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Research Components in Curriculum of Doctor of Physical Therapy Programs

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Research Components in Curriculum of Doctor of Physical Therapy Programs

by

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Andy Zhu

A capstone project submitted to the Graduate Faculty in Physical Therapy in partial fulfillment of the requirements for the degree of Doctor of Physical Therapy (DPT), The City University of New York

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This manuscript has been read and accepted for the
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ABSTRACT

Research Components in Curriculum of Doctor of Physical Therapy Programs

By

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PURPOSE:

The purpose of the study is to determine the current Doctor of Physical Therapy program curriculum, as it applies to research classes and research projects. We investigated the current research requirements of various DPT programs nationwide to determine DPT graduates' preparedness to conduct research post-graduation.

METHODS:

Participants of the current study were recent DPT college graduates selected from DPT programs across the United States. Subjects were asked to participate in a brief online survey questionnaire in reference to their DPT program research curriculum.

RESULTS:

A total of 215 DPT programs contacted, out of which 39 schools were able to participate. A total of 354 participants from 23 of the 50 states were enrolled in the current study. 315

enrolled participants (236 female, 74.9%; 79 male, 25.1%) successfully completed the study. Over 60% of the survey responses came from new graduates. Research was included in the curriculum 98% of the time according to respondents and greater than 50% of respondents claim to have 3 or more classes over the course of the program dedicated to research. Over 88% state a final research project of some kind was needed in order to complete the curriculum for graduation.

CONCLUSION:

Almost all of the DPT graduates had courses dedicated to research in their curriculum. A large portion of the population involved in the survey was required to complete a research project in order to graduate. The more research exposure in curriculum and through research projects as a student the more independent in research related skills an individual becomes and thus the more likely they are to continue with research as a professional. This survey or one similar has the potential to direct curriculum in a way that could benefit the Evidence Based Practice and therefore influence the entire field in a positive way. This will be done by pinpointing the circumstances under which a clinician is most likely to continue research as well as guide future surveys and synonymous studies as to where to focus.

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We would like to thank all participants that completed the survey.

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INTRODUCTION

Research, in general, provides for greater understanding in the respective field, but health related research allows for a more direct impact as it has a greater potential to improve the “dynamic state of well-being” of individuals within society that takes into account the physical, mental, emotional, and social aspects of life (Bircher, 2005). Evidence-based practice (EBP), serves to bridge the gap between research and clinical work, as it helps health practitioners to better serve their patients (NeuroCom2012). Much of modern healthcare now operates on the ideal of evidence-based practice. The integration of individual clinical expertise with the best available scientific evidence has allowed health practitioners to provide efficient diagnoses and treatments for their patients (Turner, 2001). This is supported by a recent study that analyzed the attitudes and beliefs among 227 dieticians, occupational Therapists, and physical therapists in regards to evidence based practice in a university hospital setting (Heiwe et. al, 2011). Results showed that research was seen as a necessary tool to support clinical decision-making. More specifically, participants advocated the use of literature and research findings to be useful in clinical practice. Another group conducted a study to determine the importance of conducting research in Physical Therapy (Connelly et al, 2001). The study showed that conducting research (1) validate physical therapy services, (2) provides information on the effectiveness of treatment, (3) improves patient care by making intelligent clinical decision based on research findings, and (4) provides therapists with more information for various problems they may face. The authors of the study determined that research can help further science by influencing current and emerging health care trends and to advance the health profession. Conducting research is crucial to the field of physical therapy because it promotes improvements the health care system such as increased enrollment in managed health care organizations, capitation of services, decreased third-party reimbursement, expanded interest in health promotion and disease prevention

(Connelly et al, 2001). Therefore, health related research addresses not only existing problems, but also allows for the identification of new problems, the development of theoretical frameworks, discovery of mechanisms, and the validation or invalidation of existing and new techniques or interventions. This process is further aided by the creation of databases for the specific area of research to allow for easy access and sharing of research done in the respective area. This allows for experts of a given specialty to better conduct focused research within their respective field.

Having limited research experience may be the primary difficulty that clinician encountered in spotting new ailments or general flaws in techniques or equipment design due to a lack of analytical skills that they would have gained if they had received more formal training on how to conduct research. It stands to reason, then, that if more healthcare professionals were trained in research, not only would practitioners gain the analytical skill to spot these issues more quickly, but would also have the skill to address them in a more efficient manner. It is also likely that, the more research training a healthcare professional receives, the more likely it will be for that professional to diagnose and treat patients with greater efficacy. It would remove autonomy and forced the health practitioner to think before acting. They would require evidence for either their proposed diagnoses or for the proposed treatments for a particular ailment.

Healthcare professionals who have dual degrees in a healthcare profession as well as its respective Ph.D. are able to do this with the greatest efficiency. Since they receive extensive training in both research and the health profession of choice, it increases the likelihood of them thinking before acting, thus practicing EBP. Furthermore, they are able to conduct research in addition to being able to treat patients, so they are in the best position to spot issues and make the scientific community aware of it. Having any degree of training in research in addition to

healthcare practice adds another layer of understanding to EBP. This is likely why most PT programs have made the shift to the doctorate of physical therapy, which includes research training for students in addition to regular coursework (CAPTE: Aggregate Programs Fact Sheet, 2013). Although the DPT degree is not officially considered a dual degree, it offers similar benefits as a PT/PhD degree would as a result of the dual training DPT students receive in both professional and research work (CAPTE: Evaluation Criteria, 2013). Current data shows that most physical therapy graduates in the past six years have graduated from the DPT program than any other physical therapy related program, most of which received some degree of training in research (CAPTE: Aggregate Programs Fact Sheet, 2013). Health care providers with extensive research training gain a greater understanding and have the potential to conduct better research, while providing better patient care, as they can apply knowledge gained from research as well as clinical work. They are also more likely to read scientific literature, which will allow them to stay up to date on the latest findings. This allows them to better steer their research while choosing the best treatments for their patients as their knowledge of the field continues to grow. This is supported by a study conducted by Schwarz and Hondras (2007), in which a survey was to explore the attitudes and perceptions of practicing chiropractors in Germany regarding research. The study also looked at their reading and research habits, and to gather demographic and practice data. Of the surveys 48 completed and returned after distribution, 45 respondents stated they would support research efforts while 15 declared interest in participating in practiced based research. An average of 3 hours per week was reportedly spent reading scientific literature by 44 respondents. It is evident here that research is a key component in practicing clinicians. Reading up to date research helps to improve educational knowledge (Schwarz and Hondras, 2007). This suggests that even healthcare professionals who receive a reasonable amount of

formal research training would be able to acquire the necessary skills to improve their understanding of the profession. The benefits gained by clinicians from having research training cannot be understated. More health related programs and their governing bodies should consider establishing a requirement to include some degree of research training into their curriculums.

