

Special Article

Inspiring Youth to Careers in Science and Medicine: Lessons From the Sloan Study of Youth and Social Development

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It is often assumed that career formation begins early in the life course, typically crystallizing in adolescence. However, recent research shows that for many adolescents this is a period of ambiguous identity development and career choices that continue well into young adulthood. Providing adolescents with a realistic assessment of their talents and skills and exposing them to a variety of occupations can ease the transition process from school to work. Efforts to encourage career interests in an occupational field such as public health should begin early in the educational process and becoming more formalized in high school. Adolescents should have opportunities to learn about the range of public health jobs, the educational requirements for different careers, and the actual work experiences such jobs entail well in advance of the college search process. Relying on findings from the Alfred P. Sloan Study of Youth and Social Development, a national longitudinal study of more than 1 000 adolescents, this article describes how educators and families can influence career development. (Access to the Sloan Study of Youth and Social Development data can be found on the ICPSR Web site.)

KEY WORDS: career formation, occupational choice, public health careers

● Building the Evidence

For the past 15 years, my research has focused on the lives of adolescents and how they form ideas about work, primarily from a sociological perspective that highlights how the school and family influence their

work and college choices.¹⁻³ This work is based on longitudinal samples of young people that rely on national longitudinal datasets such as the National Education Longitudinal Study of 1988 as well as an original dataset, the Alfred P. Sloan Study of Youth and Social Development (SSYSD). The SSYSD is a national longitudinal study of adolescent career development conducted from 1992 to 1997 at 13 high schools and 20 middle schools with more than 8 000 students including more than 1 000 of whom were followed for 5 years (with a subsample continuing to be followed today). The sampling frame was specifically designed to ensure a racially and ethnically diverse adolescent population. The study sample selection occurred in three stages: communities, the middle and high schools within each location, followed by students within the schools. Communities were chosen on the basis of their geographic location, level of urbanization, racial and ethnic composition, labor force characteristics, and economic stability.

An extensive set of instruments and measures was used to obtain information on career formation. Information was obtained from multiple in-depth interviews conducted with the adolescents and their parents, teachers, and school administrators, including their college counselors. Surveys were given to these

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young people to ascertain their perceptions and attitudes toward school, school performance, and their futures. A new career instrument was developed that explored adolescents' knowledge of the world of work. One of the unique instruments used in this study was the Experience Sampling Method, a time-sensitive signaling device that is especially useful for obtaining the subjective experiences of individuals interacting in their natural environments. This information, although extensive and rich in detail obtained from individuals as they move from middle school into their twenties, is not conclusively sufficient to draw causal inferences about what conditions affect career choice. However, extensive multivariate statistical analysis of the data shows several factors associated with more aligned career choices that build on individual strengths and the social worlds that teenagers inhabit.¹

● Factors That Promote Realistic Career Choices and Its Relevance for Public Health

Adolescence has been characterized as a period in the life course when young people, seeking independence from their parents and other adults, try out different roles and identities for themselves and imagine what their future lives might be like if they choose to pursue specific interests and not others.⁴ Evidence suggests that for the most part, adolescents are quite unrealistic about the types of jobs they expect to assume as adults and these views are held well into young adulthood.³ The consequences of having an unrealistic sense of the world can include an inability to form a reasonable plan for the future. Having unrealistic life goals complicates not only what courses to take in high school but also college choice, major, and the type of postsecondary degree to pursue. Instead of selecting career paths and making educational choices that reflect personal conceptions of self and interests, or accurate assessments of their own cognitive and social skills, some students turn to their parents' and peer groups for support and guidance.⁵

The support and advice that parents and peers give can sometimes be inappropriate, placing many adolescents in compromising situations where they make decisions often not in their self-interests. This situation occurs both in communities where there are few resources and students have limited access to information and successful role models and in more advantaged communities where students feel pressured into college choices often incompatible with their interests and talents. While these two situations tend to occur along economic and social resource lines, one can find even in more advantaged communities students and their parents uninformed about college choices and ca-

reer interests. In less advantaged communities, one also finds students being pressured into applying to colleges and scholarships for economic interests rather than for personal interests and long-term well-being.

Importance of ambitions

The ambitions of young people play an integral role in the likelihood of their successful transition into adulthood. Social scientists have shown that the educational expectations that teenagers and their parents have for their futures significantly influence adult educational and occupational success.^{6,7} Many of these studies were conducted when only a third of adolescents in high school planned on attending college; today the overwhelming majority of students expect to attend college and receive a bachelor's degree. These expectations are also shared by their parents. High educational expectations are not a social class phenomenon, and they can be found among all teenagers, regardless of their racial and ethnic backgrounds and the economic and social resources of their families. While some students have been able to realize their expectations, more than half of freshmen who enter either 2- or 4-year higher education institutions have been unable to convert their ambitions into a degree within 7 years of graduating from high school.⁸

One of the factors related to the mismatch between goals and accomplishments is having "unaligned ambitions"—educational expectations inconsistent with one's future occupational interests. Evidence from the SSYSO shows that many adolescents underestimate or overestimate the amount of education they needed to pursue particular careers. Adolescents with unaligned ambitions frequently misinterpret what the work of specific jobs entail, basing their perceptions of occupations on media images rather than on specific role models. Their unrealistic images are often reinforced by their peer groups and an absence of information provided in school. The majority of unaligned students are similarly unable to describe their mothers' or fathers' occupations or the actual work their parents engaged in at their jobs.

