

Assessing the Need for Increased Standards in the Field of Orthotics and Prosthetics

By  
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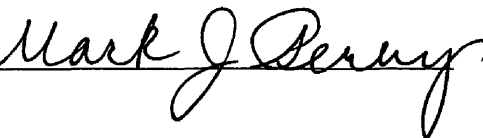
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## **Abstract**

This research addressed the current state of orthotic and prosthetic education. The purpose of the project was to assess the need for increased standards of education within the field of orthotics and prosthetics. Surveys were sent to resident and certified orthotists and prosthetist in the United States and Puerto Rico. Results showed certified practitioners were more likely to support a mandatory increase in education for new graduates if they themselves had advanced degrees; however, practitioners with increased years of experience were less likely to support this requirement for new graduates. Hiring authorities valued advanced education in their applicant pool and the results indicate a willingness to pay a premium for that increased education. Residents perceived they were inadequately prepared and desired greater education prior to residency. These findings support the development of higher levels of educational programming, and the passage of statutes that would require such education prior to obtaining a license. This suggests that if orthotists and prosthetists are licensed, states would have in place the regulatory authority to enforce the standard of clinical and administrative practice necessary to protect this patient population.

## **Research Question**

The field of orthotics and prosthetics has been evolving rapidly since 1948, when orthotists and prosthetists first formed the American Board for Certification in Orthotics and Prosthetics and required themselves to be certified. However, current practitioners widely view this as insufficient regulation for the demands of the twenty-second century. Technology has created a need for a higher quality of research; practitioners are no longer mere craftsmen, but are individually responsible for direct patient care and outcomes; and the increased pressures of limited health care funding mandate a system whereby orthotists and prosthetists can be held accountable for both the quality of their services and their administrative procedures. Yet only five states currently require orthotists and prosthetists to be licensed, in the other 45 states anyone can practice whether they are certified or not, and there are no programs past the baccalaureate level currently in operation. Those involved in health care administration, who are charged with the duty to ensure the best possible health care and creating efficient and effective delivery systems, are engaged in a national debate regarding the steps that must be taken. It has been posited that the profession must be further professionalized, such as by raising standards of education and increasing lobbying for licensure in all states.

Physical therapy as a field is significantly ahead of orthotics and prosthetics in this aspect, although physical therapists are no more independent, give no less direct patient care, give no less critical care, and have no more responsibility for the health of their patients. Upon a review of the literature, it seems that the professionalization of physical therapy as a field occurred because it was demanded by physical therapists

themselves. For orthotics and prosthetics to do the same, there must be a similar level of support within the field.

This research comprises a national survey that tests the hypotheses that (a) students and entry-level practitioners need more and higher-level education than is currently available, and (b) the business of orthotics and prosthetics will support such programs and the students who graduate from them.

## Literature Review/Contribution of the Project

### Professionalism

For over three decades, Eliot Freidson has explored the sociology, development and impact of medical professions and professionalism. So significant are his contributions to current thought on professionalism, that he has been acknowledged as having developed the fullest analysis of the rise to dominance of the medical professions, bar none [Weitz, 2001]. In his paper “The Changing Nature of Professional Control” Freidson describes a key aspect of professionalism as being that “. . . they are self-regulating, subject only to informal collegial control” [Freidson, 1984]. He goes on to say that

“. . . the professions have been singled out as occupations that perform tasks of great social value because professionals possess both knowledge and skills that in some way set them apart from other kinds of workers. It has also been thought that professionals are distinctive because they bring a special attitude of commitment and concern to their work...” (p. 2)

Furthermore, Talcott Parsons described three distinct aspects of professionalism: “First, it must have the autonomy to set its own educational and licensing standards and to police its members for incompetence or malfeasance. Second, it must have its own technical, specialized knowledge, learned through extended, systematic training. Third, it must be believed by the public to follow a code of ethics and to work more from a sense of service than a desire to profit” [Parsons in: Weitz, 2001]. From physical therapy to pharmacology, occupational therapy to speech pathology, the allied health fields have become professionalized over the past 50 years. They have changed the way they practice their craft, by increasing their standards of education and regulation, and also taken steps



to change how they are perceived by others in health care by requiring more strict codes of ethics and systematic training.

### **The Emergence of O&P as a Profession**

The role of orthotics and prosthetics (O&P) in medicine is diverse and wide-ranging. The profession involves many facets of the medical model including emergency care, inpatient and outpatient care, and in the operating room, side by side with surgeons to bring the best possible outcomes to their patients. As with all crafts that become professions over time, this metamorphosis takes place by means of apprenticeships, formal schooling, board examinations and finally in the twentieth century, a system of licensure which protects those individuals that come to the professional for help, and creates the expectation that there are standards and rules to which the professional will adhere.

However, it has only been within the past 50 years that the field has emerged as a profession. Until World War II, orthotists and prosthetists required little more than an apprenticeship with a local blacksmith. This relationship was the result of the fact that blacksmiths had the knowledge of both leather molding and ironworks so that an artificial limb or brace could be fabricated. During the Civil War there were many people who suffered amputations and deformed limbs. Most of these people did not survive the amputations due to the extreme lack of sterile or even a clean environment at the front lines. Those few who did survive, came home to the local blacksmith or saddle-maker to have a brace or limb made. These were often quite crude, and always unique, because there were no formal schools or apprenticeships where one could gain information, education, or even standards of practice.

All this was to change with World War II. Most soldiers, who surely would have died from infection secondary to amputation, were now living because of the advent of penicillin. In WWII there were mobile hospital units and the thousands of men who would have died only 80 years earlier were now having life-saving surgery in mobile hospitals with sterile or near sterile environments. They were surviving the amputation surgeries and when they returned home from the war, they expected quality prosthetic and orthotic care. It was due to this higher expectation of care that the transformation from a “craft” to a profession had begun.

In 1948, only three years after the WWII veterans began returning home, the American Board for Certification in Orthotics and Prosthetics, Inc. (ABC) was founded. In 1948 practitioners simply needed to pass a proficiency test to earn the ABC certification. In the 1970’s ABC began to require individuals possess a high school diploma to obtain admission to the O&P schools. By the late 1980’s an individual hoping to become a certified orthotist and/or prosthetist needed to earn a baccalaureate degree in orthotics and/or prosthetics (or a baccalaureate degree in a related health care field with further formal education in O&P), complete a formal residency program (1900 hours), and pass the national board examinations in orthotics and/or prosthetics (there are separate exams for each discipline). ABC is approved by the National Commission for Certifying Agencies (NCCA), an organization that establishes standards on examination validity, reliability and safeguards to the public for credentialing programs [ABC, 2000]. The American Board for Certification understood that this rigorous process was and is necessary because a patient's life may well depend on the level of skill of the orthotist or prosthetist. Those most intimately involved in orthotics and prosthetics agree that the role

filled by today's practitioners calls for a greater focus on clinical standards and education. W. Earl Reed III, CEO of Rehab Designs of America in Louisville, Kentucky, a large corporation that fabricates O&P components, stated "When such standards are established, we see improvements in quality and increased recognition for those who meet those standards. There needs to be a higher level of education required for practitioners, as well" [Otto, 2000a]. This confirms the points that not only have orthotics and prosthetics begun to emerge as a profession but also that those practicing in the profession support this professionalization of the field.

### **Further Professionalization of Orthotics and Prosthetics**

A review of the literature reveals considerable excitement within the orthotic and prosthetic field about the demands on the modern day practitioner, but also concern and debate about the best method to adequately prepare practitioners of the future to meet these demands. An examination of this ongoing conversation shows that participants keep returning to the themes outlined by Parsons as indicative of a profession: the need for orthotics and prosthetics, as a field, to set and enforce educational and licensing standards, and the need for extended, systematic training in its technical, specialized knowledge. The dialogue evidences Parson's third criteria, a special attitude toward and commitment to excellence. The study contained herein addresses the question of whether there is sufficient such attitude – outside the community of those engaging in the public debate – to follow the physical therapy model, and demand the rights and responsibilities of further professionalism.

## **Educational Standards Entailing Extended, Systematic Training**

New technologies are opening up brave new worlds in orthotic and prosthetic practice. The research projects of today and their progeny may well become the routine techniques of the future. Already on the table are computer modeling, interface development, advancements in materials sciences (such as carbon fiber pre-preg orthoses), magneto-rheologically-improved prostheses that allow a prosthetic knee to stabilize itself and damp shock with a reflexive speed that closely mimics nature, robotics in prosthetics, muscle tissue engineering, brain-controlled prostheses, bone-anchored prostheses, and polymer actuators that can attain proportional control similar to natural muscle, [Otto, 2001c] “smart orthoses” that give early warning of infection by measuring minute changes in foot temperature, and shoes that not only sense when a knee orthosis might need to tighten up, but make it happen [Otto, 2001b].