With the exception of dual degree programs, like the MD/PhD program, most health related programs do not require training in health related science research. Some of these programs, like the MD/PhD program, offer students a stipend in addition to paying for their tuition (AAMC, 2013). The accreditation council for graduate medical education has also stated that students who have participated in research training during medical school will be favored strongly during specialization. These students are offered the most opportunities for specialization upon graduating from medical school (ACGME Common Program Requirements, 2013). At present, there is a general trend where many medical students and doctors are also conducting research while practicing medicine (AMA American Medical Association, 2013). This has led to the development of more programs offering dual degrees in medical and other programs that allow students to earn degrees in research and a professional degree of their choice (University of Michigan Medical School, 2014). Although DPT programs are attempting to follow a similar trend by making research requirements a part of the curriculum, no universal method of training has been agreed upon (CAPTE: Evaluation Criteria, 2013). This presents a dilemma for physical therapy schools, as it results in a varied degree of research training and understanding of research methods and result among groups of PT and DPT graduates. Different methods range from having students critique published research, to writing research proposals but not actually carrying out projects, to adopting and assisting with a faculty research project, to actually completing an independent research project (Connolly et al, 2001). Some individuals,

like Jules Rothstein, believe that research should be discontinued for students because they assume that “students cannot understand nuances of questions, assimilate the background literature, develop theoretical bases, and comprehend measurement and design issues (Connolly et al, 2001).” It is incorrect to ignore the need for research training based on such an assumption. The lack of knowledge or familiarity with research is an issue that should be addressed in physical therapy education programs. . Rather than discontinuing research training for students of physical therapy, focus should be placed on making improvements on the current methods of training and unifying them into one method that is utilized by all DPT programs.

The lack of proper research training and experience may lead to a trend of relying on researchers in transitional research conduction. Many researchers, however, have little to no clinical experience; they are not certified healthcare professionals. Rather, the most common researchers and scientists have expertise that is based primarily on laboratory experience. Although research scientists are important for their analytical and laboratory skills in planning out research projects and analyzing the results, they may not always up to date on the current issues faced by health care professionals and their patients. Such issues include possible problems with treatments, techniques, or with equipment. Sometimes, new ailments may arise that require the development of new techniques or instruments and equipment. Clinical healthcare providers are the first to be exposed to such issues, some of which may be a rare occurrence, while others that may recur frequently. Without proper training, it is possible that such issues may not be brought to the attention of research scientists until the problem gets out of hand. This has an impact on the research conducted, as it makes the process less efficient. Issues requiring immediate attention may not be addressed until much later, which can result in the injury or death of more patients than there would be if the problem had been addressed sooner.

Currently, there is no universal requirement for research training in medical schools. The inclusion of research requirements into a medical school's curriculum is left to the discretion of the school. Despite this, however, a large number of schools have adopted the practice of including required research training as part of their core curriculum. The recent addition of mandatory research training in many medical school curriculums is considered to be one of the most important new developments in medical education in the last five to seven years (Student Research Requirements Redefine Med. Ed., 2012). Dr. David Muller, Dean of Education of Mount Sinai, states that the "mandatory research requirement for medical students was something that until recently we only saw occasionally, but now it's almost an expectation. It's beginning to determine how schools market themselves, and it's affecting residency applications and how applicants decide where to apply" (Student Research Requirements Redefine Med. Ed., 2012). Out of 126 medical schools fully accredited in 2012 by the Liaison Committee on Medical Education, 114 schools were surveyed in fall 2012 and early 2013 for the rankings of research medical schools (Top Medical Schools, 2013). The 114 schools provided the data needed to calculate the research rankings and though they did not indicate what type of research was done, it showed that they did conduct some type of research activity in the medical school program upon graduation (Top Medical Schools, 2013). Yale and Harvard medical school, for example, requires MD students to prepare an MD Thesis and dissertation (Yale School of Medicine, 2014) (HST, 2014). Keck School of Medicine of USC, on the other hand, requires students to gain some form of research experience prior to the first year of medical school or undergo research training and gain experience during their first year in medical school. (Keck School of Medicine USC, 2010). These data suggest that research training is in general required in medical schools even though these requirements vary cross the country.

A number of surveys have been conducted to gauge the attitudes and perceptions towards the inclusion of research in Medical school, Chiropractor school, Occupational, and Physical Therapy schools. Recent study surveyed the attitudes and perceptions of 211 occupational therapy and physical therapy students in Sweden through a cross-sectional study via questionnaire (Kamwendo and Tornquist, 2001). Attitudes of students were analyzed during the 1st and last semester of school. Results showed positive attitudes of students towards research. Students in their last semester of school had a significantly higher ability to conduct research versus the first semester students. Students who participated in ‘problem based learned’ were more likely to conduct research after graduation versus students who partook in traditional education methods of research (Kamwendo and Tornquist, 2001).

Surveys were also conducted to determine if graduates of the aforementioned schools actively conducted research or if they had any intention to do so. Kamwendo and colleagues (2002) conducted a study analyzing attitudes and perceptions of 343 Swedish physiotherapists towards research via postal questionnaire. More specifically, they wished to determine whether physiotherapists had intentions to perform and participate in research related activities. Results showed that physiotherapists believed research to be an integral part of their professional role (reading research literature was deemed most important activity). Lack of time and heavy workloads were barriers to participating in research related activities. A study by Harsha et al. (2009) looked at the awareness, skills, perceptions and practices among undergraduate medical students towards research and the factors responsible for willingness to take up research as a career. They used a questionnaire-based quantitative study. A total of 471 students responded to their questionnaire of which nearly 70% were aware about research, 76% were part of a research team mainly as part of the medical curriculum, and only 8.3% were confident of research as a

career option (Harsha et al, 2009). Their multivariate reveals that those with good skills, students who are involved in research and having research in addition to their curriculum were more likely to take up research as a career option or would continue to do research in the future. They concluded that good training and student support programs focusing explicitly on research would motivate students to opt for research careers (Harsha et al, 2009). Nevertheless, none of these surveys provided concerning research training in the curriculum as it applies to courses offered and required projects.

The physical therapy program was first initiated in 1921 after an increased need for specialized medical care following an epidemic of poliomyelitis and the violence that occurred as a result of World War I (Plack, 2002). A precursor to the program was established by the military before 1921 as a 3-month recovery program for returning soldiers. 1921 brought about the birth of the American Women's Physiotherapy Association (AWPA), which later changed its name in 1922 to the American Physiotherapy Association (APA). This association was the precursor to its more modern version, the American Physical Therapy Association (APTA), which established the first minimum standards for the profession in 1928 (Plack, 2002). The APA was unable to agree on universally standardized requirements for the program and so handed over the responsibility to the American Medical Association (AMA). The AMA then established the "Essentials for an Acceptable School of Physical Therapy Technicians," which allowed the first 13 institutions to be accredited. These standards were put into the format of a program from 1930 to 1950, which consisted of a 9-month training program with 1,200 hours of instruction and required the candidate to graduate from a 2-year nursing school (Plack, 2002). During this time, the program went from being localized to areas of need to more widespread as the needs resulting from World War II demanded it. 54 more institutions became accredited, 35

