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How to Select a Graduate School Program for a PhD in Biomedical Science

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Abstract

The goal of this article is to provide guidance for those who have made the decision to apply to graduate school with the plan to obtain a PhD in biomedical science. Choosing an appropriate graduate school and program can seem like a daunting choice. There are numerous graduate training programs that offer excellent training with multiple specific program choices at any given institution. Thus, the goal of identifying a program that provides an optimal training environment, which aligns with the applicant's training and career goals, can be daunting. There is no single training program that is ideal for all applicants and, fortunately, there is no sole perfect place for any individual applicant to obtain a PhD. This article presents points to consider at multiple phases of this process as collected from the authors who include a senior faculty member, a junior faculty member, and four current graduate students who all made different choices for their graduate training (**Box 1**). In Phase 1 of the process, the vast number of choices must be culled to a reasonable number of schools/programs for the initial application. This is one of the most challenging steps because the number of training programs is very large, and most applicants will rely primarily on information readily available on the internet. Phase 2 is the exciting stage of visiting the program for an interview where you can ask questions and get a feel for the place. Finally, Phase 3 suggests information to collect following the interview when comparing choices and making a final decision. While the process may feel long and can be stressful, the good news is that making informed decisions along the way should result in multiple options that can support excellent training and career development.

Key Words: graduate school, graduate program, PhD, STEM, decisions, considerations

Introduction

So, you decided you want to go to graduate school to pursue a PhD in biomedical sciences? Now is the time to take the next step— choosing the graduate school you would like to attend. Graduate school can be a very fulfilling and stimulating experience, particularly for those who choose graduate programs best suited for their unique needs and aspirations. However, choosing the right school is not like choosing between regular or decaf, paper or plastic, or wake-up or snooze. A PhD is a major time investment and a significant career decision that requires in-depth analysis of all your options. Beyond selecting a specific school, the proliferation of different graduate programs means that even within a single school, there could be a dizzying array of program options, often with confusing and interrelated names. Thus, choosing both a school and a program that align with your personal and professional goals is paramount. There are many wonderful PhD programs and several important factors you should consider when selecting the program best tailored to your learning style, training goals, and future career aspirations. [* Box 1 here]

Choosing a graduate school is an intimidating task when you do not know what you are looking for. Moreover, there are many significant considerations to be made at each step of the selection process. Here we break down the selection process into three key phases: Phase I: Research for Applications; Phase II: The Interview; and Phase III: Follow-Up Research (**Figure 1**). Within each of these Phases, there are multiple factors that require careful examination to determine the graduate program(s) that will provide you with the best training aligned with your needs and ambitions (**Figure 1**). We hope that by defining these key considerations, one can more easily determine what to look for in a prospective PhD program. [* Figure 1 here]

A key consideration for graduate training is that most of your training will take place within the context of your research laboratory. This constitutes a substantial shift from the undergraduate mentality where classes are the main venue for training. While the curriculum in graduate school can be important and should be considered, most STEM graduate programs limit coursework to the first one or two years of training. Thus, prioritizing research options and secondarily considering the curriculum and course structure is recommended.

The purpose of this article is to help those seeking a PhD in STEM-related fields select a graduate school that will provide them with an excellent training experience by narrowing down key factors one should consider throughout the selection process. Although comprehensive, this article does not encompass all considerable factors of the graduate school selection process which will vary from student to student. Thus, we advise prospective students to take these, and other personal considerations into account when choosing the right graduate school. We will solely focus on the key factors one should consider at each phase of the graduate school selection process.

Ph.D. or Master's?

While the advice offered here is directed to those who have made the decision to pursue a PhD, there are other options for graduate school. Those who are uncertain about whether they are willing to commit to a PhD may consider enrolling in a Master's program. However, there is large variation in the value of a Master's degree across STEM fields. For example, in many biomedical sciences, a Master's degree brings the same value as two years of experience, such as would be gained working in a research laboratory. For a Master's degree program, the tuition is likely to be substantial with no stipend provided, which contrasts with many PhD programs that provide a full tuition waiver and a stipend. Master's programs are typically revenue-generating, requiring tuition commiserate with other professional degrees and significant scholarships to offset the cost of tuition are rare. Some Master's programs are gateways to university PhD programs and this may be appropriate for an individual who is not yet ready to commit to a PhD, but the cost of the Master's phase of training may be substantial to ultimately end up in a PhD program where one could have been fully funded from the start. While a Master's program may be an option for some, it is important to carefully consider the cost/benefit of such a program in your specific field. For example, in basic biomedical sciences, an investment in a Master's degree is often not the most cost efficient choice.