Yet there is a need for quality research in the field. Although the National Commission on Orthotic and Prosthetic Education (NCOPE) has required basic education in research methodology since 1993 and a research project is a mandatory component of the O&P residency, the current “Standards of Excellence for the Orthotic/Prosthetic Residency Program” say, “The resident will use acceptable research methodology, and ideally the resulting project will be suitable for publication . . . .” These residents must learn advanced research skills before this ideal will become reality. As Thomas Gavin, C.O., former editor of *The Journal of Prosthetics and Orthotics*, says, “If we don’t do [research], the surgeons aren’t going to do it for us. And if [our work] is not in print in a peer reviewed journal, who’s going to prescribe it?” [Glenn, 1999 p. 26]. So, until more

rigorous research is conducted, the field will lag behind the potential level of patient care that modern technology could otherwise make possible.

Ideally, this research is performed by clinicians. According to Marty Carlson, CPO, Tamarack Habilitation Technologies, Inc., St. Paul, Minnesota, “When research is fundamentally disconnected from services, investigators may ask the wrong questions . . . Researchers may test hypotheses that are easier to control in the laboratory and be unaware that the way they have focused their hypotheses and idealized their conditions has pushed the practical meaning of the research aside” [Glenn, 1999 p. 26]. But in order for clinicians to take the steps necessary to do this primary research they must attain the requisite knowledge for adequately and properly conducting such research.

According to William Craelius, Ph.D., Rutgers University Department of Biomedical Engineering, Piscataway, NJ, “teaching students how to accomplish scientifically sound studies is key. ‘There is funding for research, funding for industrial development, but little funding for training . . . and there aren’t many schools: 9 compared to physical therapy’s 181, for instance’” [Glenn, 1999 p. 29]. This lack of funding for educational programs causes difficulties for further professionalization of the field.

Multiple authors have commented on the need, in particular, for a master’s degree program that combines engineering and traditional O&P studies to create “the next step in the evolution of the practitioner – the “PRE,” or Physical Restoration Engineer, who would be drawn from biomedical and bioengineering programs, represent a meld of disciplines, and work in a computer-intensive environment with state-of-the-art orthopedic developments” [Neumann, 2000]. Neumann concluded “master’s programs in

O&P with an engineering emphasis would increase the base of scientific knowledge used by the practitioner, improve the tools used daily in the clinic, and contribute to the design of components. The programs also could expand the career opportunities available to practitioners who have a strong background in the basic engineering sciences”. He also stated that “a[n] O&P master’s program which offered multiple post-master’s career paths would be likely to draw more students and stand a better chance of surviving . . . .” [Neumann, 34]. Thus, the literature appears to support increased educational standards in the field.

The compensation paid to new and experienced orthotic and prosthetic practitioners also appears to support would-be practitioners’ investment in a higher level of education. In December of 2000, the American Orthotic and Prosthetic Association published their finding that orthotists who are certified by the Board of Certification (BOC) rather than by the American Board for Certification in Orthotics and Prosthetics (ABC) make, on average, \$12,233 less with less than 24 months experience, \$17,864 less with 24 – 60 months experience and \$33,575 less with over 5 years experience [Appendix D].

### **Licensing Standards and the Protection of the Public**

Governments have long understood that regulation is the means by which we can protect our citizens from unnecessary harm from the medical as well as other professions. Michigan requires physicians [MCL333.17011] and other health care providers including chiropractors [MCL333.16411] and physical therapists [MCL333.17801] Michigan has

enacted a law that makes it a felony to practice in the health care professions without a license,

"...an individual who practices or holds himself or herself out as practicing a health profession regulated by this article without a license or registration or under a suspended, revoked, lapsed void, or fraudulently obtained license or registration or outside the provisions of a limited license or registration, or who uses as his or her own the license or registration of another person is guilty of a felony" [MCL333.16294].

This statute was found to be constitutional because "[t]he practice of medicine affects the public health, and it is clearly within the police power of the state to provide that those dealing with disease shall be amply qualified to do so, so far as human experience and education may qualify them" [*People v Reetz*, 127 Mich 87, 88 (1901)]. This law provides means (police) by which action can be taken to punish those health care providers who cause undue harm to their patients. However, there is no law that requires health care providers to carry liability insurance. Therefore there is little one can do other than suing the health care provider to be compensated for medical malpractice. If the health care provider is personally worth millions, then justice may be served; however, in the most severe malpractice, rarely is one's personal fortune enough to compensate for the medical bills a patient and their families must endure. Licensure assures the public that the practitioner has achieved some minimal level of preparation to render the services which he or she is engaged to perform [Latsko, 1998]. Michigan statute MCL 333.16146 states "a board shall grant a license or registration to an applicant meeting the requirements for the license or registration as prescribed..." furthermore, a task force shall recommend to this board as to the "Determination of standards of education, training, and experience required for practice in a health profession subfield or for

certification in the health profession specialty field, and where appropriate, guidelines for approval of educational programs for the subfield or specialty field" [MCL333.16163].

As a result, licensure and educational standards are closely entwined.

Yet, licensure is not the norm for orthotists and prosthetists. In most states, anyone can hang out a shingle and call themselves an orthotist or prosthetist without having relevant clinical knowledge or experience, without having his or her background investigated for past criminal or ethical problems, without participating in any type of continuing education programs, without having passed a written or practical examination related to the ability to provide competent orthotic and/or prosthetic services to the public, and without any malpractice insurance to compensate a patient for any wrongdoing on the part of the practitioner. In Michigan, even cosmetologists are subject to more stringent regulation to braid hair [MCL333.1201]. Yet, orthotists and prosthetists have the responsibilities of, and get the benefits of, being professionals that receive direct payment from third-party payers (including Medicare and Medicaid).

However, licensure has allowed states to create administrative boards to investigate consumer complaints relating to misconduct, substandard care or deceptive and dishonest business practices. Licensure allows action to be taken if any of the above misdeeds have occurred, up to and including the revoking of a license. In *Latrielle v Michigan State Board of Chiropractic Examiners* (1959) it was stated "A state license to practice a profession creates no vested interest, and right to which license grants may be withdrawn for proper cause by authority which granted it." Laws are the direct result of a desire to maintain order and justice in society. Without them, there would be disorder



and injustice. The licensee's greatest fear becomes the loss of that license, which in turn results in the loss of his/her livelihood in that state.

There are no laws protecting the patient in Michigan or 43 other states against an unscrupulous orthotist and/or prosthetist.

Some states have begun to change this state of affairs. In 1992, New Jersey was the first state to enact legislation to require all individuals in that state who practice in the field of orthotics and prosthetics to be licensed by that state. That legislature specifically stated that:

- a) The practice of orthotic and prosthetic may, if unregulated, seriously harm or endanger the health, safety and well-being of the citizens of this State;
- b) Citizens of this State need, and will benefit from, an assurance of initial and ongoing professional competence among orthotists and prosthetist practicing in this State;
- c) The present unregulated system for dispensing orthotic and prosthetic care does not adequately meet the needs or serve the interests of the public; and
- d) It is necessary for this State to regulate and license the practice of orthotics and prosthetics for the purpose of protecting the citizens of this State from injury or harm cause by ill-prepared, incompetent, unscrupulous or unauthorized practitioner and to assure the highest degree of professional conduct on the part of the orthotists and prosthetists practicing in this State" [NJSA 45:12B].

Thus, New Jersey enacted what is tantamount to a New World Order in the prosthetic and orthotic community. It was unthinkable that a state could actually achieve licensure.

Twelve years previously, in February 1981, Rhode Island State Senator Richard R.

Patterson sponsored a bill to enact legislation that would license orthotists and

prosthetists, and was shot down. Thereafter, the New England Chapter of Orthotics and

Prosthetics began to lobby for licensure. But it was not until Mr. Lou Haberman, now a

Licensed Certified Prosthetist and Orthotist from New Jersey formed a coalition of

practitioners, patients and other health care providers to address this issue did the state legislature take up the proposition. The bill was defeated the first time through the legislature, however, on the second time through was passed [NJSA 45:12B]. Since 1992, Washington [Wash. Rev. Code §18.200.030] Texas [Tex. Occ. Code Ann. X.605.001 et seq ] and Florida [F.S.A. § 468.803] have all passed legislation making it a law that one must be licensed in those states to practice orthotics and/or prosthetics. Both Rhode Island [R.I. Gen. Laws § 5-59-4] and Mississippi [Miss. Code. Ann. § 73-22-3] have made it a law that one must be certified by the American Board for Certification in Orthotics and/or Prosthetics to practice in those states, and California law [Cal. Welf. & Inst. § 14132.63] states that one must be certified either by ABC or the Board for Orthotic Certification in order to practice in that state.

