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# How do underserved adolescents want to learn about health? An exploration of health concerns, preferences, and resources utilized

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**Abstract:** Understanding health concerns and preferences of underserved adolescents has potential to shape health interventions. The objective of this study is to better understand these adolescents' current and preferred health resources, prior to the COVID-19 pandemic. High school students from underrepresented communities in six US cities completed a pre-pipeline program survey in which they reported level of personal concern, as well as current and preferred sources of information about 1) depression/anxiety, 2) nutrition, 3) sexual health, 4) trauma/violence, and 5) alcohol/drugs. 259 participants completed the survey (avg. age 15.7, 79% female, 58.3% Hispanic, and 36.0% Black). At least a moderate level of concern and some degree of prior knowledge (>3 on 5-point Likert scale) were reported across all health topics. Participants reported the lowest level of knowledge on the topic of trauma/violence. Students reported family (24%) and teachers (21%) as the most utilized current sources of information. Students reported doctors as the preferred source of information across all health topics. The difference between students' current source of information and preferred source of information was significant across four topics: depression/anxiety, sexual health, trauma, and alcohol/drugs ( $p < 0.01$ ). These results underscore the important role of physicians as educators and suggest a need for improved education on trauma/violence. These results also establish a pre-COVID-19 baseline for adolescent health concerns, current, and preference health resources. This baseline understanding may shift because of pandemic changes.

**Keywords:** Adolescent health ■ Health concerns ■ Health resources ■ Pipelines ■ Underserved

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## 1. INTRODUCTION

Providing accurate and culturally tailored health information improves health outcomes as well as satisfaction with health services.<sup>1</sup> Adolescents have specific behavioral risks and health concerns (i.e., violence, sexual health, alcohol/drug use, and depression/suicidality) that can persist into adulthood and contribute significantly to morbidity and mortality.<sup>2,3</sup> Yet, it is widely recognized that adolescents have difficulties accessing traditional health services and encounter health 'information poverty' relative to adults.<sup>4,5</sup> Researchers have also identified embarrassment, fear, and discomfort discussing health-related topics as barriers for adolescents to seek health information.<sup>4,5</sup>

Adolescents who are vulnerable (racial/ethnic minorities, low socioeconomic status, and/or otherwise at-risk) need additional support to access accurate health information, as this subgroup has been shown to have lower awareness and use of healthcare.<sup>6</sup> Additionally, vulnerable adolescents face significant health disparities in obesity, asthma, type 2 diabetes, birth complications, homicide, and more.<sup>7-10</sup> Yet, little is known about how this subgroup obtains health information and their preferences for doing so. Research in this subject may better characterize barriers in health education and how to best support this vulnerable population. In addition, being able to characterize these preferences and comparing them to how they may change during the COVID-19 pandemic may improve our understanding of how to provide better support.

In this study, we surveyed adolescents from low-income and racial/ethnic minority communities in six U.S. cities prior to their participation in the Health Career Collaborative (HCC), a national health career pathway program.<sup>11</sup> This was completed prior to the COVID-19 pandemic. Our study consisted of four main areas: 1) To assess whether commonly cited adolescent health topics were of interest to the adolescent participants, we asked participants to what degree they were personally concerned about: depression and anxiety, nutrition, sexual health, trauma/violence, and alcohol and drugs.<sup>2,3</sup> We then asked

2) their self-perceived knowledge on each of those topics; 3) from whom do they obtain information about these topics; and 4) from whom they would prefer to learn about these topics.

## 2. METHODS

### 2.1. Health career collaborative

HCC is a national pathway program of the American College of Surgeons providing health education and mentorship for adolescents from underserved communities. It functions as a partnership between medical schools and local, underserved high schools, with medical students serving as mentors and instructors for 9th-12th grade students. HCC provides a validated curriculum and a small grant to each partnership site.<sup>11</sup>

### 2.2. Study participants

With support from the national HCC program, fifteen HCC sites were invited to participate in the study. Medical students in Austin, Boston, Houston, Los Angeles, Palo Alto, and Philadelphia elected to participate and administered the survey to their high school mentees from partner high schools located in low-income and racial/ethnic minority communities across the six cities. Although individual family data for participants was not collected in this study, as detailed in [Appendix A](#), the partner high schools serve students from low-income families as evidenced by a vast majority of students participating in the free and reduced lunch program and with most average household income near or below the federal poverty threshold.

