On Linkages

INCREASING AWARENESS OF AND INTEREST IN PUBLIC HEALTH AND CANCER CONTROL CAREERS AMONG MINORITY MIDDLE SCHOOL STUDENTS

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Although African Americans make up 12% of the U.S. population, their representation in many health careers is less than half that percentage.[1,2] Compared with other students, minority students perceive fewer career opportunities available to them and more barriers to pursuing careers.[3] When career opportunities are perceived as limited, the connection between hard work in school and reward later in life is less clear to students or, worse, seems implausible. This study examined the effectiveness of a targeted magazine in increasing middle school students' awareness of and interest in public health and cancer control careers.

METHODS

In Phase 1 of this study, faculty members, research staff, and graduate students from Saint Louis University in St. Louis, Missouri, worked with faculty members, administrators, and students from Gateway Middle School in St. Louis to develop *Pathways*, a magazine about careers in public health and cancer control designed for African American middle school students. Gateway Middle School is a predominantly African American magnet school with a focus on science and career education that serves students in grades seven to nine in St. Louis Public Schools. In Phase 2, three issues of the magazine were distributed to all students during a one-month period, and changes in students' awareness of and interest in nine careers were evaluated using pre/post surveys.

The Saint Louis University Institutional Review Board approved this study (#14481).

Phase 1: magazine development

The goal of Phase 1 was to develop a series of health career magazines that African American middle school students would find attractive, interesting, and informative.

Selecting public health and cancer control careers. Careers were considered for inclusion in *Pathways* if African Americans were nationally or locally underrepresented in the career and if the career was related to research or practice in public health or cancer control. A final set of nine careers that varied in skills and level of education required was selected: epidemiologist, health educator, pharmacist, dietitian, physical therapist, health inspector, neighborhood health center administrator, health policy analyst, and radiology technician.

Audience research. Based on industry reports, we reviewed youth-targeted magazines with the highest readership among U.S. youth in general, and African Americans specifically, and identified common design features (e.g., layout) and content (e.g., puzzles). We then provided three groups of students (n=10 total students) with a common set of images, text, and graphics excerpted from these magazines and asked them to use these supplies to design a magazine that would appeal to them. Wiehagen et al. offers a full description of this method.[4]

Prototype development and testing. The student-generated designs were used to create two different magazine prototypes, which were then tested in a second focus group interview among eight different African American students. Preferred features included a colorful design, multicultural photos of actual students (not models),

Articles for *From the Schools of Public Health* highlight practice- and academic-based activities at the schools. To submit an article, faculty should send a short abstract (50–100 words) via e-mail to Allison Foster, ASPH Deputy Executive Director, at afoster@asph.org.

short blocks of text, and games and quizzes. These were incorporated into a final magazine design.

Content development. The University research team worked closely with multiple community partners to develop magazine content. Professional associations and local organizations identified African Americans working in each career who could be featured in the magazine. The middle school's language arts teacher selected 12 students to interview these professionals. After learning interviewing skills from the research team, students prepared for and conducted the interviews, and selected the responses to include in the magazine. Due to their significant involvement in Phase 1, these students' responses to the pre- and post-intervention surveys were excluded from analyses.

Final magazine content. As described in the Figure, each 12-page, full-color issue of *Pathways* included an introduction to three different careers, interviews with a local African American professional in each career, key words and definitions about the career, self-assessment and career planning activities, and career-related learning opportunities and games.

Phase 2: Evaluation of magazine effects

This phase of the study sought to determine whether exposure to *Pathways* magazines increased students' awareness of and interest in nine public health and cancer control careers.

Research design. A pre/post, cross-sectional design involved all students at the school. The pre-intervention assessment measured students' awareness of and interest in each health career and was administered to all homeroom classes in February 2007. After all classes completed this assessment, the first issue of *Pathways* was distributed, again through homerooms. The second and third issues of the magazine were distributed in the same manner, one and two weeks later, respectively. One week after the third issue of the magazine was distributed, the post-intervention assessment was administered, following the same protocol as in the pretest.