of which offered certificates, 18 offered either a certificate or a baccalaureate degree, and 1 offered only a baccalaureate degree; 37 programs would offer the baccalaureate degree by the late 1950s (Plack, 2002). The poliomyelitis epidemic of 1950, one of the worst outbreaks to occur of the disease and the Korean and Vietnam wars created continued demands for physical therapists. Even though the Salk vaccine of 1955 cured many people of poliomyelitis, many still required restorative care (Plack, 2002). By the 1960s, physical therapy interventions were more comprehensive and complex (Plack, 2002). The 1950s-1980s was a period that made the baccalaureate degree a standard for physical therapists. Anything less was not considered adequate and the APTA now required candidates for the Physical Therapy program to obtain the elevated degree of a 4-year-entry-level baccalaureate degree (Plack, 2002). The late 1990s saw an unofficial transition to a graduate level master's (MPT) or doctorate of physical therapy (DPT) degree, even though there was already a great deal of confusion if such a transition was even necessary (Plack, 2002). The first two-thirds of the last three decades saw a large variety in the degrees offered to Physical Therapists (ie, BA, BS, MA, MS, MPT, and DPT), 14 of which also included various post-professional degrees (i.e., MS, DPT, DPTSc, DHS, DSc, PhD, and ScD). This has created a great deal of confusion for most people, as many wonder at what one degree offers that others do not (Plack, 2002). A bachelor's and master's degree in physical therapy differ in terms of training in clinical research and clinical evidence based practice (APTA, 2013). As the healthcare community began embrace evidence-based practice, the difference among the various degrees was sometimes based on the amount of research training. A bachelor's in physical therapy offered no proper research training, while the master's program appears to have offered at least a minimal amount, whereas the doctoral degree appeared to offer even greater training than the master's degree, though this was not always the case.

This confusion led the APTA to implement a core curriculum for physical therapy programs as well as a requirement that all Physical Therapists and physical therapy programs transition to the DPT degree. This served to standardize the level of education and training among all practitioners of this profession. This is also likely why most institutions now offer only a DPT program, a few of which also offer an MPT. The APTA plans on having all schools transition to the DPT program by 2015 (APTA, 2012). The DPT program, on the other hand, provides an even greater amount of research training than the master's program. The University of Pittsburg, for example, offers a master's as well as a DPT program for physical therapy (University of Pittsburg, 2014). Its master's program does not place as much emphasis on research/evidence based practice as the DPT program. The program has 4 research related classes, 3 of which are research seminars, while their DPT program requires that students take research or evidenced based practice courses every semester for a total of 8 classes. In their DPT program, they also have the opportunity to participate in research. This option is not offered if they choose to opt for the master's program. Students can participate in ongoing research projects that are carried out by their faculty during the DPT program. This experience allows students who are interested in research to have a hands-on learning experience by actively participating in several aspects of basic, clinical, and translational research (University of Pittsburg, 2014). This finding indicates that the master's program offers minimal research training and opportunities compared to a DPT program.

Implementing changes to the curriculum of physical therapy programs to require more research training while transitioning to the DPT program is only the beginning. The research training requirement in various PT and DPT programs has not been clearly instructed or well-studied, especially after the transition to DPT programs. The current level and quality of research

training included in these programs is not enough. More should be done to provide students of DPT programs with a greater appreciation and understanding of research methodology and application. As the transition to the DPT degree is still fairly new, there may still be time to revise the curriculum to address the need for more formal research training and emphasis on EBP in the program.

A recent study suggests, however, that there is currently a lack of proper amounts of research training associated with physical therapy programs (Connolly et al., 2001). This affects recent graduates in their preparedness to conduct research and evidence-based practice properly, thus putting patients at risk. There is no current survey documenting DPT programs' curriculums and/or research project requirements. Furthermore, there is a significant lack of knowledge about the current research requirements in DPT programs across the United States. This is a major concern today, as data collected by the study suggests that students of various kinds of health care professions may not gain the proper research training (Connolly et al., 2001). The results of the study indicated that there is disagreement among educators on how best to train students in the field of research (Connolly et al., 2001). As a result, no unified plan is in place on how to conduct this training among institutions within the varied healthcare professions. This is perhaps why the degree of knowledge concerning research methodology and practice varies so much among graduates of these schools. The author also suggests that a lack of knowledge and familiarity with research methods is a problem that is believed to be present and must be addressed in the education system. Furthermore, it was found that, although the programs were successful in helping students to retain certain skills concerning research for a period of time, they had little effect on changing students' attitude towards research or their desire to conduct it (Connolly et al., 2001).

The APTA's requirement that all physical therapy programs transition to DPT suggests that research is considered a vital component to the new curriculum. However, we do not know whether all DPT programs follow this transition of research classes in DPT programs. During the time when physical therapy programs were transitioning to DPT, a study was conducted by Ross and Anderson on the evolution of a Physical Therapy Research curriculum (2004). In the study, they looked into the possibility of incorporating more evidence based practice (EBP) in the curriculum. In the study, they describe a course series on EBP that they developed when their Physical Therapy program switched from a masters' to a doctorate. This curriculum focused on research design, EBP, and clinical decision making. This focus on EBP, research design, and clinical decision making appeared to have a positive effect. They believe that it served to better prepare students of physical therapy, and thus improved patient care (Ross and Anderson, 2004). Since a transition to DPT is now required for most physical therapists, transitional DPT (t-DPT) programs have been established in a number of institutions. The t-DPT program allows for practicing physical therapists who did not earn a DPT degree, to go back to school and receive the training and education to acquire one (APTA, 2013). There is agreement on a general core curriculum for both DPT and t-DPT. Because the agreed upon curriculum is fairly general, the depth or quality of instruction in each course may vary from one institution to the next. In a transitional DPT program from a master/bachelor, research is an important add-on for t-DPT programs, thus it should be included in all DPT programs (APTA, 2006).

Since Physical therapists trying to become DPTs must obtain training that is equivalent to currently graduating DPTs, the courses required by t-DPT program may also be related to the courses offered in the curriculum for DPT program. Not all schools may have changed their curriculums for the DPT programs, however, to reflect the suggested requirements the APTA

wants them to follow. As a result, the amount or quality of research training provided in these DPT and t-DPT programs may vary or not be enough. This is a major concern, as it is important for students to be well versed in evidence based practice and the utilization of current scientific research to make diagnoses and offer treatments. This view is supported by an overwhelming amount of participants agreed that EBP is important and useful (Jette et al, 2003). Without it, physical therapist would receive improper or incomplete training, which can increase the chances of injury to a patient. The Board of Health and Welfare in Sweden (2009) addresses this by providing data, which reveals that 8.6% of patients were injured during hospital care. Such injuries were judged to be avoidable if knowledge about proper care protocol had been applied. Widespread standardization of the DPT curriculum throughout the United States will ensure that all physical therapists receive similar training. This will help to provide a consistent quality of care while reducing patient injury. Another issue that needs to be addressed is the time and resources available to clinicians who wish to conduct research while practicing patient care. Two of the most prominent factors limiting the use of EBP and review of scientific literature have been revealed, lack of time and resources (Jette et al, 2003).

Our goal is to determine the recent and current DPT curriculum as it applies to research classes and research projects. We investigated the current research requirement by various DPT programs nationwide to determine DPT graduates' preparedness in research activities continuation. Four fundamental questions have been raised in this study: (1) to determine the exposure to research throughout their curriculum; (2) to examine the relation between recent DPT graduates ability in research related skills to likelihood of conducting future research; (3) Investigate the extent of the student involvement in research activity and (4) Evaluate current research activity to identify factors that contribute towards expectation of resultant publication

based on project pursued, to suggest optimal factors. We hypothesize that (1) research components are not a curriculum requirement among nationwide DPT programs. If research is a curriculum requirement, (2) there is a higher expectation of publication of research project with increased length of time spent on the project. Also, if research is required to graduate, (3) the incorporation of a research component in a DPT program's curriculum will encourage continuation in research in the profession. (3a) the greater amount of research courses will lead to increased acquisition of skills required in research activities and (3b) the increased independence in research skills can be used to suggest the likelihood of pursuing future research projects.

