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Narratives of identity in everyday spaces: An examination of African American students' science career trajectories

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Abstract
For over two decades the under-representation of African Americans in school science and the workplace has been a central concern for educators, policy makers, and researchers. Existing literature provides many accounts of the barriers to science career attainment. This study examined the science career trajectories of fourteen African American high school students who were persistent in pursuing science. Using identity and social space as theoretical tools, I examined the multiple sociocultural factors that shape students' science career trajectories. Results indicate that everyday spaces were critical in shaping their career aspirations and who they wanted to become. Mapping students' learning pathways was critical to understand how different spaces—school, church, neighborhood—framed their narratives and ultimately their decisions to pursue a science career.
Keywords: Science career trajectories, African American students, identity, out-of-school spaces

Introduction

This research examines the science career trajectories of fourteen African American students who were members of an Early College High School Academy in the United States. Early College Academies have been established across the U.S., largely in urban centers, to provide opportunities for career exposure and to earn college credit while in high school. Academies are typically organized around a career theme and, in this case, it was health science. All fourteen participants were poised to enroll as full time college students during their last year of high school. They could be characterized as motivated, high-achieving science students who were determined to pursue a science career—related to health care. The purpose of this work was to map-out the science learning pathways that brought these students to this point in time. What did their trajectories look like? And, what kinds of experiences did they have (or not) along the way?

As students offered narratives about their science experiences and the meanings they made of those experiences, they recreated the pathways that moved toward their future goals. Given the participants' "good" student profile, I expected school science to be a prominent resource and support for their interest in science and subsequent career decisions. However, with the exception of a few references to elementary school science, school was absent from their narratives and was not a significant resource for their career interests. Instead, everyday spaces were prominent in descriptions of their science experiences, who they wanted to become, and their science career goals. Mapping students' learning pathways was critical to understand how different spaces—school, church, neighborhood—framed their narratives and

ultimately their decisions to pursue a science career. Their stories reveal the nuanced ways everyday spaces became resources for how students came to view themselves in relation to science, positioned science in their futures, and appropriated science in ways that aligned with future goals—thus their developing sense of identity as science learners.

Under-representation of African Americans in the U.S.

For over two decades the under-representation of African Americans in school science and the workplace has been a central concern for educators, policy makers, and researchers. National Science Foundation (2010) statistics expose the dismal representation of U.S., African American students in science. In 2006, African American students represented only 8.3% of the students obtaining Bachelor degrees, 6.6% of the students earning Master degrees, and 2.5% of the students obtaining Doctoral degrees in one of the science and engineering fields (National Science Foundation, 2010). Additionally, African Americans only comprised 4.5% of the nation's physicians (ETS Policy Information Center, 2004).

The majority of the extant research to help explain the attrition and persistence of students within the science pipeline points to myriad factors—academic preparation and early interests in STEM (Maltese & Tai, 2010; Tai, Liu, Maltese, & Fan, 2006), student and parent science career exposure (Moore, 2006), and racial barriers (Alliman-Brissett & Turner, 2010). However, despite these efforts considerable work is still needed to understand why some students choose to pursue science careers, how their interest develops, contexts that may support or thwart their science trajectories, and the nature of their experiences over time. This study attempts to elucidate these sometimes more implicit mechanisms that impact upon science career attainment.

Recently a small body of literature has examined students who persist on a science trajectory and points to the role that participation in multiple communities of practice—including school and non-school spaces- plays in their persistence. Aschbacher, Li, & Roth (2010) followed an ethnically and economically diverse sample of high school students who at one time intended to pursue science. Students' participation in multiple spaces in and out of school framed their perceptions of science, their abilities as science learners, their career options, and their science identities. Likewise Lubben, Davidowitz, Buffler, Allie, and Scott (2010) found that extra-curricular science activities initially motivated science career-oriented students. These studies offer juxtaposition to the grand narrative that attempts to explain why many marginalized students do not choose to pursue science or fail to persist in science and focus our attention to students who are interested and persist within the pipeline. Additionally, this work demonstrates the necessity to robustly examine sociocultural factors that have been under examined by the field. There remains much to understand about what invites underrepresented African American youth to consider science as a viable career option and how the multiple spaces that they negotiate impact their journeys. As such, this manuscript sheds light on how factors (both inside and outside of school) influence students' career aspirations and decisions.

