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Student Reflections on Position and Experiences in the Doctors of Tomorrow Program

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Abstract

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Keywords
Diversity, Medical Education, Mentorship, Pipeline Program, Underrepresentation

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Racial diversity in the medical field remains elusive. Actively engaging high school students from communities underrepresented in medicine (URiM) through pipeline programs has been identified as a viable strategy to support diversification of the U.S. physician population. However, students' perspectives toward these programs remains unclear. In this study, we aim to elicit insights of URiM students matriculating to postsecondary education who participated in the Doctors of Tomorrow (DoT) program to better understand their experiences. Semi-structured interviews were conducted with 14 of the 17 high school students from the inaugural year of DoT. We explored URiM students' experiences during DoT involvement, as well as growth, interpersonal interactions, and plans for the near future. Transcripts from the interviews were coded and analyzed using qualitative thematic analysis. We identified three main themes: contextually relevant experiences, meaningful relationships and interactions, and empowerment and personal agency. Access to hands-on clinical opportunities along with meaningful relationships with mentors provide students with a sense of agency that can ultimately influence their career trajectory. Understanding student experiences is important for continuing to enhance participant engagement and foster sustainability of programs that support URiM students in their pursuit of medical professions. Keywords: Diversity, Medical Education, Mentorship, Pipeline Program, Underrepresentation

Introduction

Despite the U.S. demographic trend towards increasing racial and ethnic diversity, African Americans, Native Americans, and Hispanic Americans are still substantially underrepresented in medicine (Castillo-Page, 2012; Cook & Córdova, 2006; Humes, 2011). The lack of diversity in the physician workforce limits the financial and innovative benefits of nonhomogeneous teams, negatively affects services provided to underserved populations, and affects patient comfort and compliance (Barr, Gonzalez, & Wanat, 2008; Page, 2008; Thomas, Manusov, Wang, & Livingston, 2011). Grade school, in particular, has become a focal point for educational interventions that support diversifying the U.S. physician workforce (Cohen & Steinecke, 2006; Nivet, 2011; Terrell & Beaudreau, 2003). However, there is an insufficient understanding from the perspective of students underrepresented in medicine (URiM) about what aspects of these initiatives were most meaningful at the time of matriculation to postsecondary education (Morrison & Cort, 2014).

Background

URiM populations made up 12.3% of U.S. medical school attendees in 1991 and only accounted for 15% of total medical school enrollment two decades later in 2011, compared to the 30% that would be expected if medical field involvement accurately represented the U.S.

population (Castillo-Page, 2012). Significant barriers and attrition leaks associated with diverting URiM students away from medicine occur during high school (Morrison & Cort, 2014). In particular, URiM and under-resourced communities often have fewer opportunities for students to participate in research and clinical settings, while the competitive premedical environment continues to require more exposure with the field (Muller et al., 2014). Establishing relevant clinical opportunities and meaningful academic enrichment experiences for URiM high school students in partnership with college programs has the potential to reduce barriers to medical education (Lakhan, 2003; Ovink & Veazey, 2011; Perna & Swail, 2001).

URiM students from under-resourced communities may also have the additional challenge of being a first-generation college student (Kahn & Sneed, 2015; Muller et al., 2014). According to Kahn and Sneed (2015), exorbitant debt and deferred income often discourage first-generation students from their academic pursuits. Access to career specific mentors who are able to provide guidance to URiM students on their educational pathways can help address barriers that contribute to disproportionately smaller percentages of medical school attendees (Afghani, Santos, Angulo, & Muratori, 2013; Barr et al., 2008; Dennery, 2006; Figueroa, 2014; Freeman, Landry, Trevino, Grande, & Shea, 2016). Longitudinal, near-peer mentorship has the potential to broaden career awareness, educational preparation, and serve as a role model on the pathway to medicine (Afghani et al., 2013; Baker & Lyons, 1989; Dandavino, Snell, & Wiseman, 2007; Jackson et al., 1988; Kahn & Sneed, 2015; McQuillan, 2005; MedlinePlus, 2011; Nair et al., 2011; Ten Cate & Durning, 2007; Topping, 1996).