### 2.3. Survey design and implementation

Major adolescent health risks were first identified and categorized into five topics: depression and anxiety, nutrition, sexual health, trauma/violence, and alcohol and drugs. These topics were selected based on reported health outcomes, sources of morbidity/mortality, and issues that adolescents want addressed.<sup>2-4,12</sup> We then identified common sources of health information which adolescents utilize including family, friends, teachers, online, doctors, coaches, or other.<sup>4,15,12</sup> Under each topic, the survey asked adolescent participants their level of personal concern and self-perceived knowledge on a 5-point Likert scale. Participants were then asked to select their top two current sources of information and their top two preferred sources of information for each topic. Face validity for the surveys was established by having experts in adolescent health and survey development read through and revise the surveys. After receiving exemption from the Main Line Hospitals Institutional Review Board (Department of Health

and Human Services regulations as defined under 45 CFR 46.101 (b)(1)), the survey was administered to high school students prior to the first session of the HCC program. All surveys were administered at a single, in-person session between January 2019 and May 2019. Surveys were optional, anonymous, and had no effect on program participation. Data from these surveys will be used as pilot data for full survey validation and use in follow-up studies.

### 2.4. Data analysis

All data was analyzed using RStudio v.1.2.5033. Analysis of variance was used to compare the different means of 5-point Likert scores for previous knowledge and level of personal concern of the various health topics. Bivariate Chi-squared calculations were used to test for significant association between current source versus preferred source of health information.

## 3. THEORY

Vulnerable adolescents are already at greater risk of health care disparities, and we theorize that understanding their current and preferred health resources is a starting point for optimizing their exposure to the health professions. The goal of this work is to lay the foundation for pipeline programs and health care professionals to appropriately intervene in adolescent health education. As the COVID-19 pandemic alters the educational system and health resources, we theorize additional studies will be needed to assess health concerns, current resources, and preferred resources.

## 4. RESULTS AND DISCUSSION

A total of 307 adolescents were invited to participate in the study in the six participating HCC sites. Of those, 259 completed the survey (response rate 84%). Participants had mean age 15.7 years; 79% were female; 58% reported Hispanic ethnicity, and 36% reported Black or African American race ([Table 1](#)). As described in [Table 1](#), the study participants included primarily 15- and 16-year-old 10<sup>th</sup> graders from racial and ethnic minority populations. The average percentage of students who qualified for free/reduced lunch among participating high schools was 87% ([Appendix A](#)).

Across all health topics, adolescent participants reported, on average, at least a moderate level (>3 out of 5) of personal concern. They were most concerned about nutrition (3.74), sexual health (3.66), and trauma/violence (3.63). Similarly, participants reported, on average, at least some degree (>3 out of 5) of previous knowledge across

**Table 1.** Demographics of Adolescent Participants (N=259); Austin, Boston, East Palo Alto, Los Angeles, Houston, and Philadelphia; 2018–19.

Demographic category	n (N = 259)*	Percent of sample (%)
<b>Age (years)</b>		
14 or younger	6	2.7
15	93	42.3
16	92	41.8
17	25	11.4
18	4	1.8
<b>Grade in School</b>		
9 <sup>th</sup>	5	2.3
10 <sup>th</sup>	153	69.9
11 <sup>th</sup>	61	27.9
<b>Gender</b>		
Female	173	79.0
Male	46	21.0
<b>Ethnicity</b>		
Hispanic/Latino	126	58.3
Not Hispanic/Latino	90	41.7
<b>Race</b>		
White	27	12.3
Black or African American	79	36.0
American Indian or Alaska Native	8	3.6
Asian	7	3.2
Biracial or Multiracial	14	6.4
Other	8	3.6

\* 39 to 43 of the total 259 survey participants omitted various responses for Age, Grade, Gender, Ethnicity, and Race. These participants were not factored in percentage calculations.

all topics. The highest degree of previous knowledge was in the subjects of sexual health (3.71) and alcohol/drugs (3.69), with the lowest in trauma/violence (3.07).