Theoretical Framework

Social Space and Identity

In attempting to understand the multiple sociocultural factors that shape students' science career trajectories, I turn to an examination of space. Educational researchers are using spatial theory and analysis to unpack and examine anew persistent educational problems. This social turn brings into focus the notion of space as both a product and process of human activity, social relationships, and organization of geographies (Soja, 1989). From this perspective, space is considered both social and productive; that is, space is not merely a context or container within which social interaction plays out. As Soja (2004) explains:

> Seen through this dynamic social perspective, all the spaces and places in which we live, from the home and the schoolroom to the city and the global economy, are socially constructed: and as real and imagined geographies they shape our lives in various ways, at times enabling and enhancing, at other times constraining and oppressing. (p. *x*)

This premise allows for new ways of intentionally examining how individuals, as part of everyday activity, come into contact with various resources (texts, websites, classrooms, teachers) and other forms of representations (signs, clothing, interaction styles, discourses) to construct understandings about science, a science career, and themselves. And, conversely, how individuals organize and reorganize the spaces they navigate to progress on a science trajectory. To get at this dynamic interplay between space and students' developing relationships with and in science, I draw on the concept of identity.

Some science education scholars believe that identity work is a vital part of understanding students' engagement in science (Tan & Calabrese Barton, 2008) and persistence toward or away from a science career (Aschbacher et. al, 2010; Brandt, 2008; Johnson, Brown, Carlone, & Cuevas, 2011). For this article, I am interested in how students come to identify with particular science career trajectories and how those identities are connected to particular social (and physical) spaces. From a spatial perspective, "identity can be considered an enactment of self made within particular activities and relationships that occur within particular spaces (geographic, social, electronic, metal, and cultural) at particular points in time" (Moje, 2004, p. 16). Recent critical literacy research from Rainbird and Rowsell (2011) provide a concrete example of how particular organization of space and time shape children's early literacy identities.

Rainbird and Rowsell (2011) take a spatial perspective to examine how the home space is constructed and used by parents to influence their children's early literacy experiences and identities. The researchers described the home space as a "node, a private arena, in which discourses of literacy, parental agency and temporally based needs, gathered through parent's networks, converge" (p. 215). This study highlights how discourses of "good parenting"—organized and made available through distinct space-time configurations—shaped the local literacy-related activity within the home space. The ways the social space of literacy practice was organized in each home afforded multiple and different literacy dispositions for their children. Their work highlights space and how it matters for identity work.

Examining space as an aspect of identity work is valuable for bringing to the fore how sometimes nuanced factors such as social positioning, ideologies and other manifestations of power come to bear on individuals. Students construct understandings of who they are, who they want to become, and set goals about what they want to do in and with science. Social spaces such as school, home, and community mediate this identity work and in-turn students' enact a particular sense of who they are to organize and reorganize their trajectories. Together, these theoretical tools allowed me to map-out the everyday spaces—school, church, or community—that students traversed and to critically examine how these spaces framed their decisions to pursue and persist toward their science career goals. The following research questions guided this study.

1. What meanings of science, self, and science career did students construct as they traversed various spaces along their trajectories?
2. What critical spaces for identity work were evident in students' narratives?
3. What role did these spaces play in their science trajectories?

Methods

This study was part of a larger investigation that examined the potential for an Early College Academy of Health Science Academy to recruit and retain African American students in the science pipeline. The Academy was considered a "school within a school" and was part of a larger, comprehensive high school, referred to as Edgeview (a pseudonym). Edgeview was situated within a mid-sized urban neighborhood that was impacted by poverty in the southeast of the United States. The student population consisted of 75% Black, 14% White, 6% Asian, 4% Hispanic, and less than 1% American Indian students. Potential Academy students were required to submit a formal application and acceptance into the program was competitive. The Academy students completed all of their district and state graduation requirements during their first three years of high school and had the option of attending a local university, private college, or community college during their fourth year of high school.

