SAS Honors Program

Capstone Report

Option D

BA/MD Program (Rutgers-Robert Wood Johnson Medical School)

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I. Purpose

I am a member of the 7-year joint BA/MD program offered between Rutgers University-New Brunswick and Rutgers-Robert Wood Johnson Medical School, and as such I have elected to complete my SAS Honors Program Capstone requirement by reflecting on my experience with this program.

II. Background

As I near the end of my last year as an undergraduate Rutgers student, and my first year as a medical student at Robert Wood Johnson Medical School, I find myself incredibly grateful for the opportunities afforded to me by the 7-year joint BA/MD program that I am a part of. During my time as a Rutgers student, I have enjoyed studying at a top-notch research university that has provided me with a strong background in the Biological Sciences while enriching me in so many other ways as a person. Continuing my education at Robert Wood Johnson Medical School has allowed me to begin my journey of becoming a doctor, which has been a long-term passion of mine throughout my schooling. Learning the foundational biology, genetics, biochemistry, and research methodology at Rutgers has equipped me to understand the basic science behind medical conditions that I will encounter throughout the rest of my life as a physician. My life as a medical student draws from this knowledge but is vastly different from my undergraduate work, as I have now begun to interact with real patients and practice the clinical skills that derive from the basic sciences. While as an undergraduate I may have been solving chemical mechanisms or pipetting gene cultures in a laboratory, I now enjoy taking blood pressure measurements, listening to heart and lung sounds, and interpreting comprehensive metabolic panels. I would not have been able to progress to a medical education so smoothly without the knowledge I gained from my undergraduate courses, and likewise I would not have

been able to complete the long-term goals I set for myself at Rutgers without entering a medical education. Throughout my time at Rutgers I have viewed my undergraduate and medical studies as two parts of one integrated whole, and following this vision has been made possible through my membership in the 7-year joint BA/MD program.

III. The Program

The BA/MD program I am involved with is a joint degree program offered through Rutgers University and Robert Wood Johnson Medical School that allows me to complete the coursework for both degrees (BA and MD) in a total of 7 years. Described by the Rutgers Health Professions Office as being "designed for high-achieving premedical students of Rutgers University," the program requires accepted students complete all core requirements by the end of their junior year, allowing for the first year Robert Wood Johnson curriculum to be completed in the senior year. Thus, medical school classes count toward credit for the undergraduate degree as well as fulfilling curriculum for the graduate degree. Application for the program takes place after the student's sophomore year, at which point the applicant needs a minimum GPA of 3.5 and completion of certain required Rutgers courses. There are many benefits of this program, including conditional early acceptance to the medical school, waiving of the MCAT exam, the opportunity to become involved with extracurricular activities available to medical students, the ability to save a year of time spent earning the MD, and other advantages of remaining an undergraduate for the transitional year (paying undergraduate tuition for the first year of medical school, and access to a wider variety of Rutgers facilities).[1]

IV. Undergraduate Experience

This program truly feels like a custom fit for my academic goals, and I am very glad that I managed my undergraduate work in a way that would set me up well for this program. My journey began back in my first week as a freshman at Rutgers (perhaps a little early to be making medical school plans, but it helped nonetheless). While my fellow students were preoccupied with mingling in the dorm, learning the bus system, figuring out how to manage their schedules and finding out which fraternity houses threw the best parties on Thursday nights, I began to inquire into what resources were available for premedical students at Rutgers. After my first week of classes I scheduled a meeting with Dr. Babiarz at the Health Professions Office on Busch campus to talk specifically about the BA/MD program, and in that formative session I learned a great deal about what was expected from me if I wanted to be a favorable applicant for the program. Dr. Babiarz indicated that most past applicants exhibited a blend of academic excellence (through high GPA and awards or recognition) as well as extracurricular activities that provided personal insight into their interests (with a focus on leadership). On the medical side, he indicated that shadowing in a clinical setting was a must, and that health experiences or community-oriented service were excellent opportunities to get a glimpse of what being a medical professional is like. I made it clear to him that I was forward-thinking in my plans to apply specifically to this BA/MD program, and he was very receptive of that. He helped me immensely in that first meeting by equipping me with the knowledge to help make my goal a reality.