An alternative to Master's program for some students are post-baccalaureate training programs. These programs typically provide some graduate coursework together with a focused research experience. They can be ideal for the student who is still exploring their interest in a research career. While some of these are revenue-generating and as costly as Master's programs, those supported by the National Institutes of Health termed Postbaccalaureate Research Education Programs or PREP can be excellent choices (Schwartz, Risner, Domowicz, and Freedman (2020)). The goal of PREP is to support educational activities that enhance the diversity of the biomedical research workforce. Unlike Master's programs, PREP programs are designed for students who plan to pursue a PhD or a combined degree such as an MD/PhD. These programs can be an excellent alternative for students who are uncertain if they want to pursue a PhD and do not want to accumulate burdensome debt while they make their decision. However, this does not mean that Master's degrees are not worth the time and money for all STEM students. Thus, we encourage students who are considering enrolling in Master's programs to carefully consider whether a Master's degree in their respective STEM field is necessary and beneficial for their future endeavors.

Phase I: Research for Applications

Choosing where to apply to graduate school can be an overwhelming and burdensome task. With over 1,000 graduate schools with PhD-track programs in the United States alone (Bennett, 2022; State, n.d.), selecting the schools you want to apply to may seem daunting. Moreover, the average cost of a graduate school application ranges between \$50-\$100 USD (Bennett, 2022; GradSchoolMatch, 2021a; Roberts, 2017) and each application takes approximately 10 hours to complete and submit (Minnesota, 2022). Given the pricey and time-consuming nature of graduate school applications, you owe it to yourself to make an informed and carefully thought-out decision when choosing where to apply. General industry advice is to apply to between *three and eight* graduate schools (GradSchoolMatch, 2021b), but how do you narrow down your search when you have over 1,000 options? Here we present six key considerations to help you narrow down the list of graduate schools to apply to.

Location, Location, Location

Studies show that nearly 87% of students choose to relocate to attend graduate school (GradSchoolMatch, 2016). The location of your graduate school may not seem like a top priority on your list of things to consider, however, you are not just picking a school— you are picking a location where you will spend the next 5-7 years of your life. Although picking schools based on location may seem superficial, enjoying the place you live makes enduring the stresses of graduate school much easier. There are many reasons why students choose to live in specific geographical regions including proximity to family and friends, climate, as well as career opportunities. Whatever your reasons may be, it is important to ensure that the location of your graduate school is a good fit for you.

While most students choose to relocate to different cities for graduate school, over half of students who relocate choose to remain in the same geographical region (e.g. Southeast, Northeast, Midwest) (GradSchoolMatch, 2016). This is generally because students want to remain near family and friends. If proximity to family and friends is something important to you, consider how far is “too far” away for you. For instance, if a plane is required to make the trip home in a days’ time, you may consider schools that are within reasonable driving distance to your family and friends. Many students seek the emotional and financial support that living close to home has to offer and therefore, may only consider schools within a 100-mile radius of home. On the other hand, many students choose to push themselves outside of their comfort zone and experience graduate school far away from the familiarity of their hometown. These students may instead decide to apply to schools located on opposite sides of the country and spend a several years exploring a new city. Regardless, understanding where you want to live in proximity to your current location will largely influence the graduate schools you choose to apply to.

Another factor to consider when thinking about the location of your graduate studies is the seasonal and social climate within the region. For example, if harsh, cold winters are not

your style, you may decide to apply to schools located in warmer climates. If you abhor big cities and heavy traffic you may want to avoid applying to the plethora of schools located in urban metropolitan areas. If you want to avoid driving and the overall cost of car maintenance during your PhD, you may consider locations with superior public transportation. Moreover, each city you consider will have its own cultural values and unique atmospheres. Thus, ensuring that you select a city favorable to both work and play will go a long way toward helping you guarantee happiness and perform your best.

Finally, you may consider applying to graduate schools in geographical regions in which you want to pursue your future career. For instance, students interested in careers in biotechnology may choose to apply to graduate schools in Boston, California, or in the Research Triangle Park area of North Carolina as these schools are near a diverse range of biotechnology companies. Selecting schools close to careers of interest may allow for enhanced networking and thus may aid in achieving professional goals.