Table 1. List of student participants by grade level

Participant	Grade level during study	Anecdotes from teacher and administrators
Brittany	11	She lived with two sisters and her mother. She was described by as hard-working. An administrator shared that her mother struggled financially.
Ebony	11	She was very social and talkative in class. She lived in an area of town that her teacher described as plagued by crime.
Serena	11	She was very involved with her church and enjoyed cheerleading in school.
Ashley	12	She played three different school sports. She was described as polite, willing to help others, and a dedicated student.
Jada	12	She lived with her mother and grandmother. She was described by her teachers as determined and a social butterfly.
Roxanne	12	Her presence in class was very reserved and cautious. She lived with her grandmother and did not have a relationship with her mother or father.
Natalie	12	She was described as very mature and hard-working. She worked at a local restaurant each day after school.
Sasha	11	She was very quiet in school and did not participate in any extra-curricular activities (except for campus beautification days). She volunteered at a local shelter in her free times.
Will	12	He was described as very popular. He was crowned the homecoming king his senior year in high school. He played football and was described as a talented athlete. His friends described him as "phat".
Marcus	12	He was described as a very hard worker and a deep thinker by his teachers. He lived with his father, mother, and younger brother. Teachers shared that his parents struggled economically. They added that his parents were very involved in his education and they had high academic expectations.
Antonio	12	He was described by his teachers as very intelligent. He was the high school poet laureate during his junior and senior years. He was the only student in the study with parents who had a college degree.
Joel	12	Teachers described him as a "good" kid. He held a job after school and was not involved with any after-school activities.
Dante	12	He was described as positive and willing to help others. He was very involved with community theatre. He was very expressive in his dress and appearance.
Curtis	College Sophomore	The school (teachers, administrators, counselors, and friends) referred to him as Dr. Curtis. In high school, he was very involved with student council and school leadership. In college, he was involved with several political science groups and volunteered in his spare time.

Participants

Fourteen African American students who were members of the Academy participated in this study. In table 1, I provide a list of students (all names are pseudonyms), their grade level, and anecdotal information provided by their Academy teachers, school administrators, and friends.

Data Sources

Formal semi-structured, informal, and focus group interviews (Merriam, 2009)—from over sixty hours of participant observation—were sources of data. Formal interviews were structured so that participants described their science experiences from early childhood through adolescence (ending with their admission to the academy). I was interested in understanding their meanings of science, their sense of self, and the places and times in their trajectories that they deemed critical in regard to their career goals and actions. Informal conversations allowed me to probe students about the spaces they referred to in their formal interviews to understand the relationship between these spaces and students' trajectories. These conversations were on-going over a six month period. Focus group interviews were used to follow-up on any remaining questions resulting from my initial data analysis and to serve as a way to member check (Merriam, 2009). Member checking ensured that my interpretations of the data were valid representations of participants' meanings and experiences. Formal and focus group interviews were audio recorded and transcribed while responses to informal interviews were recorded in my field journal or laptop computer. Students' recollections became the narrative that I analyzed according to the three research questions that guided this study.

Analysis

I present the data as a single ethnographic case; I looked across the individual cases for shared, group-level meanings (Spradley, 1980). For data analysis, I used Spradley's (1980) semantic structure analysis, which involved three iterative strategies: (1) domain analysis, which meant I identified categories of cultural meaning (e.g., ways to describe science/science-related careers) and also the spaces that students emphasized in their narratives ; (2) taxonomic analysis, which involved looking for relationships among the data under each domain (e.g. ways to describe self or how home space relates to career goals); and (3) componential analysis, which allowed me to determine the patterned nature of emerging themes. I drew conclusions based on themes prevalent across the data.

Findings

In this section, I describe students' meanings of science, self, and science career and the spaces critical to their construction. While my research questions address students' meanings and space separately, students did not explicitly describe "space" as separate. Instead, students' meanings were entangled amongst the spaces in which this work was accomplished. As such, I peppered discussions of the various "spaces" throughout the section as I reconstruct participants' trajectories from early childhood through adolescence.

Meanings of Science

Science as dynamic and inquisitive. Across the group, students expressed sustained interest, engagement, and enjoyment with science. They characterized science as dynamic and question-provoking. As Ashley explained "…science doesn't stay the same, it always changes". The next batch of examples mirror Ashley's remark and reflect the typical ways all students described science.

> It's really about exploring new things and figuring them out. (Will)
>
> To me science is like the motivation to just discover the unknown. No one knows everything so what you can learn is never-ending. (Jada)
>
> I just love it- like--technology and developing new technology. Science is always developing and changing. (Sasha)
>
> Science is fun and exciting. I never get bored. There is always something new to find out about. (Serena)

With these descriptions of science, students also characterized their images of scientists who are inquisitive, who desire to discover new things, and who solve problems. They further explained how they shared many of these characteristics that situated themselves as individuals who are well suited for science.