In July of 1999, Senator Tom Harkin (D) of Iowa introduced Senate Bill #1451, the "Medicare Waste Tax Reduction Act of 1999." Among a number of broad changes it proposes to the Medicare reimbursement system, it also includes language that will require the Centers for Medicare and Medicaid Services (CMS) to develop standards for who can receive Medicare payment for custom orthotic and prosthetic (O&P) services.

The American Orthotic and Prosthetic Association estimates that "Medicare could save well over \$20 million a year or at least \$100 million over 5 years if the O&P care billed now under custom L-codes was provided only by truly qualified professionals" [O&P Almanac, 1999]. Senator Harkin's bill would allow only qualified individuals to provide certain custom O&P services. The bill defines "applicable items" as "orthotics and prosthetics that require education, training or experience to custom fabricate such

item" [Senate Bill #1451, section 20, 1999]. It further defines a "qualified practitioner" as any entity that is:

"specifically trained and educated to provide or manage the provision of custom-designed, fabricated, modified and fitted orthotics and prosthetics, and is either certified by the American Board for Certification in Orthotics and Prosthetics, Inc., or is credentialed and approved by a program that the Secretary determines, in consultation with appropriate experts in orthotics and prosthetics, has training and education standards that are necessary to provide applicable items," or "is licensed in orthotics or prosthetics by the State in which the applicable item is supplied; or has completed at least 10 years practice in the provision of applicable items"[Senate Bill #1451, section 20, 1999].

Thus, this definition places responsibility for creating standards on the profession's own organizing body (the ABC), on the educational programs themselves, or on the state legislative bodies.

### **Opposition to Licensure**

While licensure oftentimes appears to have the best interests of the public in mind, as is often the case, there are individuals and groups that oppose it. Licensure of orthotics and prosthetics is no different. In the review of the literature on orthotics and prosthetics licensure, there has been no out-right statement from other allied health professions stating an overt opposition to it. However, there have been many grumblings among professionals that if licensure were to happen (as it has in 7 states), access to certain L-codes (codes used by CMS for billing orthotic and prosthetic devices) would be limited to those individuals who are "qualified providers." Individuals who are currently making their living as uncertified dispensers of knee braces and/or other orthotic/prosthetic devices, would be considered "unqualified" and would no longer be

able to make their living dispensing orthotic and prosthetic services and devices. As a result, physical therapists, pharmacists and others would lose revenue dollars if licensure indeed became a national requirement.

This is akin to the time when physical therapy became licensed, and other allied health professions had reservations about physical therapists' increased self-government and ability to evaluate and treat patients with greater autonomy.

### **The Physical Therapy Profession as a Model**

Physical therapy has done a notable job of increasing the educational requirements for new graduates. In the 1970's the field required a baccalaureate degree to enter into the profession. In the late 1980's there was a push for master's level education, and in late 1990's there began a drive for doctoral level education for the entry level practitioner. How has this come about? Laurie Hack, program director of Temple University's Physical Therapy program states "We didn't start out by saying, 'Let's go to the DPT [Doctor of Physical Therapy].' We said, 'Let's review our curriculum in light of the current demands of today's practice environment.' Clinicians told us they need new PT's with strong examination skills who are prepared to make a rapid and accurate prognosis and diagnosis. They told us that current demands in health care are such that they no longer have time to mentor new staff to the extent that they once did. We needed a program with more clinical education, and a greater emphasis on differential diagnosis, critical thinking and decision making, and evidence-based practice'" [Woods, 2001 p. 36]. This is a description of a process of change within a profession through increased educational requirements.

Much like orthotics and prosthetics, the field of physical therapy has increased its educational standards to keep pace with the increases in basic knowledge. In 1928, APTA established the first guidelines for minimum course requirements for schools training physical therapists. These schools awarded a certificate in physical therapy. This is much like what several O&P schools offer at this time (however, students opting for an O&P certificate must have previously completed a baccalaureate degree in a related health care field). By 1960, the baccalaureate degree had become the required degree offered by physical therapist education institutions. “In 1979, a resolution adopted by APTA’s House of Delegates (RC 14-79) resulted in a call for entry-level education for physical therapists to be at the post-baccalaureate level” [Woods, 2001 p. 37]. “Then in 1997 APTA developed and published *A Normative Model of Physical Therapist Professional Education*, . . . as this landmark document became widely used and accepted by physical therapist education programs, the Commission on Accreditation in Physical Therapy Education (CAPTE) announced that, effective January 1, 2002, it will no longer accredit baccalaureate-level education programs. After more than 20 years, the 1979 resolution has been realized”. “The move toward professional DPT programs since 1996 is remarkable when compared with the move to the master’s degree,’ notes Mary Jane Harris, PT, MS, APTA’s Director of Accreditation. ‘When RC 14-79 was passed, it was more than 10 years before we saw one-third of physical therapist entry-level programs at the master’s level’” [Woods, 2001 p. 37]. “...APTA’s Section on Education issued a clear statement of its own in February 2000 at the Combined Sections Meeting. With 200 of its members in attendance, the Section voted unanimously to endorse the ‘DPT as the preferred first professional degree for the physical therapist’” [Woods, 2001

p. 38]. APTA's *Vision Sentence for Physical Therapy 2020*, states "By 2020, physical therapy will be provided by physical therapists who are doctors of physical therapy, recognized by consumers and other health care professionals as the practitioners of choice to whom consumers have direct access for the diagnosis of, interventions for, and prevention of impairments, functional limitations, and disabilities related to movement, function, and health." This is an accomplishment for a field that in the fairly recent past, like orthotics and prosthetics, required a baccalaureate degree.

The driving force behind this movement from a certificate to doctoral level education are the clinicians themselves. "Physical therapy education programs are responding to current and future demands of physical therapy practice. And in many cases these programs are responding to specific input from today's clinicians who are asking the education community for new graduates who are better equipped to enter clinical practice able to examine, evaluate, diagnose, prognose, and intervene in the management of patients/clients. They want new graduates who understand and are confident in the administration, business, and advocacy aspects of physical therapy practice. Program directors report that clinicians are telling them over and over again, 'We need new grads who can hit the ground running'" [Woods, 2001 p. 38-39]. This mirrors the concerns voiced by orthotists and prosthetists today. As Mark K. Taylor, MLS, CPO, Clinical Director of the University of Michigan Orthotics and Prosthetics Center in Ann Arbor, MI stated, "Due to the current volume of patients, we can no longer afford the luxury of waiting ten years for a graduate to develop the expertise to be a fully functioning practitioner."

Physical therapists saw a need for not only increased clinical education, but education in the other skills necessary for successful practice. According to Ben Massey, PT “Things have changed radically, however, and new graduates today need to know everything I absorbed as a student *plus* all the things my clinical colleague and I have learned through continuing education and practice in the past 25 years. DPT programs provide graduates with the clinical skills they need in this new century, including the business and administrative capabilities that are so important in physical therapy today” [Massey, 2001 p. 27].

Other physical therapists agree. “Today’s practitioners need an incredible depth and breadth of knowledge, and, more important than ever, new practitioners must have these capabilities and skills when they enter practice” [Rothstein, 1998 p. 454]. In addition, “[g]raduates need theoretical and technical knowledge along with reflective and practical knowledge and competencies to deal with the complexities of current practice” [Threlkeld, 1999 p. 575]. Such depth and breadth simply cannot be accomplished within relatively short educational programs. Either a master’s degree or, in the future, a doctorate will provide the extra time and academic rigor necessary for such increased training.

These articles from the field of physical therapy reveal that articulate clinicians who demanded the education they needed in today’s world were able to raise their own standards and professionalize their field to an unprecedented extent. This poses the question whether orthotists and prosthetists similarly feel a need for heightened standards, and would support their enforcement.

## **Methodology**

To measure the interest within the field of orthotics and prosthetics in increasing educational requirements for entry-level practitioners, two detailed surveys were used. The first survey targeted the entire population of orthotists and prosthetists who are currently certified by the American Board for Certification in Orthotics and Prosthetics, Inc. (ABC) in the United States and Puerto Rico as well as the entire population of current National Commission of Orthotic and Prosthetic Education (NCOPE) registered orthotic and prosthetic residents in the United States. On October 8, 2001, 3500 surveys were mailed (first-class, United States Post) to ABC practitioners. Two weeks following this initial mailing, a follow-up postcard was sent to 1000 addresses selected by computer-generated randomization. On October 23, 2001, 221 surveys were mailed (first-class, United States Post) to NCOPE residents. The mailing lists for practitioners and residents were obtained from ABC and NCOPE, respectively. The practitioner survey [Appendix A] targeted the currently practicing clinicians in orthotics and prosthetics and was designed to determine if current practitioners support a mandatory requirement that entry-level practitioners acquire an increased level of education (master's level). This was done to limit a laissez-faire response to the question "should the level of education be increased among entry-level practitioners". A secondary purpose of this study was to determine the role an applicant's educational level plays in hiring decisions. The resident survey [Appendix B] was designed to determine if the residents' perceptions of the didactic education received prior to their residency was sufficient, and whether or not they would have chosen a master's over a baccalaureate program if one had been available to them at the time they applied to an orthotics and/or prosthetics program.