METHODS

Subjects

Participants in the current study were recent Doctor of Physical Therapy graduates of DPT programs across the United States. Out of 215 DPT programs in total that were outreached in the current survey-based project, 39 schools from 23 of the 50 states participated. A total of 354 participants voluntarily participated in the current study, and 315 participants (236 female, 74.9%; 79 male, 25.1%) successfully completed the study. All the enrolled subjects had registered and graduated from a DPT program with one to more than four years post-graduation. Age of the participants was not considered as a factor, and thus not collected and reported.

Procedure

We developed a survey questionnaire (see Appendix) to investigate the recognition and availability of research components in the vision of DPT schools in US. Specifically, the survey was designed to evaluate 1) the quantity and quality of the research preparedness throughout in-

class lecturing to off-class experimental-based practice; 2) and its interaction with determinates of DPT graduates' attitude toward research activities continuation. In total the survey consisted of twenty-four questions in the formats of Dichotomous, Demographic, Likert, Multiple Choice, and Comment Box, grouped into four categories based upon different sub-aims of the study: Demographics (n=5), Curriculum (n=3), Research Project (n=11), and Attitudes (n=5). Demographic questions (survey items 1-5) were used to describe participants' basic relevant information including gender, years since graduation, state of DPT program, name of DPT program, and work setting. Curriculum questions (survey items 6-8) were incorporated to determine the quantity and format of the research components integrated in US DPT programs' curriculum development. The majority of the survey questions were intended to extract information in regards to the requirements of the Research Project. Questions in this category (survey items 9-19) were tailored to identify if the Research Project was an integral part to the DPT program. The Attitudes category (survey items 20-24) was used to calculate the perceptions/attitudes of the graduates towards research and research related activities post-graduation.

The survey included a comment box that will allow the subjects to provide any information regarding research and its incorporation in the curriculum. The survey would take approximately 5-7 minutes to complete by the participants. Responses of the survey questionnaire from all enrolled participants were achieved via online, through service provided SurveyMonkey.com. The survey was available online for a time period of 4 months.

An initial institutions list was generated through the CAPTE database (Commission on Accreditation in Physical Therapy Education). The researchers compiled a list of contact information for each institution. The chairpersons and program directors of these institutions

were contacted by phone and email and asked to forward the survey to the recent graduates from their respective programs. There was no maximum limit to the number of participants involved in the study. Reminders were sent via e-mail to the program directors on the last day of each month.

All participants agreed to sign an IRB waiver prior to participation in the survey. The questionnaire was submitted to College of Staten Island Institutional Review Board. (We have an IRB approval letter with an 'EXEMPT' status.)

Data analysis

Data was analyzed using the SPSS version 20 for Microsoft Windows, as well as Microsoft Excel. Response frequencies for the survey questions were determined and displayed in tabular and graphic formats. Screening of the eligible responses was performed to remove inconsistency and erroneous results. 39 participants out of a total of n=354 were eliminated due to incomplete/unfinished surveys. Also some of the 39 participants were eliminated due to inconsistent answers throughout the survey. (E.g. Not understanding the meaning of the question). After examining the response frequencies, and before examining the associations between variables, some variable categories were combined in order to allow further analysis using them for correlation analyses. The data was normalized with some of the analyses questions. (E.g. Likert scale questions, each answer was given a numerical value. Strongly Agree equivalent to 5, Agree equivalent to 4, etc.) For those items with a 5-point Likert scale, the "definitely" and "likely" categories were combined" and also "unlikely" and "definitely not" categories, so that responses fell into one of three categories: "likely" "unlikely" or a neutral category of "undecided." For questions pertaining to attitude or expectation change, if a subject

had a positive change they were given a score of 1, if they were unchanged their score was 0 and if they had a negative change their score was -1. For questions with “yes/no” responses, “yes” was given a score of 1 and “no” 0.

Pearson Chi Square analysis was used to find the correlation between number of research classes and level of independence in research skills. Table _5_ shows that (multiple skills) levels of independence are correlated to the number of classes in the curriculum. From this information we can gather that the more research classes one has the higher level of independence they will have in those skills.

RESULTS

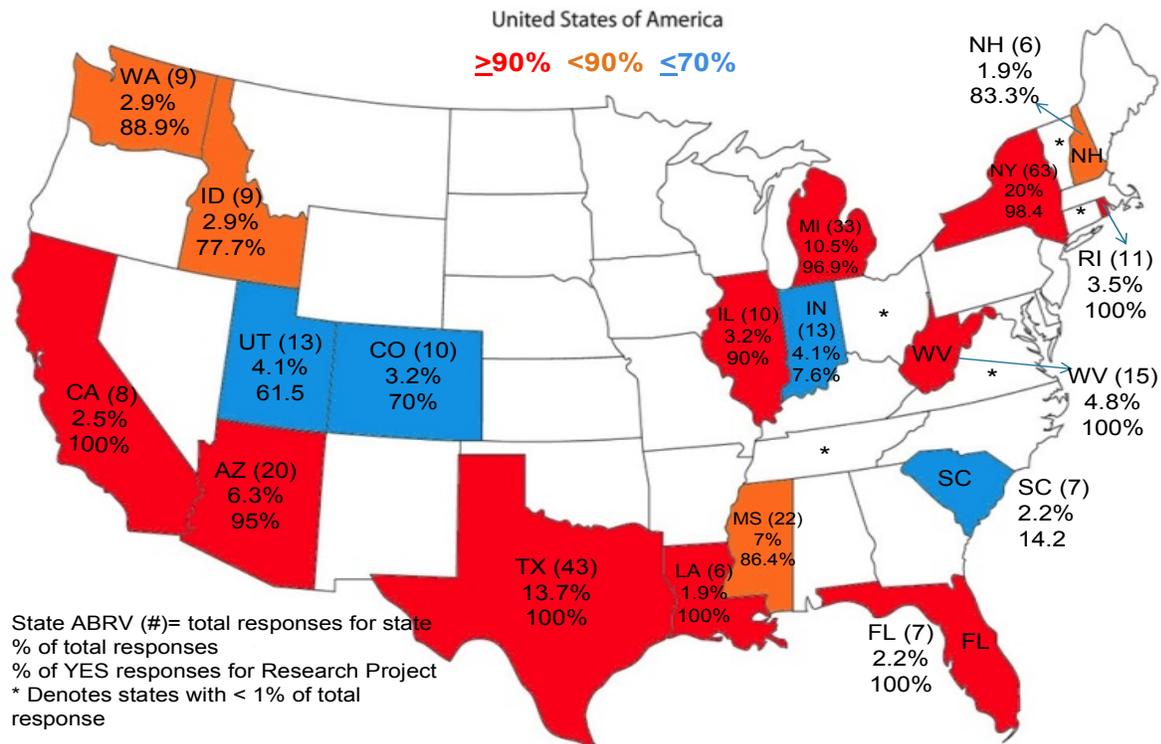


Figure 1. Shows the distribution of the participants in the survey across the U.S.A. The state abbreviation, the number of respondents from that state, the total percentage and the percentage of yes to having a requirement in curriculum for a research project.