> I don't know. I think I have always been the type of person who literally dreams. It is always- you know -the things that seem the most crazy or the most outrageous that always attracted me. Like when I was a kid, daydreaming was my thing. My mama had to snap me out of that because all day when I was in school that is what I did; I day dreamed. But it was the Frankenstein thing. Could I really create another type of person? And science is the closest thing that I can come to that because they are things that you will never hear about. They do amazing things in labs you know. (Antonio)

Evident in this quote is the imagination and creativity that Antonio saw in science. Antonio was curious, he asked questions, and enjoyed learning new things. For him, these personal characteristics exemplified a scientist.

Across the group, twelve out of fourteen participants described themselves in some way as "a science person" (Natalie) or as individuals who have "always been into science" (Will). Two of the female participants, Jada and Serena, stated they were "more into math than science" (Serena) as elementary students. But, they qualified these statements and explained how they were always interested in science and performed well in elementary school science. When students' narrated these meanings of science they tied them to experiences from early childhood situated within various spaces, including school and everyday spaces.

Early childhood spaces. Students described many rich science experiences during their early childhood. These early experiences largely occurred out-of-school; but, elementary school did surface in students' early accounts. Across the group, students reflected on many hands-on activities, experiments, and projects such as hatching chicken eggs and dissecting worms or owl pellets. Many participants even partially credited their interest in science to good science teachers who "led me toward science" (Jada). Dante described how his elementary teacher would design "little investigations that would always keep us wondering".

As students described their free choice science activities, they named numerous spaces such as zoos, museums, science centers, summer science programs, back yards, homes, and church. Overwhelmingly, students credited these spaces for piquing their sense of wonder and discovery.

> There was this one time that I wanted to know why is it that when you put pepper in water and you take soap on your finger it disperses. So I just wanted to find out why it did that. So I was just sitting there looking at it for an hour or two trying to figure it out. (Marcus)
>
> Yeah, I was always outside playing with dirt…to see what I could find – and planting flowers with my mom. (Ebony)

> Me and my brother–we would have a tape-recorder like this [points to the recorder used for the interview] and once it stopped working – that was even more fun because that meant we could just take it apart. That was fun. (Antonio)

> I used to just wander off to play with the little animals and stuff, if you consider that science. I was always looking for stuff and digging for worms. (Dante)

These examples show the ways students centered science in their free-choice activities at home. It was in these spaces that they found the freedom to question and explore; they connected these experiences to their meaning of science as dynamic and inquisitive.

All participants lived in large and mid-sized urban centers as children and many (n=10) regularly accessed informal science spaces. For example, Antonio lived in the city and had a museum within walking distance of his home.

> My mom, she always liked going to aquariums and zoos and stuff. The science museum was right by my house. So we were always going somewhere. I guess—because I had four brothers and sisters so we had to keep busy. My mom wanted to keep us busy. (Antonio)

Church was a space students associated with their early childhood science experiences. Over all, seven students specifically mentioned church, as it provided access to many informal science venues. Dante explained how, in an effort to keep him "out of trouble" and "safe", his mother encouraged him to get involved with a youth program at their neighborhood church. He explained how the church group provided opportunities to visit the zoo and go camping. Curtis, Marcus, Sasha, and Jada also took church-sponsored trips to zoos, aquariums, or museums. The physical church property was also described as a place where a few students engaged with science. For example, Brittany learned about growing plants by working in flower gardens at her church. Overall, these experiences occurred early in their trajectories—before compulsory school age and during their primary school years.

Meanings of Self

The "making" of altruists. Students characterized their future selves as individuals who would use science in the service of humanity. All fourteen students held altruistic aspirations that centered upon helping others or giving back to society in some way. The following representative examples provide insight into how students saw themselves and their future contributions.

> I have always been the type of person who likes to help people out. So I feel like being a doctor is a great way to see first-hand how you are making a difference or making a change. Also giving back to my community, I have always been interested in the need for better healthcare for underrepresented populations. (Curtis)

> I think this career [Ophthalmology] is a way for me to help others by improving their sight. (Jada)

> I want to be a pediatrician so I can help them [children]. I want to start a program for single parents-that need help- and help them out with money and financial situations. You know—if they need to go to the doctor. (Brittany)

> Everybody needs a dentist and I could be helping other people. (Roxanne)

> So, I mean helping people--I think is the only thing that-- I think when I lay on my death bed and I think about all the things that I did that is going to be the thing that makes me proud and lets me be at peace. (Antonio)

> I want to be able to give back to someone else—make an impact on my community. (Serena)

> I just like helping people and I, that's just the bottom line. I think this job [as a physical therapist] —with this job I can do that [help people]. (Ashley)

These quotes make concrete the altruistic aspects of their identities. For participants, a science career served as a vehicle to perform themselves. This notion is supported by sociocultural perspectives of identity that suggests through participation in particular contexts (e.g. a science career trajectory) individuals can re-make themselves (Holland, Skinner, William, & Cain, 2001) in ways that align with their goals.

