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Jenni Seale   April 14, 2014

Influential Experiences on the Undergraduate Premedical Track

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An abstract of
a thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
Bachelor of Arts with Honors

Sociology Department

2014

Abstract

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Over the years, the premedical track—requirements undergraduates must fulfill for acceptance to medical school—has received a lot of attention and criticism for its rigidity and intensity (e.g. Thomas, 1978; Alpert and Coles, 1987; McGahie, 1987; Emmanuel 2006; Dienstag, 2008; Gross et al., 2008; Hanscom, 2011). Specifically, there has been concern that the content and experience of the classes may push people away from scientific studies like medicine (Green, 1989; Drew, 2011) In 2013, a literature review of the existing studies about the premedical track called for more qualitative exploration to be done into the lived experiences of premedical students in order to understand the way the process shapes them (Lin et al.). This research study focuses on undergraduate students' premedical track experiences at a medium-sized Southern research university often known for its medical ties. In this research study, I use semi-structured interviews with analysis rooted in social cognitive career theory (SCCT) (Lent, Brown, and Hackett, 1994) to explore undergraduate students' premedical experiences. I particular, I examine participants' thoughts about experiences that have been central in determining their premedical persistence or discontinuation. This research builds on existing literature about premedical persistence and career choice from the SCCT perspective. Findings from this study indicate that direct experiences in a relevant workplace are more central for premedical persistence decisions than coursework experiences. The importance of these experiences may be influenced by contextual factors that shape the social climate of the premedical track. Suggestions for improved advising of premedical students are included at the end.

Influential Experiences on Undergraduates' Premedical Track Persistence

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A thesis submitted to the Faculty of Emory College of Arts and Sciences
of Emory University in partial fulfillment
of the requirements of the degree of
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Sociology Department

2014

Acknowledgements

To my adviser, thank you for making this a true learning experience for me of what it means to do research. Your guidance and support have pulled me through; I could not have made it through this research experience—or college at all—without you.

To my committee, thank you for your boundless patience and constructive advice. I pray good things will come back to you ten-fold for the support and understanding you have shown to me.

To the participants in my study, thank you for entrusting me with your stories. My thesis is grounded in your candor and vulnerability. Without you, this project would not have been possible.

To my family and friends, your support and selflessness never cease to amaze me. Thank you for editing drafts, trouble shooting hang-ups, and reminding me of my capabilities.

To Joe, you are my MVP. May the next time we get ice cream be at a more reasonable hour than midnight, and not over edits to a 75-page paper. I look forward to every opportunity I will have over the course of our lifetime together to hold you up the way you have done for me over the past few months.

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<u>Introduction</u>

On November 4, 2011, Christopher Drew published an article through the New York Times entitled, "Why Science Majors Change Their Minds (It's Just So Darn Hard)." Drew's article highlighted recent struggles in undergraduate science, technology, engineering and math (STEM) fields of study. As the title suggests, the sheer numbers of majors in those fields are falling, according to Drew, because students pursuing these STEM field tracks are discontent with the difficulty or the appeal (or both) of their courses. Having experienced invigorating and inspiring hands-on coursework in their K-12 years, many students enter college excited about pursuing a degree in science, only to find themselves in difficult, dry introductory science lecture courses that often push them toward failure or resignation. In particular, Drew cites an alarming statistic: according to studies done at UCLA, as many as 60 percent of STEM-studying and pre-medical students discontinue their pursuit of their original track, sometimes discontinuing their college career entirely (Drew, 2011).

Drew's analysis of university science classes joins a long tradition of public attention devoted to voicing concerns regarding the pre-medical academic track and other admission tools used by medical schools. In fact, more than 20 years prior, Dr. Kenneth Green, a senior research associate at UCLA, published an almost identical alarming review in the *American Scientist* of a drop in undergraduate science major interest by 50% from 1966-1988, largely blaming recession-motivated underfunding and difficult, non-applicable science courses for the decline (Green, 1989). But why is there so much hype about these declines?

The STEM "pipeline" (a nickname for the educational track that prepares students for jobs in science, technology, engineering and math) is supposed to turn out students who will lead innovation and productivity in the national and international spheres (Rask, 2010). Declining

rates in STEM fields cause concern about declines in jobs in engineering, computer technology, and especially medicine. Not only are these problems with STEM education likely to impede our country's international competitive advantage (Rask, 2010), but they are also likely to cause problems even closer to home as they impact the country's medical system, particularly in the ways they put stress on medical professionals. In 2013, the American Medical Association published reports on a major funding cut to graduate medical education intersecting with an impending crisis in healthcare: due to an increase in the health needs of the Baby Boomers, a spike in the number of people who will gain access to health insurance, and an increase in chronic disease, the US is likely to see a shortage of 62,900 physicians by 2015. Medical schools and residencies have been unable to keep up with the growing need; this shortage is likely to put more strain on American doctors trying to keep up with that trend ("As physician shortage approaches, GME funding sent to chopping block", 2013). Added stress is one thing doctors don't need. Physicians are already twice as likely as members of the general population to commit suicide because of the strains from their job (Miller and McGowen, 2000). With an aging "Baby Boomer" population, a healthcare system in constant legislative fluctuation, and doctors already on the brink of depression and burnout, problems impeding undergraduate STEM education that negatively influence the medical system in terms of numbers, training, and clinical ability are particularly alarming.

But are experiences in the coursework the only thing we should be concerned about when looking at attrition rates on the premedical track? If there is concern that undergraduates are discontinuing scientific pursuit, we must start asking the question: what do undergraduate students say about their reasons for staying on or leaving the premedical track? In this paper, I seek to answer the question, "How do the lived experiences of the premedical track compel

students toward or repel students away from the pursuit of becoming a doctor?" Approaching career persistence from a social cognitive career theory perspective, I use semi-structured interviews to explore experiences of the premedical track that may be central for career choice and persistence. This research builds on existing literature premedical persistence and career choice from the social cognitive career theory perspective.

This study assesses the impact of two major premedical track experiences on career choice: shadowing and coursework experiences. Findings show that shadowing is a major influence on premedical persistence decision in the way it influences and confirms (or negates) students' expectations of what they are working toward: becoming a doctor. Shadowing may not, however, be necessary in order to change outcome expectations from positive to negative. As for coursework, although experiences in the classes influence students' ideas about their capability and efficacy, sample participants do not rely heavily on these self-efficacy beliefs when making decisions about premedical persistence.

I begin this study with a sketch of the background of the premedical track and the major criticisms it has sparked over the years. I describe how these criticisms show a need for qualitative research to be conducted with students about their experiences of the premedical track. I then outline the theoretical framework I chose to use for my research: social cognitive career theory (SCCT) (Lent, Brown, Hackett 1994). I provide a brief summary of empirical research about premedical persistence and relevant SCCT studies. I then identify research questions and hypotheses based on this empirical research and the theory of SCCT. After detailing my empirical methods, I describe the results from the interviews. Finally, I discuss findings and propose ideas to be explored that would extend more support for premedical students.

<u>Background Information</u>

A Brief History of the Premedical Track

The first attempts to standardize undergraduate preparation for medical school began in the late 1870's. Before this time, medical education was available essentially to anyone who could pay the tuition or find someone under whom to apprentice (Barr 2010). Influenced by exposure to the rapidly advancing, natural science-centric German medical system, University Presidents Daniel Coit Gilman (Johns Hopkins University) and Charles W. Eliot (Harvard) began the process of trying to persuade their boards of trustees to approve a fixed list of mandated courses (mostly in the natural sciences) to be completed in undergraduate education before medical school matriculation (Barr 2010; Chambers, Cohen, and Girotti 2011). Initial attempts at standardizing a curriculum were met with skepticism because of their narrow and stringent focus on the natural sciences. However, in 1893, John's Hopkins accepted a large donation for the formation of a new medical school, with the donation being contingent on several factors. One of the requirements Johns Hopkins agreed to meet in order to accept the donation was that a rigorous premedical curriculum in the natural sciences (physics, chemistry, and biology) serve as a prerequisite for acceptance at the new medical school (Barr 2010). With acceptance of these terms, Daniel Coit Gilman of Johns Hopkins University laid the foundation for the American premedical education.

Other schools began to look to Johns Hopkins as a standard for medical and premedical education. In 1905, The Association of American Medical Colleges, a group of medical schools that had convened in 1890 with the purpose of pushing for standardized premedical education, established for their members the requirement of adopting a similar premedical curriculum to

that of Johns Hopkins—heavy in the natural sciences. In 1910, Abraham Flexner was commissioned by the Carnegie Foundation for the Advancement of Teaching to head up an analysis of the state of premedical education. Flexner's report, "Medical Education of the United States and Canada: A Report to The Carnegie Foundation for the Advancement of Teaching," used Johns Hopkins as the standard for assessing the quality of education at 155 medical schools around the country (Barr 2010). Now widely known within the medical community simply as "The Flexner Report", Flexner's analysis of the state of medical education at that time called for a higher and more unified standard to be applied to medical school applicants. A more clearly defined track that provided a more rigorous curriculum for aspiring doctors would improve the applicant pool, Flexner said, by identifying those who were "F.S.M."—fit to study medicine (Barr 2010).

Today, there is some question as to the internal validity of the Flexner report. In his book Questioning the Premedical Paradigm, Dr. Donald Barr of Stanford University cites historical accounts of Flexner's personal correspondences to claim that Flexner "conducted his study with substantial bias (toward Gilman's perspective) built into its methodology, using superficial data gathered 'in the course of a few hours'" (Barr 2010: 65). However, in Flexner's day, the report was accepted as scientifically grounded, and its influence spread widely across the country. Many states began requiring adherence to AAMC standards for medical school accreditation; by 1920, only 15 of the 85 medical schools in the country were not following the AAMC standards Flexner had recommended (Barr 2010).

In 1925, the AAMC set premedical prerequisite requirements for its member medical colleges that are nearly identical to those mandated in 1893 by Johns Hopkins University: 16 hours of chemistry, 10 hours of physics, 12 hours of biology, and 6 hours of English literature

and composition (Barr 2010: 68). Although standardization brought more structure through a predictable premedical track, it did not eliminate controversy from the discussion of the premedical experience, even within the AAMC. The AAMC has published reports from many internal investigations commissioned to examine effects of implementation of the premedical track—the Final Report of the Commission on Medical Education (1932); Preparation for Medical Education in the Liberal Arts Colleges: The Report of the Subcommittee on Preprofessional Education of the Survey of Medical Education in 1953; and Physicians for the Twenty-First Century: Report of the Project Panel on the General Professional Education of the Physician and College Preparation for Medicine (1984) (Barr 2010). These assessments of the premedical system generally declare that the content and implementation of contemporary requirements promote premature specialization and failure to obtain a broad, rigorous education.

Despite these periodic reassessments and acknowledgements of controversy by the AAMC, coursework prerequisites set by the AAMC today look nearly identical to the AAMC prerequisites set in 1925, which were based on the Johns Hopkins requirements implemented in 1893. According to the AAMC, member schools require that applicants have completed one year of biology, one year of general chemistry, one year of organic chemistry, and one year of physics before admission to medical school. In general, the full spectrum of requirements includes, but is not limited to, proficiency in the designated courses, extensive extracurricular and volunteer activities relevant to the medical experience, and an impressive Medical College Admissions Test (MCAT) score ("Admissions Requirements," AAMC.org). The next section will examine the discussion that has surrounded these standards of premedical education and the culture they promote for the future doctors of America.

Dialogue around the Premedical Track

Presumably, the premedical track was standardized in order to improve the quality of the education undergraduates receive, which ultimately affects the quality of care they will provide. At the core of the conversations surrounding the premedical track, both internal and external to the AAMC, the fear is that the current structure of the premedical classes runs counter to those original objectives. There is concern among doctors and policy makers alike[1] that the rigidity of the medical school track and the culture it creates have not allowed for a full understanding of the human experience as it informs health, nor true growth of the type of scientific thought that leads to intellectual curiosity. Put simply, these criticisms claim the premedical track does not allow students to truly learn relevant information and skills for being a doctor. The following criticisms of the premedical track represent the evolution of the gamut of concerns members of the intellectual community have developed over time regarding the premedical track.

Criticism #1: The current emphasis on science classes and dearth of humanistic study in the track does not adequately prepare students for relating to patients as human beings. In 1978, Dr. Lewis Thomas, an M.D. with a degree from Harvard Medical School who served as dean of the medical schools at New York University and Yale, went as far as to suggest that the pre-medical track be eradicated altogether (Gunderman and Kanter, 2008). He called instead for a focusing on the liberal arts while in college, under the assumption that heavy scientific study could be honed in medical school (Thomas, 1978).

Following Thomas' lead, Dr. Joseph Alpert of University of Massachusetts Medical School's division of cardiology and Dr. Robert Coles of Harvard Medical School's department

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[1] Specific "doctors and policy-makers" will be discussed in the following sections

of psychology co-authored an editorial in the Archive of Internal Medicine that also suggests changes to the premedical track (1987). However, Alpert and Coles do not call for as strong a rejection of science classes as Thomas, citing science material's importance in preparation for further educational training and clinical practice. Instead, their reform suggests a blending of humanities classes and science classes, both in undergraduate premedical preparation and in medical school (Alpert and Coles 1987). Later that year, Dr. William McGahie wrote a similar editorial for the Journal of General Internal Medicine substantiating the importance of the liberal arts in premedical preparation, citing classic historical ideas of the holistic role of the physician. "[The traditional] premise is that a physician is more than a technician, that patient care calls for intuition and judgment, not just procedural skill," McGahie asserts (1987). In essence, McGahie (1987) and Alpert and Coles (1987) call for a focus on the quality, not just the qualifications, of the preparation shaped by premedical education. McGahie proposes this be accomplished by placing emphasis on non-scientific coursework and personal characteristics in medical school applicant evaluation (McGahie, 1987).