Taken together, the location of prospective graduate schools is a significant determinant of those that you may want to apply to. Whether you pick locations based upon distance from home, climate, or proximity to potential careers, determining the geographical location in which you would like to attend graduate school can really help narrow down the list of schools to apply to.

Research

A PhD program typically takes 5-7 years, including 1-2 years of coursework and several years of intensive independent research. Thus, it is critical that applicants consider their research interests when deciding which graduate schools and subsequent programs to apply to. The specific research area and research opportunities available should impact not only your choice of graduate school but also your choice of graduate program within a school. Faculty at a given graduate school can be members of one or more graduate programs within that school, meaning that they teach and mentor graduate students within the programs that they have appointments. As you delve into your research, you might consider whether schools allow you to work with faculty only specifically within a certain program or whether there is more flexibility. For instance, some schools only allow students to join the labs of faculty members with appointments in that students' graduate program, and others allow students to explore labs across program lines. Prospective students who have yet to decide what area of research they want to pursue may consider applying to schools with umbrella programs which allow new students to rotate with faculty among a diverse array of programs within the graduate school. These umbrella programs are designed to allow students to explore multiple different types of research opportunities before deciding what lab they want to join.

When considering your research interests, a key point is to ensure that multiple scientists within a graduate school or program work in that area. Common and astute advice is to never select a school or program because of a single faculty member performing your dream research (Baghdassarian, 2021). That faculty member may not be taking students, or you may not work well with that individual. Thus, a recommendation is to ensure that there are at least three professors studying an array of topics you can see yourself working on. Moreover, if you are particularly interested in certain professors, you may try reaching out to these professors prior to the application deadline. This will allow you to get your foot in the door and talk to someone that can tell you more about the program, the learning environment, and provide details about their willingness to accept new graduate trainees (Baghdassarian, 2021). This will also allow you to get a better sense of whether you are still interested in these labs and could see yourself working for the advisor long-term. Another suggestion is to simply keep an open mind. Many students enter graduate school with limited research experience, so considering areas beyond their current expertise may be the best approach. Finally, research dynamically evolves with time as new global threats and cutting-edge technologies emerge, so the topics that were of interest during the application process could easily change as new opportunities arise.

Another point to consider is that graduate school is about research *training*. An ideally suited graduate program should arm you with key skills you need to develop into the best scientist you can be, including experimental design, hypothesis generation, data analysis, and the many other transferable skills such as scientific writing and communication, teaching, mentoring, and project management (Melanie Sinche, 2017). While you need to select a research topic that engages you, this topic is unlikely to be the focus of your career. You may be passionate and driven to tackle a specific research area, but you do not need to work on that specific topic in graduate school. Instead, try to focus on identifying a program where you can acquire the skills needed to develop into a scientist who is best equipped to pursue that research question at a future stage in your career.

When and if you decide to attend a specific PhD program, most schools require that students take time (approximately six months to one year) to perform laboratory rotations. Rotations are designed with the students' best interest in mind. These rotations allow students to explore different research topics and environments. Moreover, rotations are an invaluable opportunity for students to decide whether a specific advisor and laboratory environment is a good fit for their individual needs, goals, and learning styles, without the pressure of scientific productivity. Although somewhat uncommon, there are schools that will allow you to join a lab directly upon admission to the program. The challenges of graduate necessitate that students make a thoughtful and informed decision when picking a lab that they will spend the next 5-7 years of their life in, and lab rotations are an important part of this process. Unless a student has steadfast confidence that a specific lab and mentor is the best choice for them, we highly recommend that students do lab rotations to ensure that their graduate school experience is a pleasant one.

Reputation

School choice is often driven by reputation. While there are many published rankings of graduate schools, the key thing to recall is that the rankings are typically for the school overall and not the specific programs that you may be considering. Thus, while all students are likely to take reputation into consideration, this should not be a primary driving force. Some schools are better known nationally or internationally because they have excellent athletic teams, but the national ranking of the football team is unlikely to impact your STEM PhD to any significant extent. Determining the reputation of a specific graduate program or research area is more challenging than determining the reputation of a school. For this reason, reputation is an area that should be considered most extensively later in the decision tree when the choice is between a specific set of options.