***Productive spaces for altruism*.** Students' altruistic identities were tied to the narratives they shared about various spaces and experiences. They justified their need to help others by citing health care injustices they personally witnessed.

> I have been to visit people in my family and I see the way that they treat the patients and it is not all that great. (Antonio)

> My grandmother she needs heart surgery because her arteries are clogged. Now, the thing about this operation is that she does not have the money for it. So, she cannot get the surgery because she cannot afford it. To me that is like murder-almost. (Marcus)

These injustices occurred in personal or family spaces. In the next examples, Roxanne and Philip reflected on the health care conditions within their larger community.

> You know some of the doctors **here** accept Medicaid and Medicare. But some say that some insurance is not good enough and they only accept cash. You know people need their health and some cannot afford to get cared for. (Roxanne)

> Doctors, they should not be charging them to treat them. They just can't [pay]. (Philip)

These excerpts demonstrate the health care injustices that they witnessed within their community space. Students were aware of struggles faced by marginalized members of society. These first-hand realities framed their identities as altruists. In this way the physical and social space of the nursing home or community, for example, were tied to who they were and wanted to become. In all, participants were determined to improve the health care within their neighborhoods and the larger world.

Religious organizations were additional spaces that students associated with their altruistic goals. Here, students often participated in humanitarian efforts such as organizing food or clothes drives, mentoring younger youth, and neighborhood beautification. Church leaders often scheduled mentors, speakers, and workshops about leadership within the community. Within this space, the importance of "giving back to the community" (Roxanne) was an ever-present message. These activities and opportunities created a space that allowed students to engage in altruistic work and perform this aspect of their identity.

In all, participants' intended altruistic aspirations were part of their science-related identities that they desired for themselves as future health care professionals. Adopting an altruistic identity allowed students to consider purposeful action to transform their family, community and the larger society. While the meaning of self as *altruist* was consistent across the group, salient differences existed in the ways male and female students imagined their future altruistic identities. Figure 1 provides a graphical representation of the contrasting aspects of their altruistic identities.

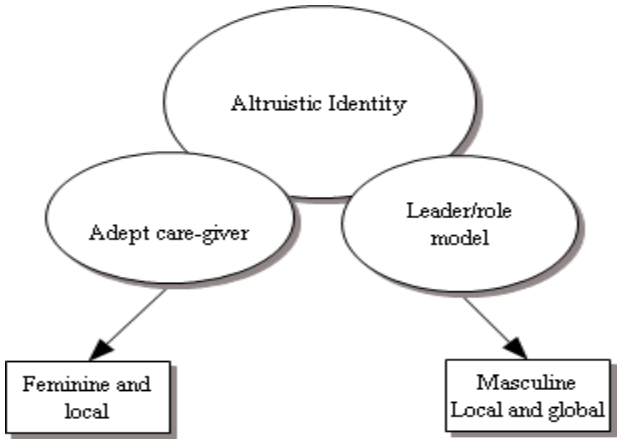

Figure 1. Gendered aspects of altruistic identity

Adept care-giver: Having the "blue blood". Female participants imagined themselves as adept care-givers. They hoped to help others by providing health care in a very hands-on fashion. I asked female participants to provide examples of how they wanted to help others through a health science career.

> I want to learn the different diseases and the cures for them and helping patients. (Brittany)
>
> I plan to give back by providing services for children that have no medical eye coverage. (Jada)
>
> Because some people cannot afford to go to the dentist - I feel that if I keep going in dentistry then I can maybe help people out those that cannot afford it [dental care] and have my own business. (Roxanne)
>
> You know-seeing all the people get hurt and rehabilitation-and-I like I like doing that kind of stuff. (Ashley)
>
> I love kids. I want to work with kids because it's more --you feel more helpful to people that aren't—like--able to take care of themselves. They are innocent. Most of the things that happen to kids, it's not normally their fault. I can help them. (Sasha)
>
> I want to help others--basically to help others live to be healthy--So that people can be built up and not torn down (Serena).

As these representative examples demonstrate, female participants' future images of *self* centered upon giving care directly to patients. Roxanne wanted to own her own dental business to provide affordable dental care to her community. Natalie wanted to become a competent and compassionate nurse and improve the quality of care available in her community.