Data collection and management. Both the pre- and post-intervention assessments were group administered in homeroom classes using Perception Analyzer,[5] a computer-based interactive research tool. Each student received a handheld response device, which was linked by wireless connection to a laptop computer that recorded students' responses. Questions were projected from the laptop onto a screen at the front of the classroom and read aloud by a member of the University research team. Only one question (and its response options) appeared on the screen at a time. Students indicated their response to each item by turning the dial on their handheld device. As they turned the dial, their response appeared on an LCD screen on the device. When all students in a class had selected their response to an item, the researcher captured all responses using the laptop. Responses were anonymous and no personal identification information was collected. The pre-intervention assessment took approximately 15 minutes to administer; the post-intervention assessment took approximately 25 minutes.

Figure. Primary components of *Pathways* magazine

Component	*Description*
Introduction to career	Careers were described in lay terms, using concrete examples and integrating culturally important values of collectivism, activism, and social justice. Educational requirements and specific steps students could take to prepare for the career were also provided.
Interview with African American professional	Interviews typically described the professional's career path and current interests, as well as academic background, and often reflected on key decisions or actions the professional made at a young age. Many professionals offered advice to young readers for career success.
Key words and definitions	Career-related terminology was defined in lay terms and accompanied by a simple pronunciation guide. Key words were color coded in text to match the definition section and facilitate comprehension.
Self-assessment and career planning	These activities and exercises helped students gain insight into their personality, learning style, and career interests, and create action plans to help them achieve academic and career goals.
Learning opportunities and games	Readers were referred to information resources (e.g., books, websites) where they could learn more about each profession, and provided puzzles, trivia, and matching games that applied career-related vocabulary and knowledge.

Measures

Exposure to the intervention. At the post-intervention assessment, students were asked if they had read any of the magazines (yes/no), how many issues they had read (0, 1, 2, 3), how much of each issue they had read (all/most/some/none), whether they were given time in class to read the magazine (yes/no), and whether they discussed the magazine as part of their class (yes/no).

Extracurricular discussion of the intervention. To determine whether the intervention stimulated student discussion outside of school activities, students were asked at post-intervention assessment whether they showed the magazine to their parents (yes/no), talked to their parents about the magazine (yes/no), talked to friends about the magazine (yes/no), and talked to their teachers or guidance counselor about the magazine (yes/no).

Awareness of health careers. Students were asked how much they knew about each of the nine health careers featured in *Pathways* magazine (never heard of the career/heard of it but didn't know much about it/heard of it and knew a lot about it). To assess potential social desirability response bias, this question was also asked about a health career not featured in a *Pathways* magazine (chiropractor). These 10 questions were asked at pre- and post-intervention assessment.

Interest in health careers. To measure interest in each of the nine health careers featured in *Pathways* (and the one—chiropractor—that was not), students were asked if they had ever thought about becoming each type of health professional (yes/no). To determine general level of interest in health careers relative to other types of careers, students were asked to indicate on a scale of 0 (least) to 10 (most) how interested they were in having a career in each of five broad career fields (with examples provided): entertainment (singer, dancer, actor), education (teacher, principal, guidance counselor), health and medicine (nurse, dentist, doctor), business (business owner, accountant, CEO), and civil service (police office, firefighter, detective). Questions about students' interest in health careers were assessed pre- and post-intervention.

Overall evaluation of the intervention. At post-intervention assessment, students were asked how much they liked the magazine (0 = not at all to 10 = very much), how much they learned from the magazine (0 = nothing to 10 = a lot), and how the magazine compared with other career information they had received in the past (liked *Pathways* more/liked *Pathways* about the same/liked *Pathways* less/never received other information).

Health career information seeking. At post-intervention only, students were asked whether they looked for information in the past 30 days about each health career featured in *Pathways* (yes/no).