Although many prestigious schools presumably have excellent graduate programs in your field of interest, it is not necessarily true that these programs are superior to the those at schools without the big name. In fact, you will find stellar graduate programs at schools that US News and World Report has ranked third tier (Report, 2018), and potentially weak graduate programs in otherwise highly ranked schools. Moreover, a PhD from a highly ranked school does not necessarily ensure a better job or a higher starting salary after graduation. Companies and hiring committees tend not to focus on the school a candidate graduated from, but instead look for the relevance and quality of a candidates research and how well this research fits with the needs of the company or department (Barr, 2020). Thus, it is critical that prospective PhD students look for graduate schools and programs that foster supportive and innovative research environments that allow their students to thrive.

In sum, if you want to find a program that will make you a skilled and competitive job applicant, your priority should be finding a graduate program that places emphasis on graduate student training. But how do you decipher between schools that emphasize training and those that do not? Graduate programs that place importance on graduate student training and development will often provide students with opportunities to take courses in grant writing, public speaking and communications, and expose students to a diverse array of research throughout their graduate career. Moreover, these programs will cultivate student collaborations and often have access to a multitude of core facilities that aid students in effectively using the latest technologies to support their individual research. By keeping in mind that the quality of your schools' training environment is more important than the schools ranking or reputation, your final list of schools will guarantee that you make the right choice when it comes time to enroll in a specific program.

Stipend

Fortunately, most STEM PhD students in the US, particularly those enrolled in biomedical science programs, are typically paid a living stipend for the duration of their graduate career with a complete tuition waiver. As many programs offer such a stipend, take care in considering any program that does not guarantee a stipend. Moreover, the ways in which this stipend may be provided can differ. For instance, some programs require a significant amount of teaching in the form of teaching assistantships (as discussed in the Teaching section) to cover a large portion of their stipend, while other programs fully support their students' stipends and require minimal teaching as a part of the required curriculum. Thus, prospective students should consider their desire to teach as well as their research priorities before applying to programs that require significant amounts of teaching to cover their stipend.

Despite offering a living stipend, this stipend typically just enough to keep food on the table, bills paid, and gas in your car, leaving very little room for extra expenses. Thus, it is vital that prospective graduate students consider the stipend and assess their financial responsibilities. More importantly, do not get distracted by schools that offer more money than others. It is not uncommon for schools that offer bigger stipends to be located in areas with a higher-than-average cost of living. Wherever you apply, you need to ensure that the stipend matches the cost of living and will be enough to keep your 'head above water' throughout graduate school. A PhD can be very long with lots of stressful ups and downs, and financial insecurity is the last thing you want to worry about.

At the time this article was written, the average graduate student makes a yearly stipend of approximately \$32,000 (Glassdoor, 2022). If you are going to graduate school right out of your undergraduate studies, this may be the most money you have ever made. On the other hand, if you are leaving a job to go to graduate school, this may be a significant pay decrease. It is not impossible to live on a graduate student stipend and most schools provide yearly cost-of-living increases to student stipends. So, when deciding between graduate schools, make sure that the stipend is livable given the cost-of living in that area. You may consider utilizing MIT's living wage calculator (found at <https://livingwage.mit.edu/>) (Glasmeier, 2022), which can help you determine the cost-of-living in different areas around the United States to help you make an informed decision when choosing what schools you want to apply to.

Curriculum

PhD curriculum varies widely between graduate schools and even between different PhD programs within a given school. Although you certainly cannot avoid taking difficult classes during your PhD, it is worth understanding what courses you will have to take, when you will have to take them, and how these courses are structured to ensure you are getting the most out of your educational experience. However, it is also important to recall that

graduate training primarily takes place within the context of your research project, so curriculum and coursework are not the driving force to consider in the same way that choices are made for an undergraduate school.

When analyzing your graduate school and program options, you want to ensure that the program you are interested in offers excellent training for enrolled PhD students. But what should this training venue look like? You should consider the broader context of the training, including curriculum as well as other professional development opportunities. Most programs require that first and second-year students take foundational courses to both deepen and broaden the students' knowledge of the field in which they are pursuing a PhD (National Academies of Sciences, 2018). Depending on the school and program, these courses may take place in lecture hall settings with a large group of graduate students, or in small, intimate classroom settings with a smaller number of students. Here, it is important to consider how you learn best. Do you know whether you have a more favorable learning experience in passive learning environments with large groups of students, or in smaller groups where you are free to engage and ask questions during class? This consideration is unique to the individual applicant but can be an impactful consideration when determining the learning environment that is best suited for you. Many students applying to graduate school may only have experiences in large-seminar type courses rather than small, intimate learning settings and therefore may not understand the benefits of small class sizes. Thus, we encourage students to keep an open mind when considering their graduate learning environment. Moreover, many graduate schools require that students take other courses including courses in statistics (depending on which STEM program you are applying to), writing, ethics, and seminar (National Academies of Sciences, 2018). These courses are designed to enhance the students' critical thinking skills as well as written and verbal communication skills (National Academies of Sciences, 2018). These courses are all taken while students simultaneously focus on their respective dissertation research. It is important to get a good sense of what courses you are expected to take and when you are expected to take them to ensure that you can sufficiently meet the requirements of both your program and your advisor without overextending yourself.