The empirical literature on this criticism of the premedical track seems to indicate that the fears may be founded. Analysis of existing premedical requirements shows that they are, for the most part, accurate in predicting some degree of future success in medical schooling, but not necessarily clinical practice (Salvatori, 2001; Ferguson, James and Madeley 2002). Penny Salvatori conducted a literature review of studies on the reliability and validity of cognitive and non-cognitive admission criteria in healthcare fields. In the literature, Salvatori found that pre-admission grades (both the overall GPA and the purely science GPA) and the MCAT (when used in combination with pre-admission GPA) were found to be clearly correlated predictors of success in subsequent academic performance post-undergrad (meaning, in the specific case of

doctors, undergraduate academic success was positively correlated with success in the academic courses of medical school) (Salvatori, 2001). A year later, Ferguson, James, and Madeley conducted a separate literary analysis of articles in major medical journals that analyzed factors believed to be significant predictors of success in medicine. Among those allegedly relevant factors was an applicant's previous academic ability (in other words, performance on the academic part of the undergraduate premedical track) as measured by GPA (Ferguson, James and Madeley, 2002). They found this factor to be a moderate predictor of success in medical classes, corroborating Salvatori's work and supplying vote of confidence for the premedical system (Ferguson, James and Madeley, 2002). However, neither Salvatori nor Ferguson and his colleagues found a strong correlation between previous academic performance and clinical success in the postgraduate medical competence (Salvatori, 2001; Ferguson, James and Madeley, 2002). These findings imply that the academic requirements for the premedical track do not provide a concrete link to strengthened medical practice.

Criticism #2: The dryness and distant relevancy of the current required premedical science classes do not promote interest or true learning. Dr. Ezekiel Emanuel of the Department of Clinical Bioethics at the National Institutes of Health and Dr. Jules Dienstag, current Dean of Medical Education at Harvard Medical School, represent a different qualm with the premedical track. In 2006, Emanuel wrote a commentary for the Journal of the American Medical Association (JAMA) arguing that the current scientific courses on the premedical track are not sufficient. According to Emmanuel, courses like organic chemistry and physics take time away from more directly medically related courses like biochemistry and genetics, which then take study time away from more advanced science during medical school education (Emmanuel,

2006). Two years later, Dienstag wrote a similar endorsement for a re-imagining of the

premedical prerequisites in more innovative and integrated formats than cut-and-dry, marginally

relevant classes like organic chemistry. He also added to the conversation by discussing a few of

the ways Harvard's medical school was adopting said changes[2] and urging undergraduate

institutions to begin offering and emphasizing a more integrated and applicable view of sciences

(Dienstag, 2008).

  Both Emanuel (2006) and Dienstag (2008) agree that the emphasis should not be on *more*

science classes, but a better allocation of time to more *relevant* science classes. This would, they

each argue, free would-be doctors from the burden of having to focus on cumbersome,

marginally relevant science classes that turn them into burned-out, grade-obsessed automatons.

Their hope is that focusing on more relevant science classes would more accurately reflect the

complexity of human health and be more invigorating for those pursuing the medical path, and

would leave time for a broader range of classes to be explored. In fact, Dienstag agrees with

Thomas that the college years should be about more than technical occupational preparation, but

rather a time of civic development that includes creative exploration and academic self-

propulsion and motivation through humanities courses—arts, language, and literature, etc.

(Dienstag, 2008:222). Frustrated by the mundane and pointlessness nature of many of the

current premed pre-requisites, Dienstag says outright, "Premedical science should never have

become a 'trial by fire'" (2008:224). However, to him, this does not mean an avoidance of the

sciences in the undergraduate track; rather, "a reasonable prescription for efficiency and

economy would involve refocusing, increasing relevance, setting a higher standard, and

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[2] Changes mentioned by Dienstag regarding the Harvard premedical curriculum centered on providing biologically-relevant and interdisciplinarily-focused science courses.

encouraging the design of more interdisciplinary premedical science courses" (Dienstag, 2008:222).

Criticism #3: The rigidity, stress, and quantitative emphasis of the premedical track encourage the onset of a "premedical syndrome," a condition in which premedical students see education only as a vehicle for "getting the numbers" to get to medical school. In his original criticism of the premedical track, Thomas infamously lashed out at the influence of medical school admission policies on liberal arts education, calling them "baleful and malign, nothing less," and claiming that the premed track forces college students to "concentrate on science with a fury and live for grades" in place of developing a foundational liberal arts-based understanding of civilization (Thomas, 1978:1180-1181). Thomas' words served as a precursor for what would become known as "the premedical syndrome," a phrase coined by Ahrins and Akins (1981) as "an overachieving, excessively competitive, cynical, dehumanized, over-specialized, and narrow individual" (as quoted by Sade, Fleming, and Ross, 1984:386).

In 1979, Hackman et al. catalogued one of the first empirical documentations of a "premedical stereotype." Their study of Yale undergraduates' perceptions of premedical students revealed the negative stereotypes held by both outsider perception and premed students self-conception of premeds as "excessively hard-working, competitive, grade-conscious, narrow in interests, less sociable than others, and more interested in money and prestige,"—in other words, exactly what Thomas feared (Hackman et al., 1979).

In 1984, Sade, Fleming and Ross published similar results from their empirical exploration of the anecdotal categorization "premedical syndrome." In their investigation of the prevalence of *perceptions* of premedical syndrome characteristics in students at 13

undergraduate institutions in South Carolina (a world they claim is important to study in contrast with the previous authors' Ivy League focus), they find important and significant differences that substantiate the study done by Hackman et al. in 1979. According to their survey data, on the "positive" side, premedical students are seen as more highly motivated, self-disciplined, goal-oriented, and proud of their career choice than their non-premedical counterparts. On the more "negative" side, premedical students are also seen as more excessively competitive, more academically overspecialized, more overachieving (described as negative in the sense that it is excessive hard work), and more preoccupied with grades (Sade, Fleming and Ross, 1984). Student interviews conducted by Conrad (1986) at Brandeis University corroborated the presence of negative stereotypes. Conrad suggests these stereotypes are largely perpetuated by the anxiety and competition encouraged by the number-centric medical admissions system (1986).

In 2008, Jeffrey Gross and a panel of colleagues, including several liberal arts graduates and an associate professor in the University of Michigan Medical School, reviewed the existing criticisms of the premedical track and claimed that the real emphasis should be on the socializing forces driving the one-track mind driving the premedical track. "The debate goes on as if content trumped context, as if the socializing experience of being a 'premed' did nothing to influence the behavior of future medical professionals. We must realize that when it comes to moral education, how students learn (including the environment in which they are learning) may be more important than what they learn" (Gross et al, 2008:516). Based on interviews conducted with medical students, the researchers assert concernedly that current dialogue of the premedical learning centers around *demonstration* rather than *development* of character. With an argument reminiscent of Bowles and Gintis' alarm against instrumental schooling in capitalist America

(1976), Gross and colleagues maintain that even a revamping of the curriculum and an emphasizing of liberal arts would be ineffective because of this "hidden curriculum" the premedical track begins to teach: one of calculable strategy rather than journey of self-discovery (Gross et al 2008). Essentially, according to these reviews, the undergraduate education on the premedical track is perceived both from the outside and the inside as focused almost solely on demonstrating a competitive medical school application.

Criticism #4: The normalization of stress and intensity by the premedical track encourages the onset of "burnout" in premedical students. "Burnout" is a concept first coined by Herbert Freudenberger (1974), and can be understood as "a state of physical, emotional, and mental exhaustion caused by long-term involvement in situations that are emotionally demanding" (Pines and Aronson 1988:9; as quoted by Schaufeli and Buunk, 1996). In 2011, Dr. David Hanscom of the Swedish Medical Center in Seattle, WA, published a strong criticism of the current medical educational system, indicting the process causing burnout in doctors (and would-be doctors)—a problem that increases the prevalence of physician suicide (Hanscom, 2011). Hanscom asserts that the premedical education system often results in suppressed anxiety, perfectionism, and stress that may lead to burnout, and does not teach any way to deal with those stressors. "Stress management skills aren't part of our medical training," Hanscom asserts. "When we do get in trouble, there's no place to turn."

Originally, the burnout construct was studied in the context of persistently overwhelming situations in the occupational environment; medicine was studied as a field in which people were especially likely to experience burnout (e.g. McCranie and Brandsma, 1989). Over time, evidence has mounted indicating that the physician's burnout process might begin in the medical

education process (McCue 1982; Vitaliano et al., 1989; Miller and McGowen 2000; Dyrbye et al., 2006). At first, this educational burnout literature only extended to studies of students in medical school. For example, in 1989, Vitaliano and colleagues published results from a longitudinal study showing that medical students experience and increase in stress and a decrease in coping mechanisms as medical school progresses—conditions that could very likely lead to burnout (Vitaliano et al., 1989). A more recent study conducted by Dr. Lisolette Dyrbye reveals alarming statistics for a cohort of 1,098 Minnesota medical students: among other problems, over 60% reported experiencing moderate to high burnout[3], and over 50% screened positive for depression (Dyrbye et al., 2006).

Over time, the literature began to expand to studies even further back into the medical education experience, indicating that the burnout stress experiences of medical students and doctors begin before students even begin formalized medical training. A Mayo Clinic summary published earlier by Dyrbye and colleagues highlighted factors causing stress for medical students; among them was stress caused by a poor experience in undergraduate education (Dyrbye et al, 2005). An inadequate STEM educational system is likely to increase stress in the undergraduate experience, as examined in Drew's review of the current state of STEM education (Drew, 2011). In 2012, Young et al published the first empirical documentations of premedical burnout: in a survey study of 2,059 University of California San Diego undergraduates, premedical students were found to exhibit greater burnout scores than their non-premedical peers, making premeds an especially vulnerable population.

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[3] Burnout in both studies by Dyrbye and the study by Young and colleagues used burnout inventory scales developed by Maslach and Jackson, who define burnout as "a syndrome of emotional exhaustion that can occur among individuals who do 'people work' of some kind (1986:1; as quoted in Schaufeli and Buunk, 1996:314)

In examining the criticisms of the premedical system, it would seem premedical students are at risk for undergoing a myriad of difficulties in their undergraduate education, ranging from dry learning to dehumanization to depression. As I read through the criticisms of the premedical track and their supporting empirical literature, I found myself wondering what drives these students to continue on a system with such considerable difficulties.

A literature review conducted earlier last year by Lin et al (2013) of the existing premedical studies and literature raised similar questions. The team was especially concerned about the lack of exploration into the actual experience of *all* types of students who attempt the premedical track, not just the ones who succeed. They spoke passionately of the impact this research could have:

> If we wish to influence the character of future physicians we must pay attention to what happens to students on their way to medical school. We must explore how this period influences students' ideas about success, relationships, and caring for others. In order to gain a deeper and more complete understanding of the physicians of the future, researchers must give equal attention to the first, critical steps occurring during the professionalization process: the premedical years (Lin et al, 2013).

For the sake of our youth, our doctors, and our healthcare system, it seems of particular importance to study the undergraduate experience of students pursuing medical degrees—particularly those experiences that influence them to continue or discontinue. With this goal in mind, I began looking into sociological theories that might assist me in my study. I hoped to find a framework that would both suggest which experiences to examine as potential influences on career choice and explain the process of how those experiences inform and shape career persistence.

Theoretical Background

Social Cognitive Career Theory (SCCT)

The theoretical background for my empirical study stems from social cognitive career theory (SCCT), originally conceptualized by Lent, Brown, and Hackett (1994). At its core, SCCT seeks to outline the reciprocal nature of relationships of social and cognitive mechanisms, and the way that reciprocity allows individuals to exercise agency over their career choice. There are two complementary levels of theoretical analysis that Lent, Brown, and Hackett (1994; 2000) identify as influencing career choice: social cognitive variable mediation, and contextual influence. These two levels will now be outlined briefly.

First level: social cognitive variable mediation. For the first level, Lent and colleagues draw heavily from Albert Bandura's social cognitive theory (1986). SCCT's cornerstone lies in Bandura's interest model of "triadic reciprocality"; by this understanding, personal attributes[4], external environmental factors, and overt behavior[5] are considered to be interlocking mechanisms that hold bidirectional influence over one another (Lent, Brown, and Hackett, 1994:82; Bandura 1986). According to Lent and his colleagues (1994), previous career theories[6] focus on the effect personal factors and environment on behavior. However, these career theories fail to include behavior's reciprocal role. Behavior's reciprocal role can be understood as the way people's responses to inputs of personal factors and environment in turn influence the situations they are in and the personal qualities they develop. Within this framework, the interdependent nature of the triad leaves room for personal agency in the career choice process. What a person does, how he chooses to view things, and where he puts himself affect the environmental influences that will affect and be affected by his personal traits.

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[4] Personal attributes might include, but are not limited to, gender, race/ethnicity, and genetic predispositions (Lent, Brown, and Hackett, 1994:104-106)
[5] Overt behavior here is qualified as distinct from internal and physical qualities of the person (Lent, Brown, and Hackett, 1994:82)
[6] Lent and colleagues (1994) cite

Bandura's original social cognitive theory posits many social cognitive mechanisms[7] that mediate the reciprocal relationships of personal factors, environment, and behavior. Lent, Brown, and Hackett (1994), however, focus in on three social cognitive mechanisms they believe to be central to career theory: self-efficacy, outcome expectations, and goal representations. Self-efficacy is constituted by "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Lent, Brown, and Hackett, 1994:83; Bandura, 1986:391). Albert and Luzzo conceptualize self-efficacy as a "dynamic set of self-beliefs specific to particular performance domains" (1999:432). Self-efficacy beliefs answer the question, "How well can I do this?"

Outcome expectations are defined as "personal beliefs about probable response outcomes…the imagined consequences of performing particular behaviors" (Lent, Brown, and Hackett, 1994:83). Albert and Luzzo explain outcome expectations as "imagined consequences of a person's imagined behavior" (1999:432). In layman's terms, outcome expectations can be simply understood as the answers to the question, "If I do this, what will happen?" (Lent, Hackett, and Brown, 2000). Outcome expectations combine with self-efficacy beliefs to shape people's thoughts about what careers they might be interested in.

Goal representations can be understood as the "determination to engage in a particular activity or to effect a particular future outcome" (Lent, Brown, and Hackett, 1994:85; Bandura 1986). Goals are the self-regulatory plans-of-action people set to organize and guide their behavior toward a particular outcome (Albert and Luzzo, 1999). In other words, goals are the action steps people take toward their interests. A full summary of SCCT, which explains the proposed interaction of these mechanisms, will be given once the second level has been outlined.

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[7] Social cognitive mechanism here simply indicates a method of processing inputs that is shaped by and shapes perceptions of the person's surroundings (Lent, Brown, and Hackett 1994)

Second level: contextual influence. In 2000, Lent, Brown and Hackett published a supplementary analysis in response to calls from barrier research studies[8] for a more clear delineation within SCCT of how contextual influences affect the career choice process. Within this supplement, Lent and his colleagues strongly emphasize that an individual's perception of relevant contextual factors (e.g. family background, perceived support structures, or financial state) affect career choice, both directly and indirectly via altered perception of self-efficacy beliefs and outcome expectations (2000). To the extent that contextual factors relevant for making and implementing career choices are perceived as impeding progress toward a career, they may be considered "contextual barriers" (Swanson and Woitke, 1997). To the extent that they facilitate progress toward a career, they may be considered "contextual supports."