While hands-on experiences, mentorship, and practical insights into the medical school trajectory have been identified as best practices in outreach programming, a fuller exploration of meaningful experiences within pipeline programs from the perspective of URiM students is warranted (Afghani et al., 2013; Baker & Lyons, 1989; Jackson et al., 1988; Nair et al., 2011; Ten Cate & Durning, 2007). Doctors of Tomorrow (DoT) is a pipeline program that partners first-year medical students at the University of Michigan Medical School (UMMS) with high school freshmen from Cass Technical High School (CTHS) where more than 80% of the population are from racial and ethnic minority groups (Derck, Zahn, Finks, Mand, & Sandhu, 2016; Humes, 2011). The goal of DoT is to actively engage, inspire, and prepare URiM high school students to pursue careers in the field of medicine by combining three core components (Ross, Yates, Derck, Finks, & Sandhu, 2016). First, ninth grade students visit the UMMS hospital campus monthly to participate in hands-on clinical experiences with physician shadowing; the students practice taking vital signs, experience the cadaver lab, and learn laparoscopic skills in a simulation center. Second, students are paired with first year medical student mentors which provides a near-peer mentor to discuss academic or personal struggles, extracurricular opportunities, college application processes, and goals for the future. Lastly, students engage in local capstone projects to address health disparities in their own communities.

When considering that students from CTHS in Detroit, Michigan are engaged in the DoT pipeline program with UMMS, the success of the program must account for what is important to the students. The purpose of this study is to elicit the perspective of URiM students matriculating to postsecondary education who participated in DoT to better understand their experiences in a program designed for them on their journey to becoming medical professionals. Findings from this work have the potential to provide educators, pre-health societies, and pipeline/post-secondary recruitment coordinators with valuable insights into the experiences that students from under-resourced and marginalized communities recognize as highly valuable. This knowledge can be used to develop and optimize the relationships and programs between secondary and post-secondary institutions to facilitate the success of URiM students.

The Context of the Researcher

Our team comprised 2 third-year medical students (EF and KP), 2 social scientists (GS and PR), and 1 bariatric surgeon (JF) who all have an investment within our roles in ensuring equity and a passion for diversifying the physician workforce. Two have been mentors within the Doctors of Tomorrow program (EF and KP), 2 are racialized women (GS and PR), and 3 are first-generation college students (EF, GS, and PR). JF first noticed the gap of URiM students in medical school and residencies. Working at a Midwest institution so close to Detroit, he decided that we had an opportunity to make a difference in the lives of high school students interested in medicine and began the DoT program. Our individual identities provided each of us with a unique perspective on equitable experiences as they relate to educational opportunities. Collectively, our goal for this study has been to learn from URiM high school students in the DoT program in order to share strategies that will lead to more effective initiatives for diversity in health professions. To this end, we as the research team are not adolescents living in Detroit who reflect a population that is underrepresented in medicine. Our positions, however, may have contributed to the collection of thick, rich data as participants often felt comfortable describing their experiences and aspirations to us in an effort to provide insight to their worldview. Learning about their different experiences and how they interpreted those events is a privileged position, and we always remembered that the students were the real experts in this study.

Interpretive description is used in this study to explore the experiences of URiM students in the DoT program (Thorne, 2011, 2016; Thorne, Kirkham, & MacDonald-Emes, 1997). Since not much is known about student viewpoints in pipeline programs designed for them, we determined that interpretive description is the most appropriate approach to fully understand their firsthand perspectives. An interpretive description design allows for descriptive reporting of participant actions as well as reasonable meaning making of those behaviors. A high degree of trust is placed in the interpretations that the researchers are making, thus it is important that we foreground the analysis by sharing the context and position from which the researchers entered into the project (St. George, 2010). Interpretive description is also invested in generating practical ideas for stakeholders. In our project, the stakeholders for whom this study will likely have application include the American Medical Association (AMA), Association of American Medical Colleges (AAMC), and medical schools who have publicly stated their commitment to finding ways to diversity the physician workforce; the pre-health societies and pipeline program coordinators invested in designing opportunities to enrich exposure and interest in health professions; and the high school students themselves as one form of validation reflecting the experiences they value as part of their post-secondary pursuits.