In the two undergraduate years following that encounter I followed his advice very closely by keeping my GPA up (4.0), completing all requirements to be in the School of Arts and Sciences Honors Program, taking difficult science classes that would prepare me for medical school curriculum, shadowing physicians extensively (in the Emergency Department at JFK

Medical Center), becoming an EMT-certified first responder (for the towns of East Brunswick and Surf City), working in a research lab (at the New Jersey Neuroscience Institute), and broadening myself personally as Trombone Section Leader of the Rutgers University Marching Scarlet Knights. I learned a good deal about medicine, and about myself, from these experiences because of the diversity of settings in which I worked. Shadowing doctors was instrumental because it showed me exactly what is entailed in being a physician, with all of the benefits, stresses, and responsibilities. Taking an EMT course gave me some valuable medical knowledge that primed me for my studies today, and serving in the community as a volunteer first-responder continues to show me the great value of providing healthcare services for those in need. Working in a research lab showed me a completely different side of medicine, where discoveries are made about the basic science mechanisms underlying biology.

On the other side, participating in the Rutgers band program (with marching band, pep band, and concert band) gave me many valuable experiences from outside the realm of medicine. I had originally looked for a school with a robust, reputable marching band when deciding on which college to attend, and this paid off by making my college experience truly memorable. Music gave me a creative outlet to explore my interests outside of the sciences I was studying so arduously. By becoming a leader in this organization, I was able to develop and practice many of the skills that I also see as being very important in doctors. This includes the ability to empathize with the needs of others and give them the means to achieve their personal goals, to work with diverse personalities, to lead by example and garner respect through acting respectably, to live up to my responsibilities, and so much more. While the setting was music instead of medicine, I relished the opportunity to practice these skills and form myself into a better leader. My experience in the band program was only made possible because of the

undergraduate institution I attended, which had the resources to make this program available for students to enjoy and benefit from. By being an undergraduate student at Rutgers I was able to develop myself through this program, and because of the smooth transition to medical school through the BA/MD track I was able to effectively relate lessons I learned there to my subsequent study of medicine.

This extracurricular activity was a vital part of my undergraduate education as a whole because it taught me the skills that cannot be taught from sitting through a lecture: how to interact with other human beings, and work with them to accomplish amazing things. This is how medicine is practiced, by forming the foundation of a doctor-patient relationship that can be built upon to cure disease, maintain health, and improve a person's standard of living. In the band program, we worked long and hard, often under unfavorable conditions, to create something and develop it in a way that showed a sign of quality and effort. It was our work, and we were proud to call it ours because we knew what went into building it. Like a musician, a doctor must also work long and hard to perfect his art of healing, so that he can do great things and be proud of the work he does. I am grateful to have had this undergraduate experience at Rutgers, because I know that it will impact my future career in medicine in a very positive way.

Dr. Babiarz's original guidance helped show me what types of activities would shine positively on my resume, but ultimately I followed my own passions to engage in activities that were right for me. My interests in the doctor-patient relationship, community service, and medical science shaped what I found myself most interested in, so these became the activities I pursued. In order to "stand out," I followed another genuine love of mine by performing music for the Rutgers community, something that was very unique to me and my Rutgers experience.

On top of these experiences though, there was no question that I would need to have top grades in a premedical curriculum in order to be a suitable candidate for this program.

As an undergraduate student at Rutgers, I found my curriculum of studies to be stimulating, challenging, and overall excellent preparation for the medical school courses that would follow. Upon starting at Rutgers I dived headfirst into Organic Chemistry, a subject usually reserved for the second year and one that causes many prospective premeds to change career paths. In my opinion, this class shaped me as a student more than any other undergraduate course I have taken. Organic Chemistry required me to sit and study for long hours, to push through difficult concepts instead of giving up, to identify what the most important information was, to integrate all of the information in a way that made sense, and to thoroughly prepare for whatever the next exam might throw my way. I had to adapt my study style continuously and remain self-aware throughout the course so that I could accomplish my goal of getting an A for both semesters. When I finally did earn those A's, I was rewarded in feeling that I could accomplish anything that I put my will to. This was tested by numerous other difficult courses throughout my undergraduate years such as Biochemistry, Physics, Genetics, and Endocrinology, for which I utilized the same skills I had developed in Organic Chemistry.