Lent and his colleagues go into intricate detail explaining the reciprocal interactions they posit to occur between the social cognitive mechanisms, contextual factors, and behaviors according to SCCT. However, in the interest of not re-writing their entire paper, I will briefly summarize the framework of SCCT as it relates to my study. (For the duration of the paper, any hypothesis or proposition parenthetically cited will refer to the hypotheses and propositions of Lent, Brown, and Hackett (1994), the full wording of which can be found in Appendix 1, where I have provided full list of the propositions and hypotheses posited by Lent, Brown, and Hackett (1994)). Additionally, I have included Lent, Brown, and Hackett's diagram model of their theory, listed in my paper as "Figure 1", which outlines all the paths of SCCT, only some of which will be explored in this paper.

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[8] Lent, Brown, and Hackett (2000) cite barrier studies by Albert and Luzzo, 1999; Swanson, Daniels and Tokar 1996; and Swanson and Woitke, 1997 as the literature calling for this revision.

Figure 1. "Model of person, contextual, and experiential factors affecting career-decision related choice behavior" (Lent, Brown, and Hackett, 1994:93)
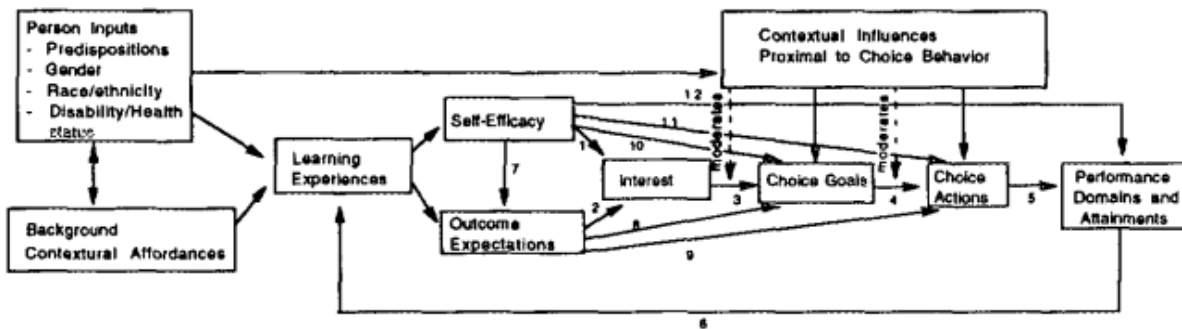
Theoretical Summary (as related to this study). Contextual factors shape learning experiences (Lent, Brown, and Hackett, 2000). In the absence of relevant contextual barriers that impede the credibility of the environmental stimuli, learning experiences set up a system of positive and negative social and cognitive reinforcements that develop a person's self-efficacy beliefs and outcome expectations regarding a particular area (Proposition 10: Hypothesis 10E; Proposition 5: Hypothesis 5B). As these social cognitive mechanisms mediate the experiences of environmental and personal factors, a person develops interests that lead to goals that lead to actions (Propositions 5 and 7). That is to say, a person's choice actions are determined partly by his belief that he will be successful in his pursuit—self-efficacy (Proposition 3)—and partly by a desire for what he believes will result from his successful pursuit—outcome expectations (Proposition 4). Outcomes from these actions should create new experiences that further support or weaken self-efficacy beliefs and outcome expectations, which ultimately influence choice persistence. Thus, SCCT posits career choice and persistence to be a dynamic self-referential feedback loop—a loop in which a person constantly evaluates his experiences and moderates his behavior toward a career in which he will find success and enjoyment.

Empirical Background

Non-SCCT empirical studies of premedical career choice and persistence

Non-SCCT literature (that is, studies that do not cite SCCT as their guiding framework) draws strong predictions about the relationship between experiences and career persistence.

Some of the literature supports ideas that experiences that could be linked to self-efficacy are important for career choice/persistence decisions. These studies follow how the challenging coursework of the premedical track inclines students away from pursuit of a medical degree. Some of this literature specifically hones in on difficulties for women and minority students, seeking to explain and ameliorate their historic underrepresentation as medical professionals. Barr, Gonzalez, and Wanat, for example, found that in a longitudinal survey study of Stanford undergraduates, women and under-represented minorities were less likely to maintain interest in a medical career, largely because of the difficulty of premedical courses like chemistry (Barr, Gonzalez and Wanat, 2008). Other studies focus on the difficulty of the track for the larger population. A subsequent survey study by Barr and colleagues showed that the chemistry coursework was not only a deterrent for women and minority students (thought it did affect them disproportionately), but also served as a major deterrent for all other demographic categories as well (Barr et al, 2009). A longitudinal study of attrition data done by Kevin Rask in 2010 showed that in addition to pre-collegiate preference (as demonstrated by marked preference on college application), grades in STEM classes were one of the strongest motivators of discontinuing STEM classes such as the ones on the premedical track (Rask, 2010).

Another trend in the literature indicates that experiences with the potential to affect outcome expectations might play an important role in career choice and persistence. For example, in a national cross-sectional survey of college students, Barondess and Glaser (1993)

examined what factors drew undergraduates toward medical careers versus what factors repelled them. In a random sample selected from AAMC data, they compared 500 medical school applicants with 277 qualified nonapplicants (scored well enough on the MCAT to be competitive applicants but chose not to apply). Barondess and Glaser found that students not interested in applying to medical school were more likely than not to believe their work choice would bring them as much satisfaction and the opportunity to contribute as much to the good of society as a medical career supposedly offers. Although most felt they their salaries would be inferior, they felt their time for personal life would far exceed that of someone on the medical track. Non-applicants were much more concerned about the educational and professional stress and sacrifice of time and freedom required by the medical profession than about a lack of science aptitude (Barondess and Glaser, 1993).

In 2002, Karen Lovecchio and Lauren Dundes examined a new facet of the premedical experience: logic of students discontinuing the premedical track while still completing undergraduate requirements. The study contrasted survey responses from 53 undergraduate students who were currently on the premedical track with 44 undergraduate students who had begun the track but discontinued somewhere in the middle of it. Lovecchio and Dundes found that among former premedical students, demands of the medical life and an interest in other careers figured more prominently than concerns about the premedical curriculum and grades in their choice to discontinue (Lovecchio and Dundes, 2002).

The non-SCCT literature on premedical career choice, persistence, and retention indicates that experiences forming both self-efficacy beliefs and outcome expectations are important for premedical persistence. While these studies give some insight into what types of experiences

may be important for career choice and persistence on the premedical track, there is no empirical

reasoning cited within them for why these experiences might be important (or unimportant).

SCCT Literature: Self-efficacy

Before SCCT was a defined framework, Betz and Hackett (1983) administered an

empirically-tested likert scale survey regarding self-efficacy beliefs about relevant fields (like

mathematics and science) to 262 undergraduate students and found that these relevant self-

efficacy expectations were significantly correlated with selecting science-based college majors.

Though choosing a major does not necessarily necessitate also choosing a career in that field,

Betz and Hackett cited this correlation as "supporting the postulated role of cognitive

meditational factors in educational and career choice behavior" (1983:329). Many other

researchers have corroborated the link between science and math self-efficacy and career/major

choice (Lent, Lopez, and Bieschki, 1991; Smith and Fouad, 1999; Lent et al., 2003; Mau 2003;

Mani 2011). Together, these studies indicate that math/science self-efficacy has an important

influence on career choice in science fields like medicine; implicitly, this indicates that

math/science self-efficacy-shaping experiences would be important in making career choice

about medicine.

SCCT literature: outcome expectations

Most of the self-efficacy studies do not look into the effect of outcome expectations.

Lent, Lopez, and Bieschki's study, however, does (1991). In addition to supporting the Hackett

and Betz's 1983 findings regarding a link between math/science self-efficacy and outcome

expectations, Lent and his colleagues find an interesting link between self-efficacy and outcome

expectations.[9] Namely, they note that "outcome beliefs moderated the relation of self-efficacy to choice, with high-outcome-belief subjects achieving a stronger self-efficacy/choice correlation than did their low-outcome-belief counterparts" (Lent, Lopez, and Bieschki, 1991). Of note, this finding did not make it into the propositions or hypotheses of SCCT. In fact, Proposition 12 suggests that outcome expectation will be mediated by self-efficacy, not the other way around. The potential mediating link of outcome expectations on self-efficacy, however, is only hinted at in the "additional theoretical possibilities," where Lent, Brown, and Hackett mention in passing that outcome expectations may be needed in order for self-efficacy beliefs to influence behavior because "self-efficacy may not translate into interests unless people expect their activity involvement to be rewarded" (1994:93). This same link also shows up in Schaub and Tokar's survey study of college students' sociocognitive mediation of interests to career choices (2005). Another survey study by Byars-Winston et al. (2010) also found a mediating role of outcome expectations on self-efficacy and science-related career goals of underrepresented minority students in science majors. Taken together, these results suggest that the "additional theoretical possibility" mentioned by Lent, Brown, and Hackett (1994)—that outcome expectations mediate self-efficacy—may be empirically grounded.

The final SCCT empirical study I will cite is one that closely followed the format I used in my own study. In 2002, Lent et al. conducted 19 in-depth interviews with state university students about factors that promoted or impeded their career choices (career interests were not controlled for). Lent's team found that six categories of experiences were mentioned with moderate frequency (between one third and two thirds of the time): interest, direct exposure to

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[9] As a side note, Hackett went on to collaborate with Lent and Brown to help shape Social Cognitive Career Theory, and Betz is thanked for input as well in a footnote of the theory (Lent, Brown, and Hackett 1994).

work-relevant activities, various exposure to work-relevant activities, work conditions or "reinforcers", ability considerations, and leisure experiences. These findings supported the idea that both self-efficacy (indicated by ability considerations) and outcome expectations (indicated by work conditions or "reinforcers") both seem to play a role in shaping career choice. Of particular interest for my study is that experiences in the work place were considered important for choice formation by many of the participants. Coupled with the findings from other literature indicating a potential major role of outcome expectations in forming goals and contextualizing self-efficacy, these findings indicated that experiences (like shadowing) that build into outcome expectations may play a major role in career choice/persistence.

Research Questions

RQ 1a: Do direct experiences affect outcome expectations on the premedical track?

RQ 1b: Do performance experiences affect self-efficacy on the premedical track?

RQ 2a: Do outcome expectations play a mediating role in career perseverance on the premedical track?

RQ 2b: Does self-efficacy play a mediating role in career perseverance on the premedical track?

I planned to begin my research by examining the experiences of students who stay on the premedical track and students who discontinue. Through this examination, I hoped to establish a better understanding of the lived experiences of the Emory premedical track that make a central difference in compelling students toward or repelling students away from the pursuit of becoming a doctor. Recognizing that I could sifting be through a myriad of experiences in searching for answers to my question, I wanted to find a way to hone what specific types of experiences might be significant for persistence. SCCT proposes that experiences shape self-

efficacy and outcome expectations, which are the central mediators of a person's career choice and persistence. Therefore, I decided to examine the main experiences that SCCT predicts would influence outcome expectations and self-efficacy.

RQ 1a deals with examining experiences that lead to outcome expectations. According to SCCT, outcome expectations are predicted to be most influenced by direct experiences with occupationally relevant activities (Hypothesis 11B). Because it is illegal to practice medicine without a license, it would be very difficult for premedical students to engage in literally direct experiences with medicine. However, a premedical student can get very close to direct personal experience by shadowing. By this logic, I operationalized "direct experiences with occupationally relevant activities" as shadowing. Based on SCCT's propositions and the empirical literature surrounding outcome expectations, I expected to find that 1) students who ultimately chose medicine had had positive, affirming shadowing experiences that shaped their outcome expectations, and 2) that students who discontinued had had negative, disconfirming shadowing experiences that shaped their outcome expectations.

RQ 1b deals with examining experiences that lead to the formation of self-efficacy beliefs. Self-efficacy, SCCT predicts, will be influenced by the feedback gained from performance experiences (Hypothesis 10B); on the premedical track, personal performance is most often experienced in coursework. Based on SCCT and empirical support, I expected to find that students who had positive coursework efficacy experiences expressed that this experience increased their self-efficacy, and that students who had negative coursework experiences expressed that this experience lowered their self-efficacy (Hypothesis 10A).

In order to understand whether or not experiences ultimately had an influence on the decision to stay or leave, it would not be enough to identify them as influencing one of the social

cognitive mechanisms; the social cognitive mechanisms those experiences related to would also have to be relevant in the participants' decision-making process. Therefore, I decided the next step would be to examine whether or not participants expressed logic in their decision-making process for leaving or staying that would indicate either outcome expectations (RQ2a) or self-efficacy (RQ2b) as motivation, the operationalization of which I describe here:

Because my two comparison groups ultimately decided to go two different directions (staying on the track and discontinuing), I had two different questions to get at those thought processes. Those in the "discontinued" category usually brought up their decision-making process of their own volition in their career narrative or in the section of the interview devoted to the experience of discontinuing (see Appendix 6). If, by the time we got to the end of the interview, they had not made clear statements about their decision-making process, I asked, "What was your thought process when you started considering discontinuing?" In the interviews with participants "on track," all participants acknowledged that the courses took a lot of time and required work that was not always enjoyable, even if they felt they had done well. That is to say, all of the participants in both categories experienced difficulty on the track, either because they felt they were doing poorly at the time or because they had to make sacrifices of time and immediate happiness (or both). In fact, 50% of participants in the "on track" group said they had seriously considered discontinuing at one point. In order to get at the decision-making processes of the "on track" for not discontinuing the premedical track, I asked, "What kept you from discontinuing when your experiences felt hard?" In this paper, I will refer to participants' answers to these questions as "critical decision statements."

Critical decision statements indicating self-efficacy logic were operationalized as the participant expressing that they chose (or chose not) to pursue medicine because they felt they

were (or were not) good enough at relevant tasks. Decision statements indicating outcome expectations were operationalized as the participant expressing that they chose (or chose not) to pursue medicine because they felt they wanted (or did not) want to be a doctor badly enough.

SCCT posits that both self-efficacy beliefs and outcome expectations serve as mediators of career choice and persistence (Propositions 3 and 4). Thus, according to SCCT, I expected that within the interviews, I would find critical decision statements from participants indicating that both outcome expectations and self-efficacy had played key roles in their decisions to stay on the premedical track or to discontinue.

