of contraception availability on campus. Students were asked about contraceptive product availability on campus. Using a Chi-square test of independence, we found a statistically significant difference ($p = 0.000478$) between the pre and post-surveys for students'

reports of contraceptive availability on campus. 42% of respondents in the pre-survey reported on-campus contraceptive availability, compared to 71% of respondents reporting this post-survey (Fig. 2).

This student-led, anonymous, and discreet delivery strategy and method impacted students' perception of available sexual health education on campus. We asked students how [BLINDED NAME OF CAMPUS] provides access to sexual health education. Using a Chi-square test of independence, we found a statistically significant difference ($p = 4.315e\text{-}15$) between the pre and post-surveys for students' reported level of access to sexual health education at this campus. Reports of "Easy Access" rose from 5–34%, with drops in "Minimum Access," "No Access," and "Uncertain" responses (Fig. 2).

*The Kit* product use increased students' perception of access to health services on campus (Fig. 2). The pre-and post-survey asked how HSI provides access to sexual health services. Using a Chi-square test of independence, a statistically significant difference ($p = 9.241e\text{-}13$) was found between the pre-and post-surveys for students' reported level of access to sexual health services on this campus. Reports of "Easy Access" rose from 13–30%. No respondents in the post-survey responded with "No Access," compared to 14% who did in the pre-survey. Decreases were also seen in the "Minimum Access" and "Some Access" response groups.

The availability of *The Kit* increased students' perception of access to emergency contraceptives on campus. Both surveys asked how [CAMPUS NAME BLINDED] provided access to on-site resources of contraceptives that do not require a prescription, such as condoms, both female and male, spermicides, and others. Using a Chi-square test of independence, we noticed a statistically significant difference ($7.137e\text{-}10$) between the pre and post-surveys for students' reported level of access to over-the-counter contraceptives at UMR. For instance, "Easy Access" rose from 21–49%, nearly half of post-survey respondents. There were also significant decreases in the "Minimum Access," "No Access," and "Uncertain" response groups. The availability of *The Kit* and connected activities to this larger initiative likely played a significant role in this change.

# DISCUSSION

While college-aged youth's access to sexual health resources and promotion can increase contraceptive use [14, 32] and decrease unsafe sex behaviors and practices [21, 38], sexual and reproductive healthcare disparities persist among groups of U.S. undergraduate students, especially those students attending institutions of higher education with limited access to student-based clinics and resources [1, 9, 25]. Furthermore, the burden of sexual health disparities in U.S. youth varies across identities [1, 4, 12, 27, 39, 40] and social determinants of health [1, 11, 27, 41], suggesting that access to sexual and reproductive health (SRH) services, knowledge, and resources for U.S. students is a matter of increased urgency. This article highlighted preliminary findings of the effectiveness of a student-led, sexual, and reproductive health wellness delivery strategy among U.S. undergraduate students with limited access to SRH resources, services, and knowledge.

*The Kit* may have increased students' perception of contraception availability on [BLINDED NAME OF CAMPUS]. Forty-two percent of respondents in the pre-survey reported on-campus contraceptive availability, compared to 71% of respondents reporting this post-survey. We suggest that the availability of *The Kit* may have influenced this significant change. Previous studies found that students often needed to be aware of the resources and services available at their campuses [13, 21]. We should also note *The Kit's* impact on students' perception of access to health services on campus. *The Kit*'s approach to student recruitment and engagement—community-embedded and peer-to-peer direct messages about *The Kit*—translated to campus availability to the students that used it.

This intervention may have also shaped students' perception of available sexual health education on campus. There was a significant change between pre- and post-survey responses on the level of access to sexual health education. For instance, previous scholarship shows that limited sexual and reproductive health knowledge shapes college students' use of available health services for SRH needs [11, 42, 43]. While *The Kit*'s availability might have played a role in this drop, other factors may have also contributed. At the time of implementation, student leaders (ROJ and others) coordinated activities around implementing and delivering *The Kit* and also organized student education events, workshops, presentations, and fairs in collaboration with Planned Parenthood and other reproductive justice organizations. Further, faculty members (KO, RO, AR, and AM) designed, implemented and collaborated with students and *The Kit's* student leaders to develop community-engaged learning opportunities in and out of the classroom using Reproductive Justice-inspired [44] and participatory-centered educational activities geared to the campus community. The presence of these resources and events, in tandem with the availability of *The Kit*, shaped students' perspectives on the on-campus availability of SRH knowledge and resources.