Respondent Characteristics

There were 315 respondents who completed the entire survey out of 345 total respondents. Females represented 75% of the respondents which reflects the percentage of male to female ratio of the profession of Physical Therapy according to the APTA website. The states of New York, Texas, and Michigan make up 45% of the total responses. For more information regarding the state by state breakup please refer to the map (Figure 1).

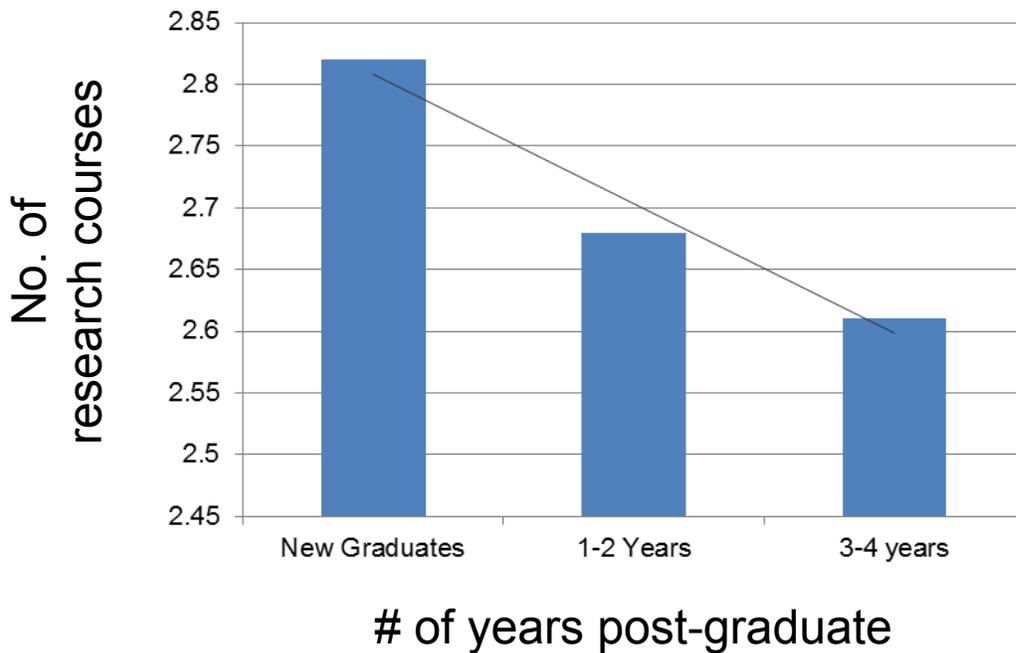


Figure 2. The group of greater than 4 years graduated from school was omitted secondary to the small sample size and the misleading appearance of the graph. The graph shows the newer the graduate the more classes they have however there is no significance to this statement

New graduates represented 66% of the total and of the current career settings Outpatient clinics represented 47%. All of the demographics for the survey respondents can be found in Table 1

Table 1. Responses for Demographic Category

<i>Characteristic</i>	<i>No.(%) of Respondents</i> <i>(N= 315)</i>
<i>Gender</i>	
Male	79 (25.1)
Female	236 (74.9)
<i>Years of Practice</i>	
New Graduate (<1 yr)	209 (66.3)
1-2 years	85 (27)
3-4 years	18 (5.7)
>4 years	3 (1)
<i>State of DPT Program</i>	
Arizona	20 (6.3)
California	8 (2.5)
Colorado	10 (3.2)
Connecticut	3 (1)
Florida	7 (2.2)
Idaho	9 (2.9)
Illinois	10 (3.2)
Indiana	13 (4.1)
Louisiana	6 (1.9)
Michigan	33 (10.5)
Missouri	22 (7)
New Hampshire	6 (1.9)
New York	63 (20)
Ohio	2 (0.6)
Rhode Island	11 (3.5)
South Carolina	7 (2.2)
Tennessee	3 (1)
Texas	43 (13.7)
Utah	13 (4.1)
Vermont	1 (0.3)
Virginia	1 (0.3)
Washington	9 (2.9)
West Virginia	15 (4.8)
<i>Job Setting</i>	
Hospital	43(13.7)
Nursing Home	19 (6)
Outpatient Clinic	149 (47.3)
Home Care	12 (3.8)
Researcher	2 (0.6)
Other	90 (28.6)

Curriculum

Research was included in the curriculum 98% of the time according to respondents and greater than 50% of respondents claim to have 3 or more classes over the course of the program dedicated to research. The majority of new graduates had three or more classes dedicated to research during their graduate school program (68.4%, R sq.- 0.02), while those practicing for over a year were evenly split between having 4 or less research dedicated courses (Figure 2). Over 88% state a final research project of some kind was needed in order to complete the curriculum for graduation, the breakdown of research project requirements by state can be seen in the map as well. (Figure 1).Some data from the survey regarding the subsection of curriculum in the DPT programs is described in Table 2.

Table 2. Respondents for Questions in Curriculum Category

Curriculum Characteristic	Respondents (n =315) Counts (%)
Research Dedicated Courses	
Yes	311 (98.7)
No	4 (1.3)
Number of Research Courses	
0	1 (0.3)
1-2	112 (35.6)
3-4	157 (49.8)
>4	45 (14.3)
Research Project Requirement	
Yes	278 (88.3)
No	37 (11.7)

Research Project Characteristics

The data of the survey questions surrounding the research project performed by the students is described in Table 3. A collaborative group of students and faculty made up the research project group 53% of the time. Seventy one percent worked on their project between 1-2 years. Majority of subjects report that they read and reviewed between 1-40 articles in preparation for their research project. Figure 3 shows all of the questions and factors that go into the feeling that a project will be published such as: frequency of meetings, who came up with the project, number of members, and length of project. The frequency of meetings between the faculty advisor and student research group was once per month for 43% of the participants. Twenty seven percent did not submit for publication but not sure if it will in the future, while 35% say it was not submitted. Thirteen percent submitted their project for publication and twelve responses (3%) claim that the work was published.

Table 3. Responses to Questions Regarding Research Project Requirements

<i>Characteristic</i>	<i>No. (%) of Respondents (N= 315)</i>
<i>No. Of Articles Read</i>	
0	19 (6)
20-Jan	86 (27.3)
21-40	124 (39.4)
41-60	48 (15.2)
61-80	16 (5.1)
>80	22 (7)
<i>Research Project Developer</i>	
Faculty	37 (11.7)
Students	65 (20.6)
Faculty & Students	167 (53)
No Final Project	31 (9.8)
<i>Faculty Mentor Meeting</i>	
Once/Week	66 (21)
Bi-weekly	81 (25.7)
Once/Month	136 (43.2)
No faculty mentor	32 (10.2)
<i>No. Students in Group</i>	
1	52 (16.5)
2	42 (13.3)
3	71 (22.5)
4	89 (28.3)
>4	31 (9.8)
No group	30 (9.5)
<i>Length of Project Completion</i>	
1 Semester	64 (20.3)
1 Year	124 (39.4)
2 Years	101 (32.1)
> 2 Years	26 (8.3)
<i>Submitted for Publication</i>	
Yes	43 (13.7)
No, but will in future	46 (14.6)
No, but not sure	85 (27)
Not Submitted	111 (35.2)
No Final Research	30 (9.5)
<i>Project published?</i>	
Yes	12 (3.8)
No	303 (96.2)

Attitudes towards Research

Questions were posed regarding the expectation of publication prior to and following the completion of research, there was a decline in the expectation of the publication of the paper after the research was finished. Roughly 44% of the respondents were undecided on their likelihood to continue research post-graduation whereas the remaining subjects were definitely/likely (32%) and definitely not/unlikely (24%) but 58% felt they were able to contribute to a research project upon graduation. There was a positive attitude towards the belief that research is an essential part of the role of being a Physical Therapist. The data for the subsection of attitudes of the students toward research is focused in Table 4.