Methodology

Research Design

I conducted 20 semi-structured interviews with Emory undergraduate fourth year students who had at one point taken required premedical coursework[10] at Emory in order to pursue a career in medicine. Through these I hoped to gain a better understanding of the lived experience of students pursuing the premedical track, especially as it pertained to stress. In combing through the premedical literature, I found very few qualitative ethnographic studies that gave space for students to simply discuss their experiences of the premedical track. Howard Becker's ethnographic study on medical students, Boys in White, paints an intricate picture of the effects of medical school educational culture on young medical students (1961), but I could find no in-depth ethnographic study of that magnitude that the outlined the impact of premedical culture and norms on students.

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[10] Premedical coursework, for this study, refers only to the 4 major science classes listed by the AAMC (and cited in this paper's background section) as required: General Chemistry, Organic Chemistry, Biology, And Physics

Much of the existing empirical literature surrounding the premedical track uses qualitative analysis based on surveys and academic records. Methods that utilize academic record data or quantitative survey responses allow for a much larger and broader sample to be drawn for analysis. However, while surveys play an integral role in gauging a wide range of possible experiences or concerns, they may not allow for expression of the rationale behind a person's answer, which may be important. Surveys might also misrepresent the most important or immediate concerns informing a person's decision. As an example, the survey conducted by Barondess and Glaser (1993) asked for agreement or disagreement with a range of statements regarding medical education and then used those to cite statistics of what factors are important to students on the premedical track. However, some of those reasons might not have been ones that people would have organically stated as influencing their decision. A person can agree to the statement that physicians accrue significant debt, but that may not necessarily have been a strong influencing factor in their immediate decision to discontinue the premedical track. The importance of those characteristics to the students may be inflated if students in their own organic narrative wouldn't have cited that characteristic.

With these considerations in mind, I decided to use qualitative methodology in hopes that it would enable me to go in-depth while maintaining an exploratory nature (Miles and Huberman 1994; Lofland, Snow, Anderson, and Lofland 2006; Weiss 1994).

Sample and Site

My participants were 20 college seniors, ages 21-22, who had at one point pursued coursework on the premedical track. Although both race and gender may affect experiences in a significant way, I chose not to analyze either race or gender in this particular study, hoping

instead to gain a more general understanding. Seventeen participants were female and three were male. In terms of racial/ethnic descent, seven participants were white, three were Asian American, three were African American, two were Hispanic, four were Southeast Asian, and one was Middle Eastern. I decided to interview all fourth-year college students because at that point in a college career, students have typically decided on some kind of course for their career development and have identified some "next steps." Although I was not so naïve as to think this would mean they would all have their careers lined up, I hoped the similar age and life stage would put them all in a similar outlook state, which would provide more consistency in my interviews. Ten of the students still considered themselves "premed"; nine of these students were female, and one was male. The other ten self-identified as having "discontinued" the track, in the sense that they were not planning on applying to medical school to pursue becoming a doctor; eight of these students were female, and two were male. The participants varied in their length of time on the premedical track and their conception of whether or how they would continue the premedical track. The only binding requisite, other than class year, was that they had completed at least one semester of a premedical course. 14 participants completed all of the required premedical course work; 8 of those 14 were still "on track" to pursue medicine. (The other two participants from the "on track" group each had one more semester of a class to finish at the time). Of the 10 participants still planning on pursuing medical school, 3 had already been accepted to medical school. The other 7 planned on taking one or more gap years. All but one of the students taking gap years were doing so because they had spaced their courses and MCAT preparation in such a way that they were not finished in time to apply during their junior year. The other student taking a gap year was seeking to strengthen standardized test scores.

I chose to conduct my research at Emory University in Atlanta, Georgia, for several key reasons. The convenience of the location should not be ignored; its geographic proximity to where I live, work, and attend classes is unparalleled. Additionally, however, Emory proved to have several strengths related to my topic.

Emory's highly-ranked medical school and proximity to/affiliation with several of Atlanta's major hospitals (Emory Hospital, Winship Cancer Institute, Grady Hospital, Children's Healthcare of Atlanta, to name a few) make it an attractive school for students hoping to pursue a career in healthcare. It is no secret that a large proportion of each annual incoming class indicates an interest in and/or intent to pursue medicine. This high density of medical interest not only gave me a large pool of participants to recruit from, but also provided a strong, well-defined premedical culture to study. Additionally, at Emory it is common for students to pursue educational tracks (and, ultimately, careers) based on interest and perceived satisfaction.

Finally, I felt Emory would be a strong site to study the premedical experience because over my four years on this campus, I have heard so much from students both on and off the track about the ups and downs of the premedical track at Emory. All around me I heard students discussing not only the rigor of the classes, but also their experiences of the pressure of competition, concerns about not measuring up, and frustrations with the paucity of resources available to help them navigate their journey. I hoped that people who were willing to talk about these issues in their free time would be willing to discuss them with me in a more formal context. Additionally, I hoped I would find something of interest through my research that might help shed light on the process in order to help my premed peers—or people like them in the future.

Data Collection

  I set out looking to recruit a group of students, half of whom still considered themselves "on track" to become a doctor, and the other half who considered themselves to have started but discontinued the premedical track. Immediately, I ran into a structural problem: Emory does not have a defined premedical track in which students enroll. Students may sign up to receive information from the Pre-Health Mentoring Office (PHMO)—an incomplete list of premedical students, but a list nonetheless. Unfortunately, PHMO was unable to provide me with access to the email listserv of students who signed up for their notifications. This meant I would be dealing with hidden populations, and therefore would be unable to pursue obtaining a random sample.

  I decided a snowball sample would be the best way to pursue recruitment. Throughout my experience at Emory, I had come to know many students who had told me they were "on the premed track," some of whom I also knew had discontinued at one point or another. I began by reaching out to them personally via email[11]. I informed them that I was writing an honors thesis on the undergraduate experience of the Emory premedical track and asked that they respond via email if they were interested in participating in a 45-minute interview. I also included an attached version of my lay summary and informed consent (to look over, not to sign yet) for extra clarity. Participation was entirely voluntary, and many people did feel comfortable declining my request. Most of the people I contacted, however, were enthusiastic about wanting to discuss their experience of the premedical track. Those who responded with an interest in participating received a follow-up email setting up a date, time, and place for their interview.

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[11] Appendix 2 contains the text of the solicitation email; the formal introduction sentences were foregone with potential participants with whom I was acquainted.

Interviews took place, for the most part, in a quiet room in an academic building on campus. On the rare occasion that a participant was only available on the weekends when academic buildings were closed, we met at a place of their choosing, which invariably ended up being a secluded area of one of the campus student centers. Before conducting the interviews, I made sure the participant felt secure in the level of confidentiality afforded by the space, though my interview questions did not contain any conventionally sensitive topics. I then provided them with an informed consent form[12] to sign, while verbally reaffirming their consent to an audio recording of the interview. Having clarified areas of sensitivity and obtained verbal and written consent, I proceeded with the interview.

I opened the interview by requesting that the participant give an overarching narrative of their career development path, starting as early as they wanted to and proceeding to the present day. This free-form question left room for participants to begin by saying anything that triggered their minds as being foundational to their path. After they finished their narrative, I asked questions from my interview guide. My goal was to let the interviewee feel free to paint their own picture of their path; my interview guide, which included inquiries about major influences, pivotal moments, and social experiences across the lifetime, would provide them with tools to paint that picture. The interview continued in an in-depth, semi-structured form, usually lasting between 45 minutes to an hour.

I developed the questions on the interview guide to give a comprehensive outline of career decision development, formation, and persistence (or lack thereof) across the participant's life. During the interview, I asked open-ended questions related to four categories: the participant's premedical decision formation prior to their experience with the premedical classes;

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[12] Appendix 3 contains the text of the informed consent form, which all participants had to sign in order to participate in the study

their experience of the Emory premedical track; their current life goals, aspirations; and finally, a sketch of their home life, self-conceptions, and stress-management strategies[13].   While the questions served as a helpful backbone to ensure consistency in the type of information I received from each participant, I often branched out to include relevant questions inspired by themes, patterns, and anecdotes as these factors emerged. This semi-structured format allowed me to delve deeply into the personal details participants shared with me as they pertained to my understanding of their experience of the premedical track. At the end of each interview, I reminded each participant of their freedom to retract any statement or withdraw entirely from the study, and asked permission to contact them if needed to ask further questions or clarify. No participant retracted any statements or withdrew from the study, and every participant gave permission for further contact.

Analysis

After digitally transcribing all twenty of the interviews, I sorted the files into two folders to categorize them: on track, and discontinued. This allowed me to engage in comparisons between the two groups easily during coding. When thinking about coding criteria, I first considered the research questions I had formed from my analysis of the literature. I formed deductive codes to identify the general experiences and arcs of self-efficacy and outcome expectation formation for individuals in each group. After identifying the self-efficacy and outcome expectations statements, I began, through multiple rounds or of re-reading and sub-coding, using inductive coding to explore the ways they placed those concepts within their career development paths.

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[13] Appendix 4 contains the text of the interview guide on which interviews were based

To keep track of the identification process, I used the highlighter feature of Microsoft Word to form a color-coding system that distinguished the self-efficacy statements from the outcome expectation statements. Over time, I drew constellations out of patterns that experiences of self-efficacy and outcome expectations formed: the arches they drew, the ways they connected to each other, and how they shaped and were shaped by the experiences of the premedical track. All results can be found in table form in Appendices 5-10.

Results:

The effects of shadowing on outcome expectations

In coding for shadowing experiences, I considered not just whether or not the participant had shadowed, but also the stated response to the shadowing experience. Experiences of shadowing for "on track" participants clearly showed a divergence of experience from experiences of "discontinued" participants in a way that directly linked to outcome expectations. Ninety percent[14] of the "on track" students said they had had a positive, formative shadowing experience that gave them a picture of what they were working towards—a picture that compelled them to continue. One "on track" participant vividly recalled the details of one definitive shadowing experience:

> The doctor I shadowed gave me the white coat and I was sold. All these patients we met with, we met with like 20 patients that day and I was tying in all the things I had learned and asking him questions and all I wanted to was help, be hands on, do something, but all I could do was observe. I think that was a really good defining moment of what I wanted.

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[14] The one "on track" participant who reported a negative experience with shadowing said it was not the work she did not enjoy, but the format, because "[y]ou're in the way. You're not being productive for society; you're just in the way. If anything, you're hindering people's progress because people have to account for you." This more than anything made her feel uncomfortable.

In many cases, "on track" participants said shadowing dispelled idealized outcome expectations and replaced them with realistic outcome expectations that were more salient because they were grounded in reality. One "on track" participant, to her own surprise, even came to view her shadowing physician as a mentor and a model:

> I just thought I would be shadowing a doctor who probably wouldn't say much to me and I would just follow him around and look at what he was doing, but he just made it into a different experience where I learned so much about the field and about what it means to actually be a doctor instead of what the books say…He showed me not just patient care but also how to interact with your colleagues, how to handle patient care along with that, how to take care of yourself, so he sort of really showed me the broad perspective of being a doctor, not just the clinical side of things. He was a very, very passionate guy who just loved what he was doing, and the fact that I sort of envisioned myself in his position later in my life, and I was like, I think that would be great, that was the moment where I was like, "Okay, I think this is the right thing for me. I think this is going to work out."

One "on track" participant who experienced extra difficulty in the coursework during a semester of intense illness described how her shadowing experience had given her a clear picture that motivated her to keep going on the track:

> Participant: I kept thinking, "This is what I want to do. This is what I want to DO. And I'm not going to let any kind of external factor get in the way of that, thinking costs are too hard or seeing other people change their minds- you KNOW this is what you want to do so don't let anything else come in that path." I just essentially made a decision: Whatever happens, happens. You're going to follow this path to the end, and if you get in great, and if not, then maybe re-apply, or then find other options. But this is the primary thing that you've wanted to do and you've worked hard for. You shouldn't give up."
> Interviewer: What was feeding that image?
> Participant: Just seeing what it meant to be a doctor- shadowing, volunteering in hospital settings. When I saw that, I was like, "This is it. This is what I've been looking for." It just fit. It was that missing puzzle piece I was looking for. So I knew that's what I wanted to do, and knowing that, I said well I have to do whatever I can to get to that. I was like, I know it's going to be hard, but as my mom put it, people have done it, so it's possible.

The experiences of shadowing for "discontinued" participants showed very different results. All five "discontinued" participants who had shadowed said their shadowing

experiences had turned them away from medicine because the work did not because the work did

not live up to their expectations. For one participant, the shadowing experience was directly

negative. She had aspired to be a doctor specifically because she felt it would be a good way to

help people, but when shadowing an oncologist intern, she found a much less "caring"

environment than she had imagined. During a particularly sensitive operation—a melanoma

removal from the heart area using a cauterizing scalpel—the doctors were singing along with the

Top 100 radio station, and at one point, one of them commented, "Oh yeah, it smells like

barbecue in here now!" Reflecting back on the experience, the participant mused:

> If I had had a lot of people there to show me that it was still meaningful to them and that
> they actually had some sort of human compassion left, it might have taken me a little
> longer to reach the point I reached…I think that was a real eye-opener for me because I
> had always associated medicine and the idea of being a doctor or surgeon with the idea
> that primarily the important thing is people, and I think that a lot of the people I
> encountered who were doing the same thing and who were in the field themselves, their
> priority was a lot different.

For the other four "discontinued" participants who shadowed, the work they saw while

shadowing was simply not interesting to them the way they had thought it would be. "It was just

him checking peoples ears, checking peoples pains, asking them questions, like every doctor's

visit I've been to. Nothing really special—and like, doing gross things, like checking some

dude's prostate. I didn't necessarily want to see that. It wasn't anything glamorous like I'd

imagined," one "discontinued" participant recalled. Another participant discussed a similar

letdown with her shadowing experience. "It didn't live up to my dream of helping people…I was

like, 'Oh, I guess this is also just a job.' (laughs) You know? You go into work and then you see

people and then you go home. Womp womp."

These results indicate that the experience of shadowing is important for developing and

re-forming outcome expectations of premedical undergraduate students. In order to check this

link, I analyzed the trend of outcome expectation to see how it had changed for participants over time.