The common and preferred sources of health information among adolescent participants are listed in [Table 2](#). Cumulatively, across all topics, adolescent participants reported utilizing family (24%) the most, followed by teachers (21%) as sources of health information. When asked how they would most like to learn about each health topic, adolescent participants reported doctors as their cumulative preferred source (34%). Teachers were the second preferred source of health-related information across all health topics except alcohol/drugs, for which family

was second. When common and preferred sources were compared as distributions, there was a statistically significant difference ( $p < 0.001$ ) across all topics except nutrition ( $p = 0.055$ ). In summary, [Table 2](#) details the significant difference between participant's current and preferred sources of health information across all topics except nutrition, highlighting an opportunity for improving health education.

When compared to other health topics, trauma/violence presents itself as a salient finding. Participants reported a significantly lower level of previous knowledge ( $p < 0.01$ ), despite a similar level of personal concern. When examined in concert with previous studies that demon-

**Table 2.** Current Versus Preferred Sources of Health Information of Adolescent Participants (n=259) in Austin, Boston, Houston, Los Angeles, Palo Alto, and Philadelphia (2018–2019).

Source	Current (%)	Preferred (%)	p Value
<b>Depression/Anxiety</b>			<.001
Family	98 (23)	71 (16)	
Friends	90 (21)	43 (10)	
Teachers	81 (19)	94 (22)	
Online	96 (22)	63 (15)	
Doctors	50 (12)	143 (33)	
Coaches	11 (3)	15 (3)	
Other	6 (1)	5 (1)	
<b>Nutrition</b>			.055
Family	96 (21)	67 (15)	
Friends	18 (4)	19 (4)	
Teachers	113 (25)	102 (23)	
Online	55 (12)	53 (12)	
Doctors	131 (29)	173 (39)	
Coaches	36 (8)	29 (7)	
Other	2 (<1)	2 (<1)	
<b>Sexual Health</b>			<.001
Family	109 (24)	81 (18)	
Friends	60 (13)	39 (9)	
Teachers	111 (24)	91 (20)	
Online	57 (12)	59 (13)	
Doctors	105 (23)	167 (37)	
Coaches	13 (3)	15 (3)	
Other	6 (1)	5 (1)	
<b>Trauma</b>			<.001
Family	93 (23)	67 (16)	
Friends	57 (14)	31 (7)	
Teachers	71 (17)	91 (21)	
Online	88 (22)	71 (17)	
Doctors	75 (18)	143 (34)	
Coaches	11 (3)	20 (5)	
Other	12 (3)	3 (1)	
<b>Alcohol/Drugs</b>			<.001
Family	128 (28)	97 (22)	
Friends	96 (21)	54 (12)	
Teachers	93 (20)	87 (19)	
Online	66 (14)	69 (15)	
Doctors	66 (14)	125 (28)	
Coaches	10 (2)	15 (3)	
Other	3 (1)	2 (<1)	

strate higher levels of exposure and adverse events involving trauma/violence in children from low-income and racial/ethnic minority communities,<sup>10,13</sup> this finding is striking. Notably, trauma/violence is absent or underrepresented in national health curriculums.<sup>13</sup> Our study lends credence to the notion of an educational gap in trauma/violence for vulnerable adolescents.

The most common current source of health information for our cohort varies across health topic. Family, friends, and teachers are commonly cited. However, across all topics, doctors were the preferred source of information. Previous studies describe a preference for more informal sources like family and friends, particularly regarding non-physical complaints and counseling.<sup>14</sup> Other studies report doctors are the preferred source of information for symptomatic and physical concerns.<sup>15,16</sup> Perhaps the optimum source of information for this subgroup would be providers that have developed a longitudinal relationship and sense of familiarity – capable of providing both counseling and medical expertise.

With that being said, the COVID-19 pandemic has changed the way education and mentorship is approached and may have huge implications on adolescent current and preferred learning resources moving forward. We anticipate further studies will explore online/remote learning more in depth, and how these resources influence career interests.