I registered to take Biochemistry 407 in the fall semester of my sophomore without realizing that this course also served as a required class for graduate students. Therefore, this course was my first exposure to graduate-level education in the basic sciences. In retrospect, the method of teaching presented in Biochemistry 407 was very similar to the style that I am used to today with my medical school classes. We had one main course coordinator (Dr. Deis) who taught about half of the material, then two other professors who were researchers primarily but

taught the material that was most relevant to their studies. This type of format repeated itself in multiple courses I encountered in my first year in medical school, so Biochemistry 407 was good preparation in that regard. The subject matter I learned in this undergraduate course was also very relevant to my medical studies, which is to be expected given that Biochemistry 407 counts as a redundant course for this program (meaning that taking it as an undergraduate did not count toward my Life Sciences elective requirement). The Biomedical Sciences course at Robert Wood Johnson Medical School deals with very similar topics and modes of thinking about biochemistry, so Biochemistry 407 provided me with an excellent background to tackle the beginning of my medical education. This undergraduate course gave me an introduction to research methods such as PCR, gel electrophoresis, blotting techniques, and immunohistochemistry, all of which are important for a medical student to have some background in, and taught me much about DNA, RNA, genes, enzymes, chemical messengers, different types of molecules (carbohydrates, proteins, lipids), cell structure, and everything in between that maintains life on the microscopic level. This undergraduate course challenged me to look at the basic sciences in a different way, not as a list of facts to be memorized but as a series of concepts to understand and apply to various situations. For example, learning the sequence of events leading from the creation of DNA to the formation of diverse proteins that run all of our bodies' functions allowed me to understand the enormous variety of actions that are taken on the molecular level to sustain a living organism. Dr. Deis's emphasis on the endpoint goals of different pathways also helped me to put all of the complicated biochemistry in perspective and understand the larger logic of what our bodies are trying to accomplish. This actually provided me with a sense of wonder about biology, and furthered my motivation to study the fundamental science behind living organisms. While I had to use many of the same

study strategies as Organic Chemistry to handle the large amount of complex material in Biochemistry 407, this course gave me a new and enlightening perspective on how to best understand the basic sciences that underlie medicine.

Taking Endocrinology in the following fall semester prepared me in many of the same ways as Biochemistry, but took my undergraduate education a step further. This course integrated microscopic science with its macroscopic effects on our bodies, and I was finally able to learn about specific endocrine imbalances that cause human disease. Endocrinology itself is a very complicated study of diverse molecules and the effects they have on every level of biological organization (DNA, enzymes, cells, tissues, organs, etc.). While this course was actually a basic introduction to this subject, it was perhaps the most information-dense (and most like medical school) that I had encountered thus far as an undergraduate. While Biochemistry taught me the fundamentals of life processes, Endocrinology used this information as a springboard to introduce medically-relevant concepts into my curriculum. This material was immensely helpful in preparing me for the Renal-Endocrine-Reproductive Systems block I encountered in medical school this year, where I once again learned about hormones related to the kidneys, adrenal glands, thyroid, bone, and reproductive organs. My endocrinology background also helped me in the Digestive Systems, Nutrition and Metabolism block where insulin, glucagon, and other gastrointestinal hormones play a major role. Aside from covering the individual hormones, this course taught me about the general mechanisms they act through, involving different receptors, second messengers, and intracellular effects which have larger effects throughout the body. As I took this course I remember fighting through the difficult material, but feeling very excited to finally be studying medicine as part of my undergraduate coursework, and to get a glimpse of what a medical education was like.

Dr. Advis taught the class in a manner where lectures were important, but true mastery of the material came from putting in our own time to read up, learn the details, and categorize those details into more generalizable pathways. This was accomplished through recitation assignments where we were supposed to pick a hormone, and follow a standardized list of questions to write out its function in a simplified way. I remember being quite frustrated at times as I struggled to condense so much information into a few simple sentences, but learning this way conditioned me to understand "the forest, not the trees" as Dr. Advis (and my future medical school professors) would often say. In my current studies I am frequently bombarded by facts, figures, tables, chemical names, and drug interactions that are much more palatable when I ask to myself: "What does this mean?" Dr. Advis told us on the very first day of his course that he would teach us more about how to study in graduate school than about the specifics of endocrinology, and while I was skeptical at first, I am now very appreciative that I had exposure to this style of learning.