When examining this trend, I began by identifying statements reflecting what the people's attitudes about their outcome expectation had been before beginning the premedical track—did they feel like they would want to be a doctor based on what they knew about it? (While this may seem obvious from the fact that they had chosen the track, I acknowledged it was possible that people felt had felt externally pressured to pursue medicine and had entered expecting to hate it.) Actual expectations of the work ranged from humanitarian service opportunity to interesting/exciting applications of science to prestige to autonomy. However, no matter the content of their outcome expectations, every participant unanimously agreed that based on what they knew about being a doctor, they felt when they began the track that medicine would make them the happiest, made the most sense for what they wanted to do, and would be the best fit for them.

From there, I examined people's current attitudes about the outcome expectations they had for medicine. If shadowing were important for outcome expectations, I would expect that all participants who reported negative shadowing experiences would express that their current outcome expectations of being a doctor would not be compelling to them. Conversely, I would expect that all participants who reported positive, formative shadowing experiences would affirm that their current outcome expectations of being a doctor were compelling to them.

Of the nine participants (all in the "on track" group) who had positive shadowing experiences, every one expressed that their current outcome expectations for the field of medicine solidified the appeal of being a doctor, and that they couldn't imagine preferring anything else. Of the five participants (all in the "discontinued group) who reported negative

shadowing experiences, all reported at least one adjustment in their attitude toward their outcome expectations of being a doctor; these adjustments manifested in two different ways. First, all five respondents indicated that their current outcome expectations of being a doctor are not compelling to them; their outcome expectations either actively drive them away from the track or simply are not enough to keep them on the premedical track. Second, four of the five stated that they feel another field meets their career aspirations better than what they expect they would experience in a medical career.

These results indicated that shadowing has the potential to strongly affect outcome expectations. These direct experiences give an undergraduate a realistic chance to experience the aspired outcome, which either inspires or disappoints them based on how that experience aligns with previous outcome expectations. However, the results also indicate, that direct shadowing experiences may not be necessary for students to decide that outcome expectations do not align with their preferences. Recall that all participants entered believing medicine would be the best fit for them. SCCT predicts that direct experiences will be most influential in shaping outcome expectations. Five of the "discontinued" participants did not shadow at all, yet four of them reported that their current outcome expectations of a doctor are not compelling to them, and three reported another field attracted them more than medicine. The non-shadowing participants all said that when they were faced with the commitment of time and effort the premedical track required, they thought more about why they wanted to be doctors and realized the outcome was not worth it to them. For one participant, even just the thought of shadowing turned her away from the track:

> I got to a point where I literally couldn't see myself doing it anymore, so I just didn't…I just knew that I wasn't looking forward to doing medicine and the next steps in the process were not things I was eager about doing. Even thinking about returning to doing research or shadowing or continuing volunteering or thinking about trying to get letters of

recommendation from science professors who I didn't feel well-connected with, everything in a set made it feel like it really wasn't the right fit.

The effect of coursework on self-efficacy

I approached my analysis of self-efficacy by examining each participant's expressed overarching experience of the premedical course experiences. I began by examining the participants' statements about their self-efficacy before they began the premedical coursework. Every participant stated that they came in with high science-course self-efficacy based on their performance experiences in high school science classes; however, fifteen of those twenty participants reported that after coming to college, they found themselves revising their ideas about how good they were in their science courses, largely because of their experience in the premedical courses. It was common for participants to describe how they had overestimated their ability to face the difficulty of the premedical coursework. As one "on track" participant remembered:

> I hadn't done poorly in high school; school came easy, and I assumed that college would come easy and then I'd get into med school, and then med school would just happen and I would be a doctor--because up to that point, I hadn't been challenged academically…Big goober jock me was like, 'Yeah I'll go to college and kill it, it'll be sick.' …[But] actually going through it was so much harder than I could have conceptualized, just because I had to completely change my approach to how I studied in premed classes.

Another participant echoed these sentiments:

> My entire life, I've been #1, on top, getting the highest everything, right? And so in my head I thought I could continue that because that's just the thing. But then freshman year i really learned that everyone at Emory was like top, #1…Initially…I wasn't getting the all A's I was used to, and some people were. And I was wondering, "Am I just not smart enough? How come they can do it and I can't do it?' Things like that. So in terms of self-esteem and things like grades, it kind of dropped because I just started questioning whether I was smart enough.

Responses like these hinted that course experiences affected self-efficacy on the premed track. To examine this trend more concretely, I sorted the expressed course experiences of each participant to see if those who experienced difficulty in the classes also stated a change in their self-efficacy beliefs. The responses fell into four categories: perceived significant difficulty[15] and discontinued after only 1 course, perceived significant difficulty for the duration of the experience[16], perceived significant difficulty at first that improved over the course of the experience, and generally perceived proficiency the entire experience. Only three participants total fell into the "proficiency" category; these three were the same three who did not indicate that their high entry-level self-efficacy had been "set straight" in some way. These results indicated strongly that course experiences tied into self-efficacy.

Of note, in assessing the content of the course experience accounts, I found there was great variation in both the "on track" and the "discontinued" groups of perceived experiences of difficulty in coursework. For the breakdown of the "on track" group, by definition no participant perceived significant enough difficulty to discontinue after the first course, but 30% perceived significant difficulty for the duration of their experience, 50% perceived significant difficulty at first that eventually improved, and only 20% said they perceived themselves as performing proficiently for the entirety of the premedical track. The results for the "discontinued" group were even more varied. 20% of these participants perceived significant enough difficulty to decide to discontinue after only 1 course, 30% perceived significant difficulty that persisted throughout their experience, 20% perceived significant difficulty at first that improved over time,

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[15] "Significant difficulty" implies academic performance (in premedical classes) at a level perceived to be undesirable for at least one full semester.

[16] "Experience" denotes the duration the participant stayed on the track, which, having separately categorized those who discontinued after one course, ranges anywhere from three semesters to completion

and 30% perceived proficiency for the duration of their entire premedical experience[17]. In short, because these experiences feed into self-efficacy and self-efficacy is supposed to influence career persistence, I would have expected the "on track" group to report experiencing less difficulty than the "discontinued" group. By proxy, these results seemed to hint that self-efficacy might not be as central as originally thought for decision-making on the premedical track.

According to SCCT, self-efficacy and outcome expectations are each supposed to influence career choice/persistence. Having examined the way that pivotal experiences influenced (or didn't influence) self-efficacy and outcome expectations, I then examined whether those thought processes outlined the mediation of difficult premedical experiences.

Outcome expectations and premedical persistence

My analysis of shadowing and outcome expectations had implied that response toward or away from outcome expectations often mediated career persistence decisions. In order to examine this relationship, I analyzed participants' critical decision statements, looking for thought processes that indicated logic based on outcome-expectations.

Between the two groups, eighteen out of twenty—that is, ninety percent of respondents—reported that their decision to stay on track or discontinue was largely due to a belief that their outcome expectations would give them the fuel they needed get through.

Eight of the "discontinued" participants said that their decision to leave was rooted in the belief that they didn't want the outcomes of being a doctor enough to put in what it took to devote themselves to the track, though they felt they could have done it if they had wanted the

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[17] Those who perceived proficiency in the "discontinued group" completed all the premedical courses.

outcome badly enough. One participant, who discontinued after struggling through one semester

of general chemistry, described how she reached this point through pivotal conversations with

her mother:

> I kept saying, 'This is what I want, but I'm so miserable,' and crying and crying and crying. And, you know, she would just try to support me, because I had all these insecurities in different things. And she would just say, "[name], you really have to depart from these pressures you're putting on yourself and where you're deriving this anxiety because you just need to look at it as…what is it that you want to do?" …And I was like it's not that I can't do it, I'm sure that I can if I really, really, really put in more time than I did, but that's unimaginable to me. When it came down to it, I was just sad. And I wasn't myself."

Although this participant was struggling in chemistry, she said she did not make the decision to

discontinue based on the belief that she could not do it, but the belief that she did not want it

badly enough to try. "I made a conscious decision that it wasn't right for me," she explained

later in the interview, "and I can respect those who choose to do it but I can happily say that it

wasn't for me and that came along with the process." Another "discontinued" participant who

had a similar experience with chemistry described how watching other people struggle and

decide to continue had shown her that she did not have the motivation to continue:

> It was actually really good to see the difference between the people who were really passionate despite doing poorly in the class and the people who did really well in the class and maybe were thinking it wasn't for them. It gave me the insight that maybe you can still do well but realize it's not for you, and it's okay for me to realize it's okay for me [to discontinue] even if I don't do well. I think the biggest thing though was seeing people who were so ready to keep tackling this beast of premed even though they had failed the class or even though they got a less than desirable grade in the class. And to me that was kind of like, 'That's what I would need and that's what I don't have.'

For another "discontinued" participant, the realization that she did not have the motivation came

while she was studying for the MCAT after having completed all of the classes:

> I definitely remember sitting taking a practice test for the MCAT in the stacks in the library and I was in the middle of one of the sections and I thought "I literally couldn't

care less what I put as this answer. I could care less what my score is. Because I ultimately don't care if I go to medical school." and it was in that moment I realized, "I'm not going to finish this practice test, I'm not going to apply, and I'm done."

This participant had done well in the courses, but ultimately decided she did not want what she was working towards enough to continue. "When you're not excited about it and you're dreading doing it, then it's never gonna work. If I were to stick with that path with that mentality, I wasn't gonna finish medical school because I would hate it so much," she reasoned. This sentiment prevailed among the "discontinued" participants.

In the "on track" group, eight of the ten participants also expressed the mediating effect outcome expectations had on their decision to stay on track. Some participants who did well in the courses said that while their confidence in their ability factored into their consideration, ultimately, what they expected to get out of the job had the final say in their decision. For example, one "on track" participant said he kept going when courses were stressful because he knew he had it in him to get to where he wanted to be, but that his motivation to continue was inspired by his end goal of becoming a doctor:

> I think the real thing is just, you know, I know what I can do in terms of my classes and my career goals and whatnot. I don't want to disappoint myself and not achieve those…If I found something else I loved doing more I would've definitely pursued that. But so far I haven't found something…[S]o far, most of the evidence I have shows I will be very happy as a doctor, and I feel like I'll make a good doctor so that's where I'm going right now.

For other participants who stayed "on track" despite experiencing difficulty in the coursework, they said they stayed on the track because they believed that no matter how hard it got, they would find it within themselves to do well because they wanted badly enough to be doctors. "I felt like if I dropped, I'd be a lost soul, and I knew what I wanted. I knew I could do it and this was just a temporary hardship; I just had to do it. I knew in my heart of hearts I could

do well and I'm cut out for it, but I just had to buck up and figure out how to do it right," one "on-track" participant explained as he described what got him through difficulties in his courses. Another "on track" participant had been doing poorly academically in the premedical courses her first semester of college, but decided to give the track one more shot; the next semester, when her grades improved, she decided to stay the course. Although her grades had played a pivotal role in her decision to stay on the track, she said what kept her motivated to keep trying at all was her vision of the outcome:

> It's something that I want- what am I going to do? Just say it's hard and not do it? That doesn't even seem like any option anymore…I imagine myself with the white coat, I imagine myself with patients. I put myself in the physician's shoes who I shadowed. I imagine myself making a difference…[but] if you want something you have to work for it. That's just a part of being premed that you don't want to admit but it's still there. You don't want to think it's all about grades but you know they're important.

Thus, according to the responses of my participants, outcome expectations seemed to play an important role in premedical persistence. Additionally, outcome expectations were often cited as either being more important than or the motivating factor behind self-efficacy beliefs.

Self-efficacy and career persistence

My exploration of experiences of premedical courses had shown that negative experiences in coursework negatively influenced self-efficacy, but the data had also hinted that self-efficacy might not be as central as originally thought for career persistence decisions. In order more concretely test the link between self-efficacy and career persistence, I analyzed participants' critical decision statements, looking for thought processes that indicated logic based on self-efficacy.

Overall, I found that fewer than half of the students from each group indicated self-efficacy beliefs as a central reason for staying or leaving the premedical track during times of difficulty. Four "on track" participants cited a confidence in competency as a reason that they chose to continue medicine; four "discontinued" participants cited a lack of confidence in competency as a reason they chose to discontinue. Moreover, of the eight people who cited self-efficacy as a mediating factor on their persistence decision, only two (one in the "on track" group and one in the "discontinued" group) indicated self-efficacy beliefs as their sole reasoning for continuing or discontinuing the premedical track. The participant who discontinued solely because of decreased self-efficacy reported what might be considered the typical "weedout" experience:

> My grades overall—my science GPA, things that are considered when you're applying to medical school—compared to my peers were just not up to par. You know what people say, you have to do well in your core science classes and you have to have a good science GPA to be successful in getting into medical school and being a doctor. I had accepted that correlation that if you do well in [chemistry], you will succeed, but if you don't, then you won't.

The "on track" participant had similarly come to a crisis with grades in an organic chemistry class. Instead of discontinuing, however, this participant used self-efficacy beliefs formed by social persuasion to mediate the experience:

> That class, the first test was a really big blow…I think that's the biggest drawback to your self esteem when you think that you're putting your all into something and then you don't really see how it's paying off on the test. It's just the worst feeling ever…But it was pretty much just a general consensus around the class. I knew that I wasn't not getting it more than everyone else was.

This participant felt confident in the decision to stay on the premedical track because her self-efficacy was restored by the normative conditions of the experience.

The other 5 participants' self-efficacy statements were, as explored earlier, qualified by outcome expectations. Together, these results showed that while self-efficacy may be a consideration in premedical persistence, outcome expectations seemed to play a more important role in compelling people to stay on the track or repelling them away.

Two of the results I found were perplexing within the framework of SCCT. First, direct experiences via shadowing were not always necessary for outcome expectations to be changed on the track. Second, self-efficacy did not seem to play a large role in forming career persistence decisions. Recognizing that the second path of SCCT highlights how contextual factors may affect the formation and effectiveness of the social cognitive variables, I returned to the interview transcriptions to see if I found any contextual trends of note that might explain these unexpected findings.

Contextual influences: idealized entry-level outcome expectations

In order to understand better how outcome expectations could be changed without direct work-related experiences mediating that change, I looked back at the outcome expectation statements. I noticed a strong theme: participants frequently stated that their ideas of what it would be like to be a doctor were idealized when they entered. One discontinued participant laughed when he remembered how ungrounded much of his reasoning was:

> My reasons for becoming a doctor were just, 'I've been told I have good bedside manner, or would have good bedside manner, hypothetically if I was a doctor,' so I was like, 'Ok this seems like something I'd be good at.' I always found biology interesting, which is kind of an extrapolation to go from biology to "I will be a doctor." [laugh] Because there's a lot more to biology than the stuff that actually ends up being applied.