Female participants often highlighted how their personal characteristics aligned well with their imagined future selves. For example, Ebony explained how she "fit" with the image of working in health care because, "I'm a social person. So I like to be around new people, different people, everyday—you know—get to know them and their life story". Sasha admitted that she has "the blue blood for it", borrowing the term "blue blood" from her mother, who worked as a certified nurse assistant. Her mother explained to me what it meant to have the blue blood:

> Blue blood is something that you need to have to work in the health field. If you have the blue blood- you know- you'll stay there 12 hours. If you're on call, you will go back to that hospital no matter how tired you are. You don't give up until you're satisfied with a patient's condition. You know that you're giving your best. You are giving them [patients] the best medicine-the best that's humanly possible. (Barb, parent interview)

Female participants exhibited caring and compassionate traits; they were nurturers. They felt that these traits were essential for an adept caregiver identity. They also envisioned their future selves as individuals who acted locally. When females talked about helping others and giving back, they referred to their immediate community. Their meaning of self was very connected to the local and did not talk about their work having a more global impact. For example, they did not refer to African Americans' health care concerns on a global scale. Instead, the females wanted to improve conditions locally, in their own neighborhoods—one aspect that contrasted with the male participants altruistic identities.

Leaders/role models: "Obama is in da' house". Males wanted to become leaders and role models for the African American community. The males were compelled to change the social and economic conditions of the African American community through leadership. As Marcus explained, "…leadership is definitely important" in the African American community. When males talked about their future selves, they mentioned prominent black leaders such Jessie Jackson, Gandhi, and President Obama. Dante felt it was his duty, as a young African American male, to "…inspire other people to do better and to strive to be better. Otherwise there won't be another Obama in da' house". They drew on very accessible masculine models of "success" to take on leadership roles within the African American community.

Each male participant talked about the pressure and responsibility they felt to lead the African American community as a whole. As Curtis stated, "I have always felt a pressure to not be a statistic—or to beat the stereotypes". Attainment of a science-related career was one way to change society's negative perceptions.

> Yes, I mean, if I flourish from my career then I am definitely going to give back. You know set an example. (Joel)

> I feel like being a doctor or being a lawyer or a professor, will make you stand out and change some of those ideas because it is not expected of you. (Curtis)

As these examples demonstrate, males articulated a relationship between what they perceived as high status leadership roles and their altruistic goals. That is becoming a leader and giving positively and impacting on the African American community could be accomplished through a science career. Though I probed during interviews for more concrete examples of possible leadership activities, they found this very difficult. For example Joel explained that, "… if I am successful I could do something to change things in this community—you know—to have more, to make more—opportunities for us [African Americans]". Clearly, Joel did not articulate exactly how he would change his community. Unlike the females who had fairly developed altruistic plans, the males found it difficult to make tangible connections between their future careers and humanitarian commitments.

The males' altruistic identity was decidedly more masculine than the females' altruistic identity (i.e. leader/role model vs. care-giver). Male participants did not necessarily see themselves involved in direct patient care or talk about themselves as nurturers. They aspired to be role models who could motivate and uplift the African American community as a whole. The males, at times, referenced their local communities, as Joel did in the previous paragraph. But more often, males discussed stereotypes as a society level issue. They did not believe that these stereotypes were unique to just their local community.

Gender differences and space. A spatial analysis was helpful to understand these apparent gender differences. For both males and females, family space had a significant impact on their nuanced meanings of altruism. However, the space of family framed these meanings differently. For example, females linked their nurturing, care-giver characteristics to experiences with female family members who worked in health care as nurse assistants—a role in health care typically dominated by females. All but one female talked about shadowing aunts, mothers, and older sisters in various workplaces such as nursing homes and home-health care situations. Through these experiences, they received tacit information about health care and the day-to-day job of being a care-giver. It is also possible that these experiences partially impacted the "local" aspect of female participants' future identities because females' immediate, informal social network included career-related role models. In all, the females framed their understandings of who they were and wanted to become in relation to a science career through these informal family experiences and spaces.

Males talked about the role of family and community differently. Instead, family influence looked more like support and encouragement but did not explicitly relate to science careers. For example, males continually received messages about the importance of contributing to society in positive ways. Marcus explained, "My father talks to me about what I am going to with my life almost every day". Their families and communities expected them to make a difference. Below, my discussion with Dante highlights this expectation.