I can say with certainty that the learning methods I developed in this class, and all of the others in my undergraduate education, set me on the right track to transition smoothly to medical school. My undergraduate experience at Rutgers was truly excellent because the coursework was challenging, I was exposed to fantastic opportunities to develop myself as a future medical professional, and I expanded myself as a person through the experiences available to me as a student there.

V. Medical School Experience

My experience in medical school so far has been a marvelous one, as I have been able to build upon my undergraduate experience and continue to enrich myself in many ways. Much of my undergraduate life at Rutgers was focused on getting accepted to medical school, and specifically the BA/MD program that I am in currently, so it was incredibly gratifying when I

received the news that I was accepted. The fact that my undergraduate years were shaped by this goal actually made my Rutgers experience even more positive, as there was a stronger focus to the work I was doing. This has also helped to make my medical education more rewarding, as it builds on my undergraduate curriculum to arrive at the point I originally envisioned for myself at Rutgers.

These connections were apparent beginning with my first course of medical school, the aforementioned Biomedical Sciences block. In many ways the course revisited old concepts I had learned in classes such as Biochemistry and Genetics, where my educational foundation in the basic sciences was rooted. While much of the material was the same though, it came much more quickly and in much higher volumes than I was used to as a Rutgers undergraduate. My fellow classmates and other medical students have referred to medical school curriculum as "drinking from a firehose," meaning that the material is quite understandable for the most part, but just comes in such high volumes that it is hard to stay on top of the workload. Whereas a typical undergraduate class would meet 2 or 3 times a week for an hour and twenty minutes, medical school classes usually fill up about 3 hours a day with lecture and then small group sessions scattered throughout the week. Offsetting this, though, is the fact that we essentially only take one course at a time. I was not used to this system at first, but adapted to it without much difficulty. One aspect of my undergraduate education I enjoyed was the ability to focus on the life sciences while also sampling from other areas, such as participating in the band program, learning about music history, and engaging in the humanities. Medical school has refined the focus even more, and while there are strengths to a broader curriculum, I appreciate the value of this new type of education at this point in my training. Because I had structured my education so

far in a way that was so concentrated on medicine, it is rewarding to be learning about what I am passionate about, and with such focus.

Biomedical Sciences was a great extension of the biochemistry I had learned as a Rutgers undergraduate, but the first class that really made me feel like a medical student was Structure & Function. This course was my first detailed exposure to human anatomy, and included extensive time in the lab dissecting cadavers to see these structures with my own eyes. This was an incredibly rewarding experience, and a privilege I am very grateful for, because I learned about the human body in an entirely new and different way. Reading textbooks and figures of biochemical pathways is one effective way to teach the science of medicine, but nothing teaches the student quite like allowing them to cut into a human body, explore its contents, and integrate the study of medicine with a human life that once existed. I had seen preserved human organs before, such as in the Genetics, Law & Social Policy class I took as a freshman at Rutgers, but nothing quite prepared me for working on a full cadaver. The first day of anatomy lab was fascinating and uncomfortable at the same time, as we learned the techniques of dissection and actually began to perform this on our assigned body. With each lab session though, our lab group became much more comfortable with the dissection process and with each other. This course truly provided the foundation of our knowledge of the human body and built a sense of camaraderie among classmates who worked through these atypical circumstances together. By the end of the course, we were almost abnormally comfortable with the bodies and had no more qualms about doing the dissections or going into the lab for review. This introduced a struggle that I had never before had to face in my undergraduate studies: how does one view the human body as a biological machine to be cut open and explored, but also a dignified former human life? Numbing ourselves to the reality that we were working on dead bodies was one way for us

to move forward and learn an enormous amount of medical details, but this neglects to consider that they were once real, living human beings. Likewise, fully reflecting on this reality may have been too difficult for some among us, and would have prevented us from learning the medicine that our donors set out to teach us. Striking the balance was key to our success in the course, and to our development as compassionate future physicians. This experience left such a lasting impact on me that I chose to participate in the planning of the medical school's annual Anatomy Memorial Ceremony, where students show their appreciation by delivering speeches, presenting art, and interacting with the families of those who donated their bodies. Putting on this event allowed our student body to collectively reflect on and appreciate what our anatomy donors have done for us, and allowed me to do this on a personal level.