Finally, the availability of *The Kit* increased students' perception of access to over-the-counter emergency contraceptives on campus, with a 28% increase in post-survey respondents who indicated "Easy Access." There was also a change in those participants who responded to having "Minimum Access" and "No Access." The availability of products in T*he Kit* and the connected health promotion and education activities comprising this larger initiative will likely have shaped this change in response. This finding supports previous research studies showing that college and university students prefer access to contraception and sexual health resources via a comfortable environment [38, 45] and discreet ways [20, 21, 46]. When implementing a mail-order contraceptive delivery program for college students, Butler and colleagues [47–49] found that receiving condoms and other sexual health aids via this modality allowed more discretion than a traditional campus health center setup, which in turn increased students' ease when ordering sexual health supplies while decreasing high-risk behaviors via increased condom usage. Fluctuation in demand is expected to shift as *The Kit* expands offerings based on student needs. Utilizing predictive analytics provides an opportunity to forecast future demand based on ongoing data collection with if/then operators.

# Implications for higher education settings with limited SRH service provision

Since university-provided student health services are increasingly being supported by student fees and less institutional budget allocations [50], our findings apply to high-resourced institutional settings and those with limited resources and access. To increase comfort, institutional sites with no on-campus health centers should still focus on further leveraging ideas and strategies to increase regular STI/HIV testing, de-stigmatize seeking resources and treatment options for SRH concerns and empower students to be more agentic in their health care behaviors with the resources already on-hand. Engagement in positive SRH behaviors is possible even in low-resource settings. For instance, strategies used by activists, health advocates, and practitioners when implementing peer-based promotion of contraceptives [51] in the Global South exemplify success despite resource limitations. *The Kit*'s design and engagement activities were inspired by advocacy strategies used in these sites when reaching out to youth populations. Some of these novel approaches include the use of "community-embedded" [52] health promotion models that use participatory action research methods to educate, such as using documentaries based on sexual health norms with local community participants as the storytellers and educators [53]. Also, *The Kit*'s flexible approach as a "pop-up" sexual health resource and knowledge as well as a source of sexual health supply distribution [54] has been shaped by the lessons disseminated in recent papers highlighting the use of mobile health education consultations [55, 56]. Finally, in collaboration with AM and K.O., student leaders implementing *The Kit* and other reproductive justice-centered activities have used participatory theater approaches similar to those used in youth-centered educational projects in parts of Latin America [52].

Using innovative self-directed testing for STIs might be another answer for low-resourced campus settings to increase SRH preventive behaviors in college-aged youth. For example, self-testing has been found efficient in undergraduate populations practicing riskier sex [57]. Such "at-home" approaches have been successful in populations located in low-resource contexts, domestically [58], and in the global South [59]. We see great promise in using these novel types of testing in tandem with solid partnerships with local and federally funded nonprofit health centers, including Title X Family Planning clinics.

# Implications for educators

Undergraduate students under the guidance of faculty (R.O. and AM) identified, wrote, and submitted five grants over three semesters to support *The Kit*, with one additional grant awaiting approval. The student grant-writers earned college credit as this experience was embedded into their coursework. Grant writing is a learned life-long skill that can transition from a daunting task to a successful experience through mentorship, scaffolded assignments, and constructive feedback [60–62]. While this manuscript focuses on *The Kit*'s design, implementation, and success, it is worthwhile to note the rich learning opportunities for the students working to implement this intervention while enrolled in a community-engaged learning course. Briefly, the faculty worked with the students through grant identification, broke the components of

the grants into attainable pieces and assignments, and assisted with the submission process. This experience fostered students' problem-solving, scientific literacy, and communication skills [63, 64].

# Limitations

Although this pilot study highlights new understandings of undergraduates' use of a sexual and reproductive health supplies distribution program, there are several limitations to note. For example, the survey did not measure the introduction of *Planned Parenthood* student advocates and activities in the Fall of 2022 and Spring of 2023. Our population comprises undergraduate students majoring in health and medical sciences, with most of them training to enter careers in healthcare. Students enrolled in majors related to health and medicine might be more likely than those selecting other majors to initiate SRH preventive behaviors [43]. Furthermore, our work as a collective of interdisciplinary scholars, clinicians, academics, activists, and health professionals holding various intersectional identities is shaped by our role in researching access to sexual and reproductive health knowledge, resources, and services but also on the rights and socio-economic impacts of that access when it came to the experience of our target population. Finally, our implementation of *The Kit* occurred during and throughout the social moment defined by the U.S. Supreme Court's decision (Dobbs v. Jackson Women's Health Organization) and now what activists call a post-Roe climate. Thus, findings concerning sexual and reproductive health access should be understood within those contexts.