Table 4. The Respondents Attitudes Towards Research

Question	No. Responses	%
<i>Expectation of Publishable Project BEFORE Started</i>		
Strongly Agree	29	9.21%
Agree	95	30.16%
Neither Agree/Disagree	115	36.51%
Disagree	57	18.10%
Strongly Disagree	19	6.03%
<i>Expectation of Publishable Project AFTER Started</i>		
Strongly Agree	21	6.67%
Agree	78	24.76%
Neither Agree/Disagree	106	33.65%
Disagree	84	26.67%
Strongly Disagree	26	8.25%
<i>Readiness to Contribute to Research Upon Graduation</i>		
Strongly Agree	20	6.35%
Agree	163	51.75%
Neither Agree/Disagree	87	27.62%
Disagree	33	10.48%
Strongly Disagree	12	3.81%
<i>Likelihood to Continue Research</i>		
Definitely	18	5.71%
Likely	83	26.35%
Undecided	138	43.81%
Unlikely	66	20.95%
Definitely Not	10	3.17%
<i>Agreement with, "I believe research is an essential part of my role as a Physical Therapist"?</i>		
Strongly Agree	91	28.89%
Agree	159	50.48%
Neither Agree/Disagree	53	16.83%
Disagree	11	3.49%
Strongly Disagree	1	0.32%

Skill acquisition

Ninety three percent claim that they acquired the skill to perform literature review from the research dedicated courses. Other skills that show a large amount of acquisition secondary to the courses in the curriculum were Presentation, research design, data analysis, and data collection with 62.2%, 62.2%, 64%, and 65% respectively. Of the above acquired skills 66% respondents are confident they could perform literature review independently. Independence in presentation and data collection represented 34% and 24% respectively. The information regarding the skill acquisition of the subjects in the survey is located in Table 5. Figure 3 is broken into three groups, group 1 is definitely going to continue with research after graduation, group 2 is definitely not continuing with research after, group 3 is definitely not continuing with research but feel research is important. Figure 5 looks at the rating of skills by the individuals and their plans towards research in the future as stated before. Group 1 rated themselves on average 26.9 out of a grand total of 35, group 2 rated at 24.4 and group 3 at 24.5. Group one compared to groups 2 and 3 shows significance with p values of 0.001 and 0.000 respectively.

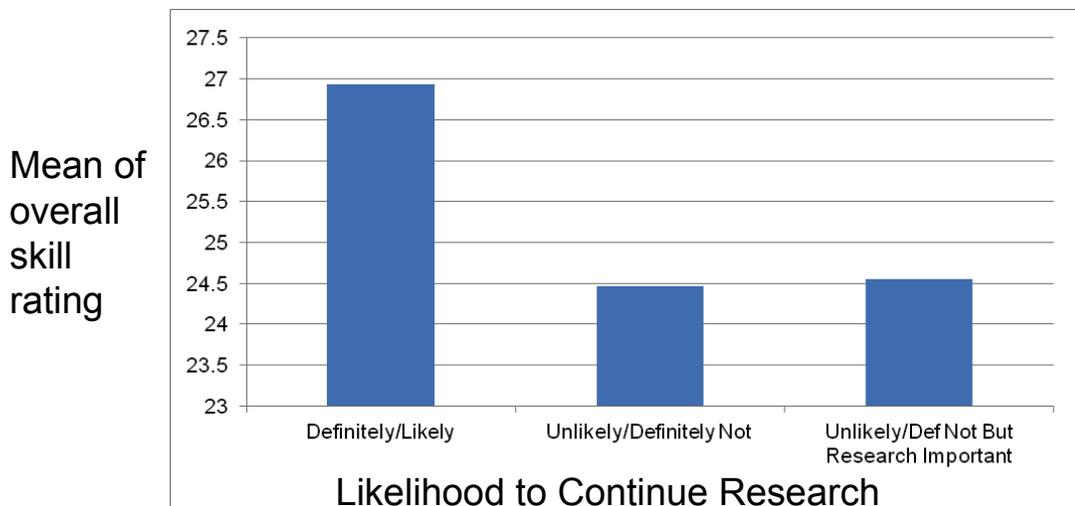


Figure 3. Shows the average rating of the seven characteristics related to research and the likelihood to continue with research for the participants in the survey.

Table 5. Self Rating of Skills by No. of Research Classes

Literature Review	1-2 Classes	3-4 Classes	>4 Classes
Need Assist	1.59%	4.44%	4.76%
	10.48%	24.44%	28.57%
Independent	23.49%	56.19%	65.71%
Experimental Design	1-2 Classes	3-4 Classes	>4 Classes
Need Assist	18.10%	39.37%	45.08%
	12.70%	32.70%	38.73%
Independent	2.22%	8.89%	11.11%
IRB Application	1-2 Classes	3-4 Classes	>4 Classes
Need Assist	17.46%	40.63%	47.62%
	6.03%	20.63%	24.76%
Independent	1.59%	6.67%	8.57%
Data Collection	1-2 Classes	3-4 Classes	>4 Classes
Need Assist	11.43%	22.22%	25.71%
	13.97%	37.14%	43.49%
Independent	6.03%	20.32%	24.44%
Data Analysis	1-2 Classes	3-4 Classes	>4 Classes
Need Assist	15.56%	38.41%	44.76%
	7.62%	22.22%	26.03%
Independent	1.90%	5.40%	7.30%
Manuscript Preparation	1-2 Classes	3-4 Classes	>4 Classes
Need Assist	14.92%	38.10%	44.13%
	10.16%	29.52%	33.33%
Independent	3.17%	7.62%	11.11%
Conference Presentation	1-2 Classes	3-4 Classes	>4 Classes
Need Assist	7.62%	16.51%	20.00%
	13.02%	36.51%	40.95%
Independent	12.06%	28.57%	34.60%

When it comes to number of classes taken, the skills acquired at the highest self rating were Literature review (p =.774) and Conference poster presentation (p =.152). The remaining skills on Table 6 all have a p <= 0.05. IRB application and Data Analysis was rated the hardest skill to acquire in Table 6 and has the lowest p value of all the skills with p of 0.000 and also has the highest Pearson Correlation of 0.206.