In January 2002, there were 3262 currently practicing O&P clinicians in the United States and Puerto Rico in good standing with the American Board for Certification, Inc. [Sloan, 2002]. It is presumed that those individuals who were on the ABC mailing list and were sent the questionnaires, but were not currently practicing and were not current active members of the American Board for Certification did not return the surveys. Three of the surveys were returned with a note attached that the individual was not currently working, an additional 18 were returned, "address unknown" and 817 were returned by the deadline of December 1, 2001. The response rate of 25.1% generates an error rate of  $\pm 3\%$  [Hill, 1962]. Seventy-seven of the 221 residents returned their surveys, and 3 were returned, "address unknown." Which is a response rate of 35.3%. No follow-up post cards were sent to the residents because the initial response rate was statistically significant. Each survey was marked with an identifying number when returned so that they could be crosschecked for accuracy.

Data from the survey were entered into Microsoft Office Excel 2000 spreadsheets and simple statistics were obtained using the statistical package within that software. All graphs were generated using Microsoft Excel 2000. The difference of means tests in the paired samples test for the residents' surveys was obtained using the statistical package SPSS for Windows. Use of this method allowed this researcher to determine if the difference between the two means from the questions were statistically significant.

## **Presentation of Results**

### **Practitioner Survey**

The practitioner demographic data showed that completed surveys were received from all 50 states and Puerto Rico. The distribution of disciplines from the survey did not mirror precisely those of the national percentages. More than forty-three percent of the survey respondents (43.3%) were certified prosthetist/orthotists (CPOs), 26.7% of the survey respondents were certified prosthetists (CPs) and 29.9% of the respondents were certified orthotists (COs). This distribution is similar to the distribution of disciplines for the profession as calculated by ABC in January 2002 which was: 34.0% CPO's, 32.3% CP's, and 33.7% CO's [Figure 1].

More than 71% of the respondents (579) held baccalaureate degrees while 3.7% (30) had a high school diploma, 13.1% (106) held associate degrees, 11.5% (93) held masters degrees, and only 0.37% (3) individuals held Ph.D.'s. Of these respondents, those with increased levels of education were more likely to support a mandatory masters degree in orthotic and prosthetic education [Figure 2]. The mean years of experience in the field (orthotics and/or prosthetics) was 12.989 years. Those who were in support of the mandatory masters requirement had a mean of 10.69 years experience, while those who did not support the mandatory masters requirement had a mean of 13.93 years of experience in the field [Table 1 & Figure 3].

All of the orthotic and prosthetic educational programs were represented [Appendix C], however 344 of the 765 survey respondents who identified their alma mater, nearly 45 percent (44.96%) held certificates from Northwestern University. Facilities with residency programs accounted for 45.9% of the respondents. The smallest number of employees in a facility reported by a survey respondent had just one

Figure 1: Distribution of Disciplines from 1999 ABC Annual Report versus 2001 Practitioner Survey

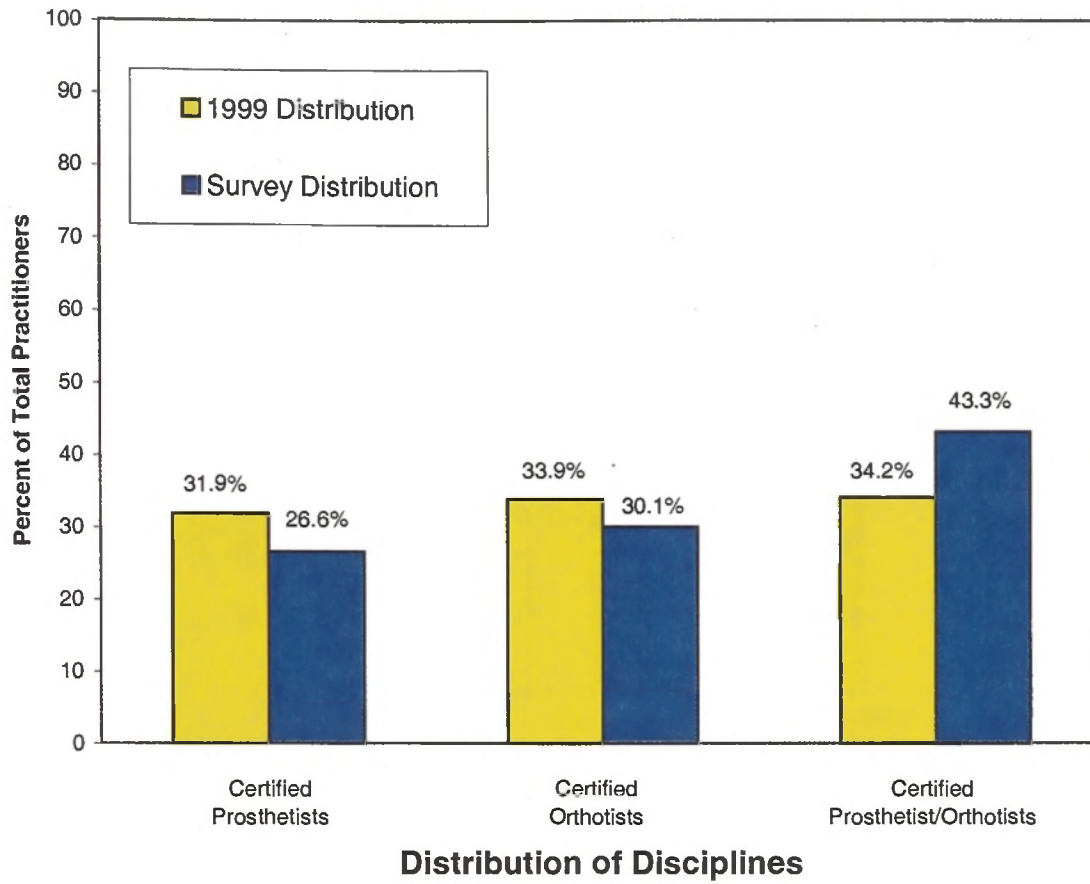


Figure 2: Respondent Support of Mandatory Masters Level Education by Level of Practitioner Education