Having Structure & Function as part of my education through the BA/MD program was an incredible opportunity for me, and one I would not have had in my undergraduate education without such a program. While other undergraduate courses incorporate human anatomy into the main material, none (to my knowledge) allow students firsthand access to human cadavers, nor do they offer the freedom that we had with them. The anatomy lab was open to us at all hours to go in and review on our own time, and with this freedom came certain responsibilities: to clean up after our work was done, to use this opportunity for educational purposes, and to treat the bodies with respect. Very few people have this privilege, of being able to study off of a human cadaver, and I used this chance to learn as much as I could about the medicine affecting human anatomy. What I gained from the experience was an education about anatomy, but I also learned what it truly takes to be a doctor. This involves being compassionate and respectful of my future patients, being a good team player with my peers, and to have a thirst for knowledge that drives

my work. All of these skills were practiced in the anatomy lab, and I am appreciate that I had this experience as a continuation of my undergraduate education through the BA/MD program.

The courses that followed Structure & Function continued to expand on my life sciences background and build my medical knowledge. The Cardiopulmonary Systems block took the heart, vasculature, and lungs as its focus, and I learned much about medical science as well as clinical practices from this course. In this course I learned how to read and interpret EKGs as well as comprehensive metabolic panels (blood labs), and our lectures often revolved around clinical vignettes that required us to think critically in order to come to a conclusion about the patient. This format was challenging but stimulating, and made me think similarly to how a physician would when handling the case. This style was continued in the Renal-Endocrine-Reproductive Systems block, which required a higher level of thinking to come to the appropriate conclusions for the patient cases presented. The material from this course drew in many ways from the Endocrinology course I had taken earlier as an undergraduate, but with this new format I needed to use that background for its clinical application. It was very exciting for me to bring my undergraduate knowledge to this setting, because it meant that my new medical education was a true continuation of everything I had worked for in previous years. What I had enjoyed about that earlier Endocrinology course (i.e. its medical relevance) was a major facet of its medical school iteration, and I am very happy to know that regardless of which path I take, it will continue to be very relevant to my work. The courses that followed this (the Digestive Systems, Nutrition and Metabolism block, Immunity block, and the Microbiology block) have all continued to build on this model, and have been rewarding in new and different ways. These courses have allowed me to explore new areas that I did not have much previous background in, and likely would not have been exposed to without being involved in the BA/MD program. This

program has given me the opportunity to learn real medicine, to let my undergraduate foundation take me to new and exciting places educationally, and to learn what it takes to become a doctor.

Running concurrent with these science-based courses at Robert Wood Johnson Medical School is the Patient-Centered Medicine course, which has taught me an immeasurable amount about the art of being a physician. While the other blocks teach me the foundational scientific knowledge to practice medicine, PCM allows me to reflect on the entire medical school experience and learn all of the things that a textbook cannot teach. One arm of the course deals with a diverse array of issues surrounding patients and their access to satisfactory healthcare, including factors such as economic status, race, religion, age, language, and disability, to name a few. Discussing health disparities can be emotionally challenging at times; it is truly sad to hear about sick and dying patients who are unable to be properly healed. However, I recognize that feeling this is a sign that I am a compassionate person, and this is one important aspect of my personality that has continued to develop throughout this course.

The other side of PCM allows us to practice critical physician skills such as taking patient histories, performing physical exams, developing a rapport with the patient, and providing them with compassionate care. At times it could be quite hard to do this right, and I would sometimes feel uncertain or unsure of myself, but upon reflection I realize that feeling this way is a perfectly natural part of the learning process. For example, physically examining patients or talking to them about their most personal concerns can be an uncomfortable, even unsettling experience, but it was rewarding to be able to practice these situations to build my own comfort and self-confidence. And as with anything, I have learned that practice is the key to success. These skills are developed in the classroom by watching videos, practicing on my fellow classmates, and interacting with standardized patients (actors), but also in actual clinical settings. Through my

offsite experiences visiting a school for children with disabilities, interviewing clients at an assisted living facility, teaching health workshops, and shadowing a family medicine physician through a continuous series of visits, I have had the privilege of learning from real patients. This has had an amazing impact on my education, as it allows me to use everything I have learned so far and take it to its endpoint—the treatment of patients. This incorporates the biological science from my undergraduate work, my growing medical knowledge, and my budding clinical skills to learn how to best serve others, which is the goal I have envisioned for myself throughout my entire Rutgers education.