Conceptual Orientation

Given our focus on the participant perspectives, we used positioning theory as the lens to explore URiM students' experiences on their pathway to medical professions (Davies & Harre, 1990). From this viewpoint, it is the students' position and experiences—an identity of gender, race, geography, opportunities, to name a few—that provide essential insights about the relevance of programming designed for them, but often not by them (Wear, 1997).

We used positioning theory to approach the project and frame the analysis. Positioning theory considers individual identity, social participation, and interpersonal interactions as part of the complex ways in which people understand their experiences in the world (Davies & Harre, 1990). While experiences are informed by expectations around social roles, such as what it means to be a doctor, they are also informed by personal attributes and histories (Harré,

Moghaddam, Cairnie, Rothbart, & Sabat, 2009). In other words, positioning theory suggests that an extra-curricular program or experience does not just happen to individuals, rather they have agency with respect to how they engage with and make meaning of these experiences. While the DoT leadership and directors initiated a 4-year partnership with CTHS, it was quickly apparent that the URiM students had good insights into their own experiences, barriers, and potential that were informed by their geographical location, race, and personal identities. We designed questions to hear directly from the students about how they are positioned in this world. Students have a unique lens through which they view the world given their position, identity, and involvement within the program, so we enlisted them as the expert knowers to learn more about the meaning they give to certain experiences.

Methods

This project arose out the decision to develop a greater understanding of high yield events from the students' perspective in order to continue to enhance and optimize DoT. Ethical approval for this project was provided by the University of Michigan Institutional Review Board (IRB).

Educational Setting and Participants

Data for this project was generated as part of the DoT educational initiative between the UMMS in Ann Arbor, Michigan and CTHS in Detroit, Michigan. In 2012, a team of faculty and students at UMMS reached out to CTHS to develop a program for high school students that could leverage medical school teaching practices and experiences. As the first cohort of DoT students was graduating from high school in 2016, it became evident to DoT medical student and directors of DoT that we needed to know more about their engagement with DoT. Hearing the voices of the DoT students provides an important platform from which these youth can have their stories heard inclusive of the realities, nuances, and perspectives only available from the social positions they individually occupy. It is important to explore and share the insights and experiences of students who have been successful in the DoT program so that future educators, pre-health programs advisors, and post-secondary recruitment coordinators are better prepared to support and understand students from schools in underserved communities in their pursuit of medical professions.

The first cohort of DoT in 2012 consisted of 17 students, all of whom matriculated to postsecondary institutions in September 2016. Faculty leads (GS and PR) reached out to all 17 students via the high school faculty liaison. The students were provided hardcopy handouts inviting them to participate in DoT exit interviews prior to leaving CTHS. Students were told that participation was voluntary and would have no bearing on their academic performance or influence any future connection to DoT. Fourteen of the graduating students (8 males; 6 females) volunteered to participate in DoT exit interviews in May 2016. Twelve students identified as African American, 1 as Hispanic, and 1 as Asian American. Consent was provided by students and their parents/guardians. No financial or other incentives were given for participating.

Data Generation

During the study, the two faculty leads met weekly to develop the interview protocol; determine location, dates, and times of interviews; and ensure consistency in our interview methods. Semi-structured individual interviews were conducted with participants. Each interview was facilitated by a member of the research team (GS or PR) and lasted a maximum

of 25 minutes. The students were interviewed in the CTHS media center. Students visit this space regularly as a part of their studies. Rooms in the media center had previously been used for DoT educational activities. The students could come to the media center during their lunch periods. For these reasons, we decided the familiarity of the space and the ease of access provided a strong rationale for the location and timing of the interviews. Furthermore, ensuring the comfort and confidentiality of the participants were important considerations for determining who would interview the participants. The consistent presence of the faculty leads at DoT programming events, their availability during school hours, and experience with interviewing for qualitative research projects reinforced that the faculty leads (GS and PR) would be the interviewers.