Graduate Records Exam (GRE)

If you are thinking about going to graduate school, you have probably heard about the Graduate Records Examination (GRE). The GRE is a standardized test created and administered by the Educational Testing Service (ETS), which is designed to test a student's overall preparedness for graduate-level studies (Kowarski, 2021). The GRE is like the SAT college entrance exam and seeks to assess general competence in areas such as analytical writing, mathematics, and verbal reasoning (PrincetonReview, 2022). Recently, however, the utility of the GRE as a predictor of graduate student success has been intensely debated. A 2014 study published in *Nature* illustrated that women and individuals from

underrepresented groups often score lower on the GRE than their white male counterparts (Miller & Stassun, 2014). Moreover, the exam cost approximately \$205 which is prohibitively expensive for many low-income students, further impeding promising students from entering graduate school (Blanco, 2021; Miller & Stassun, 2014). Interestingly, these studies show that GRE scores are very poor predictors of a graduate students' scientific productivity (Hall, O'Connell, & Cook, 2017; Miller & Stassun, 2014). Fortunately, many leading STEM graduate programs have begun to recognize that the GRE is a weak predictor of PhD student success and have dropped the GRE as an admissions requirement (Moneta-Koehler, Brown, Petrie, Evans, & Chalkley, 2017). Therefore, students can easily apply to a slate of top biomedical graduate programs without taking the GRE. For information about the many programs that no longer require the GRE, see Dr. Joshua Hall's public spreadsheet (BioGRE.info), which lists many of the biomedical PhD programs that have dropped the GRE admissions requirement (Hall et al., 2017). To be crystal clear, most of these programs no longer accept or consider the GRE in admissions decisions, so taking the GRE brings no value for such applications. Moreover, there are no graduate fellowships or grant opportunities that require the GRE. However, there are some specific areas of graduate education that continue to rely more heavily on the GRE than others, so whether the GRE is required for applications may depend on your specific area of study. Regardless of whether you choose to take the GRE before applying to graduate school, it is important to know that your performance on this standardized exam does not directly correlate with your readiness for the hands-on intensity of a PhD program.

Phase II: The Interview

Congratulations! You have been invited to interview at some of the schools you applied to. Many applicants consider this to be the most stressful part of the application process but fail to realize that while the school is interviewing you, *you are also interviewing the school*. This is your chance to get an up-close and personal look at the life of a typical graduate student in each of these programs. Here you can ask the nitty-gritty questions your late-night google searches left unanswered. There are also many questions you may not know you should ask! Thus, we have provided a chart of key questions prospective students may consider asking faculty and current students during their interview weekend (**Figure 2**). These questions may help with one of the key stages of the interview where you are likely to be asked, "Do you have any questions?" A key piece of advice is to always have one or more question because this shows your interest. You can ask multiple people the same question. In fact, this can be an invaluable approach as you can test whether you get the same answer from multiple sources. Importantly, you will have the chance to have candid talks with the current students and get a feel for their overall satisfaction with the program. Moreover, you may get a chance to speak with faculty members whose labs you are interested in joining.

All in all, the interview process is one of the most important steps to deciding what graduate school would be the best for your training and career development. Here, we have outlined things to consider finding out when you embark on your interviews. [* figure 2 here]

Funding mechanism(s)

During Phase I of the process, you should have narrowed your choices to schools that provide a tuition waiver and offer a living stipend. At this stage, you should gather more information about the mechanisms to fund your stipend. In the ideal situation, your stipend is guaranteed if you are making satisfactory progress. You should seek options that clearly state this to be the case. Typically, such a situation means that the university has some resources to support your stipend early in training (1-2 years) and then your research mentor has grant funding to support your stipend and any associated fees. This model can differ from program to program, but you should seek clarity during the interview about the source of funding. There are also some options that may offer additional training or opportunities.