Table 6. Self-Rating of Research Skills in Order of Difficulty

Research Skill	Unable		Need Assist		Independent	Rating Average
<i>Literature Review</i>	0	2	15	90	208	4.6
<i>Conference Presentation</i>	0	13	63	130	109	4.06
<i>Data Collection (Acquisition)</i>	3	16	81	138	77	3.86
<i>Experimental Design</i>	3	12	143	122	35	3.55
<i>Manuscript Preparation and Submission</i>	5	30	139	106	35	3.43
<i>IRB Application</i>	24	36	150	78	27	3.15
<i>Data Analysis</i>	15	53	142	82	23	3.14

**Skills are in rank order of highest self-rating to lowest*

Feeling of Publish ability

One factor that could sway a person to partake in research or not is the goal of being published. Several questions looked into the feeling towards publish ability of the research projects for the respondents. In Figure 4 a map of the questions relating to publication are shown, the ideal research project based on this figure is a project lasting one year, created by the faculty advisor as well as students, who meet once a month, and have 3 or 4 members in the group. The longer the research project the more likely the person is to feel that they are to be published as can be seen in Figure 5. Attitude change and length of project were found to be significant with a p of 0.001 while the larger a group and attitude change for the positive was found to be significant as well with a p of 0.011.

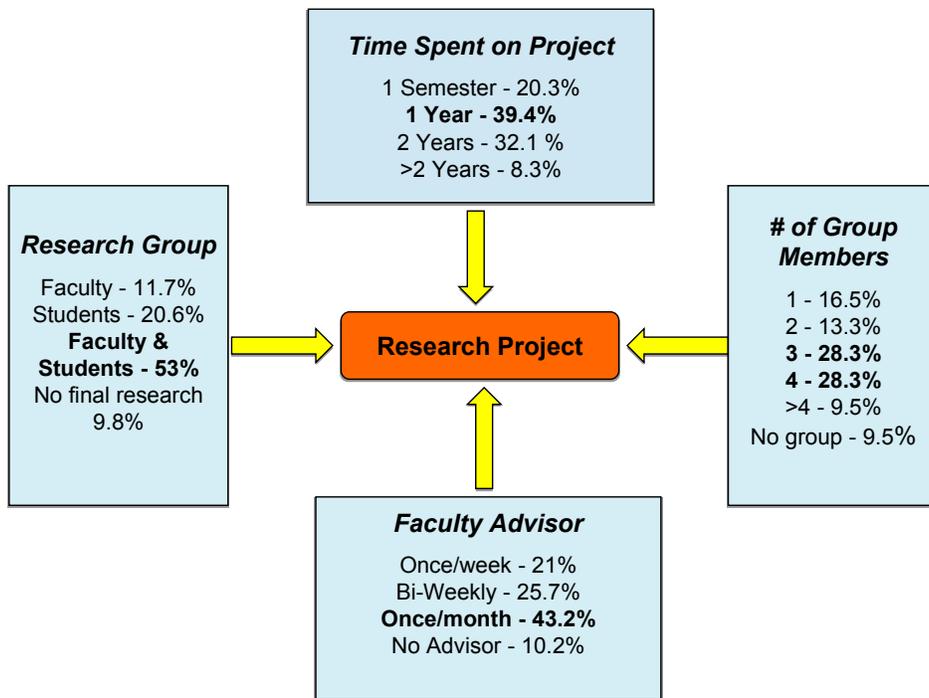


Figure 4. Potential factors that contribute to DPT students' predictability on conducted publishable research project. The most chosen option in each question is indicated in bold.

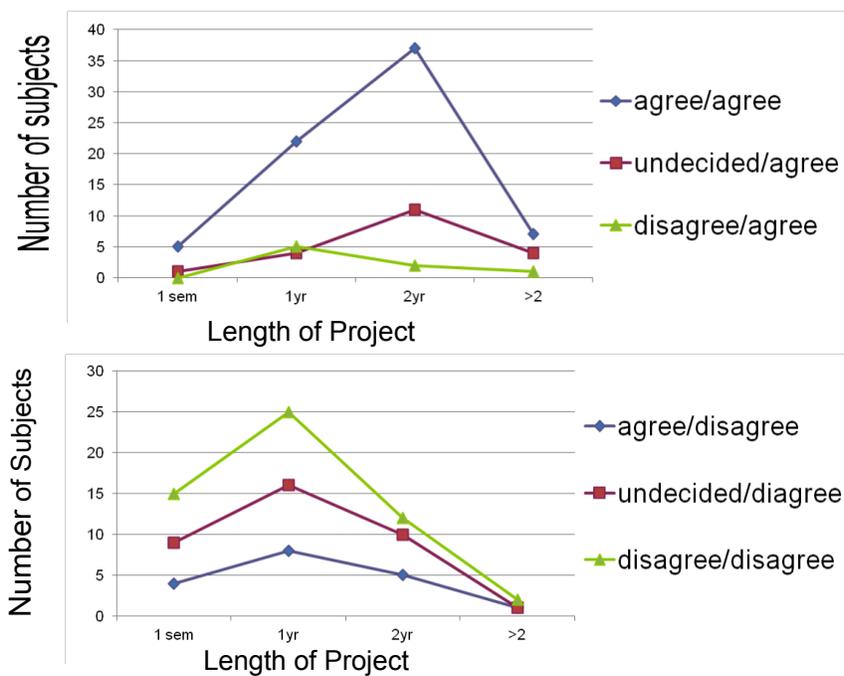


Figure 5. (a) Shows the Positive attitude change of the participants about publication over the length of the project. (b) Shows the negative change over the length of working on the project.

DISCUSSION

The majority of the respondents being of the female gender reflects the APTA membership as of 2013 according to the APTA website which states its membership is 66% female. Almost half of the responses came from three states, almost half of the responses came from Physical Therapists working in the outpatient setting and over 60% came from new graduates, all of these numbers are percent of the total responses. This benefits the study because the questions regarding curriculum are accurate considering all the material is fresh in the mind of new graduates and that majority of the answers reflect the most current curriculum of the DPT programs throughout the United States. Unfortunately with the overwhelming amount of responses coming from fresh graduates it does not allow an accurate comparison to what the curriculum was like in the past and how it might have changed.

Almost all of the DPT graduates had courses dedicated to research in their curriculum, despite the overwhelming percentage, this is subjective because some programs might not refer to their research courses with the word inside the title however still had those research specific courses involved in their course load. With an R squared value of 0.02 there is no significance of number of years graduated with number of courses dedicated to research for each program. A large portion of the population involved in the survey were required to complete a research project in order to graduate however it can be assumed that in order to complete a project from start to finish in one semester as 20% of the respondents claimed, said research project was more than likely a literature review of articles. With this in mind it is possible that different DPT programs use the word “research” within different contexts.

Continuing with the research project topic, if the research project was worked on for longer than 2 years the more likely the students were to believe that they were to be published,

although if the project lasted longer than 2 years (most DPT programs are only 3 years) the likelihood to believe publication was a possibility diminished. This could be due to the fact that the project took longer than expected to complete or was more time consuming and difficult than previously expected or more than likely it is due to small sample size. Both length of the project worked on and the number of members in a group were found to be significantly linked with attitude change for the better. So the longer the participants worked on the project the confidence in their work increased. This goes hand in hand with the adage “Practice makes perfect”.

The groups that worked on their project for a semester would most likely have jumped onto a project that was continuously ongoing and not done much of the leg work or more than likely simply performed a literature review which would not fall into the category of a research project since literature review is in actuality a step used to complete a research project.