The participants and interviewers had preexisting familiarity through interactions in DoT education programming. Therefore, to ensure comfort, we intentionally focused on DoT during our opening dialogue which included some general questions to continue our rapport (DiCicco-Bloom & Crabtree, 2006). At the beginning of the interview, we also explained our goal was to understand students' perspectives about their DoT experiences. We also reinforced that their experiences were important, and we wanted to hear them; at the same time we were ethically compelled to tell students that they should only share what they felt comfortable expressing.

Semi-structured interviews were used for data generation because this method allowed us to have some focused topics (looking back at DoT experiences and looking ahead at graduation) while creating space for participants to share their individual stories (Dixon, 2015; Fontana & Frey, 2003; Rabionet, 2009). Building in flexibility in the interviews through open-ended questions allowed students to maneuver dialogue in directions that were more comfortable and meaningful to them. The open-ended questions in the semi-structured interview protocol explored experiences associated with DoT and asked students to describe their participation, personal growth, interpersonal interactions, plans for the near future, program strengths, and areas for program improvement (Appendix A).

Interviews were audio-recorded and transcribed verbatim by a professional transcription service. Three members of the research team checked the audio recordings against the transcriptions for accuracy (DiCicco-Bloom & Crabtree, 2006; Dixon, 2015; Fontana & Frey, 2003; Rabionet, 2009).

Data Analysis

Thematic analysis procedures, as outlined by Braun and Clarke (2006) were used to analyze data. The steps we followed started with an iterative process of reading and rereading the transcripts, which then continued throughout the analysis (Braun & Clarke, 2006). Data were completely and independently coded, line-by-line, by two researchers (EF and KP). Individual quotes were labeled with phrases that summarized the theme of the students' words. For instance, one student stated, "'Cause the [medical] field is dominated by Caucasians and everything else. And me coming from a single with my mom and five kids, then I felt like I was at a disadvantage." During initial line-by-line coding, this quote was labeled as "social barriers/accessibility." Categorization of codes was inductive and ongoing while relationships among codes were established. A third researcher (GS) coded a sampling of the data to ensure consensus in the analysis, allowing us to integrate triangulation into the process of coding and analysis. Any discrepancies were discussed among the research team and resolved. We then took a wider view of the coding and looked at patterns in the sorting and organizing of data within a more holistic context of the study as well as the DoT program. This individual and collective inquiry allowed our research team to make interpretations that presented important programmatic opportunities from the position of the participants. Three key themes and nine

subthemes were identified. The three themes are: culturally relevant experiences, meaningful relationships and interactions, and empowerment and personal agency.

Rigor and Trustworthiness

Rigor and trustworthiness are vital to this study. Our findings' worth depends on not only the specific analytic process but also the way in which such a process was considered within a broader research context. As such, we specifically use the principles of objectivity, dependability, credibility, and transferability as measures of rigor and trustworthiness. We hope that these principles will illuminate both the construction of knowledge and the positioning of the researcher within this project (Thorne, Con, McGuinness, McPherson, & Harris, 2004).

Objectivity in this study was addressed in large part in the methods section, within which the study's procedure was described in great detail. The sequence of data gathering, interpretation, and presentation are explained as they relate to the broader context of the paper's motivations and relevance (Colorafi & Evans, 2016). Through semi-structured interviewing and intentional probing, we collected verbatim accounts from the voice of the participants to provide thick description of their experiences. Interpretive authority was demonstrated by explaining each researcher's personal relationship to the study. This also allowed for reflexive evaluation of perceived assumptions by the research team inherent to our analysis (Thorne, 2016).

To achieve dependability, we maintained a consistency with our methods, namely the semi-structured interviews. Each participant was interviewed at the same place, around the same time, and with the same calibrated questions; audio recordings and transcriptions further ensured consistency in data collection. Throughout the analytical process, junior researchers (EF and KP) met with a senior researcher (GS) to ensure fidelity towards the original research objectives (Colorafi & Evans, 2016). We are confident that other researchers will be able to reproduce this methodology, even with different demographic objectives in mind (Zambrano-Varghese, 2017).