# CONCLUSION

Sexual and reproductive healthcare disparities persist among groups of U.S. undergraduate students despite increased efforts at the policy level to provide healthcare coverage to U.S. individuals and at the institutional level to increase access to available services. The above findings highlight the importance of further research into intragroup health disparities beyond enrollment in the types of institutions and services provided. A future goal will be to continue a deeper evaluation and dissemination of replicable practices that individuals and groups in similar low-resourced contexts can quickly implement to increase existing health service use. Our ethnographic forays and connected qualitative research findings into the lives of our students indicate this population's need to strengthen their sense of sexual citizenship in a current moment where rights related to one's embodiment and sexuality are constantly under attack.

# Declarations


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### DATA AVAILABILITY

The data and materials analyzed for this study (including supplementary work) are available from the corresponding author upon reasonable and on-time request.


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### COMPETING INTERESTS

The authors declare that they have no competing interests.

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# Figures

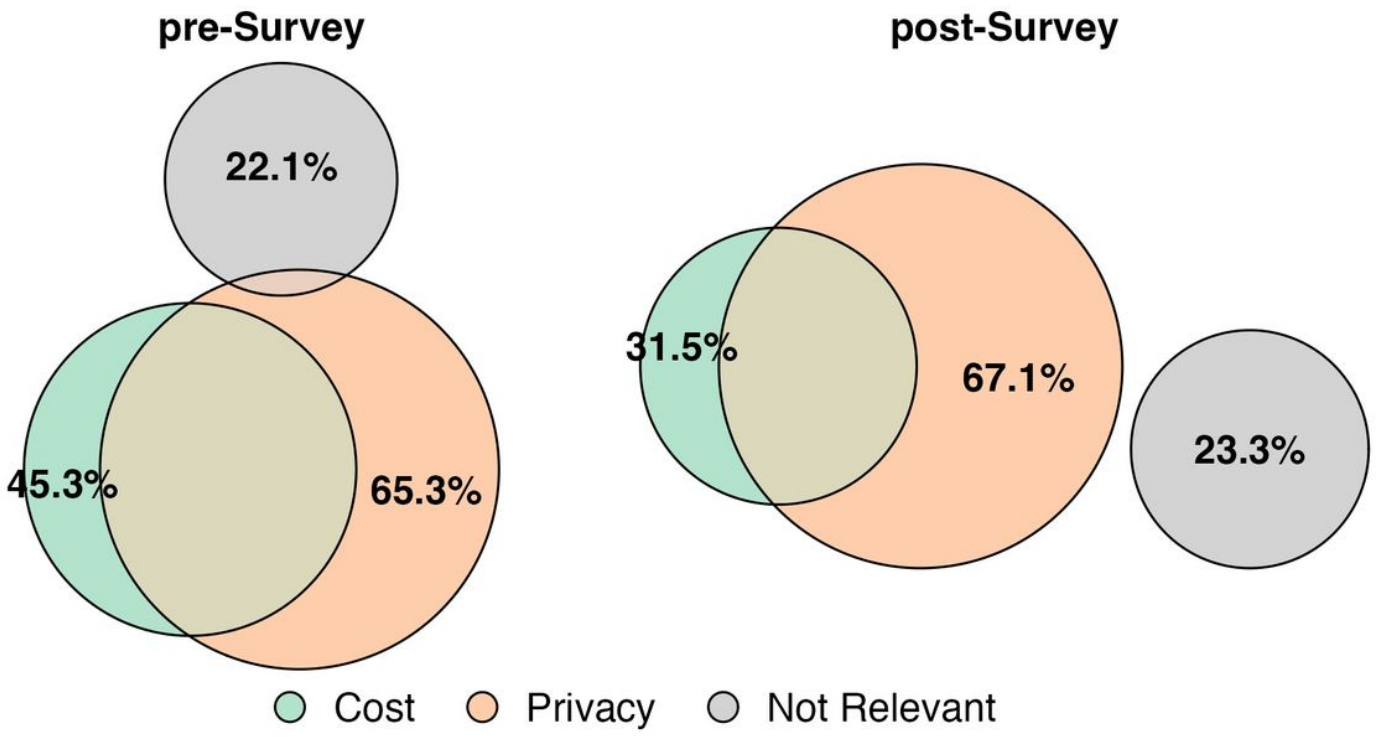


**Figure 1**

**Student-perceived barriers to sexual health product acquisition**. *Students were surveyed before the development and establishment of The Kit and subsequently surveyed one year later. The Euler diagrams show reported barrier(s) to acquiring contraceptives based on the question: "What would stop you from getting contraceptives at school?". Percentages are listed as a proportion of the survey group that selected a given barrier. Overlapping circles indicate the relative proportion of students who selected multiple barriers.*