Another participant had to laugh when she remembered how she had formed most of her outcome expectations: television. "I thought I would be Christina Yang from Grey's Anatomy except instead of being a fabulous heart surgeon, I would operate on brains. That's what I thought my life would look like. [Laugh]." As it turns out, she was not alone in that type of thinking; in the "discontinued" category, five other people said they had based their decision largely on outcomes they formed from television.

When I tallied these types of comments, I found that seventeen participants—including the entire "discontinued" group—said they started out (and for many, continued for some time) with unrealistic, idealized, or incomplete outcome expectations for a medical profession. It is not hard to imagine how someone might experience the difficulties of the premedical track and realize it was something they did not want after all. But why is it that so many people would come in having decided very concretely to pursue a career they did not have a realistic grounding in? While it is highly possible that most 18-year-olds entering college have little knowledge of the field they might aspire to pursue, I decided to analyze the interviews again to see if anything specific about the context of the premedical track might promote the formation and/or sustenance of unrealistic outcome expectations.

The main theme that kept coming up in my analysis was this: many participants claimed they did not form realistic outcome expectations because the focus of the track seemed to be about aptitude rather than motivation. When they were making the premedical decision, the assumption was that if you *could* be a doctor—you were smart, good in science, etc.—naturally, you *would*. Parents, teachers, and friends alike often immediately encouraged participants in their pursuit of a medical career without questioning their motivation. These reactions could be,

in the words of one participant, "overly supportive." A different "discontinued" participant said

the support made it seem as though other options were totally illogical:

> I had a couple teachers tell me 'You'd make a great doctor.' Just as a blanket statement,
> like what does that even mean? Do you know what that means? When I think back, I'm
> like "Wow, why didn't I ever question that?" But they did say things like that, it's sort of
> like this inception, they influenced the way I was thinking. It was never a discussion
> topic in itself, it was like "Do I take this obvious choice or do I not take this obvious
> choice?" I never even started thinking about any alternative ever.

Likewise, Pre-Health Mentoring Office was often cited as unhelpful for critical thinking

about the premedical choice in that its counseling was geared toward assessing aptitude rather

than asking about motivation. One "discontinued" participant who finished all the coursework

before she realized she was not passionate about medicine said she wished institutional support

had focused more on the impetus than the implementation. "I think it's interesting, [PHMO] will

tell you you're not good enough for it, and you need to get these scores and these stats, and if you

don't fall into that range then think again. But I think they should take it from another focus

besides not being good enough number wise—like maybe not being passionate enough about it,"

she said. Another "discontinued" participant had experienced this proposed type of advising

from a doctor at Children's Healthcare of Atlanta, and said that although the message was hard

to hear, he was receptive to it because the experience was, overall, positive and helpful:

> While it was tough and discouraging to learn 'Oh, one year into it and you're still not on
> the right track, man—you're not gonna make it,' he actually encouraged me to reflect
> about what this goal is. He kept saying, 'This isn't the only path for you; you should
> really think about why you want to be a doctor, and I was like "Maybe he's right, maybe
> this isn't the only path.

Ultimately this advice enabled this participant to feel free to let go of the path he was not

motivated for and pursue one he loved: computer science.

Even "on-track" participants wished they had received this counseling; it would have made it easier to anticipate and get through difficult times, they said. One "on-track" participant felt lucky to have figured out more realistic goals through shadowing and conversations with doctors, but said that neither her friends nor her family nor institutional support at Emory did much to aid her in the process of realistic self-reflection and outcome formation:

> I didn't get much help, it was more idealistic thinking saying, 'Oh I have good grades, I'm good at science, maybe I should consider medicine.' Looking back I wish there had been people who had given me more realistic details about what classes you have to take- the realistic details of what medicine would be.

Over and over again, participants from both groups said they wished someone had talked with them more about thinking through the realistic process and outcomes of becoming a doctor. Emphasizing a person's capability become a doctor without encouraging them to consider whether they should be a doctor may contribute to the formation and persistence of unrealistic outcome expectations on the premedical track.

Contextual Influences: mistrust of self-efficacy

In order to understand better why self-efficacy might not be as important as outcome expectations for premedical persistence decisions, I examined the context around self-efficacy beliefs of the premedical track. According to SCCT, self-efficacy beliefs regarding particular career/academic activities should be positively related to four types of experiences: (a) the perceived amount of personal successful performance experiences, (b) exposure to successful models, (c) favorable social-persuasory communications, and (d) positive physiological reactions (e.g., relaxed state) during task performance. Self-efficacy beliefs should be inversely related to the perceived amount of personal and vicarious failure experiences and negative persuasory and physiological (e.g., anxiety) experiences, relative to particular career/academic activities

(Proposition 10: Hypothesis 10A). However, confidence in the clarity and honesty of the appraisals and feedback (both internal and external) that shape self-efficacy beliefs moderates the relation of self-efficacy to behavior (Lent, Brown, and Hackett 1994; Bandura 1986). In essence, for self-efficacy to be a significant motivator of behavior, a person must feel they are able to trust their contextually relevant experiences to present reliable indicators of their capability. With this in mind, I went back to my interview transcriptions to look for indicators of contextual influences that might impede the credibility of feedback information.

Among the participants in my sample, it was a common experience to have self-efficacy beliefs shaken from the start of the premedical track. All of the participants came in with high self-efficacy, but the college experience often proved to present a different set of challenges than high school. This trend of the premed track shattering overinflated self-efficacy beliefs already has potential to set a tone in which self-efficacy is discredited—especially if the lived experience of the track provides little material with which to build self-efficacy back up.

From there, I moved on to examining statements related to each of the four contextual influences that are supposed to shape self-efficacy beliefs: performance responses, social-persuasory communications, physiological reactions, and vicarious learning. Here, I should be clear that in my analysis of these contexts, I was looking for statements that indicated that the premedical environment had the potential for unfavorable credibility within each of these realms; I was NOT looking for statements that indicated that the incredibility of these experiences in these realms had caused a problem for that participant. For example, if a participant used the term "weedout" to describe any of the classes, I considered that an indicator that the track has potential to undermine social persuasion, even if that participant did not feel they themselves were weeded out. With that being said, in my analysis, I found strong widespread indication that

on the premedical track, three of the four contextual influences on self-efficacy have the potential for tainted credibility: performance responses, social-persuasory communications, and physiological reactions.

Incredibility of performance experiences: "How a person does on the premedical track doesn't actually reflect how good of a doctor they'd be." Under normal circumstances, performance experiences shape self-efficacy through experiences of success or failures (Bandura 1977). 95% of participants stated beliefs about the premedical track that have potential to undermine the credibility of personal experiences (related to the coursework) in premedical track self-efficacy beliefs.

One contribution toward this mentality included statements about the unnecessary difficulty of the classes. In describing the difficulty of the classes, one respondent who discontinued explained, "There's all this stigma about premed classes being tough, and a lot of it's true, but people talk about how tough it is, and that makes it appear tougher, psychologically." As (Barr 2008; 2010) might have predicted, organic chemistry was frequently cited as a class an intentionally overly-difficult class in which very few people, if any, do well. One "discontinued" participant recalled experiencing stress trying to figure out how she was doing in organic chemistry with the structure of the grading being the way it was:

> The professor I took, the averages on the test were like, 60- something, 70- something, and at the end of the year, he'll adjust you up, so if you've been making the average but the average is 65, you'll still end up with a B. But the whole semester, you're like so worried, you're like, "I'm failing organic [chemistry]" ya know?

Especially when there may be a curve in the class, the normative difficulty seemingly "everyone" goes through in courses like organic chemistry could very likely lead to an inability to trust experiencing difficulty as a negative sign of aptitude.

Usually, experiencing difficulty in a class feeds into ideas about capability; however, if coursework is perceived as intentionally and normatively difficult, it may lead students to wonder if they're actually doing poorly or if they're just being "psyched out." This has strong potential to invalidate that feedback from coursework.

The unrelated nature of the coursework to practicing medicine came up frequently among my respondents as well. "The things you do in the premed courses have nothing to do with being a doctor," one "on track" participant said. According to him, their purpose was to "literally force you to learn a ridiculous amount of complicated material that is very dense and very convoluted with a lot of names and moving parts, and see if you're able to do that." A widespread perception that the classes are not related to the actual work of doctor has potential to blur the link between doing well in the classes and actually becoming a doctor, which could impede the credibility of self-efficacy feedback.

Additionally, participants often perceived disjuncture between who does well on the track and who would make a "good doctor"—or even who gets into medical school. One on-track participant expressed great frustration with the system:

> We don't give [people with lower numbers] a chance because we judge it based on not having the numbers. I think that's sad. It's happened to some people who I think would be great doctors because they care, and I know some people with 3.9's who I honestly don't want to become doctors because they don't have the empathy. They're great with books and everything but they just don't have good empathy skills.

Another "on track" student agreed that there has to be more to a medical professional than just grades: "You can be a bookish dude, but if you can't talk to people, I don't want you taking care of me. If someone is just a vacuum of useless knowledge, he shouldn't be treating humans." Although both participants had done well in the coursework, they did not appreciate that the

process sometimes selects for people who can do the coursework rather than those who "should" do medicine.

Alongside the view that doing well in the classes may not indicate aptitude as a doctor is the idea that grades don't count as much for medical school admissions as people may think they do. An "on track" student who sought out information about scores from matriculating medical students when she was struggling academically said that after those conversations, she felt that "[t]hings were okay. They didn't get a 33 on the MCAT and they weren't straight A students. They just were regular." While the mentality that good grades do not automatically lead to becoming a good doctor—or even guarantee entrance to medical school—can be grounding, it also has the potential to invalidate the credibility of performance feedback from the classes.

Incredibility of social persuasion: "It's a weedout track, so take people's 'advice' to you with a grain of salt." Social persuasion can be understood as the feedback (usually verbal) people receive from other people attempting to get them to believe they can (or cannot) cope with the challenges they face (Bandura 1977). Ninety percent of participants stated beliefs about the premedical track that have potential to undermine the credibility of social persuasion.

In this category, the belief that institutional advice was unfounded, impersonal, and/or biased toward getting students off of the track was especially prevalent. The most commonly identified (and often within an interview, the *only* identified) "support" structure at Emory was the Pre-Health Mentoring Office (PHMO); however, all 20 participants agreed that the PHMO did not reach out to them. Many students acknowledged receiving PHMO "email blasts," but no one reported these to be helpful. "I feel like they kind of stay to themselves in the PHMO. They don't put themselves out there. They say, 'Oh come visit us!' But they don't go to the students…they're waving their flags but not coming out to reach people," one on-track student

reported. Only 2 students out of 20 reported having a positive experience with the PHMO once they sought it out. Conversely, 8 students reported having actively negative experiences with the PHMO, while the other 10 who did not report positive experiences simply described the office as irrelevant and unhelpful. The general consensus around discontent with the office was that their information is unhelpful in that it is, in one "discontinued" participant's words, "cookie cutter." Students who sought counseling at the PHMO when they were struggling often felt they were discouraged from pursuing the track because they were "viewed as numbers" without consideration for their circumstances or motivation. Students who were not struggling often viewed the PHMO's advice as having nothing to offer them. "You can look up something on the Internet and so can I," one participant joked. The credibility of the PHMO as a source of social persuasion has strong potential to be invalidated by this perception that they simply give the same advice to everyone.

Feedback from professors was also tainted in its credibility, especially in courses thought to be weedout courses. One on-track student who worked closely as a TA with general chemistry professors expressed that "sometimes they have so many students in there that they've seriously lost the 'I want to help each student do well' mentality. It's just another premed, can they get in or will they get out?" In other words, the attitude of the advisory system is perceived by students as cold and impersonal. As described in a chilling analogy from an on-track participant, "Right now, it's, 'I'm throwing you in the shark tank, let's see if you can swim.' That's what I feel like is happening- that's the way it was for me. The ones who floated are going to medical school. That's 150 of them. There are so many others who just got eaten by the shark." Essentially, the credibility of feedback of professors and counseling professionals is

compromised by the view that these advisors see premedical students, in their large quantity, as dispensable.

Incredibility of physiological reactions: "Stress is just part of the premed track—if you feel totally stressed out, you're doing it right." Physiological reactions shape self-efficacy through experiences of emotional arousal, either positive or negative. Every person I interviewed mentioned that going through the premedical track inevitably entails stressful experiences: anything from the loneliness of sacrificial time commitments to coursework anxiety to physiological health decline, and everything in between. Lack of sleep was a particularly salient theme; when recalling what it took to get through organic chemistry, one discontinued participant admitted "there were weeks where I just got 5 hours of sleep a week. I was forgetting to eat meals—it had a lot of long term health effects on me." These health behaviors were encouraged on the premedical track, she said, because "there's sort of this mentality that whatever doesn't kill you makes you stronger and you can sleep when you're dead." Other participants mentioned losing hair, losing weight, gaining weight, and feeling depressed as a result of the lifestyle they felt they had to engage in for success on the premedical track.

Several participants noted that it was even common for premeds to engage in a sort of bragging ritual about the extent of their unhealthy sacrifices for the premedical track. As one "discontinued" participant recalled, "you would always hear people be like, 'I haven't slept in so many hours,' or like, 'I've been in the library forever,' and people would want to one-up each other, you know? So you just feel like you're never doing enough." These physically and emotionally taxing experiences are understood to be part of what it takes to get through the premedical track. Stressful behaviors become a badge of commitment to the premedical track. An "on track" respondent put it this way: "They're trying to show they are working harder than

others. If you're not working as hard as them, you're not good enough. That kind of thing. It's almost a crime to get 8 hours of sleep, when your fellow pre-med is pulling all-nighters multiple times a week." In a system where the presence of negative physiological experiences is not only normalized but also glorified, these manifestations that would normally trigger a decrease in self-efficacy may be mistrusted and disregarded.

<u>Discussion</u>

The findings of my study explore what types of experiences might be important for undergraduates making persistence decisions on the premedical track, and why those experiences might be important.

Shadowing seems to be one of the most important influential experiences for premedical students. Shadowing provides (almost) direct career experience, which is thought to be the most important formative influence on the formation of outcome expectations. All fourteen participants who shadowed stated their shadowing experience was central in either confirming or discrediting the outcome expectations they had previously formed for being a doctor, and eighteen of the twenty participants reported outcome expectations as the most important mediating factor of persistence decisions. Participants motivated by their outcome expectations felt they could and would get through whatever it took to get to those outcomes; participants who did not feel compelled by the outcome expectations they had did not feel they would be willing to do what it took to become a doctor. Shadowing, then, is important for the premedical track because it plays a central role in forming outcome expectations, which then mediate career persistence.