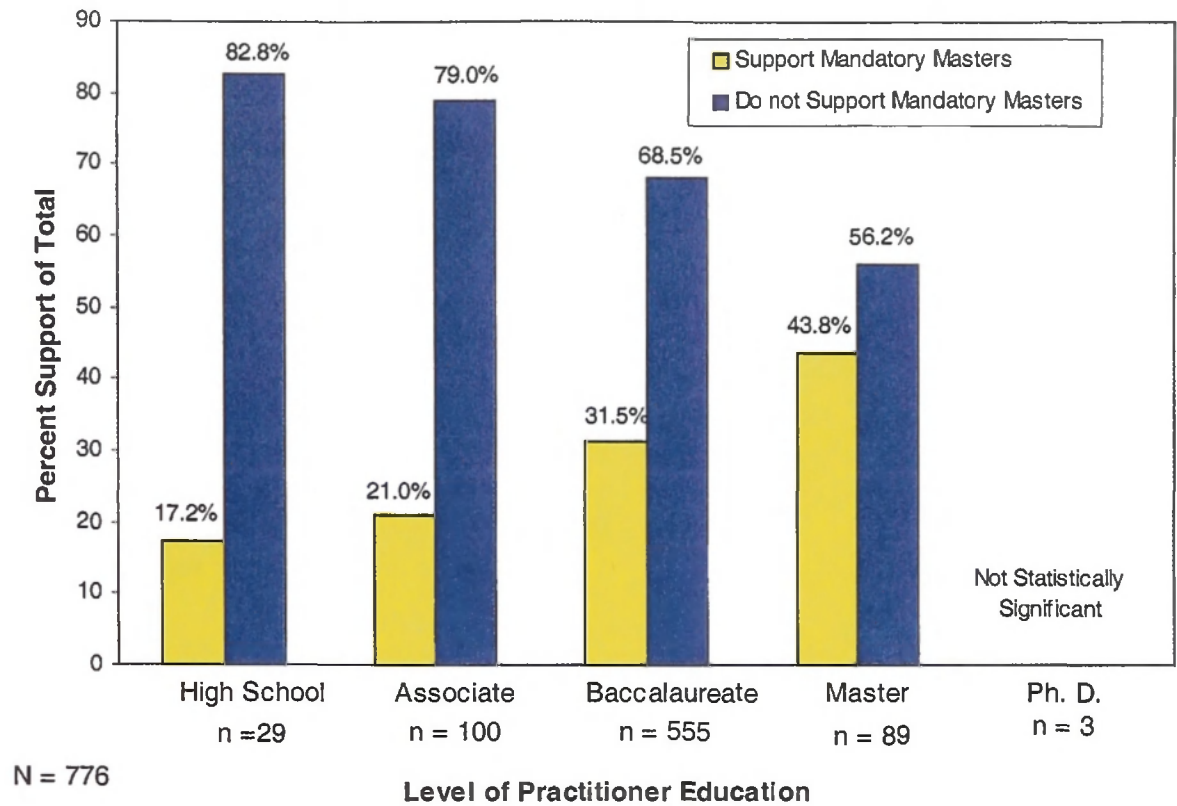
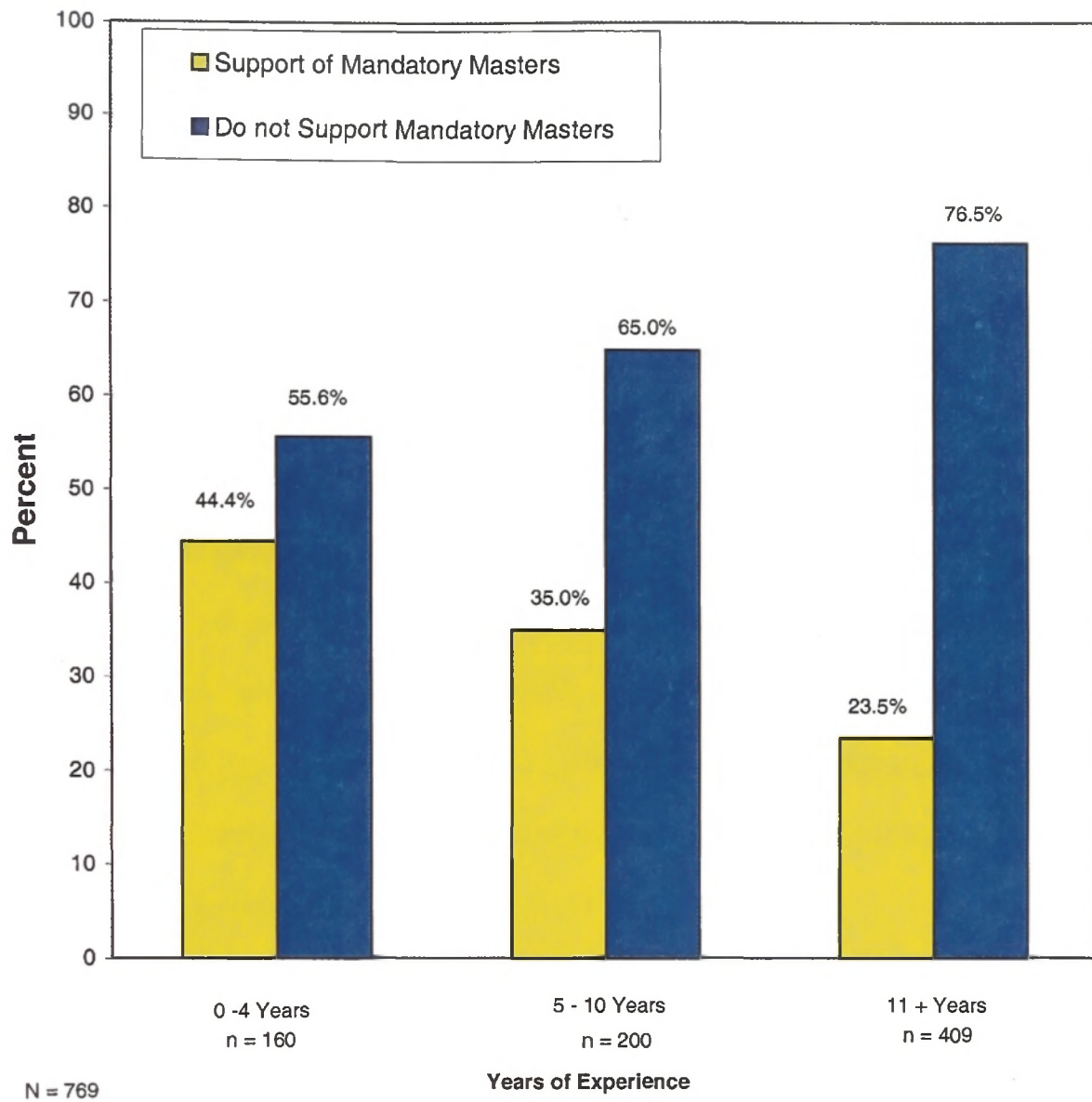


Table 1: Respondent Support for a Mandatory Masters in Orthotics and Prosthetics by Years of Experience

	Years of Experience	Mean Years	Standard Deviation	Standard Error Mean
Support Mandatory Masters	0 – 4 years = 71 (respondents)	10.69	8.180	0.531
	5 – 10 years = 70			
	11 + years = 96			
Do Not Support Mandatory Masters	0 – 4 years = 89 (respondents)	13.93	8.915	0.387
	5 – 10 years = 130			
	11 + years = 313			

N = 769 Respondents

Figure 3: Respondent Support of Mandatory Masters by Years of Practitioner Experience



employee; the largest facility had 250 employees. The mean number of employees in the facilities where survey respondents work was fourteen.

Of the individuals who answered whether or not they were the hiring authority, 53.1% stated “yes” they were and of those, 58.8% stated that they were either “very likely” or “somewhat likely” to hire within the next two years. An additional 31.8% may hire an orthotist and/or prosthetist depending on how circumstances develop, and only 9.4% were not at all likely to hire another practitioner within 2 years. When considering a candidate for employment, the educational background would play a “significant” role in the hiring decision for 63.6% of hiring authorities who are “very likely” to hire a practitioner within the next 2 years. Furthermore, of hiring authorities that are “very likely” to hire a practitioner, 90.2% would find the applicant’s educational background to be “significant” or “somewhat significant” to their hiring decision. Of those who were “somewhat likely” to hire a practitioner, 90.7% would find the applicant’s educational background to be significant or somewhat significant in their hiring decision. Over 40% of the hiring authorities would pay a premium for a candidate “who has acquired the master’s level education described in the cover letter” [Table 2].

Although most individuals who responded that they were the hiring authority felt strongly that the educational level of the applicant was important, more than half of the total respondents (69%) did not believe that mandating a master’s level education for entry into the field of orthotics and prosthetics was appropriate at the time of this survey. Only 31% of the total practitioner respondents felt the time was right for a mandatory masters for entry into the profession (N = 781).

**Table 2: Importance of Educational Background of the Prospective Employees to Employers Who are Hiring Within the Next Two Years**

		<b>Importance of Educational Background</b>					
		Significant	Somewhat	Not Much	Neutral	Not at all	Total
<b>Hiring Within the Next 2 Years</b>	Very likely	110 (63.6%)	46 (26.6%)	7 (4.0%)	5 (2.9%)	5 (2.9%)	173 (100%)
	Somewhat likely	34 (45.3%)	34 (45.3%)	2 (2.7%)	2 (2.7%)	3 (4.0%)	75 (100%)
	Neutral	52 (38.8%)	49 (36.65%)	8 (6.0%)	15 (11.2%)	9 (6.7%)	134 (100%)
	Not at all Likely	16 (39.0%)	14 (34.1%)	2 (4.9%)	0 (0%)	8 (19.5%)	40 (100%)
	Totals	213 (50.5%)	143 (33.9%)	19 (4.5%)	22 (5.2%)	25 (5.9%)	N = 422 (100%)

Note: Of the 817 surveys, 425 answered “yes” to the question of whether they were the hiring authority, of those 422 answered the question of importance of educational background.