Some schools or programs will require you to commit to serving as a teaching assistant. While teaching experience can be valuable, be sure you understand the commitment. Will you be responsible for teaching a whole section of a course or are you acting as a teaching assistant? Even if you enjoy teaching, the need to teach each semester while trying to balance your research progress can be daunting. Ensure you understand the commitment and speak to more senior students to gather more information about the time required.

Many programs have some form of training grant support. These training grants can be provided from various sources, including federal agencies such as the National Institutes of Health (NIH) T32 training grants or the National Science Foundation (NSF). These training grants can support student stipend at specific training stages and offer some additional perks such as funds for travel or supplies. As such training grants require a clear plan for training, schools or programs that have such a support mechanism may offer additional training that is mandated by such funding mechanisms. The NIH National Institute of General Medical Science (NIGMS) funds many such training mechanisms and this institute has led the way in requiring training to produce well rounded ethical scientists that are prepared to function within the biomedical research community. These funding mechanisms must be renewed every five years, so this is essentially a required regular refresh of the training offered. Checking whether the school or program you are interested in has such funding mechanisms can provide you with information about how the school or program values graduate training because such funding mechanisms also require significant institutional support.

Some schools will offer support for students to apply for their own independent research funding (Kahn, Conn, Pavlath, & Corbett, 2016). There are several mechanisms for

this support where the graduate student is the principal investigator (PI) for the grant. Some schools also offer an increase in the stipend to those students who secure their own extramural research funding. Like a training grant, these individual pre-doctoral fellowships often have some funds available to support travel and purchase supplies. The experience of crafting a persuasive proposal to see your research to those who make funding decisions can be a very valuable part of graduate training.

In summary, learning the details of the funding, including the sources available should be a key part of your investigation during the interview process. You should ask questions on this important topic of both program leadership and current students to paint the full picture. A goal should be to select a school or program that aligns with your goals and offers you stable funding that aligns with your needs.

Teaching Requirements

Most graduate students are required to teach at some point during their graduate career. However, at some universities teaching is necessary to make up a significant portion of your stipend, while other universities ask students to teach for only a semester or two as a part of the standard curriculum. While teaching can be a fun and enriching experience, for students who do not necessarily need in-depth teaching skills for their future career, having multiple semesters of required teaching can become distracting and burdensome when trying to focus on thesis work. Thus, it is important to understand the teaching requirements at the different programs you interview with.

Teaching assistantships are designed to help postgraduate students develop invaluable teaching and assessment skills. After meeting curricular requirements, some students choose to continue teaching to earn extra money and/or gain valuable teaching experiences (a skill that can easily be applied in your future career and added to your CV). The responsibilities of graduate student teaching assistants (TAs) include leading undergraduate classes, grading papers, as well as providing laboratory supervision and demonstration (Taylor, 2022). Teaching as a graduate student is an excellent opportunity to expand your horizons, gain invaluable scientific communication skills, and put your knowledge to the test. Whether you teach for one semester, or you decide to teach throughout your graduate career, try to take pride in the fact that you will be teaching and engaging undergraduates in your academic discipline.

Career Exploration

Career Exploration, sometimes referred to as professionalization, is an important aspect of your graduate career. After completing your PhD, you will need to enter the job market with transferrable skills— skills that can be applied in your future career. Although

some graduate students remain in academia after completing their PhD, over 50% of STEM PhD graduates do not work in academia or even perform research as their primary job (Lautz, 2018). Instead, many talented graduate students pursue careers in industry, government, or even medical writing. Moreover, it is very common for graduate students change their career goals during the duration of their graduate studies (Cornell, 2020). Therefore, we recommend that applicants consider attending graduate programs that adequately prepare students for a diverse set of careers after graduating.

But what professionalization and career exploration opportunities should you look for in a graduate program? Lautz *et al.* recommend that graduate programs invested in student professionalization and career exploration hold a student-led foundational seminar course to address career needs. These seminars should provide students with early exposure to multiple career pathways to develop a sense of community as well as a professional network (Lautz, 2018). Moreover, graduate programs should encourage and support students seeking professional training specialization and internships in academic and non-academic sectors (Lautz, 2018). By showing STEM graduate students multiple career options, graduate programs can adequately meet the needs of today's PhD students and prepare them for life beyond graduate school.