Skill acquisition is an important part of the survey because this measures how much the students from the various DPT programs feel they were prepared for research in the future as part of their career. To be prepared for research would be an important factor since 79.4% of respondents agree that research is a vital part of PT. The Chi-Square analysis showed a strong correlation (p -value <0.01) between number of research classes and level of independence in research related skills. The only research skills that did not show significance were literature and conference poster presentation. Our reason is that these particular skills are gained or reach independence with having only one class therefore taking multiple classes does not enhance one’s ability or level of independence. The analysis also showed that some research skills are highly correlated between each other, meaning achieving independence in data analysis for example which was rated the hardest skill (Table 6), then one would have reached independence in all other skills. Figure 3 presents the ratings for individuals on skill acquisition, that the

individuals who were definitely going to continue with research while the individuals that rated themselves lower were less likely to continue with research. Groups 2 and 3 compared to group 1 shows significance with $p < 0.05$. Groups 2 and 3 show no significance between them despite the increase in the skill ratings for group 3 with a p of .899 and t of -0.127. Table 6 ranks the skills at question in our survey from easiest to hardest based on the feedback from all respondents. The easiest skills of Literature Review and Conference presentation had no significance when compared to the number of research courses the graduate took. When it came to the remain skills, the harder the skill the higher the Pearson correlation and lower the p value.

All of the above information allows us to come up with our conclusion that there is a “sweet spot” when it comes to length of working on a research project, amount of participants and the process, that “spot” is over two years. This survey or one similar has the potential to direct curriculum in a way that could benefit the Evidence Based Practice and therefore influence the entire field in a positive way. This will be done by pinpointing the circumstances under which a clinician is most likely to continue research as well as guide future surveys and synonymous studies as to where to focus.

CONCLUSION

The broader the exposure to research reading and working on research in classes and during projects during DPT school, the more confident the individuals feel in their research abilities and therefore the more likely they are to carry through with research of their own or be part of a group in the future as a professional. The more research classes the program has the more independent in each skill the students will feel and therefore the more comfortable the student will feel to continue with research upon graduation and in their future as a Physical

Therapist. The longer the project is worked on the more confidence an individual will have in their work and their ability to present the work. The more group members working in said project the more confidence in the publication prospects of the group as well. There of course would be limits on these specifications. For instance if a individual is working on a research project with 50 other individuals there might be too much input and rather than a positive change there might be a negative change of attitude for publication. Throughout our survey we have a common theme that more is better.

Ideas for future research

Look into Evidence Based Practice and how that is used throughout the careers of the PTs to see how they utilize research when they are not performing research.

Limitations

The setting was half outpatient which is less likely to be a research driven setting. The new graduates who just finished a research project are not going to want to participate after finally getting freedom from the demands of their research professors. Majority of responses being from 39/215 possible DPT programs throughout these United States does not accurately reflect the practices of all the program.

APPENDIX

Survey on Research Components in Curriculum of Doctor of Physical Therapy Programs

(Stephen Ingrassia, Gary Mulligan, Roman Tverdovskiy, Andy Zhu)

Advisors: Dr. Wei Zhang

Please select only one answer

- 1) Gender
 - A) Male
 - B) Female

- 2) Which of the following best describes you?
 - A) New Graduate (up to one-year post graduation)
 - B) Practicing 1-2 years
 - C) Practicing 3-4 years
 - D) Practicing more than 4 years

- 3) Please list the name of your DPT Program?

- 4) Please list the state in which your DPT program is located?
(Drop Down Menu)

- 5) What is the current setting of your primary job?
 - A) Hospital (Acute Care)
 - B) Nursing Home
 - C) Outpatient Clinic
 - D) Home Care
 - E) Researcher
 - F) Other (please specify): _____

- 6) Did you have Research courses that were dedicated for research purposes in your DPT curriculum?
 - A) Yes
 - B) No

- 7) Approximately, how many of these Research classes were included in your DPT curriculum?
- A) 0
 - B) 1-2
 - C) 3-4
 - D) More than 4
- 8) Please select all that apply. What skills (if any) do you feel have been enhanced or gained through your Research classes?
- A) None
 - B) Literature Review
 - C) Experimental Design
 - D) IRB Application
 - E) Data Collection (Acquisition)
 - F) Data Analysis (including statistics)
 - G) Manuscript Preparation and Submission
 - H) Conference Presentation (podium or poster)
 - I) Other (please specify): _____
- 9) Were you required to conduct a final research project in order to graduate?
- A) Yes
 - B) No
- 10) Approximately how many articles did you read and review for your research project?
- A) 0
 - B) 1-20
 - C) 21-40
 - D) 41-60
 - E) 61-80
 - F) >80
- 11) Did you contribute to the application preparation for an Institutional Review Board (IRB) approval for your study?
- A) Yes
 - B) No

12) Who designed or developed the research aims/hypothesis for the final research project?

- A) Faculty
- B) Students
- C) Faculty and student group
- D) Other (please specify): _____
- E) No final research project was pursued

13) If you had a faculty mentor, approximately how often did you meet with them during the research project?

- A) Once a week
- B) Bi-weekly
- C) Once a month
- D) I did not have a faculty mentor to supervise the final research project

14) How many students were in your research group (including yourself)?

- A) 1
- B) 2
- C) 3
- D) 4
- E) >4
- F) I was not in a research group

15) Was there an expectation or perception that your final research project would be publishable **BEFORE** you started your research project?

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16) Did you expect your final research project to be published in a scientific journal **AFTER** the research was completed?

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17) Was the final research project submitted for publication?

- A) Yes
- B) No, but it will be submitted in the future
- C) No, I am not sure if it will be submitted in the future
- D) No, it will not be submitted
- E) No final research project was pursued

18) Was your research project published in a scientific journal?

- A) Yes
- B) No

IF YES LIST FULL CITATION OF THE ARTICLE:

19) How long did you work on the final research project?

- A) 1 Semester
- B) 1 Year
- C) 2 years
- D) >2 years

20) Did you participate in any research activities upon graduation?

- A) Yes
- B) No

21) Upon graduation I was ready to contribute to a research project?

- | | | | | |
|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| Strongly Agree | Agree | Neither Agree nor Disagree | Disagree | Strongly Disagree |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

22) If 1 stands for Unable, 3 for Need Assist, 5 for Independent, and 2 and 4 for somewhere between, please indicate what you feel best describes your level of performance after graduation in the following skills:

Literature Review

Unable		Need Assist		Independent
1	2	3	4	5
<input type="radio"/>				

Experimental Design

Unable		Need Assist		Independent
1	2	3	4	5
<input type="radio"/>				

IRB Application

Unable		Need Assist		Independent
1	2	3	4	5
<input type="radio"/>				

Data Collection (Acquisition)

Unable		Need Assist		Independent
1	2	3	4	5
<input type="radio"/>				

Data Analysis (including statistics)

Unable		Need Assist		Independent
1	2	3	4	5
<input type="radio"/>				

Manuscript Preparation and Submission

Unable		Need Assist		Independent
1	2	3	4	5
<input type="radio"/>				

Conference Presentation (podium or poster)

Unable		Need Assist		Independent
1	2	3	4	5
<input type="radio"/>				

23) How likely are you to further conduct research in the future?

Definitely	Likely	Undecided	Unlikely	Definitely Not
<input type="radio"/>				

24) Do you agree with the statement, "I believe research is an essential part of my role as a Physical Therapist"?

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25) Please feel free to provide any additional comments: (if you have no additional comments please type "no additional comments")

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