> Julie: What are your family's hopes for your future?
> Dante: To be better, to be successful.
> Julie: What do you mean by successful? Talk about what successful means to you?
> Dante: Making a difference

My interview with Joel provides another example.

> Julie: What motivated you to want to help others?
> Joel: People in my family. My dad is always talking about giving back to the community. My grandma is always talking about never forgetting where you came from.

These examples demonstrate how the family space encouraged the males to set and fulfill altruistic goals. Unlike the females, they did not have the same informal career experiences (i.e. shadowing family members in health care facilities). Instead, males drew heavily on the popular media and on-line resources to frame their meanings of self as health care professionals.

The space of popular media was highly referenced in male's descriptions of who they wanted to become. U.S. television programs that depict the medical field such as ER, Grey's Anatomy, and TLC channel were examples of such popular media. As Antonio shared, "They [characters on ER] save lives and everyone respects them". The male participants perceived work in health care, as it was portrayed on television, to be exciting and dramatic. They talked about how the characters really seemed to make a positive difference in the fictional lives of their patients. Further, they held the viewpoint that society "looked-up" (Will) to people in health care professions and they sought this same recognition. The space of popular media provided males with images of health care workers and was a resource they drew on to understand who they wanted to become.

Meanings of Science Career

Transformative: A vehicle for agency. Across the group, students described the transformative power of a science career. It symbolized a tool for agency—a way to "do" altruistic work. In essence, a science career was the vehicle through which they would perform themselves as altruists, allowing students to transform their community with humanitarian work. A science career was also transformative in that it provided the

opportunity to change negative perceptions and oppressive social positioning. For example many of the males talked about a science career as a way to combat stereotypes.

> I guess it [a medical career] would make us the same as everyone else. Well, we [African American males] would be seen differently, like—you know—that we are not lazy or going to jail all the time. (Marcus)

Here we see how Marcus is associating a science career with a change in social position. Many youth shared how they felt automatically labeled as "another statistic" because of their racial membership. They perceived a relationship between science careers and an elevated social standing. Ebony shared that a science career could "make you look more advanced". She went on to explain that obtaining a science career proved that she could "make-it" as a young African American.

Community and school space. Society's negative perceptions of African American youth were very real for students and present in the every-day spaces they navigated.

> When I walk down **the street** I'm thought of automatically as someone who has a bunch of kids or a STD [sexually transmitted disease]. But I can change that and show others what I can do. (Dante)

> We [African American females] are not supposed to be doctors. Men have always been top priority—in **school** too, not just **jobs**. (Jada)

Dante's and Jada's narratives attached a space to their positioning. For Dante, his label as an unpromising black youth is framed within his neighborhood as he walks down the street. Likewise, Will's insights provide a glimpse into the lived geographies of African American youth.

> Just like in **here** [school library] or at the **mall**. You know, for me when people see me, they see my size and my skin tone. So what happens is that I am already in one category. My job is to exceed their expectations and to show them what I am.

Will went on to explain that because he is black, tall, and muscular many community members, including his teachers at school, limit his abilities and aptitude to athletics. And also assume that he is a trouble maker. Evident here is how a circulating racial discourse within a youth's community and school space position them as particular kinds of people with predictable futures. Importantly, students believed that a science career has the power to reposition them within society.

Economic stability and mobility. When discussing their meanings of a science career, students often couched their responses within a socioeconomic context. They referenced how a future science-related career could provide them with economic stability and/or mobility.

> Doctors and nurses are really needed with the shortages and everything. (Natalie)

> It [science] will play a big part in everything, as far as people's jobs—that you can get. (Ashley)

> The medical field is going to always be around. It's always going to be around and that's a guarantee with the job. I want a steady job. I don't want to, you know, be worrying about finding a job and stuff like that. So, I want a job in the medical field, you know--because that's going to be around." (Jada)

> And that is another reason that I look toward the medical field because it is always a guaranteed job. Business and housing and stuff like that are fine and all but the way that the market is falling they might not be that good of a choice. There is a big demand for males [in health science careers] and they get paid at least twenty dollars an hour. (Dante)

Health care careers symbolized stability because these careers were in demand and offered high pay. They also meant economic mobility. Joel explained that becoming a physician was "a way out" of his town, which meant leaving a life of economic hardship. Students' concern for job stability and economic mobility was connected to their personal experiences within their community and homes.