Low-income minority youth have a particular difficulty identifying the type of adult work they would like to pursue. The most common careers to which low-income men aspire are professional athletics, although by 12th grade fewer students keep these aspirations. Women tend to aspire to careers in entertainment, including modeling. In both instances, the students could not describe how to become a professional athlete, movie star, or model, the likelihood of being selected, or the average salaries for individuals who held these jobs. The most frequently cited career choice for teenagers regardless of their race or ethnicity

and socioeconomic status was medicine; however, here, too, students showed a lack of familiarity with the requisite educational trajectory from college through internship and residency required to become a physician. The bottom three occupations students expected to have were accountant (21), architect (21), and engineer (31). Of the 4281 students who responded to this question, the top three occupations in addition to medicine were business and legal practice. Occupations that were more directly related to public health careers ranked in lower half of the 12 most frequently mentioned jobs that adolescents expected to have and would like to have. On the positive side, when adolescents were asked about the value of their occupational choices, few listed making money as a first choice, whereas helping people and improving society were more frequently mentioned.

Adolescents with aligned ambitions have more realistic views of career paths, often receiving this information from family members and other adult role models. Students with aligned ambitions often learn firsthand from adults about the challenges, responsibilities, and educational requirements of particular jobs. The information links between the educational requirements for and the characteristics of specific jobs can be traced in part to adolescents' academic, social, and subjective experiences in high school. Academically, students with aligned ambitions can identify what courses would best prepare them for college entrance examinations, the fields they plan to pursue in college, which colleges would be most likely to offer majors in their fields of interest, and whether they have a strong or slight chance of being admitted to the college of their choice. These students are very strategic; if they have difficulty with a course, they are more likely than their unaligned counterparts to enlist the assistance of teachers and parents for guidance on how to persist and do well in their classes.

Students with aligned ambitions are more likely to construct a life plan (even in high school) that increases their chances of reaching their occupational goals. These plans tend to be coherent, detailed, and realistic and often reveal an understanding of the institutional rules that govern how schools and colleges operate. Life events are seen as sequentially organized; aligned students often articulate an understanding of how doing well at something creates opportunities for other experiences. They are more likely to use their time and effort strategically by investing in challenging activities that engage them, that they are good at, and for which there is a reasonable probability of success. For example, a student who wishes to be a lawyer may participate in the debate team and take Advanced Placement English. Research has shown that students who exhibit high levels of engagement in particular subjects

have a greater likelihood of taking additional courses in these subjects in the future.¹

For teenagers in urban environments, the situation can be especially difficult. It is not that their parents do not want them to pursue college degrees or occupational success; parents, regardless of economic and social resources, have very high educational expectations and occupational aspirations for their children. What parents and students often lack is information about the world of work, the courses needed for acceptance by more competitive colleges, and the preparation needed for specific occupations. Many students lack role models for the paths they hope to pursue. They may be the first in their family to attend college or aspire to a professional career. As a result, they may not know how to navigate through an educational system where choices may have real consequences that are hard to reverse. For example, not taking advanced courses in high school, such as physics and calculus, or not getting good grades in these subjects makes it harder to be admitted to a highly selective college and eventually graduate from school with a degree.

● Steps for Forming Realistic Career Goals in Public Health and Other Fields

The consequences of unaligned ambitions have direct implications for how to encourage adolescents to pursue health careers. Results from the SSYSD suggest that to interest students in specific careers requires (1) knowledge of career educational requirements and trajectories, (2) a realistic assessment of adult work, and (3) an understanding of and engagement in academic activities related to future careers.⁹ A lack of information about particular career paths is a major obstacle particularly for underrepresented minorities who are low income. The problem for many minority students is not a lack of talent or interest, but rather a lack of information, strategies, and role models. It is not enough to give students information about careers; they need to be actively engaged in the experiences of adult work. Student knowledge of careers appears closely associated with being exposed to adults in different occupations where they are able to learn firsthand about the challenges, responsibilities, and educational requirements of particular jobs. Finally, students need to be actively engaged in academic activities where connections between schoolwork and what the implications of poor performance have on future goals. Multivariate analyses revealed that student engagement was related to both the challenge of classroom activities ($p < .001$) and the relevance of the material to future goals ($p < .001$).

In the SSYSD, those students who were more likely to feel the most challenged tended to have higher

grades than those students who did not report such feelings. When adolescents expressed feeling challenged at school, they tended to be involved in individual work, taking a test, studying or doing homework, or taking notes. Results show that students who were more likely to be highly engaged in their schoolwork were more likely than students who did not report these feelings to state that they valued things such as concentration in school, perceiving their schoolwork as important to their future goals, and feeling good about living up to their parents' expectations of them. (Results are based on statistical analysis that showed a significant difference between these two groups of $n = 404$. Students engaged in schoolwork were higher on concentration, 7.02, than were the other group, 6.52, which was significant at $P < .01$; importance to future goals, 5.06 vs 4.41 significant at $P < .01$; and self-esteem 6.35 vs 5.86 significant at $P < .01$.)