Credibility of our findings was achieved through triangulation as these same three study team members (EF, KP, and GS) also conducted the coding and analysis. Furthermore, the interpretive sections of the analysis were contextualized within a theoretical framework using foundations built by other researchers who have attempted similar work. Lastly, the results and implications described in the study are relatively intuitive and will easily make sense to the reader especially with the elucidation that our study provides (Colorafi & Evans, 2016).

One of the most important aims for this study was its transferability to different communities and contexts (Lincoln, Lynham, & Guba, 2011). As such, we fully described the characteristics of the participants in this study so that similarities with other populations can be explored. To clarify threats to transferability, we discuss the study's limitations. This study also suggests ways in which the findings can be further tested by other researchers, thus opening the door to new and improved application for the future (Colorafi & Evans, 2016).

Findings

Through our analysis of the data, we identified three themes that present meaningful experiences associated with participating in a mentoring and pipeline program from the position of the URiM high school students. The theme *contextually relevant experiences* describes the engagement of DoT high school students at UMMS and in their own community that was established as part of the DoT program and provided a broader view of medicine. The theme *meaningful relationships and interactions* indicates the importance of the relationships

they developed through the program for their future. The theme *empowerment and personal agency* highlights the increased awareness and involvement in improving health care access for those in their community as well as their own personal growth. Each theme is supported by evidence in the form of direct de-identified quotes from participants.

Contextually Relevant Experiences

Contextually relevant experiences included activities such as monthly visits to the hospital campus for hands on clinical experiences including physician shadowing opportunities and laparoscopic surgery skills teaching and completion of collaborative end-of-year capstone service projects related to locally relevant health issues. Our activities focused on providing URiM students with exposure to health professions. Students described how these activities were specifically relevant to their goal of entering the medical field.

As students with limited access to individuals in the field of medicine, all 14 participants noted that engaging in targeted medical activities provided them with an inside perspective on the responsibilities of a physician. Student ET shared the following about his clinic shadowing experience:

> I saw that you have to do a lot of different things at one time. And you have to focus on this patient and you got to focus on that patient. And you got people talking to you at the same time, like the other doctors around working with you. And I saw that's a lot of multitasking. And just following him around and hearing what he has to say. He had to go on a business trip to Washington, D.C. the next day. He was telling me he's got to catch a flight and he's just got to do it. I'm like, wow. This guy is really prepared. He's ready to just do whatever comes at him. (African American male)

Ten students also recognized the applicability of their DoT experiences for patient care. They were making connections between the opportunities with which they were engaging and a possible future state for themselves. One African-American female student described her experience with CPR training:

> We also got to actually go into the lab and see the cadavers and do the sim training for laparoscopic surgery. And I didn't think I would be good at it. I thought, "Oh, man, this is going to be horrible." But then I did it. And I was like, this isn't normal stuff anymore. This is real. And I realized that's not something that everybody gets to really do. Not everyone gets to practice CPR and stuff. And I realized that's an actual thing that can be used in real life, you know, not just for book's sake or anything. Like, this could be something. (Student TD)

More than hands-on experiences, these contextually relevant experiences also provided multifaceted information from which students constructed an understanding of what physicians actually do.

All DoT students also engaged in a community project to facilitate their understanding of health in their community. Four students noted that these experiences changed their perceptions about their community and ignited an understanding of healthcare disparities in their communities—things they had not paid attention to prior to participating in DoT. An African American male student explained:

> It made me feel different about my environment. Everybody can't afford to go to the doctor, and it made me feel that I want to help as many people as I can if they can or can't go to the doctor. It made me want to be more helpful to the community and give back more, pretty much like that. (Student RS)

Students in this program extracted far reaching learning extensions from these contextually relevant experiences, expanding their awareness of health in their current geographical situation as well as making connections to their imagined roles and responsibilities as a future physician. The information students gained from their experiences caused them to become aware that healthcare is not only a rewarding high stakes profession, but also a prime example of how social inequity and health disparities are perpetuated. While acquiring a broader perspective of health, the URiM students saw agency in their positions and expressed this as a desire to give back to their community in an effort to promote access and equity.