However, shadowing may not be necessary in order for premedical undergraduate students' initially positive outcome expectations to be revised in a negative way. Half of the "discontinued" group reported having no shadowing experiences, but instead cited that the necessary commitment of the track inspired them to think harder about their premedical decision. Though they all had previously thought medicine would be the best career choice for them, after revision of their reasoning, they decided that their choice reasoning had been incomplete or unrealistic and that they did not want to pursue medicine enough to continue. Contextual analysis of the formation of initial outcome expectations showed a climate that may encourage incomplete outcome expectation formation by asking students to consider only their premedical aptitude, rather than their premedical motivation. Indeed, seventeen out of twenty participants stated they came in with idealized, unrealistic, and/or incomplete outcome expectations.

This trend may also contribute to the importance of shadowing. It is likely that students may decide to pursue medicine for idealized reasons; according to data from the US census and telephone surveys, as of 2009, U.S. citizens have ranked "physician" among the highest occupational prestige positions since at least the 1960's (Corso 2009; Smith et al., 2012). The combination of medical prestige along with sensationalized media representations of medical professionals like the television shows *House* and *Gray's Anatomy* (which were cited by half of the discontinued participants in my sample as major influences on their outcome expectations) may encourage students to choose to pursue the premedical track without thinking through the difficulties of becoming a doctor. Shadowing provides an avenue to gain a more clear understanding of the medical profession—an understanding that will sustain a student through the long road to becoming a practicing physician.

As far as coursework was concerned, experiences in the classes did feed into participants' ideas of self-efficacy. All twenty participants entered with high self-efficacy beliefs about their science course abilities; seventeen out of those twenty participants reported that their self-efficacy beliefs had been lowered over the course of their experience on the premedical track. Those same seventeen participants reported experiencing significant difficulty (difficulty for at least one full semester) in the coursework. However, contrary to what SCCT would have predicted, those self-efficacy concepts were only cited by seven participants as playing a central role in career persistence, and of those seven, only two did not qualify self-efficacy's importance with a preface of outcome expectations. That is to say, in my study, when premedical students hit crises, whether or not they felt they would be able to proceed was determined by the strength of their affinity for their perceived the outcomes of becoming a doctor rather than by their concept of whether or not they would do well. If doing well was mentioned as a motivator or concern, the participant usually prefaced this statement with the idea that their capability would be moderated by the desire to fulfill their expectations of becoming a doctor. These findings may be viewed as joining with other SCCT literature (Lent, Lopez, and Bieschki, 1991; Schaub and Tokar, 2005; Byars-Winston et al. 2010) to support Lent, Brown, and Hackett's "additional theoretical proposition" of SCCT (1994), which suggests that outcome expectations mediate self-efficacy. Alternatively, or perhaps additionally, contextual factors may influence self-efficacy's effect on the career persistence process. Analysis of the decision-formation context showed that ideas about the normalization of stress and the "weedout" process on the premedical track have potential to create an air of mistrust regarding negative premedical course experiences. This mistrust may undermine the influence of self-efficacy on premedical persistence decisions.

Overall, these findings indicate that what experiences people have and how they come to have them may matter more than the general cognitive mediation processes supposed by SCCT.

These findings are limited in several regards. First, though my data highlight many relevant experiences and thought processes on the Emory premedical track within my sample, my participant group is likely not representative of all premedical students—especially because of the female-heavy nature of my sample. The problem of generalizability is to be expected with most qualitative research with hidden populations due to the limited sample size and sampling methods. Of particular importance to note is that my results were likely strongly influenced by the emphasis among students at Emory on finding a career that one is passionate about. Many student populations might have more of an emphasis on the practicality of job choice. Again, it seems that context plays a crucial role in career choice. Further research should look into the effects of different school contexts (e.g. technical schools, junior colleges, and state schools) on experiences that influence career choice and persistence.

Second, the semi-structured interviewing method, while valuable for gaining in-depth information, lends itself to inherent interviewer bias. Though I took careful precautions to code for the variables I was examining, it is possible that interviewer bias may have factored into my data. In particular, the ideas of a mistrust of self-efficacy and an encouragement of undeveloped entry-level outcome expectations were drawn from inductive coding of the contextual environment. (To reiterate, those inductive codes did not necessarily consist of actual experiences of those difficulties, but statements that indicated a climate that could potentially lead to those difficulties. Thus, the contextual influences on premedical persistence decision-making are more speculative than concretely explanatory. Further research would need to be

conducted to confirm or deny the influence of those contextual factors on premedical persistence decision-making.)

Third, all participants were speaking in retrospect about their decision-making process. It is possible that their memories of their affectation or reasoning were influenced by cognitive bias toward congruency of their current career choice with autonomous decisions and preferences.

Overall, my results indicate that experiences like shadowing that encourage realistic pictures of the medical career enable participants to make more confident, informed career decisions. Broad application of these findings would encourage students considering a medical career to seek out direct experiences that will inform and feed their desire to pursue medicine. Hopefully, for those who are drawn to true outcomes of medical practice, these experiences would provide fuel for getting through the many difficulties of the premedical track.

Emory University might specifically benefit from applying these findings in institutional support organizations like the PHMO. Most participants acknowledged the PHMO faces structural difficulty; someone has to "keep it real," as one participant put it, and the quantity of students can constrain the amount of time and energy the office can realistically invest in each person. But the call of the students was not for unrealistically positive advice, but rather, for more thought-provoking advice and opportunities. Participants frequently mentioned they wished they had had more guidance in figuring out what it looked like to be a doctor and assessing what that might mean to them. Several participants also suggested the PHMO work on developing a more streamlined process for setting up shadowing opportunities.

Both the expressed wishes of participants and the trends found in this close analysis of participants' persistence decision formations suggest that institutional counseling from the PHMO and other on-campus resources should focus on facilitating more direct experience

opportunities like shadowing and helping premedical students affirm concrete, realistic reasons for their career choice. If the proposed contextual impedances examined earlier are, in fact, real barriers to persistence decision formation, this type of emphasis in counseling could be helpful on both accounts. First, it could address idealized entry-level outcome expectations by helping students ask "why medicine" and find concrete answers. Second, it could ameliorate mistrust of self-efficacy by creating a more individualized, hospitable, and helpful tone to the information being provided by the PHMO, which could in turn increase the credibility of their advice. These changes could lead to a premedical environment at Emory that better enables and encourages students with true passion for medicine to envision and work towards their career goals.

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Appendix 1:
Propositions and Hypotheses of Social Cognitive Career Theory (SCCT)
Lent, Brown, and Hackett 1994

Proposition 1: An individual's occupational or academic interests at any point in time are reflective of his or her concurrent self-efficacy beliefs and outcome expectations.

  Hypothesis 1A.   There will be a positive relation between occupationally relevant self-efficacy beliefs and (expressed or inventoried) vocational interests.

  Hypothesis 1B.   There will be a positive relation between occupationally relevant positive outcome expectations and (expressed or inventoried) vocational interests; negative outcome expectations will relate inversely to vocational interests.

  Hypothesis 1C.   An additive combination of self-efficacy and positive outcome expectations will account for more variance in career/academic interests than will either self-efficacy or outcome beliefs alone.

  Hypothesis 1D.   Self-efficacy and outcome beliefs regarding broad domains of work activity (e.g., artistic capabilities) will tend to stabilize by late adolescence or early adulthood.

  Hypothesis 1E.   A significant portion of variance in vocational interest stability will be accounted for by stability in self-efficacy and outcome expectations.

  Hypothesis 1F.   Changes in self-efficacy and/or outcome expectations will be associated with changes in vocational interests.

  Hypothesis 1G.   Gender and racial/ethnic differences in interests and in interest-goal relations arise largely through differential access to opportunities, supports, and socialization processes.   Thus, such group differences will be reduced when differences in opportunity structures, support systems, barriers, and socialization practices are controlled.

Proposition 2: An individual's occupational interests also are influenced by his or her occupationally relevant abilities, but this relation is mediated by one's self-efficacy beliefs.

  Hypothesis 2A. There will be a positive relation between measures of vocational ability and interest.

  Hypothesis 2B. The correlation between vocational ability and interest will be eliminated when the influence of self-efficacy is controlled.

Proposition 3: Self-efficacy beliefs affect choice goals and actions both directly and indirectly.

Hypothesis 3A.   Occupationally relevant self-efficacy will relate positively to choice goals (e.g., expressed choices).

Hypothesis 3B.   Occupationally relevant self-efficacy will relate positively to entry behaviors (e.g., information and job searches, applications for admission/employment, declaration of an academic major, attained choices).

Hypothesis 3C. The correlation between self-efficacy beliefs and entry behaviors will be reduced but not eliminated when the influence of vocational interests is controlled.

Hypothesis 3D. The correlation between self-efficacy beliefs and entry behaviors will be reduced but not eliminated when the influences of vocational interests and goals are controlled.

Proposition 4: Outcome expectations affect choice goals and actions both directly and indirectly.

Hypothesis 4A. There will be a positive relation between occupationally relevant positive outcome expectations and choice goals (e.g. expressed choices).

Hypothesis 4B. There will be a positive relation between occupationally relevant positive outcome expectations and entry behaviors (e.g., information and job searches, applications for admission/employment, declaration of an academic major, attained choices).

Hypothesis 4C. The correlation between occupationally relevant outcome expectations and choice goals will be reduced but not eliminated when the influence of vocational interests is controlled.

Hypothesis 4D. The correlation between occupationally relevant outcome expectations and entry behaviors will be reduced but not eliminated when the influences of vocational interests and goals are controlled.

Proposition 5: People will aspire to enter (i.e., develop choice goals for) occupations or academic fields that are consistent with their primary interest areas.

Hypothesis 5A. There will be a positive relation between indices of (expressed or inventoried) interest and choice goals (e.g., aspirations, expressed choices).

Hypothesis 5B. The relation of interests to choice goals will be moderated by opportunity structures (e.g., job availability, economic conditions, costs associated with occupational entry, perceived and actual barriers to entry) and support systems (e.g., financial, emotional, and instrumental support). Interest-choice goal relations will be stronger when opportunity and support are perceived to be high versus low. Conversely, these relations will be attenuated when perceived barriers (e.g., discrimination, disapproval of significant others) are high versus low.

Proposition 6: People will attempt to enter occupations or academic fields that are consonant with their choice goals, provided that they are committed to their goal, and their goal is stated in clear terms, proximal to the point of actual entry.

> Hypothesis 6A. There will be a positive relation between choice goals and entry behaviors.

> Hypothesis 6B. The relation of choice goals to entry behaviors will be moderated by goal properties (e.g., commitment, clarity, proximity to entry point). That is, entry behaviors will be more predictable from choice goals when goal commitment is high and when goals are specific and expressed close in time to the point of choice implementation.

> Hypothesis 6C. The relation of choice goals to entry behaviors will be moderated by opportunity structures and support systems. Goal-behavior relations will be stronger when opportunity structures and support are perceived to be high versus low. Conversely, these relations will be attenuated when perceived barriers (e.g., discrimination, disapproval of significant others) are high versus low.

> Hypothesis 6D. Gender and racial/ethnic differences in career goals, actions, and goal-action relations arise largely through differential access to opportunities, supports, and attendant socialization processes. Thus, such group differences will be reduced when differences in opportunity structures, support systems, barriers, and socialization practices are controlled.

> Hypothesis 6E. Under conditions of limited educational or economic opportunity, occupational choices will be dictated more by job availability, self-efficacy, and outcome expectations than by interests. Thus, when perceived or actual opportunities are limited, the direct effects of self-efficacy and outcome beliefs on choice actions will be stronger than their indirect effects through interests and goals.

Proposition 7: Interests affect entry behaviors (actions) indirectly through their influence on choice goals.

> Hypothesis 7A. There will be a positive relation between (expressed or inventoried) interests and choice actions (e.g., information and job searches, applications for admission/employment, declaration of an academic major, attained choices).

> Hypothesis 7B. The correlation of interests to choice actions will be eliminated when the influence of choice goals is controlled.

Proposition 8: Self-efficacy beliefs influence career/academic performance both directly and indirectly through their effect on performance goals. Outcome expectations influence performance only indirectly through their effect on goals.

Hypothesis 8A. There will be a positive relation between self-efficacy beliefs and career/academic performance.

Hypothesis 8B. The relation between self-efficacy and performance will be reduced but not eliminated when the influence of performance goals is controlled.

Hypothesis 8C. There will be a positive relation between positive outcome expectations and career/academic performance.

Hypothesis 8D. The relation between outcome expectations and performance will be eliminated when the influence of performance goals is controlled.

Proposition 9: Ability (or aptitude) will affect career/academic performance both directly and indirectly through its influence on self-efficacy beliefs.

Hypothesis 9A. There will be a positive relation between measures of career/academic ability and corresponding performance indices.

Hypothesis 9B. The relation between ability and performance will be reduced but not eliminated when the influence of self-efficacy beliefs is controlled.

Proposition 10: Self-efficacy beliefs derive from performance accomplishments, vicarious learning, social persuasion, and physiological reactions (e.g., emotional arousal) in relation to particular educational and occupationally relevant activities.

Hypothesis 10A. Self-efficacy beliefs regarding particular career/academic activities will be positively related to the perceived amount of (a) personal success experiences, (b) exposure to successful models, (c) favorable social-persuasory communications, and (d) positive physiological reactions (e.g., relaxed state) during task performance. Self-efficacy beliefs will be inversely related to the perceived amount of personal and vicarious failure experiences and negative persuasory and physiological (e.g., anxiety) experiences, relative to particular career/academic activities.

Hypothesis 10B. Direct, personal performance experiences will account for more variance in self-efficacy beliefs than will vicarious, social persuasory, or physiological reaction experiences.

Hypothesis 10C. The relation of prior performance experience to self-efficacy beliefs will be moderated by the nature and variety of conditions under which the task was performed. Successes achieved under conditions varying in level of difficulty or challenge will be more strongly related to self-efficacy than will those achieved under conditions of limited difficulty or challenge.

Hypothesis 10D. Prior performance accomplishments will be more strongly related to self-efficacy when accomplishments have been reinforced than when they have not been reinforced or have been punished.

Hypothesis 10E. The relation of prior performance experience to self-efficacy beliefs will be moderated by cognitive biases and distortions. For example, self-efficacy will be more predictable from performance experience among persons exhibiting low rather than high levels of negative affectivity.

