

8. Quantitative Psychology

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We suspect that undergraduate psychology majors (UPMs) would say they know less about quantitative psychology² (QP) than other sub-fields within the discipline. If UPMs are unaware of QP, it actually would be quite ironic since most are required to complete QP coursework. In their review of 374 UPM programs, Stoloff et al. (2010) reported that 98% require completion of a research methods or statistics course. Thus, most UPMs have been exposed to QP, but may not have made the connection between these courses and the field.

The American Psychological Association (APA) describes QP as “the study of methods and techniques for the measurement of human attributes, the statistical and mathematical modeling of psychological processes, the design of research studies and the analysis of psychological data” (APA Task Force for Increasing the Number of Quantitative Psychologists, 2009, p. 9). That is, QPs focus on methodological, measurement, and quantitative issues that arise in both applied and basic psychological research. To further clarify, consider the following research questions that QPs might be called upon to answer:

1. How should data be collected to examine the effectiveness of a program created to reduce test anxiety in college students? Should test anxiety be measured not only for program participants, but also for students who do not participate in the program? How often should data be collected and from how many students?
2. How should test anxiety be measured? Should self-report items be utilized? If so, what should be their content and response scale for the items? How many items are necessary? Would biological measures of test anxiety (e.g., galvanic skin response) be more accurate? Does one method of measuring test anxiety result in more precise and/or meaningful values than another?
3. What statistical analyses are needed to describe the results of the study and to make conclusions about program effectiveness not only for this sample, but for the larger population of college students from which the sample was obtained? What are the assumptions of these inferential statistical methods? If evidence suggests that assumptions have been violated, how are conclusions impacted and what alternative analyses might be used?

These questions were intentionally arranged into three sets corresponding to different areas of training within QP: research methods, measurement, and statistics, respectively. Although a QP may specialize in one of the three areas, QPs receive training in all three.

How is QP distinct from other sub-fields?

Because every psychologist consumes or produces research, they must have facility with quantitative methods. The necessity of quantitative skills is why UPMs and psychology graduate students are required to complete quantitative coursework (Aiken, West, & Millsap, 2008). Given all psychologists are expected to have quantitative proficiency, a relevant question is what makes QPs distinct? The answer pertains to the depth and breadth of the coursework, research, and practice that QPs devote to these topics. Whereas a developmental psychologist might learn about quantitative methods to answer research questions within their domain, it is the quantitative methods in and of themselves that are of interest to QPs. For instance, QPs might develop new techniques in research methods, measurement and statistics, or may evaluate the performance of existing techniques under commonly occurring conditions (e.g., small sample sizes, non-normal data; APA Task Force, 2009).

Because QPs develop and evaluate the quantitative methodology used to answer substantive research questions in *all* areas of psychology, becoming a QP does not mean a person has to “give up” their interest in

² QP will be used as an acronym for Quantitative Psychology and Quantitative Psychologist.

other domains. In fact, having expertise in quantitative methods allows QPs to be involved in a wide variety of research in the social sciences.

What kinds of jobs do QPs have?

QPs enjoy a wide variety of careers, including those in academia, research/testing organizations, and governmental agencies. Examples of job titles include professor, research scientist, psychometrician, data analyst, and evaluation specialist. We find it helpful to distinguish between what might be called “technical” and “applied” positions. QPs in more technical positions may spend the majority of their time examining the behavior of measurement or statistical models under various conditions or developing new models. Many faculty positions in QP graduate programs at research-intensive universities would be considered technical. There are also technical careers in educational testing or research organizations where a large proportion of time might be devoted to evaluating various models, writing code, executing analyses, and writing reports.

Careers suitable for more applied QPs include positions at research and testing organizations where a great deal of time is spent explaining quantitative techniques and results to non-quantitatively oriented audiences (e.g., policy makers, teachers, and clients). Applied positions typically require strong interpersonal and time management skills because responsibilities include managing projects as well as people.