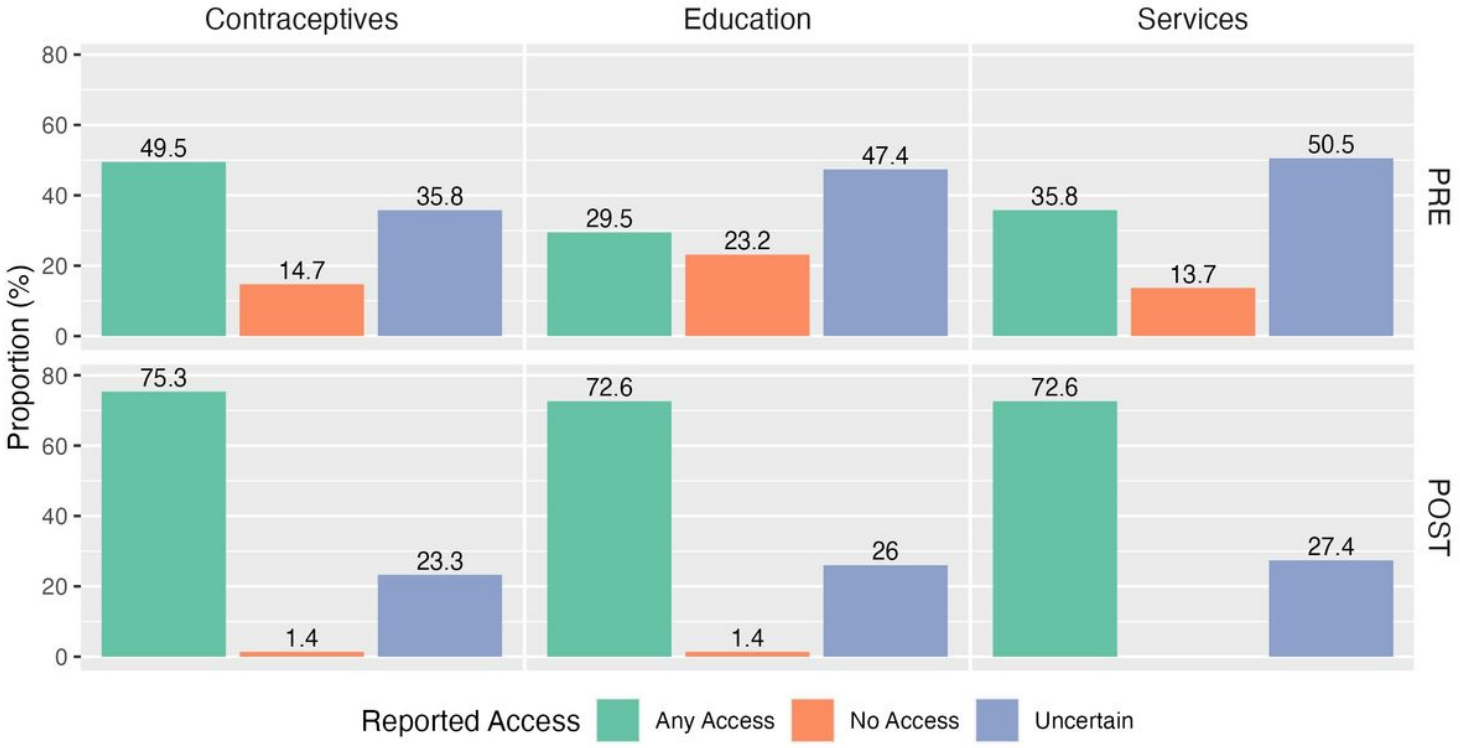


**Figure 2**

**Pre- and post-intervention analysis of contraceptive, education, and sexual health service access perceptions.** *Students were asked to rate "How does HSI provide access to.." (1) "on-site resources of contraceptives that do not require a prescription (ex. condoms, spermicides, etc.)?", (2) "sexual health education?" and (3) "sexual health services?".*