Our study was primarily limited by sampling bias. As the adolescent participants were self-enrolled in the HCC, a health pathway program, it is likely that they were already inclined to be more interested in and concerned about relevant health topics. Given the focus on careers in healthcare within the HCC, it is possible this cohort had a proclivity towards learning from doctors and providers. We attempted to limit program participation bias by surveying students prior to the first session of the program. However, further research with improved recruitment and study design is warranted.

## 5. IMPLICATIONS

We developed this survey to better understand the health education needs of adolescents from low-income and racial/ethnic minority communities. Despite numerous barriers to healthcare access, we found that adolescents in our study indicated a preference to learn about health topics from providers/doctors. Yet many health providers report feeling inadequately trained to meet the needs of adolescents.<sup>17</sup> Our findings also suggest there is a paucity of trauma/violence education provided to this group of adolescents who are disproportionately affected by trauma and violence. These results suggest a need for further train-

ing for physicians to serve as health educators for adolescents and to address the unique concerns of adolescents from underserved communities. Additionally, this research opens opportunities to now compare how adolescent current and preferred health resources change in the setting of the COVID-19 pandemic, and how it ultimately influences interest in the health professions.

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## ETHICS APPROVAL

This study received exemption from the Main Line Hospitals Institutional Review Board (Department of Health and Human Services regulations as defined under 45 CFR 46.101 (b)(1)).

## CONSENT TO PARTICIPATE

Signed consent was provided by participants prior to their inclusion in this study.

## CONSENT FOR PUBLICATION

All participants provided signed consent for future publication of findings.

## AVAILABILITY OF DATA AND MATERIAL

All relevant documentation and data is available to be sent upon request to verify and validate findings.

## CODE AVAILABILITY

Not applicable

## AUTHORS' CONTRIBUTIONS

All authors were involved in conception and design of this study. Survey design and data collection were performed by Andrew Homere, Surabhi Reddy, and Liana Gefter. Data analysis was performed by Leonard Haller. All authors were involved in writing and revision of the manuscript and provided final approval prior to submission.

## APPENDIX A. MEDIAN HOUSEHOLD INCOME AND PERCENTAGE OF STUDENTS RECEIVING FREE OR REDUCED LUNCH IN HCC PARTNER HIGH SCHOOLS IN AUSTIN, BOSTON, EAST PALO ALTO, LOS ANGELES, AND PHILADELPHIA (2018–2019)

High School	Medical School partner	City	% free/ reduced lunch <sup>1</sup>	Median household income by zip code <sup>2</sup>
Travis Early College High School	UT-Austin Dell	Austin, TX	77	\$70,511
Edward M. Kennedy Academy for Health Careers	Harvard	Boston, MA	55	\$37,340
East Palo Alto Academy	Stanford	East Palo Alto, CA	88	\$103,680
César E. Chavez High School	UT-Houston	Houston, TX	87	\$48,345
YES Prep East End Charter School	UT-Houston	Houston, TX	73	\$36,532
Orthopaedic Hospital Medical Magnet High School	USC-Keck	Los Angeles, CA	93	\$25,226
Abraham Lincoln High School	Temple*	Philadelphia, PA	100	\$48,576
Dobbins Career & Technical Education High School	Drexel*	Philadelphia, PA	100	\$20,955
Esperanza Academy Charter School	Thomas Jefferson*	Philadelphia, PA	96	\$21,665
Mercy Career & Technical High School		Philadelphia, PA	N/A	\$63,926
Overbrook High School		Philadelphia, PA	100	\$34,844
Universal Audenried Charter High School		Philadelphia, PA	79	\$42,009
West Catholic Preparatory High School		Philadelphia, PA	N/A	\$28,505
West Philadelphia High School		Philadelphia, PA	99	\$28,505

1. Source: National Center for Educational Statistics 2018, CA Dept of Education 2019, MA Dept of Elementary and Secondary Education 2019

2. Source: <https://incomebyzipcode.com>, data from US Census Bureau's 2018 American Community Survey 5-year estimates

\*Medical students from these three schools worked with all sites in Philadelphia

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