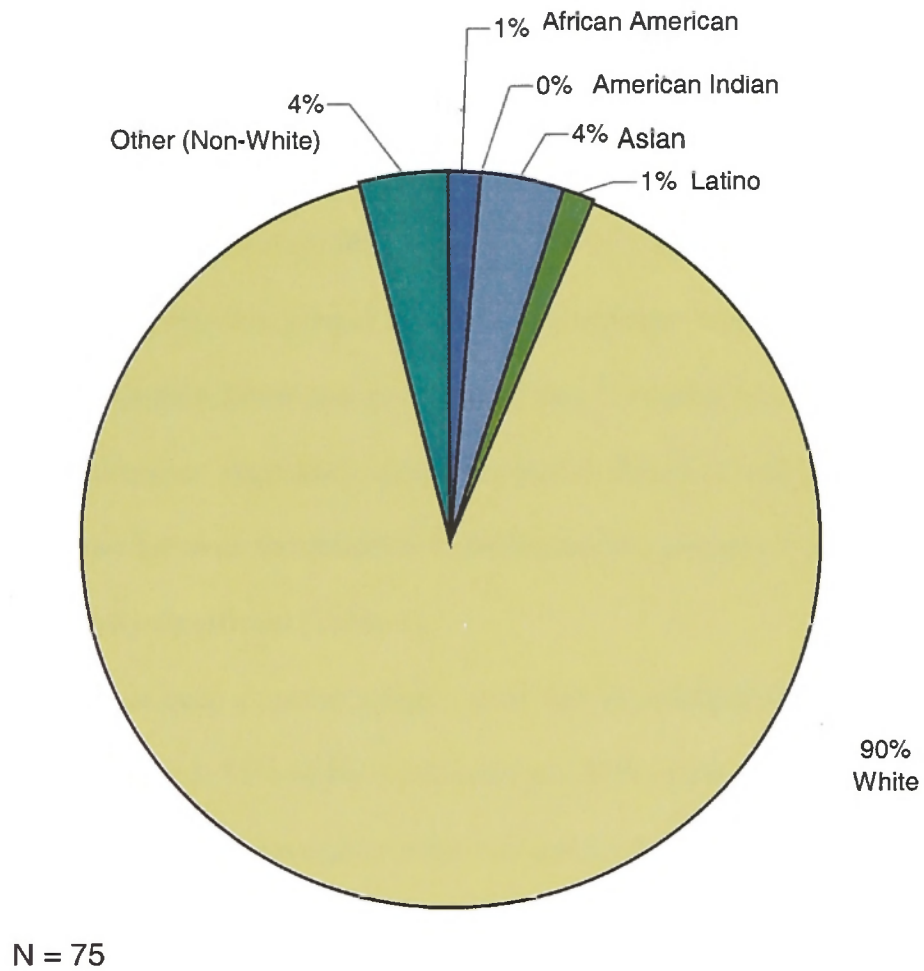


## **Resident Survey**

The results from the resident survey showed the typical respondent is a white (88.9%) male (74.3%) with a mean age of 28.27 years who went to a certificate program (75.3%). Among the respondents, 1.4% are African American, 0.0% were American Indian, 4.2% were Asian, 1.4% were Latino and 4.2% identified themselves as “Other” [Figure 4]. The majority of the respondents hold baccalaureate degrees (95.9%), with only 1.4% holding associate degrees and 2.7% master’s degrees.

Current NCOPE-accredited residents were questioned regarding their expectations about the level of competence they felt they should have attained through their orthotic and/or prosthetic education prior to beginning residency (Appendix B section 2.1). In addition, survey respondents were asked to weight the extent to which those expectations were met (Appendix B section 2.2). A response of 1 to either question would mean that the respondent felt they should not be (or were not) given adequate instruction and/or experience to be at all competent in a particular skill area. A response of 5 would mean that the respondent should be (or were) given adequate instruction and/or experience to be fully competent in that skill area. A difference of means test was used to assess whether there was a statistically significant difference between the expectations (Question #1) and the extent to which those expectations were actually met (Question #2). For example, for the question regarding the issue of “safety,” comparing the mean response from Question #1 (4.26) to the mean response in Question #2 (3.99) indicates that respondents expected a greater level of instruction on safety issues than they actually received, at a significance level of 5%. Residents responded that, in 22 areas of practitioner expertise identified by the survey as

Figure 4: Ethnicity of Residents as of December 2001



those that would be key to their practice, their expectations of educational competency were not achieved by their instruction and/or experience prior to NCOPE residency.

The perceived under-preparation was not statistically significant in the following areas: range of motion testing, manual muscle testing, plan of care, patient interview skills, interdisciplinary treatment planning, gait analysis, and data interpretation. For example, for the issue of “range of motion testing,” there was not a statistically significant difference between the mean responses to Question #1 for expectations (mean = 4.38) and Question #2, if those expectations were met (mean = 4.30). However, in the areas of safety, professionalism, ethics, legal issues, interdisciplinary communication, documentation, human resource issues, policy & procedures, L-coding, insurance issues, evaluation of practice outcomes, regulatory agencies, patient education, and computer technology, the difference between the residents expectations and perceived actual experience *was* statistically significant [Table 3].

When asked if there had been a master’s degree available in orthotics and prosthetics at the time the residents applied, 55% of the certificate- and 52% of the baccalaureate-educated residents said they would have chosen the masters level program over the program they actually attended (N = 57). However, when answering this question, respondents were asked to elaborate why or why not they would they choose a master’s level degree over a baccalaureate or certificate. Several of the resident’s added comments that they did not want the entry level degree to be a masters level degree because it either required more time to complete than the baccalaureate or certificate, or they felt it would not be adequately rewarded in terms of career compensation.

**Table 3: Paired Samples Analysis of Current Resident's Expectations of Professional Preparation by Current NCOPE Programs**

<b>Variable</b>	<b>Mean Question 1*</b>	<b>Mean Question 2**</b>	<b>N</b>	<b>T-statistic (Difference in Means Test)</b>
Safety	4.26	3.99	73	2.473 **
Professionalism	4.35	4.11	72	2.063 **
Ethics	4.30	3.63	71	5.036 ***
Legal Issues	4.04	3.01	71	7.911 ***
Inter-disciplinary communication	4.14	3.59	73	3.821 ***
Inter-personal communication	4.00	3.76	72	1.732 *
Documentation	4.12	3.77	73	2.312 **
Range of Motion Testing	4.38	4.30	73	0.772
Manual Muscle Testing	4.33	4.22	73	0.956
Plan of Care	4.14	4.29	73	-1.496
Patient interview skills	4.23	4.04	73	1.409
Human resource issues	3.07	2.75	72	1.976 *
Policy & Procedures	2.99	2.21	71	5.506 ***
L-coding	3.57	2.56	72	5.823 ***
Insurance Issues	3.11	1.93	72	7.442 ***
Evaluation of Practice outcomes	4.28	4.10	71	1.606
Regulatory agencies	3.14	2.52	71	4.190 ***
Interdisciplinary Treatment planning	3.53	3.49	72	0.344
Patient education	4.26	3.79	73	3.869 ***
Computer Technology	3.01	2.19	73	4.561 ***
Gait Analysis	3.44	3.67	72	-0.390
Data Interpretation	3.30	3.22	73	0.591

\* To what level of competence should schools educate and/or train students prior to the student beginning an NCOPE accredited residency?

\*\* To what level did your orthotics and/or prosthetics schooling educate you in the following skills?

\*\*\* Indicates the variable is significant at the 0.01 level of significance.

\*\* Indicates the variable is significant at the 0.05 level of significance.

\* Indicates the variable is significant at the 0.10 level of significance.

## **Discussion**

### **Practitioner Survey**

Support for the mandatory master's degree as the entry-level degree in orthotics and prosthetics has been a question for the field since the 1970s. There are several factors this study took into account when determining support; discipline of the practitioner, educational level, years of experience, whether or not a practitioner attended a baccalaureate or certificate program in orthotics and prosthetics, whether or not the facility at which the practitioner worked had an NCOPE residency program, the number of employees at the facility, and whether or not the individual was the hiring authority. Of these factors, only years of experience and level of education were significant in the support of the mandatory entry-level master's degree by the practitioner respondents. The longer a practitioner has been in the field, the less likely he or she is to support a master's degree as a mandatory prerequisite for entrance to practice (significant at the 1% level). Among the most experienced group – those who have been in practice for eleven or more years – a surprisingly high 23.5% supported a required master's degree for entry-level practitioners. This is surprising due to the fact that the individuals who possess greater than eleven years of experience as certified practitioners did not have the requirement of a baccalaureate degree to become ABC certified and could instead enter the field by means of apprenticeships (residency) once they completed their certificate program. Therefore, it is presumed that those in the field for greater than eleven years would be less likely to possess secondary education and therefore these individuals would tend to believe experience, not formal education was the most important factor to becoming a competent practitioner in the field of orthotics and prosthetics. Indeed, many of those

respondents to the practitioner survey who were not in favor of the mandatory master's degree added that experience in the field was the most important factor to becoming a competent practitioner. However, among those who have been in practice for four or fewer years, almost half (44.4%) supported a mandatory master's degree as the entry-level degree for orthotists and prosthetists. This is more than likely due to experience increasing the level of skills over time. The educational level of the practitioner also played a significant role in determining support for the mandatory masters. The greater the level of education of the practitioner, the more likely they were to support the master's degree (significant at the 5% level).