Support Network

Every successful graduate student has a support network (Studies, 2020). This support network typically includes faculty and staff, other graduate students, postdoctoral students, technicians, friends, and even family. Graduate school is a long and challenging process. Therefore, having a network of people to support you and help you along the way is essential to your success.

Although prospective students are not yet ready to build their support network, it is important that they get a feeling for the current support networks within prospective schools. When interviewing, ask the current students about their support networks. Are these support networks made up of diverse group of people at different stages in their career? You may also consider asking if these students feel supported by the programs' faculty and staff or whether the program has built-in student support systems. Many graduate schools also have graduate student unions (GSUs). These unions serve to protect graduate students' rights and advocate for support from multiple branches of the university. Moreover, many schools have graduate student associations (GSA) comprised of graduate students from many different departments (Studies, 2020). Attending GSU- and GSA-like events can be a great way to get to know people outside of your program and will help you build a support network that will last even after graduation.

Community, Diversity, and Inclusion

Building a community of supportive colleagues and mentors as you transition to graduate-level research training will be instrumental to your overall success as a scientist. Commonly, ambivalence and/or feelings of doubt about one's abilities almost always accompany any major transition, the decision to kick-off your professional academic career by enrolling into graduate school will be no different (Joseph, 2022). It is important to note that you are not alone, and the community you build will play a pivotal role in helping you steer the ins and outs of graduate school. These supportive connections are very important for several reasons: First, your network of colleagues and mentors can act as a team of advocates, providing support and guidance as you develop personally, academically, and professionally. Second, this network often becomes your "family away from home" – helping you to not only navigate deeply personal issues that inevitably arise during graduate school, but also making themselves available to grab ice cream after a long day in the laboratory. Ultimately, the community you build will play an essential role in you living a healthy, balanced, and fulfilling life while in graduate school.

As noted above, the decision to apply to graduate school, interview, and ultimately weigh the multitude of factors that inform where you will spend the next 5-7 years of your life is a very challenging, but rewarding process—for everyone. However, often, individuals from groups that are historically excluded and underrepresented in STEM fields face unique challenges that many of their graduate school peers do not have to consider when deciding what graduate school program best suits them. For example, many of these students face the challenge of finding a program that includes faculty that reflect the diversity of the broader population. In fact, only 10% of STEM faculty members in the US are from underrepresented groups, according to a recent NSF-funded report (Bennett, 2020). Therefore, in the eyes of interviewees from underrepresented groups, this reality emphasizes the sentiment of a familiar quote by Marian Wright Edelman, "You can't be what you can't see", which in turn intensifies doubts about the likelihood of success. In addition to finding mentors with similar backgrounds, many of these students often have the additional pressure of trusting that diversity, equity, and inclusion (DEI) values espoused by programs are not just lip-service, but closely held beliefs of the faculty, staff, and students. Thus, students must have a great deal of faith that graduate programs will invest the time and resources to support stated DEI values. Taken together, the process of choosing a graduate school presents unique challenges for all students, but particularly for students from underrepresented groups that span the application phase through matriculation.

While there has been a long-standing push to diversify and create a sense of belonging in STEM, universities in the US and by extension graduate programs still trail behind in establishing an inclusive community for its faculty, students, and staff. Historically, US institutions of higher learning have supported hierarchies of race and other forms of difference since their founding, and remnants of this very ideology persist in the academy broadly including graduate education. However, the recent rise of social justice movements has led to a renewed sense of urgency to break social barriers and pave the way for the

realization of true DEI in all US institutions. As in many sectors of life in the US, graduate schools still have a long way to go before achieving their goals specific to DEI. These efforts will need to address all aspects of student differences, including many that have not been the focus of efforts such as ableism (R. J. Peterson, 2021). Recent support for social, gender, and racial equity by leaders in higher education are an important first step and provide hope to many graduate students who are from groups historically excluded and underrepresented in STEM fields. As you navigate graduate school, build and leverage your community to be a force for social change. Thus, leaving behind a more inclusive and equitable environment for junior trainees. Importantly, DEI in STEM is a continuous effort that does not have a finish line and will require action from the entire scientific community to keep improving. While navigating through the interview process, it is critical that you begin to identify efforts made by the program to establish an equitable and inclusive environment. For example, as you converse with current students and faculty, ask about initiatives for diversification and inclusion, such as student-led empowerment organizations, community outreach, and DEI committees.