Hypothesis 10F.   Gender and racial/ethnic differences in self-efficacy beliefs are mediated largely by differential access to sources of efficacy information and differential rates of reinforcement for performance accomplishments. Such group differences will be reduced when differences in efficacy source experiences and reinforcement are controlled.

Proposition 11: As with self-efficacy beliefs, outcome expectations are generated through direct and vicarious experiences with education and occupationally relevant activities.

Hypothesis 11A. Positive outcome expectations regarding particular career/academic activities will be positively related to the perceived amount of reinforcing (including self-evaluative) consequences that one has directly experienced, or observed others experience, for engaging in such activities. Negative outcome expectations arise chiefly via negative direct and vicarious performance consequences.

Hypothesis 11B. Outcome expectations will relate more strongly to direct, personally experienced performance consequences than to vicariously experienced consequences (i.e., observing, hearing, or reading about others' outcomes).

Hypothesis 11C. Gender and racial ethnic differences in outcome expectations are mediated largely by differential access to direct and vicarious reinforcement experiences. Such group differences will be reduced when differences in the access to, or nature of, reinforcement contingencies are controlled.

Proposition 12: Outcome expectations are also partially determined by self-efficacy beliefs, particularly when outcomes (e.g., successes, failures) are closely tied to the quality or level of one's performance.

Hypothesis 12A. There will be a positive relation between occupationally relevant positive outcome expectations and self-efficacy beliefs.

Hypothesis 12B. The relation between outcome expectations and self-efficacy beliefs will be moderated by the degree of response-outcome contingency. That is, the relation of self-efficacy to outcome expectations will be higher when outcomes are closely versus loosely tied to performance quality.

Appendix 2

Solicitation Email

Dear [potential participant],

Hi, my name is Jenni Seale, and I am an undergraduate sociology major. I am currently working on a senior honors thesis about undergraduates' experience of the premedical track. I am looking for undergraduate volunteers who pursued education on the premedical track at any point in college, and who are willing to participate in one interview with me, which will last no more than one hour. All information will be kept confidential and we will do whatever we can to protect your privacy. Your participation will be completely voluntary and you may choose to end your participation at any time. It will in no way affect your class standing, course grade, graduation status, or standing with any faculty or staff at Emory.

The interview will be conducted in a quiet private room either in a smaller seminar room in Tarbutton or in a study room in the Library. I am unable to provide compensation for your time, but your participation is essential for my study and will be greatly appreciated.

You must be a senior undergraduate, and have at one point considered and pursued the pre-medical track while at Emory but decided to discontinue that pursuit. If you are interested and willing to spend an hour of your time being interviewed, or if you have any questions, please contact me by replying to this email. You may also contact me at (478) 461-0246. If you are unsure of whether you wish to participate and would like to ask me any questions before deciding, please contact me and I will be happy to answer any questions or address any concerns.

Thank you for your consideration.

Best,
Jenni Seale
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Appendix 3

**Emory University Undergraduate
College Consent To Be A Research Subject**

Title: *Undergraduate Honors Thesis: Influential Experiences on the Undergraduate Premedical Track*
Principal Investigator: Tracy L. Scott, Ph.D.
Co-Investigator: Jenni Seale

Introduction
You are being asked to be in a research study. This form is designed to tell you everything you need to think about before you decide to consent (agree) to be in the study or not to be in the study. It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study.

You were chosen to participate in this study because you are a senior undergraduate at Emory University in Atlanta, GA, who considered medicine as a career at some point during your undergraduate education but then decided not to pursue that path. Participation in this study would last between 45 minutes and 1 hour. This study is being conducted as part of my Senior Honors Thesis under the direction of Dr. Tracy L. Scott.

Before making your decision:
- Please carefully read this form or have it read to you
- Please ask questions about anything that is not clear

You can take a copy of this consent form, to keep. Feel free to take your time thinking about whether you would like to participate. By signing this form you will not give up any legal rights.

Study Overview
The purpose of this study is to examine undergraduates' experiences that influence continuing or discontinuing a pursuit of the pre-medical educational track.

Procedures
You will be participating in an in-depth interview in which you will be asked about your experiences and thoughts about your career choice process. Before beginning the interview, you will be asked to fill out a short demographic survey. The interview will last between 45 minutes and 1 hour. With your permission, the interview will be taped using an audio recorder. The recording will not be shared with anyone other than the Principle and Co-Investigator of this study. The co-investigator (Jenni Seale) will transcribe the interview, and immediately after transcribing the audio recording will be destroyed. Jenni Seale will be conducting the interview. The interview will take place at a location on campus that is easy for you.

Risks and Discomforts
The only foreseeable risk is a breach of confidentiality; however researchers will protect all personally identifiable information with password protected documents and computers, as well as locked filing cabinets (see Confidentiality section below.) There are no other foreseeable risks or discomforts associated with this study.

Benefits

This study is not designed to benefit you directly. This study is designed to learn more about undergraduate students and their career choice process. The study results may be used to help others in the future.

Compensation
You will not be offered payment for being in this study.

Confidentiality
Certain offices and people other than the researchers may look at study records. Government agencies and Emory employees overseeing proper study conduct may look at your study records. These offices include the Office for Human Research Protections, the Emory Institutional Review Board, and the Emory Office of Research Compliance. Emory will keep any research records we create private to the extent that we are required to do so by law.

A study number rather than your name will be used on study records wherever possible. Your name and other facts that might point to you will not appear when we present this study or publish its results. All identifying information will be destroyed. Only the principal investigator and co-investigator will have access to participant identities during data collection and interview transcription. Interview recordings will be stored in a locked cabinet in the principal investigator's office, downloaded only to password-protected computers belonging to the principal investigator or co-investigator, and then destroyed upon transcription.

Voluntary Participation and Withdrawal from the Study
You have the right to leave a study at any time without penalty. You may refuse to answer any questions that you do not wish to answer. This decision will not affect your class standing, course grade, graduation status, or standing with any faculty or staff at Emory.

Contact Information
Contact Jenni Seale at jseale2@emory.edu or (478) 461-0246 or Dr. Tracy L. Scott at tscott@emory.edu or (404)727-7515 if you have any questions about this study or your part in it or if you have questions, concerns or complaints about the research.

Contact the Emory Institutional Review Board at (404) 712-0720 or Toll-Free at (877) 503-9797 or irb@emory.edu if you have any questions about your rights as a research participant or if you have questions, concerns or complaints about the research. You may also let the IRB know about your experience as a research participant through our Research Participant Survey at http://www.surveymonkey.com/s/6ZDMW75.

Consent
Please, print your name and sign below if you agree to be in this study. By signing this consent form, you will not give up any of your legal rights. We will give you a copy of the signed consent, to keep.

_____

Name of Subject

_____   _____   _____

Signature of Subject   Date   Time

_____   _____   _____

Signature of Person Conducting Informed Consent Discussion   Date   Time

Appendix 4

Interview Guide

Background demographics:
- o What is your major?
- o What do you like about it?

Overarching narrative:
- o Can you tell me about your career development path, starting back as early as you want to?
- o When you decided to be pre-med, how did you come to decide on that career?
- o Once you got to Emory, what changed your mind about being pre-med?

Pre-med decision formation:
- o What would you say were the most important factors in your decision to be pre-med?
- o What were the reasons you chose this path and/or goals you had in mind? (talents/abilities, interests, values/beliefs, aspects of the work itself (autonomy, money, helping people, etc.), relationship or family issues)
- o Who did you talk to as you were making the decision to pursue the pre-med track? (family, friends, teachers, other adults, etc.)
- o What did you talk to them about?
- o What were their reactions?
- o How was talking to people as you were making the decision to be pre-med helpful to you? (reassuring, supportive, advice, etc.)
- o How was talking to people as you were making the decision to be pre-med unhelpful to you? (stressful, claustrophobic, etc.)
- o What life goals did you think being pre-med might help you accomplish?
- o When you were still set on pre-med, what did you think your life would look like once you became a doctor?

Experience of Emory Pre-Med Track
- o What was your experience like in classes?
- o First, could you just tell me: how would you characterize students in the pre-med track?
- o What do you think your life would have looked like in college if you had stayed on the pre-med track? (e.g. time allocation, relationships, health, self-esteem, status, networks, support, comfort level)
- o So moving away from the abstract, what was your experience of pre-med classes?
- o Did you ever shadow—if so, what was your experience like?
- o Thinking about Emory at an institutional level, how did you feel that Emory reached out to you going about helping you through the pre-med track when you were pre-med?
- o What systems do you know of that are in place to help pre-med students? (Anything you think is helpful- academic, organizational, emotional, etc.)
- o Did you seek out guidance (friends, older students, informal conversations with professors, the internet, books, etc.) about going through the pre-med track?
- o In what ways was the guidance you received from the university helpful?

- o In what ways was the guidance you received (or didn't receive) from the university not helpful?

FOR DISCONTINUED GROUP:
   Decision to discontinue pre-med track
   - o If you think back to when you were pre-med just before you decided to change tracks, how did you feel about your life in that specific moment?
   - o Who did you talk to as you were making the decision to not pursue the pre-med track? (family, friends, professors, advisors,)
   - o What did you talk to them about?
   - o What were their reactions?
   - o How was talking to people as you were making the decision to not be pre-med helpful to you?
   - o How was talking to people as you were making the decision to not be pre-med unhelpful to you?
   - o What makes the uncertainty of not pursuing medicine more attractive than the track?
   - o Looking back on this whole experience, what do you wish you would've known?

FOR "ON TRACK" GROUP:
    Potential to discontinue pre-med track
   - o What did it take for you or require of you to get through the premedical track?
   - o Was there ever a moment when you considered discontinuing the premedical track?
   - o What kept you from discontinuing when your experiences felt hard?
   - o If you think back to when you were considering changing tracks, how did you feel about your life in that specific moment?
   - o Who did you talk to as you were making the decision to stay on the pre-med track? (family, friends, professors, advisors,)
   - o What did you talk to them about?
   - o What were their reactions?
   - o How was talking to people as you were making the decision to stay on the premed track helpful to you?
   - o How was talking to people as you were making the decision to stay on the premed track to you?
   - o Looking back on this whole experience, what do you wish you would've known?
   - o What could Emory do to improve the premedical experience for undergraduates?

The Now:
   - o FOR DISCONTINUED PARTICIPANTS ONLY: What do you think your life would have looked like later in life if you had stayed on the pre-med track? (e.g. time allocation, relationships, health, self-esteem, status, networks, support, comfort)
   - o How do you envision your future life?
   - o Now, how do you feel about your current life in this moment?
   - o What overall life goals are important to you now?
   - o How do you plan on achieving those life goals?

Personal conceptions:

- How would you describe the house you grew up in?
- What do your parents do?
- How would you describe your personality?
- What are your best qualities? What are your weakest areas?
- What is your general problem-solving strategy?
- How do you respond to uncertainty in your life?
- What some things or situations that stress you out when you're at school?
- What are you like when you get stressed?
- Who helps you when you get stressed?
- What do you like to do to de-stress?

Appendix 5

Table 1: Reports of Shadowing Experiences

	Positive formative shadow experience	Negative formative shadow experience	Negative non-formative shadow experience	Did not shadow
On track				
S1	x			
S2			x	
S3	x			
S4	x			
S5	x			
S6	x			
S7	x			
S8	x			
S9	x			
S10	x			
Discontinued				
D1				x
D2				x
D3		x		
D4				x
D5		x		
D6		x		
D7				x
D8				x
D9		x		
D10		x		

Appendix 6

Table 2: Reports of current outcome expectations as compelling or repelling

	My current outcome expectations solidify the appeal of being a doctor for me and I couldn't imagine doing anything else	A field that better meets my outcome expectations draws me more than the premed track	My current outcome expectations of being/ becoming a doctor drew me away from/were not enough to keep me on the track
On Track			
S1	x		
S2	x		
S3	x		
S4	x		
S5	x		
S6	x		
S7	x		
S8	x		
S9	x		
S10	x		
Discontinued			
D1		x	x
D2			x
D3		x	x
D4			
D5		x	
D6		x	x
D7		x	x
D8		x	x
D9		x	x
D10		x	x

Appendix 7

Table 3: Reports of Coursework Experiences

	Significant difficult, discontinued after 1 course	Significant difficulty for duration of experience	Significant difficulty at first, got better	General proficiency
On track				
S1			x	
S2			x	
S3		x		
S4				x
S5		x		
S6			x	
S7			x	
S8				x
S9		x		
S10			x	
Discontinued				
D1	x			
D2				x
D3			x	
D4		x		
D5			x	
D6		x		
D7	x			
D8				x
D9				x
D10		x		

Appendix 8

Table 4: Reports of career persistence decision-making process

	I stayed/left because I felt like I was/n't good enough at it to make it	I stayed/left because I felt like my motivation to be a doctor would/n't be enough to get me through	Experienced a time when considered discontinuing
On track			
S1		x	
S2		x	x
S3		x	
S4	x	x	
S5	x		x
S6	x	x	
S7		x	x
S8	x	x	
S9		x	x
S10		x	x
Discontinued			
D1		x	
D2		x	
D3		x	
D4	x		
D5		x	
D6		x	
D7	x	x	
D8		x	
D9		x	
D10	x	x	

Appendix 9

Table 5: Reports of revising self-efficacy beliefs due to coursework

	I was smart/ good at science in high school, this will be like that	I moderated that idea of being "good" after experiencing premedical courses
On track		
S1	x	x
S2	x	x
S3	x	x
S4	x	
S5	x	x
S6	x	x
S7	x	x
S8	x	
S9	x	x
S10	x	x
Discontinued		
D1	x	x
D2	x	
D3	x	x
D4	x	x
D5	x	x
D6	x	x
D7	x	x
D8	x	
D9	x	
D10	x	x

Appendix 10

Table 6: Reports of entering (initial) outcome expectations

	Humanitarian (help people, human health, etc.	Interesting/exciting application of science	Stability	It will make me happiest/ "Best Fit"/makes the most sense	Being a doctor is the most prestigious/ important/ admirable thing I could do	Autonomy	It'll be like TV
On track							
S1	x	x		x			
S2		x		x	x		
S3	x	x		x			
S4	x	x	x	x		x	
S5	x			x			
S6	x	x	x	x	x		x
S7	x	x	x	x			
S8	x	x		x			
S9	x			x			
S10	x	x		x		x	
Discont.							
D1	x		x	x	x		
D2	x	x		x	x		x
D3	x	x		x	x		x
D4	x			x			x
D5	x	x		x	x		
D6	x	x		x	x		x
D7	x	x	x	x			x
D8	x	x		x			
D9	x			x		x	
D10	x	x	x	x	x		x