Interest in school subjects. At pre- and post-intervention, students were asked to indicate on a scale of 0 (not at all) to 10 (very much) how much they liked six school subjects: math, reading, social studies, writing, computers, and science. We combined the six items into a "likes school" index that is the mean of responses to these items, and used a median split of this variable in analyses.

Demographics. Students' grade level, sex, and race/ethnicity were measured at pre- and post-intervention.

Statistical analyses

The primary goal of analyses was to compare students' awareness of and interest in selected careers in public health and cancer control before and after receiving *Pathways* magazines. Students' demographic characteristics, awareness of careers, interest in careers, magazine use, and comparison of the magazine to other resources are categorical variables reported as proportions; interest in different career fields, interest in school subject areas, how much students liked the magazine, and how much students learned from the magazine are continuous variables reported as means.

Chi-square analyses compared pre- and posttest proportions, and one-way ANOVA and independent samples *t*-tests compared means. Binomial logistic regression tested whether exposure to or discussion of the magazines significantly predicted information-seeking about health careers after adjusting for grade level, sex, race/ethnicity, and interest in school (using the "likes school" index variable). Adjusted odds ratios and 95% confidence intervals are reported. Because African American students are the intended audience for *Pathways,* findings for primary outcomes (i.e., awareness and interest) are stratified by race (African American/not African American) when reported. All analyses were conducted using SPSS 15.0.[6]

RESULTS

Study population

Data were collected from 273 students pre-intervention and 278 students post-intervention. The majority were African American (52%) with 12% Asian American, 9% Caucasian, 9% Hispanic/Latino, 7% biracial/multiracial, and 10% other. Half were girls (49%), and most were in grades 7 (42%) and 8 (31%), with fewer ninth-graders (27%).

Exposure to the intervention

About two-thirds of students (66%) reported reading any *Pathways* magazines—12% read one issue, 30% read two issues, and 24% read all three issues. Exposure did not differ by race.

Extracurricular discussion of the intervention

Overall, 39.2% of students reported that they had discussed *Pathways* as part of their class, 78.1% said they were given time in class to read the magazine, and 34.5% said they discussed it with a teacher or guidance counselor. None of these proportions differed by race. However, compared with other students, African American students were significantly more likely to report showing the magazine to their parents (35.9% vs. 12.0%, $p<0.001$), discussing it with their parents (26.2% vs. 12.8%, $p<0.01$), and discussing it with friends (49.0% vs. 36.1%, $p<0.05$).

Awareness of health careers

As shown in Table 1, there was wide variation in students' awareness of different health careers—ranging from 66.7% of students reporting they had heard of and knew a lot about the career of a physical therapist, to only 6.6% who said this about the career of an epidemiologist and 4.3% for a health policy analyst. At post-intervention, the proportion of students that reported awareness of each career increased significantly for four of the nine careers featured in *Pathways*: health educator (+13.8%), pharmacist (+12.2%), epidemiologist (+10.3%), and dietitian (+8.7%). Among African American students only, awareness increased significantly from pre- to post-intervention for the same four careers—epidemiologist (+16.8%), health educator (+15.6%), pharmacist (+13.4%), and dietitian (+9.8%)—but also for the careers of radiology technician (+8.1%) and health policy analyst (+6.5%). No change in awareness was observed from pre- to post-intervention for chiropractor, which was not featured in *Pathways*.

Interest in health careers

Students' interest in different health careers also varied widely (Table 2). Pre-intervention measures showed that almost one-quarter of students (23.4%) reported having thought about becoming a physical therapist, but only two or three students had thought about becoming an epidemiologist (1.5%) or dietitian (1.1%). At post-intervention follow-up, the proportion of students who reported interest in each career increased significantly for five of the nine careers featured in *Pathways*: epidemiologist (+9.3%), physical therapist (+9.3%), pharmacist (+7.7%), dietitian (+6.8%), and health educator (+6.6%). Among African American students only, awareness increased even more: physical therapist (+22.0%), health educator (+14.4%), epidemiologist (+14.1%), dietitian (+11.0%), and pharmacist (+9.7%). No change in interest was observed pre- to post-intervention for chiropractor, which was not featured in *Pathways*.