Although we have made a distinction between technical and applied positions, most positions have both technical and applied components. The most successful QPs have technical expertise as well as excellent communication and “soft” skills (e.g., time management skills, interpersonal skills). Although one can become a QP with subpar skills in some areas, the number and nature of the jobs available are more limited.

Are QPs in demand and what is their typical salary range?

The demand for QPs has been high for some time and there is no reason to expect it will decrease. There is a particularly great need for educational measurement specialists, often called psychometricians, who assist in the creation and evaluation of educational tests and scales (Brennan & Plake, 1991; Herszenhorn, 2006; Patelis, Kolen, & Parshall, 1997). Because there are more jobs than QPs to fill them, APA convened the “Task Force for Increasing the Number of Quantitative Psychologists” in 2006. Not surprisingly, this task force and others have called for heightened recruitment efforts of undergraduates into QP (APA Task Force, 2009; Finney & Pastor, 2012; Sireci, 2000; Sireci & Khaliq, 2002).

It would not be unusual for a new Ph.D. to obtain starting salaries between \$50,000 and \$120,000, although the particular amount will depend on the employer, location, position, and applicant. More information can be found in Camara (2007) and Packman, Camara, and Huff (2010).

What kind of training is needed to become a QP?

A master’s or doctoral degree is needed to become a QP, with more job opportunities and higher pay typically available to those with a doctorate. QP graduate programs are housed in departments of psychology and educational psychology, with programs in the two departments overlapping in the quantitative training provided, but differing in the applied context (APA Task Force, 2009). UPMs interested in quantitative methods to address questions in psychological research and practice should consider programs in psychology departments, whereas those interested in educational research and practice should consider programs in educational psychology departments. A listing of programs can be found in the APA Task Force report (2009) and those specific to educational measurement can be found in Kolen and Tong (2012).

What kind of undergraduate courses or experiences would be most helpful in applying to QP graduate programs?

Applicants to QP graduate programs typically have an undergraduate degree in the social sciences or education with coursework in statistics, mathematics, or computer programming. Students with degrees in statistics, mathematics, or computer programming with coursework in the social sciences or education are also well suited. In preparation for graduate work, UPMs should complete as many courses as possible in

measurement, statistics, and research design and also seek opportunities to assist faculty with research. These experiences will help students answer the question, “Is a career in QP right for me?” If the answer is yes, these experiences will strengthen the student’s application. If the answer is no, these experiences are still beneficial as they likely strengthen the student’s application for employment or graduate study in another domain.

Coursework in mathematics (e.g., calculus, matrix algebra) is required by some QP graduate programs. Other QP programs put less emphasis on the number and type of mathematics courses completed and more emphasis on QP coursework (e.g., psychological statistics, research methods) and experiences (e.g., research with faculty). There is no doubt that mathematical training facilitates deep understanding of QP concepts, but QP graduate programs and careers vary in the extent to which mathematical skills are required and utilized.

Summary

The expertise of QPs in research methods, measurement, and statistics allows them to enjoy a wide variety of careers. QPs are in high demand and are usually paid generous salaries. A graduate degree is typically needed and more opportunities are available for those with doctorates. Completing quantitative coursework and engaging in research with faculty will not only help UPMs decide if QP is right for them, but will strengthen their resume regardless of what career they decide to pursue.

Final Thoughts

Even though quantitative psychology is one of the Charter Divisions of APA (i.e., Division 5), less than <1% of APA members identify their major field as QP (or a related field; APA, 2012) and of that small percentage, many “stumbled onto the field by chance” (APA Task Force, 2009, p. 20). Because the field is not well known, UPMs may encounter professors, even of quantitative courses, who know little about the field. For this reason, UPMs interested in learning more should consult the resources in the reference list and connect with faculty and graduate students in QP programs. UPMs should also visit the websites of QP programs and relevant professional organizations (APA-Division 5, American Educational Research Association – Division D, National Council of Measurement in Education).

We hope that we have given UPMs reason to adhere to this wise piece of advice from Novotney (2008): “Next time you’re considering skipping stats class, think again.”

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