White males continue to dominate the field, but respondents were less likely to come from this demographic than those who responded to a survey conducted in 2000 by the Practice Analysis Task Force of the ABC, which found 90.5% of practitioners were male, and 93.5% white. Those statistics are consistent with the ABC database of that same year.

### **Resident Survey**

Strides are being made toward gender equality in the field, as females comprise 25.7% of the residents who answered this survey. This is a dramatic increase in the number of females in the field as the Practice Analysis Task Force of 2000 states that females comprise only 9.5% of the total population of orthotists and prosthetists.

Among O&P residents, the population responding to the survey largely (90%) identified as white, which is 3.5% less than the Task Force found in 2000.

Residents perceived areas of their didactic education in orthotics and prosthetics to be inadequate for current practice in the field. Several areas, such as legal and

insurance issues, professionalism, ethics, interdisciplinary communication, documentation, human resource issues, policy and procedures, patient education, and computer technology could be taught in the academic environment, however it seems from the results of this survey, they are not adequately taught at this time. That is, the respondents indicated they received inadequate training in 40.9% of the areas tested for in the survey.

Although over half of the residents would have chosen a master's level degree if one had been available, several of the respondents added comments to the survey indicating they were unsure if those increased credentials would be adequately compensated in the job market.

### **Strengths and Limitations**

This is the first study of its kind regarding the education of orthotists and prosthetists in this country. This study is limited by the fact that it is merely a representation of current resident's perceptions of their education during their NCOPE residency. At the onset of residency, the resident tends to be overwhelmed with the vast amount of information from real-world situations that are all but impossible to teach in an academic environment, therefore the perceptions of their education may be skewed. This study is also biased due to the overwhelming majority of individuals who answered the practitioner survey graduated from the Northwestern University certificate program (41.4%). The probable reason for this is that Northwestern University graduates more students per year (80+) than all the other programs combined; therefore those individuals have a greater influence on the study results.

## **Conclusions**

### **Implications for Public Administration**

Licensure assures the public that the practitioner has achieved some minimal level of preparation to render the services that he or she is engaged to perform. In any state where orthotic/prosthetic licensure is required, as will eventually be the nationwide norm, there will be minimum academic requirements for prospective licensees. Given the risks involved, the minimum academic requirement for orthotic and prosthetic practitioners will eventually have to be a master's degree. Even now, when in some states literally anyone can put out a shingle and call him or herself an orthotist or prosthetist, it is surprising how high the level of support there is for this requirement among respondents to this survey, given how few of them hold such a degree themselves.

This study documented both a need and a demand for a master's level program in orthotics and prosthetics by both current practitioners and resident practitioners. Current residents are feeling under-prepared for their first jobs in critical areas. An extended academic curriculum would go a long way to teach these students what they require to become competent entry-level practitioners. And rather than using the required year of residency as a catch-up year, the residency would serve as a year of exploration to engage in critical research into the various subspecialties of orthotics and prosthetics. The time has come for the field of orthotics and prosthetics to propel itself to a higher level of professionalization.

Public administrators – and specifically health care administrators – who are charged with the duty to ensure the best possible health care for patients as well as creating efficient and effective delivery systems are in a national debate about who



deserves licensure and how to best go about licensing a field of professionals. This study attempted in a small way to determine if there was a need and a demand for increased standards, the first step to licensure. Using the physical therapy field as a model, the ripple of discussion among O&P professionals may indicate a greater wave of change to come. For health care administrators to ensure the safety and standards of care for patients requiring orthotic and prosthetic care, there needs to be higher professional standards and, perhaps, licensure of the field to ensure the best possible care for the public at large.

By demanding increases in education and ultimately licensure, we place regulation on the field. This regulation will help ensure that O&P practitioners have adequate training, stay up to date with continuing education, have a compelling interest in not committing malpractice, and stay within their scope of practice. This creates a standard of practice, which when deviated from, jeopardizes the practitioners' license and therefore their continued employment. O&P patients deserve to expect this level of competence and professionalism.

### **Future Research**

Further study must be done to determine the costs associated with licensure. Such a study would need to take into account that many individuals not currently certified by the American Board for Certification, Inc. would likely be 'grandfathered' into any state licensing program, so that it could be some time before licensure would create the desired increase in the quality of health care, as well as the public's confidence in it. Other costs associated with licensure and increased education include the increased salaries for such

orthotists and prosthetists. It is unknown whether the public, insurance companies, and the rest of the health care industry will embrace increased standards, given the inevitable increases in cost for such heightened care.

In addition, further study must be done to fully assess the need and demand for increased standards in the field of orthotics and prosthetics. Orthotics and prosthetics as a field possess the attributes of a profession. However, it seems to be missing one characteristic of a truly professionalized field – licensing standards based on high educational standards. There are only seven states that currently engage in licensing the orthotic and prosthetic professions, of which most implemented the statutes only within the past three years. Public and health-care administrators must do further research to ensure that the public will benefit from this licensure and that increased standards of education will lead to increased competency and therefore quality care for public health at large.

**Appendix A**  
**Survey Instrument: Practitioner Survey**

## A Survey of Current American Board of Certification in Orthotics and Prosthetics, Inc. Certified Practitioners

This is a survey regarding the training of Orthotists and Prosthetists. It is being conducted in partial fulfillment of a master's thesis at the University of Michigan - Flint. Participation in this survey is completely voluntary. No names are requested. E-mail addresses are optional and will be used exclusively for delivering feedback to participants. Participants may answer all or any of the following questions. Your participation, however, is highly desirable and you are encouraged to complete all of the questions.

This information will be consolidated for statistical reporting only. Individual responses will be destroyed subsequent to the creation of a computer file of the coded responses.

Additional information, questions or comments about this survey should be directed to:

*Alicia J. Davis, CPO at: 734-973-2400 ext. 248, or via e-mail at: aliciad@umich.edu*

If you wish to have summary results of this survey sent to you please include your e-mail address here:

Email: \_\_\_\_\_

### Part 1. Demographic information and opinion of entry-level professional preparation.

Please check your certification.

CP	_____
CO	_____
CPO	_____

Please check the highest level of education you have attained.

High School	_____
Associate	_____
Baccalaureate	_____
Master's	_____
Ph. D.	_____

How many years have you been certified? \_\_\_\_\_ Years

Does your facility participate in a residency program? Yes \_\_\_\_\_ No \_\_\_\_\_

### Part 2. Needs and Demand for personnel. Please mark the appropriate response.

1. How many people are currently employed at your facility? \_\_\_\_\_
2. Are you the hiring authority at this facility?  
 \_\_\_\_\_ Yes      \_\_\_\_\_ No      (If no, please proceed to question #6)

3. How likely are you to hire a practitioner within the next 2 years?
  - a. Very likely
  - b. Somewhat likely
  - c. Neutral – depends on the growth of my business
  - d. Not at all likely
  
4. When making a decision to hire a new practitioner, to what level does the educational background of the candidate play in your decision to hire?
  - a. Significant
  - b. Somewhat
  - c. Not much
  - d. Neutral
  - e. None (as long as the candidate is a certified practitioner)
  
5. Would you pay a premium for a practitioner who has acquired the master's level education described in the cover letter?
 

\_\_\_\_\_ Yes      \_\_\_\_\_ No

  - a. If yes, then how much of a premium? Please circle the answer that best describes
    - i. 5%
    - ii. 10%
    - iii. 15%
    - iv. 20%
  
6. Would you support a master's degree in orthotics and/or prosthetics curriculum if it incorporated one year of residency within the academic environment?
  - a. Yes
  - b. No
  - c. Why or why not?
  
7. Would your facility be interested in participating as a residency site for a master's program in O&P?
  - a. Yes
  - b. No
  
8. If you are a singly certified practitioner (CO or CP) and are thinking of becoming a CPO within the next 5 years, how likely are you to pursue the type of master's degree described in the cover letter? *(Please leave blank if you are a CPO)*
  - a. Very likely
  - b. Somewhat likely
  - c. Neutral
  - d. Not very likely
  - e. Very unlikely
  
9. Physical Therapy and Occupational Therapy now require master's degrees for entry-level practice. Should orthotics and prosthetics require a master's degree level of education for entrance into the profession? Why or Why not?

10. Beyond any of the above questions and comments, what course work do you believe to be critical to the education of orthotic and prosthetic practitioners in the future?