Meaningful Relationships and Interactions

Through the program's activities, DoT students interact with DoT peers, UMMS medical student mentors, DoT faculty, and other health professionals at UMMS to varying degrees. Many of these one-on-one interactions were rich experiences that fostered reflections and personal growth. Students described how these interactions developed into resourceful and long-lasting connections throughout their participation in DoT.

As noted above, all DoT high school students are paired with a medical student near-peer mentor to help guide their experience. All 14 participants commented on mentoring relationships. An African American female student reflected on one of her meaningful relationships with her mentor:

> She helped us with the project. She checked up on me and everything. It was real nice to have a resource, someone that wasn't that much older than me to basically check up on me, see how my grades are going. It was just real nice because I didn't really value the importance of having a mentor in life. So, this basically shed light of why a mentor is a necessity and how it can really help you. (Student KJ)

Access to near-peer medical student mentors in DoT provided insights into pathways to medical school, an academic resource, and role models for what is possible to accomplish (Cervantes et al., 2014). DoT students expressed the value of their mentoring relationships, which gave them a chance to learn how someone a few years older can help create a clearer picture of the path from college to the medical school application process.

Students we interviewed felt empowered from having access to DoT peers, medical students and faculty, who not only wanted them to succeed, but gave them resources and tools to do it. One African American male student described the benefit of networking after the annual capstone project symposium:

> I was just at—well, at the capstone presentations this year afterwards when everybody was going around looking at posters I got stopped by a few current U of M med students, graduate and undergraduate level saying, "Hey, I heard you were interested in neuroscience. I'm neuroscience. Here's my email if you want to ever contact me. I can help you understand some stuff or we can just talk if you want. And I asked them about UROP [Undergraduate Research Opportunity Program] and they said definitely do UROP. You might even want

> to do it your second year or you can pursue an independent study, that's fine. And they gave me a lot of guidance for what I—how I would want to plan my— at least my first two years at U of M. (Student GJ)

The medical student mentorship and additional relationships that were available through implementation of the program were recognized as valuable by the DoT students. While the interactions may not initially have appeared to be important, the URiM students came to recognize that their continued success stood to gain from a network of meaningful relationships.

Empowerment and Personal Agency

Twelve students described how their participation in the DoT program empowered them to pursue their goals and exercise agency on their behalf. They were able to navigate other resources and build their personal credentials. Furthermore, students recognized the access they had to committed individuals associated with DoT which gave them the confidence to request letters of recommendation. An African-American male student shared:

> [The medical students and physicians], they just really want you to be great. And they'll give you the tools to do it. But you have to step up and talk to them. If I never went up and shook [this physician's] hand, he would have never have wrote me a letter of recommendation to get into the University of Michigan. And that I think that was a big key for me. (Student ET)

Feeling supported by the commitment demonstrated by the DoT medical students, faculty, and staff, DoT high school students harnessed their own confidence to reach for opportunities. This example also highlights the comfort established within DoT, whereby participants recognize that the program is responsive to and focused on the success of students, yet the high school students realize DoT is a partnership and their success also depends on advocating for themselves.

Ten students indicated that DoT helped them develop new skills and identify personal talents. This sense of empowerment is best captured in the words of one DoT student who identifies as an African American female:

> I can do this. And I don't think I would have ever been able to do that had I not been in Doctors of Tomorrow. I also decided that I wanted to be a biomedical engineer because I wanted to build stuff too is what I found out during high school. But I also remember that Doctors of Tomorrow, I really loved the aspect of helping people. So I had to find a way to combine medicine with building stuff. (Student TD)

These skills resulted in increased confidence about approaching their future academic and career goals. Most DoT students were inspired to continue pursuit of medicine; some even found themselves interested in particular clinical specialties. Other DoT students discovered new paths to explore in business administration, dentistry, and engineering. Increasing confidence was also present in students' descriptions of meaningful relationships and interactions (Sweeney & Villarejo, 2013).