Learning these skills has been a marvelous experience, because it helps me develop into not just a competent physician, but an excellent one. The activities included in this course are certainly the most different from those I have experienced in my previous undergraduate education, so I am incredibly grateful that I am able to engage in them through this program. Never before in my undergraduate education have I been able to interact with patients from a position of regard such as this, as a medical student, and intend to continue using that privilege to grow into the best doctor I can be.

Overall, beginning medical school has been an incredible experience for me as a scholar and as a person. Continuing my education in this way has enriched and challenged me intellectually, satisfying my thirst for knowledge but giving me even more to look forward to. Entering medicine has also been my goal to grow as a person, and I love that I am learning more about myself every day that I spend studying medicine. I say with certainty that I am a very happy and very lucky person because I have the opportunity to follow this path through the BA/MD program.

VI. Summary

Taking medical school classes as a continuation of my Rutgers undergraduate experience through the BA/MD program between Rutgers and Robert Wood Johnson Medical School has truly shaped my education in meaningful and exciting ways. The format of this program has offered me the unique opportunity to make my undergraduate and medical education two parts of one integrated whole, and this has worked beautifully. The BA/MD program has helped me fulfill my educational and personal goals in this way, and I feel that this type of program works so well for me because it was made for students like me. Dr. Babiarz, the coordinator of the program and the person I initially spoke to about it, has said that, "A student that goes into the BA/MD program at Rutgers is the type of kid who jumps off the bus from high school; slides right into Rutgers and doesn't miss a beat…They have to be smart, positive people with good social skills who don't shy away from hard work." I like to think that this statement summarizes my approach to academics, and describes my entry into Rutgers with uncanny accuracy. Dr. Sonia Garcia Laumbach, Assistant Dean of Student Affairs at the medical school (and 1999 graduate of the BA/MD program) has indicated that the program tries to, "attract bright, mature, highly motivated students with excellent interpersonal skills to medicine early on in their college career and get them interested in the program."[2] Together, the aforementioned qualities depict the kind of student, and person, I have always strived to be. I feel that I reflect well on the program because of this, and because to the work I have done in the program so far, and I am very appreciative to have been accepted for this highly competitive, and very rewarding, opportunity.

My involvement with the BA/MD program has been an incredibly enriching experience for my undergraduate education, as it has allowed me to expand the scope of my education in ways I would not have been able to do otherwise. Studying biological sciences at Rutgers gave

me the intellectual tools to tackle the rigorous curriculum I would find at Robert Wood Johnson Medical School, and continuing my Rutgers experience with a medical education has given such substantial meaning to the undergraduate work I had done. From learning what an enzyme is to understanding the enormous variety of functions they have in the human body, from performing benchwork in a research lab to talking with patients and hearing some of their most personal health concerns, my participation in this program has taken me a long way educationally. Because I had always envisioned the stages of my education as two pieces of a whole, I have handled each stage accordingly. The BA/MD program has proven to perfectly suit my needs because it has allowed for the most complete integration, and smoothest transition, from undergraduate school to medical school that I could have possibly experienced.

Participating in this program has also had its challenges, and facing these head-on has helped me grow as a student and a person. Studying long and hard for top grades, transitioning to new learning styles, facing the unknown in the cadaver lab, feeling uncertain during patient interviews, and facing emotionally-challenging situations have all been part of my BA/MD experience. My Robert Wood Johnson professors have at different times stated that medical students need to "feel comfortable with being uncomfortable," and I have found this to be very true about my experience. Through this program I have faced challenges, surmounted them, and come out a fuller, more enriched person.

By integrating my undergraduate and medical education, the BA/MD program has allowed me realize my academic vision and enter a career I am truly passionate about. This has been a very enriching experience, challenging at times, but very much worth it. I am excited to continue moving forward on this path, to learn more about medicine and myself, and to continue building upon these lessons for years to come.

VII. Bibliography

[1] " Joint Programs." *Rutgers Division of Life Sciences - Office of Undergraduate Instruction*. Rutgers University, n.d. Web. 25 Apr. 2016.

[2] Lally, Robin. "RWJMS-Rutgers Seven-Year BA/MD Program Attracts the 'Best and Brightest'" *Media Relations*. Rutgers Today, 6 Dec. 2012. Web. 25 Apr. 2016.