Overall evaluation of the intervention

Students' ratings of how much they learned from *Pathways* did not vary by race (mean = 4.3 on a scale

Table 1. Students' pre- and post-intervention awareness of health careers

	All students		*African American students*	
	Pre (n=*273*) N *(percent)*	*Post* (n=*278*) N *(percent)*	*Pre* (n=*171*) N *(percent)*	*Post* (n=*145*) N *(percent)*
Heard of and knows a lot about:				
Physical therapist	182 (66.7)	197 (70.9)	117 (68.4)	100 (69.0)
Health inspector	131 (48.0)	136 (48.9)	89 (49.7)	61 (42.1)
Pharmacist	108 (39.6)	144 (51.8)[a]	69 (40.4)	78 (53.8)[a]
Chiropractor[b]	106 (38.8)	118 (42.4)	62 (36.3)	57 (39.3)
Health educator	91 (33.3)	131 (47.1)[a]	56 (32.7)	70 (48.3)[a]
Health center administrator	38 (13.9)	37 (13.3)	19 (11.1)	21 (14.5)
Dietitian	37 (13.6)	62 (22.3)[a]	21 (12.3)	32 (22.1)[a]
Radiology technician	26 (9.5)	34 (12.2)	11 (6.4)	21 (14.5)[a]
Epidemiologist	18 (6.6)	47 (16.9)[a]	9 (5.3)	32 (22.1)[a]
Health policy analyst[c]	11 (4.3)	22 (7.9)	4 (2.5)	13 (9.0)[a]

[a] $P<0.05$

[b] Career was not featured in magazine.

[c] Pretest $n=255$ due to missing data

Table 2. Students' pre- and post-intervention interest in health careers

	All students		*African American students*	
	Pre (n=*273*) N *(percent)*	*Post* (n=*278*) N *(percent)*	*Pre* (n=*171*) N *(percent)*	*Post* (n=*145*) N *(percent)*
Ever thought about becoming:				
Physical therapist	64 (23.4)	91 (32.7)[a]	32 (18.7)	59 (40.7)[a]
Pharmacist	38 (13.9)	60 (21.6)[a]	20 (11.7)	31 (21.4)[a]
Chiropractor[b]	33 (12.1)	42 (15.1)	22 (12.9)	24 (16.6)
Health educator	22 (8.1)	41 (14.7)[a]	12 (7.0)	31 (21.4)[a]
Health inspector	20 (7.3)	27 (9.7)	15 (8.8)	14 (9.7)
Health center administrator[c]	13 (4.9)	11 (4.0)	6 (3.6)	5 (3.4)
Radiology technician	13 (4.8)	12 (4.3)	6 (3.5)	7 (4.7)
Health policy analyst[d]	5 (1.8)	4 (1.4)	3 (1.8)	2 (1.4)
Epidemiologist	4 (1.5)	30 (10.8)[a]	3 (1.8)	23 (15.9)[a]
Dietitian[e]	3 (1.1)	22 (7.9)[a]	0 (0.0)	16 (11.0)[a]

[a]$P<0.05$

[b]Career was not featured in magazine.

[c]Pretest $n=266$ due to missing data

[d]Pretest $n=271$ due to missing data

[e]Pretest $n=262$ due to missing data

of 0 to 10). However, African American students liked *Pathways* more than other students (means = 5.4 and 4.2, respectively, on a 0 to 10 scale; $p<0.01$). Additionally, 30.3% of African American students reported that they liked *Pathways* more than other career resources compared with 14.3% of other students ($p<0.01$). Liking school was also associated with positive responses to *Pathways*. Compared with students scoring below the median on the "likes school" index variable, those at or above the median reported learning more from *Pathways* (mean = 5.09 vs. 3.38; $p<0.001$) and liking the magazine more (mean = 5.77 vs. 3.66, $p<0.001$).