Twelve students found that DoT helped them refine or redirect early interests, others combined passions that once appeared incongruent, and still others recognized the importance of choosing a concrete path early. An example from an African American female student was:

> I learned that me wanting to go into the medical field, this [DoT program]
> actually solidified my choice of going. I know that's what I'm doing for sure.
> And no matter—I say I want to be a OBGYN right now, but I might change my
> mind but I just know for sure I'm going to go into the medical field. And when
> I get there to residency and everything I might see something else that I like,
> but I know for sure now I'm going into the medical field. I basically found my
> passion and found something that was meant just for me. (Student FK)

For many students, DoT provided experiences and opportunities to help them find their focus
and support them towards specific goals. The determination with which this student expresses
her aspirational journey and visualizes achieving a goal indicates a belief in personal agency.

As students from URiM backgrounds as well as an under-resourced city, six recognized
that they would need to overcome social barriers in order to pursue becoming a doctor. DoT
students astutely shared their ideas about social barriers and stereotypes that they faced in their
pursuit of becoming doctors. One African American female student stated her mature
awareness and vision:

> I have to be extraordinary. Not only am I black, but I'm also a woman. And I
> come from Detroit. And people don't expect things from me. I have to work ten
> times as hard to get whatever I want in this world. So I'm going to go all the
> way. I'm going to get my doctorate degree. And I'm going to make history. I
> know that I'm not the average person anymore. Doctors of Tomorrow already
> proved that I'm not average. And so I can't live my life like I'm average.
> (Student TD)

DoT students participating in this study felt strongly about overcoming social stereotypes.
Socially disadvantaged college students have been found to possess a strong sense that their
"starting point" significantly encumbered their ability to be accepted into medical school. As a
result of these feelings, students feel the need to drastically exceed expectations and work much
harder than the average pre-medical student (Freeman et al., 2016). DoT participants expressed
similar perceptions of barriers, such as race, gender, and social/economic status, to be obstacles
on their journey to medical professions. DoT students recognized that although individuals
from similar racial, ethic, and gender backgrounds may be underrepresented in medicine, they
saw pathways for achieving success in the medical field.

Discussion

The purpose of this study was to explore the perspectives of URiM students
matriculating to postsecondary education who participated in the DoT pipeline program
designed for them. Using interpretive description, we learned that for the students contextually
relevant experiences, meaningful relationships and interactions, and empowerment and
personal agency are essential components for personal growth and engagement with the DoT
program. Prior to this study, we did not find any other research that reported on first-hand
experiences and insights about participating in a medical school pipeline program from the
perspective of high school students in the program. There were a number of studies that
described pipeline programs and their potential contributions to a more equitable health
profession (Martos et al., 2017; Winkleby et al., 2014). However, the absence of student voices
describing and interpreting their experiences renders an incomplete understanding of pipeline
programs. Positioning high school students at the center of this study as expert-knowers, they

were invited to actively include their identities, social roles, and geographical awareness, to name a few, as part of what was important and meaningful about their experiences in DoT. Learning from experiences of URiM students provides new insights into their perceptions of becoming and being a doctor, personal barriers, and meaningful educational opportunities (Bureau of Health Professions, 2006; Cohen, Gabriel, & Terrell, 2002; Smedley, 2004).

The DoT events that the high school students described as memorable were related to both the hospital context and their personal communities. However, it was not the ability to detect meaningful moments during their participation in DoT that surprised us. It was the maturity and insights with which the students drew out the relevance from these experiences as they related to their current positions as matriculating students, the future impact on their educational and professional trajectories, and on the communities with which they identified. DoT students seem to have a heightened awareness of social barriers and opportunities, and from that awareness are able to extrapolate what DoT was able to do for their individual personal growth as well as how the program can be enhanced to support incoming students. Interestingly, improving DoT for students simultaneously appeared to be associated with greater awareness and involvement with health care in their community.

The importance of interpersonal connections for the DoT students cannot be overstated. They recognize the investments of mentors, medical students, and faculty on their development during DoT and continued growth into post-secondary education. Their reflections indicate that mentoring has been a salient aspect of the program that has been highly valued. This is in keeping with the Haggins, Sandhu, and Ross (2017) study which found that the mentor-protégé relationship was valued by both individuals and supported the claim that these connections could be important in promoting health care careers among URiM students (Haggins, Sandhu, & Ross, 2017). Extending the network of participation and interaction with similarly invested peers, mentors, and advisors will be important to nurturing the full scope of DoT students' identities and interests (Derck et al., 2018).