Community and home space. Students' neighborhood and homes space were prominent as they discussed the possibilities that a science career could offer. They referred to instances of recent job losses by family members, friends, and community members. It was apparent how hard economic times had touched their lives. Dante witnessed first-hand the difficulties his father experienced in life. He was certain that he would find success through a medical career and end his personal history of struggle. Roxanne also shared how her personal and family circumstances compelled her to pursue a dental career.

> I am not going to say-well my family background-I do not come from a real, real poor family and I do not come from a rich classy family. But my Grandma, she works hard for our family-her kids, her grandkids and her great grandkids. Then as I was growing up, I look at my uncle and he has struggled and struggled. He was a barber and he used to make good money. But now there are so many of them [barber shops]. It is a lot harder to make it. Someday I feel like I will make it and I will be at a point where our family does not have to struggle.

For Dante, Roxanne, and others, a career in health science signaled hope for a better life. Students shared very personal stories of how their parents struggled to support and provide for their families and they did not want to experience the same struggles. Overall, participants understood that a science career had the promise for economic mobility.

Discussion

Tensions

Students' narratives revealed tensions between their conceptions of who they wanted to become and the realities of a health care career. As I discussed earlier in this manuscript, the space of popular media was an important resource. They were enamored with images of heroic health care practitioners as they were portrayed on television and longed to be like them. However, Curtis' experience shows how this space is fraught with issues associated with identity and career exposure. Curtis wanted a hands-on experience and decided to volunteer in the emergency room of his community hospital. Curtis anticipated the kinds of exciting storylines and events to play-out during his volunteer experiences, as they did on his favorite medical television dramas. The television images that Curtis drew upon to construct an identity were not reflected in the actual space of the emergency room.

> I was so psyched for my first day. I was there—you know—waiting for the police to rush with a gunshot patient. But, all I did was pour water for four hours. (Curtis)

These tensions are important for thinking about supporting students' science career trajectories, particularly in terms of resources needed for meaningful identity work. For many of these students, images from popular media were a point of tension.

A second tension that surfaced reflected how students continually reconciled their specific science interests with the career trajectories available to them. Many students had interests in chemistry and astronomy; they excelled academically in these subjects and wanted to learn more. I questioned these participants to understand why they were pursuing a health science career rather than a chemistry or astronomy career. They shared how they really wanted to do humanitarian work and that this goal outweighed their interest in other subjects. They did not understand that a chemist, as an example, could also engage in humanitarian efforts. But, why

did the students have such a narrow view of the relationship between science careers and altruistic work?

The image of a chemist who engages in humanitarian activity may not have been widely circulated. One could reason that students did not have the resources to gain tacit understandings of a chemist's work. For many students, the cultural model of a medical professional as an altruist or humanitarian is quite accessible. At some point, it is likely that an individual living in the United States will visit a health care clinic or have an interaction with a health care professional. These kinds of informal experiences allow students to understand the altruistic nature of a doctor's work, where a similar model of chemist (or other scientist) may be less available.

Implications for underrepresentation in science careers

Clearly these tensions have important implications for practice. First, the findings from this study suggest that altruism can be an entry point for African American students in science and plays a major role in their commitments to pursue a science or science-related career. Students in this study decided to pursue a career in health science because of its altruistic potential. In part, they saw it as an avenue to end personal economic and social oppression but also to impact the lives of others. However, students may have a limited understanding about the altruistic potential of science work in general. And as we see here, this narrow view regarding the nature of science careers can impact persistence toward a science career.

Much of the science education literature describes how images of science (as masculine, elitist, and devoid of emotion) and scientists (as nerdy, white males) can contribute to students' decisions to opt-out of science (Aikenhead, 2006; Carlone, 2004; Rahm, 2008; Osborne & Collins, 2001; Scantlebury, Tal, & Rahm, 2007). However, the fact that the students reported in this article chose to pursue science for its altruistic potential is significant.

Second, findings here suggest that students must be exposed to images and experiences that reflect realistic portrayals of scientists, the nature of their work, and varied employment opportunities. The resources students accessed (both in and out of school) did not expose them to multiple science-career trajectories. Both formal and informal science venues may be critical spaces to provide these opportunities.

Finally, a spatial lens was critical for understanding the nuanced factors that impact students' career decisions and pathways. This approach to the underrepresentation problem also raises other important questions related to the relationship between access and geography. In what ways are science and career resources spatially located, accessed, and put to use (or not) by particular groups and individuals in society? The more we learn about the spaces youth navigate, the better equipped we are to make available and support students' science career trajectories.

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