Our work and that of others suggest that to help young people form realistic career goals—across careers, including public health—the following steps need to be taken. Students need to

1. visualize the educational requirements for different career paths,
2. acquire information on how to achieve specific educational goals,
3. differentiate between productive and unproductive time use,
4. form realistic plans for college choice and occupational goals,
5. be exposed to adult work and qualifications associated with specific jobs,
6. identify and act upon strategies for achieving goals,
7. mobilize resources based on assessments of personal strengths, and
8. garner social support emerging from a trusting environment where teachers and principals consider the welfare of the students and their college plans a priority (see Schneider⁹ for further explanation of these factors).

● Realistic Goals and Adult Choices

Recent intensive phone interview follow-ups and pre-structured interview protocols (available on the ICPSR Web site) with the original high school sample reveal that people with an interest in medicine, science (including biology), and public service are more likely to pursue these fields in college and take jobs in these areas in contrast to those interested in communication and the arts. It appears that science-oriented individuals make their choices very early on. If one is to interest individuals in these careers,

it has to begin early. Moreover, those who sustained interest in health careers are more likely to participate in extracurricular activities related to their interests and view their schoolwork as being related to their future goals, not necessarily with precise definitions but exhibiting an understanding of the connections between learning and how it may affect their future lives. One of the most differentiating experiences of those who report (at the age of 24 years) feeling good about themselves and their career choices, and life satisfaction is that when in high school they reported being so fully engaged in activities they considered valuable to life goals that they would lose their sense of time and feel fully challenged and skilled at what they were doing.

These are individual experiences. Other multivariate work shows that the social context of adolescent lives also profoundly influences career choice. Families have a significant effect on adolescent choices, but more important in urban schools (where families have limited economic and social resources), the high school can become a major source of social support, positively influencing the life choices of its students.^{10,11} These and related findings suggest that rather than identifying individuals who show particular promise, interventions to facilitate the development of aligned ambitions should be whole-school endeavors, providing consistent messages across classrooms, locker rooms, and lunchrooms.

A series of statistical models was estimated in the SSYSD to determine the relationship between school factors and career formation. One of the first findings of the SSYSD was that most adolescents had unrealistic career goals and that for most adolescents the transition to occupational careers does not occur in high school but until years later. What does appear to be the role of the high school is not job preparation but preparation for additional education. Results showed that the most critical aspects of the high school experience are advanced course-taking in science and math, a clearer understanding of the world of work, and high ambitions that aligned with educational expectations. High schools that supported such activities school-wide were more likely to send their students to 4-year colleges (nearly two-thirds of the student population compared with about a quarter in high schools with similar student socioeconomic characteristics significant at $P < .001$ level). Multivariate analyses indicated that 64% of the variance in college choice was directly related to high school organizational factors including curricular course sequences in mathematics and science ($P < .001$).

It is important to highlight some of the limitations of programs already in place in some high schools with the aim of fostering interests in particular careers and providing career development skills. These are important

factors for an agency to consider in deciding whether and if so how to target career-development resources at the high school level. First, programs targeting specific grade levels or groups of students within a school can create a divisive school community—even if the assistance is targeting the academically gifted. Second, programs that target a select group of teachers or college counselors make it difficult to coordinate messages and activities throughout the school. When select groups of professionals are involved instead of the entire school community, students easily interpret the actions of these groups of professionals as disingenuous. Third, many programs are not based on models of adolescent development. Adolescents are at a particularly vulnerable age, with quite diverse physical and social differences. Consequently, it is imperative that a program be customized to the grade level and life experiences of the students. Fourth and finally, any program that is involved with changing expectations has to have an incentive component that is directly tied to the outcome. If the goal is to interest students in pursuing health careers, there needs to be some type of (eg, financial) incentive to make that interest a reality.

● The Importance of Design

The SSYSD is an observational study and we have used a number of methods to deal with problems of selection bias and the effects of unobserved factors that may be contributing to the outcome under investigation, whether it is aligned ambitions or college major. Our work has focused on modeling development, not on testing the effect of a specific program. The most powerful design for determining program efficacy or effectiveness would be to implement a randomized controlled trial (RCT). We have used the findings from the SSYSD to create an immersion program for talented youth to interact with professional mentors and gain experience in the field of health-related research, TEACH (Training Early Achievers for Careers in Health) research. This program provides high-achieving minority high school students who are in the Collegiate Schol-

ars Program at the University of Chicago, participating in an ongoing clinical research project led by Dr David Meltzer, with opportunities to interact with undergraduate students, medical students, and faculty and gain practical experience in health-related research. It is important to note that the design of this program is an RCT. I would strongly urge that any program that has as its goal promoting interest in specific career(s) be similarly based on a theoretical model that can be tested empirically with an RCT.

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