What stood out the most to us was the breadth of ways that the students articulated their personal agency—ranging from how they felt they were expected to perform their identities to growing confidence to seek resources to facilitate their success. One of the URiM DoT students eloquently explained her experience that society broadly saw her race and gender before they saw her abilities. However, she stated that she was well aware of her abilities and potential and intends to realize her vision. Their deep insight into what it takes to navigate this challenging landscape is reflective of a viewpoint developed from an astute awareness of social stereotypes. A similar keen understanding of how one is positioned socially (e.g., based on race, ethnicity, age, economics, geography) is found in experiences shared by other DoT participants as well. Knowing this is vitally important because it reinforces the usefulness of partnering with high school students in the development and improvement of pipeline programs. This will help enhance programming so that it accounts for what students understand to be key issues in their communities, social and political awareness, and the final impact they would like to have on the program that supported them.

This study has limitations that should be noted. It was conducted within one pipeline program that exists between two institutions (UMMS and CTHS) which may limit the transferability of findings. While we were able to capture responses from most of the graduating cohort, three DoT students did not participate in the project, so their experiences and perspectives were not included. Thus, we acknowledge the potential for selection bias in our results as only the voices of those students who participated are represented here. In addition, the participants were familiar with the interviewers. The familiarity may have led to some presumptions in understanding during the interviewers, affecting either the scope or depth of the data collection. Having established the trustworthiness of the study, we feel that these limitations of participant inclusion and interviewer relationship point to opportunities for

augmented methods during continued investigation within DoT, with programs in different communities, and with university students who previously participated in pipeline programs.

Participants' reflections on experiences and interactions provide practical suggestions for optimizing pipeline programs for URiM students. From the position of DoT students, there are several key enhancements that can leverage existing curricula in pipeline programs: contextually relevant experiences (e.g., shadowing a physician in clinic), meaningful relationships and interactions (e.g., near-peer medical student mentors), and empowerment and personal agency (e.g., discussions about community inequity and health disparities). Our findings suggest that students have a thoughtful synthesis of their participation in DoT strongly informed by the complexity of their social interactions. Stakeholders with a vested interest pipelines program and equitable access to medical school (such as medical school admissions committees, pre-health societies, pipeline program coordinators, high school counsellors, and students themselves) are well served by the experiences shared by DoT students in our study. For future planning, it would be important to learn more from students about factors that influenced their decisions to continue to pursue medicine or shift their goals. Their insights have the potential to enhance engagement in pipeline program.

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Appendix A

The following questions were included in the semi-structured interview protocol:

1. Thinking back over the past 4 years, what would you say you got out of your participation in DoT?
2. What opportunities did you have as a result of your participation in DoT? (e.g., workshops, internships, etc.)
3. What skills did you gain from being a part of DoT?
4. What did you learn about yourself from being in DoT?
5. What relationships did you establish through DoT?
6. Tell me about your relationship with your DoT mentor over the past 4 years.
7. How would you describe your future plans now that you are getting ready to graduate? (School, work, job)
8. 8. Are you still interested in pursuing medicine?
   a. If "No," what changed your mind?
   b. If "Yes," how do you think you will make sure you reach that goal?
9. How many colleges and universities would you say you applied to?
10. How did you decide which school to attend?
11. In what ways, if any, did your participation in DoT influence your after-graduation plans?
12. What could we have done differently to make the program better or more helpful to you?
13. Is there anything else you would like to say about the Doctors of Tomorrow program?
14. Do you have any questions for me?

The preset questions were not always asked in order; rather they followed the flow of the responses. To delve deeper into responses, we had prepared several probing questions to facilitate deeper inquiry. Probing questions comprise:

1. Tell me more about…
2. Can you say more about…
3. Can you explain what you mean by that?
4. Can you give me an example of that?
5. Rephrase response and say, "anything else?"
6. Rephrase the question

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