Health career information seeking

At post-intervention assessment, 38.8% of students reported seeking information about at least one career featured in *Pathways*. Regression analysis found discussing *Pathways* with parents (adjusted odds ratio = 4.0, confidence interval 2.1, 7.4) to be significantly associated with information seeking. Discussion of the magazine in class and level of exposure to the magazine were not significantly associated with information seeking.

DISCUSSION

In 2005–2006, of the 11 million middle school students in the U.S., 2 million were African American.[7] Projecting findings from this pilot nationally, 282,000 African American middle school students might be expected to develop a new interest in epidemiology if all such students were exposed to information like that in *Pathways*. Even if only 1 in 1,000 of these new converts went on to apply to an epidemiology program at a school of public health, it would easily double the number of such applicants today. Obviously, the program is nowhere near ready for universal dissemination nor are costs considered in this example. Yet there is likely so much room for improvement in students' awareness of and interest in public health professions that even nominal improvements might contribute significantly to a more diverse workforce.

In this study's sample of predominantly minority students from an urban public middle school, awareness of careers related to public health and cancer control was generally quite low, and interest in these careers lower still. In close collaboration with the school, we developed and delivered an intervention—*Pathways* magazine—that introduced students to nine specific careers in public health and cancer control. After receiving three issues of *Pathways* during a one-month period, students' awareness of and interest in many of these careers increased. Neither awareness of nor interest in a control career (chiropractor) that was not addressed in *Pathways* changed from pre- to post-intervention.

Awareness and interest increased most among African American students, who also had significantly more favorable reactions to *Pathways* magazines and were more likely to show the magazines to their parents,

and talk to both their parents and friends about the magazines. These findings were expected given that *Pathways* was designed specifically for African American middle school students, and reinforce a growing consensus among health communication scientists that thoughtful integration of race, ethnicity, and culture into health-related information can enhance its effectiveness.[8–12]

A key assumption underlying *Pathways* was that the health career role models featured in the magazines should come from the local community and represent the same racial/ethnic groups as the students who would read the magazines. Exposing students to these success stories from their community can make more concrete the connection between school performance and career opportunities, and enhance the atmosphere for learning and achievement among minority students.[13,14] Given the differential effects of *Pathways* for African American and other students, it seems likely that the effects of *Pathways* might be further enhanced by creating different versions of the magazine for students from different racial/ethnic backgrounds.

It is widely recognized that parental involvement in a child's education enhances learning.[15] Findings from this study suggest the same is true for generating interest in health careers. Students who reported talking to their parents about *Pathways* magazines were four times as likely as other students to seek additional information about health careers featured in the magazine.

Pathways increased awareness of and interest in some careers but not others. There was no significant difference from pre- to posttest for the careers of health inspector and health center administrator. In a post-hoc content analysis of all magazines, we found no differences in the content or approach of stories about these professionals. It is possible that a different approach might make these careers more attractive to middle school students, but it is also possible that some careers are simply less likely to interest students in this age group.

Limitations

The primary limitations of this pilot study are its uncontrolled design and single-school sample. To help counteract these limitations, we included in pre- and post-intervention measures awareness of and interest in a control health career that was not introduced in *Pathways* magazine. Consistent with our expectations, students' awareness of and interest in this profession did not change, thus supporting an explanation of true intervention effects.

CONCLUSION

If the apparent effects of *Pathways* can be replicated in a randomized study with a multi-school sample, it would be well suited for widespread dissemination. *Pathways* has been designed in two specific ways to facilitate adoption by schools, school districts, and/or health professional organizations elsewhere. First, because layout designates specific spaces for each component, it can easily be converted to a standardized electronic template that could be filled with localized content for schools in different communities. Second, it provides a simple way for local professional organizations to become involved in career development for minorities in their communities. In St. Louis, *Pathways* relied heavily on such organizations to identify African American professional role models featured in the magazine. National health professional organizations would be critical partners for broader dissemination of *Pathways*.

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