Program Responsibilities

Graduate school, like a 'real job', occurs in a matrixed environment where students are a part of multiple chains of accountability and therefore have responsibilities not only to their thesis advisors, but also to their program (R. Peterson, 2021). Thus, it is necessary to determine what your responsibilities outside of the lab will entail and if these responsibilities change as you progress through your degree. For example, many students are required to help with recruitment of new students, organize program-related events, and attend program seminars. These responsibilities, while important, may serve as a distraction from your thesis work. Thus, it is critical that you determine what your program responsibilities are within each graduate program. These answers are likely not found on the internet but can be readily discussed with current graduate students and faculty members at your interview.

Phase III: Follow-Up Research

The interviews are finally over, and you have solidified acceptances from several schools. Take a deep breath and pat yourself on the back! The bulk of the work is over, but now comes the hard part- deciding which graduate school and program you would like to attend. You may be able to see yourself at multiple different schools/programs making the decision burdensome and potentially anxiety-inducing. At this point, reminding yourself that there is no single "right choice" may relieve some stress. However, there is some follow-up research which may not have been provided during the interviews that can be beneficial as you consider your options and make your final choice.

Student Fees

Unfortunately, student fees do not disappear in graduate school. Despite the fact that the average graduate student stipend is \$32,000 a year (Glassdoor, 2022), most schools still require that graduate students pay fees each semester. While most of the price of the fees is covered by the graduate school, the burden of the remainder of the fees falls on the student. The average graduate student pays some amount in student fees per semester. These fees typically include technology fees, health and wellness fees, athletic fees, and even activity fees. However, the types of fees and the semesterly rates vary greatly between schools and programs. Thus, we recommend that applicants research student fee rates for each of the schools they are interested in. Unfortunately, these data may be hard to find with a simple google search and a scroll through the university website. Applicants may instead consider reaching out to current graduate students to get an idea of the cost of student fees as well as how these students feel about the fees. You may consider asking current students if they are able to easily pay the fees with their current stipend, or if they feel that the fees are fair. Regardless of where you attend, you will probably have to pay some amount of student fees, but it's a good idea to know how much and how often you will have to pay as a graduate student.

Health Benefits

Health benefits can be a stressful topic for many incoming graduate students, especially for students previously covered under their parents' health insurance plan. Typically, student health insurance plans are offered by the institution, however these plans can vary greatly in cost and coverage. Unforeseen medical expenses, such as those related to treating a cold or a simple rash can cost hundreds of dollars, and you do not want to be blindsided by a medical situation in which you do not have adequate financial coverage. This can cause students financial hardship and lead to added stress. Therefore, as you contemplate your graduate school options, it is important to compare the health benefits each school has to offer.

What should you look for in an acceptable student health insurance plan? According to U.S. News, students should expect that plans offer a minimum coverage per year with an annual deductible (Martin, 2013). Moreover, plans should provide coverage for both inpatient and outpatient services anywhere in the U.S. as well as coverage for mental health services, prescription drugs, and physical therapy (Martin, 2013) . Applicants should also determine when their coverage starts and lapses as well as whether they are required to use specific doctors, hospitals, or clinics to be covered.

Gut Feelings

When you know, you know. We cannot emphasize enough the importance of trusting your 'gut feelings' when considering if a graduate school and program is the right one for you. This refers to relying on inclination that you cannot readily explain. Although you should not disregard objective facts, balancing an objective outlook with your subconscious intuition is ideal when deciding what program suits you best. The American Psychological Association reports that decisions recruiting gut feelings are often a reflection of one's true self (Association, 2018), and when picking a graduate school which you will attend for the next 5-7 years, it is best to make a decision that is an authentic reflection of your goals.

Concluding Remarks

Seeking out a stimulating and supportive environment where you can gain the skills needed for the next stage of your career is a daunting, but exciting task. We have presented many different factors applicants should take into consideration when selecting a graduate training program. However, each decision is unique to the individual and there is no single "right" choice, especially when presented with many excellent options. Selecting a graduate school and subsequent program is a major life decision, thus, considering your individual values and aspirations is critical to ensure your success and happiness throughout your graduate career. PhD training can potentially be a consuming and strenuous process; therefore, we advise students to seek training environments that encourage a healthy work-life balance and offer a breadth of training opportunities to support their values and future goals. Although deciding where you want to carry out your graduate studies is a challenging task, we hope that the information presented here will arm you with the knowledge necessary to select a graduate training program that will allow you to thrive personally and professionally. We wish you the best of luck in your graduate school-hunting and future endeavors!

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