**Thank you for completing this survey.**

Should you have any questions about this survey, please contact either Alicia J. Davis, CPO at: 734-973-2400 ext. 248, e-mail [aliciad@umich.edu](mailto:aliciad@umich.edu) or you may contact the principle investigator:

Kristine A. Mulhorn, MHSA, Ph. D.  
303 E. Kearsley Street  
Flint, MI 48502

810-762-3172

[kmulhorn@umflint.edu](mailto:kmulhorn@umflint.edu)

**Appendix B**  
Survey Instrument: Resident Survey

**A Survey of Current Orthotic and/or Prosthetic Residents in  
NCOPE Accredited Residencies**

**This is a survey regarding the training of Orthotists and Prosthetists. It is being conducted in partial fulfillment of a master's thesis for the University of Michigan - Flint. The purpose of this study is to assess the current state of professional education in orthotics and prosthetics. Participation in this survey is completely voluntary. No names are requested. E-mail addresses are optional and will be used exclusively for delivering feedback to participants. Participants may answer all or any of the following questions. Your participation, however, is highly desirable and you are encouraged to complete all of the questions.**

**This information will be consolidated for statistical reporting only. Individual responses will be destroyed subsequent to the creation of a computer file of the coded responses.**

**Additional information, questions or comments about this survey should be directed to:**

***Alicia J. Davis, CPO at: 734-973-2400 ext. 248, or via e-mail at: [aliciad@umich.edu](mailto:aliciad@umich.edu)***

If you wish to have summary results of this survey sent to you please include your e-mail address here:

Email: \_\_\_\_\_

**Part 1. Demographic information and opinion of entry-level professional preparation.**

Please check your current residency:

Prosthetics	_____
Orthotics	_____

Please check the highest level of education you have attained:

High School	_____
Associate	_____
Baccalaureate	_____
Masters	_____
Ph. D.	_____

Please check your ethnicity:

African American	_____
White	_____
Latino	_____
Asian	_____
American Indian	_____
Other (non-white)	_____

Your current age: \_\_\_\_\_

Your gender: M\_\_\_\_\_ F\_\_\_\_\_

State in which you practice prosthetics and/or orthotics \_\_\_\_\_



**Please refer to the list of skills in Part 2 to answer the following question.**

Based on your residency experience, do you feel you will have adequate education in the areas listed below upon graduation from an NCOPE accredited residency? Please explain why or why not?

**Part 2. Information about professional preparation.** The following three sections will ask you to provide your professional opinion about the importance and sequence of specific education and training for the orthotics and prosthetics profession.

For each of the following education and training categories, select one (1) answer and fill in the corresponding circle (●) from the scale to the right that best describes your opinion.

**2.1 To what level of competence should schools educate and/or train students prior to the student beginning an NCOPE accredited residency in orthotics and/or prosthetics?**

	Not Competent	—————			Fully Competent
Safety regulations for materials management <i>Is able to use tools and equipment in a safe and appropriate manner. Familiarity with material data sheets.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professionalism <i>Is able to relate to patients and coworkers with behaviors that put patients and families first and minimize personal desires and prejudices.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ethical practice issues/Concepts <i>Is familiar with American Board for Certification in Orthotics &amp; Prosthetics, Inc. Canons of Ethical Conduct and complies with these canons in their practice.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Legal issues of practice <i>Maintains knowledge of the legal requirements of and limitations to their own practice. Abides by these requirements.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inter-disciplinary communication <i>Is able to communicate with other members of the clinical team, patients, families and members of the community in a directed, concise and kind manner.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inter-personal communication <i>Responds to one-on-one communication with focus, listening skills, reflection and appropriate dialog.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Documentation writing <i>Records patients history, data from evaluation and plan of care in a concise manner and in an acceptable format.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical examination of patients ROM testing <i>Is able to evaluate and appropriately record patient ROM.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not Competent	_____	_____	_____	Fully Competent
Manual muscle testing <i>Is able to evaluate and appropriately grade and record active motion.</i>	○	○	○	○	○
Plan of care <i>Is able to develop an appropriate plan of care for specific patients utilizing correct orthotic/prosthetic diagnosis and other data and findings.</i>	○	○	○	○	○
Examination of patients through patient interview skills <i>Asks questions and records appropriate historical and current data. Is focused on the patient and is cognizant of body language, affect and other observable findings.</i>	○	○	○	○	○
<b>Administration &amp; management skills:</b>					
Personnel (Human Resources) <i>Have a working knowledge of what personnel are required to maintain a successful O&amp;P practice.</i>	○	○	○	○	○
Policy and Procedures <i>Is able to develop, put into practice and maintain a policy and procedure manual</i>	○	○	○	○	○
Fiscal management					
Billing (appropriate use of L-codes) <i>Is able to correctly distinguish and use L-codes for billing.</i>	○	○	○	○	○
Billing (knowledge of insurance) <i>Keeps abreast of changing insurance requirement. Possesses a working knowledge of how to set up insurance procedures, obtain insurance contracts and encourage business.</i>	○	○	○	○	○
Evaluation of practice outcomes <i>Is able to evaluate the appropriate design, fit and function of an orthosis or prosthesis and change or modify as required by the patient. Routinely evaluates outcomes and invites suggestions/comments from others.</i>	○	○	○	○	○
Regulatory agencies <i>Is able to work with regulatory agencies, meet their requirements and pass all inspections without having to pay fines or lose licenses to practice.</i>	○	○	○	○	○
Interdisciplinary treatment planning <i>Is knowledgeable of the specific role and function of each member of the interdisciplinary clinic team. Functions with them to develop an interdisciplinary comprehensive plan of care as needed.</i>	○	○	○	○	○
Patient education techniques (Proper use of orthoses or prostheses) <i>Is aware of and makes appropriate use of patient education resources in various media. Answers questions of patients, family and caregivers correctly, completely and appropriately.</i>	○	○	○	○	○
Computer technology <i>Is able to utilize current CAD-CAM technology to design and produce an orthosis or prosthesis.</i>	○	○	○	○	○
Gait analysis <i>Is able to collect and analyze data from patients using force plates, strain gauges and other technologies</i>	○	○	○	○	○
Data interpretation <i>Is able to form a hypothesis and interpret the data collected as to distribution and significance</i>	○	○	○	○	○

**2.2 To what level did your orthotics and/or prosthetics schooling educate you in the following skills?**

	Not Competent	—————			Fully Competent
Safety regulations for materials management <i>Is able to use tools and equipment in a safe and appropriate manner. Familiarity with material data sheets.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professionalism <i>Is able to relate to patients and coworkers with behaviors that put patients and families first and minimize personal desires and prejudices.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ethical practice issues/Concepts <i>Is familiar with American Board for Certification in Orthotics &amp; Prosthetics, Inc. Canons of Ethical Conduct and complies with these canons in their practice.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Legal issues of practice <i>Maintains knowledge of the legal requirements of and limitations to their own practice. Abides by these requirements.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inter-disciplinary communication <i>Is able to communicate with other members of the clinical team, patients families and members of the community in a directed, concise and kind manner.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inter-personal communication <i>Responds to one-on-one communication with focus, listening skills reflection and appropriate dialog</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Documentation writing <i>Records patients history, data from evaluation and plan of care in a concise manner and in an acceptable format</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical examination of patients					
ROM testing <i>Is able to evaluate and appropriately record patient ROM.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual muscle testing <i>Is able to evaluate and appropriately grade and record active motion.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plan of care <i>Is able to develop an appropriate plan of care for specific patients utilizing correct orthotic/prosthetic diagnosis and other data and findings.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Examination of patients through patient interview skills <i>Asks questions and records appropriate historical and current data. Is focused on the patient and is cognizant of body language, affect and other observable findings.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Administration & management skills:					
Personnel (Human Resources) <i>Relates to all staff members in a democratic manner. Is able to both give and receive direction.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Policy and Procedures <i>Is able to develop, put into practice and maintain a policy and procedure manual.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not Competent	_____			Fully Competent
<b>Fiscal management</b>					
Billing (appropriate use of L-codes) <i>Is able to correctly distinguish and use L-codes for billing.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Billing (knowledge of insurance) <i>Keeps abreast of changing insurance requirements. Communicates with patients and referral sources regarding insurance as appropriate.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Legal aspects of practice</b> <i>Is knowledgeable of national and state legislation and statutes that relate to orthotics and prosthetics. Manages own practice procedures accordingly.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Evaluation of practice outcomes</b> <i>Is able to evaluate the appropriate design, fit and function of an orthosis or prosthesis and change or modify as required by the patient. Routinely evaluates outcomes and invites suggestions/comments from others.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Regulatory agencies</b> <i>Is able to work with regulatory agencies, meet their requirements and pass all inspections without having to pay fines or lose licenses to practice..</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Interdisciplinary treatment planning</b> <i>Is knowledgeable of the specific role and function of each member of the interdisciplinary clinic team. Functions with them to develop an interdisciplinary comprehensive plan of care as needed.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Patient education techniques</b> (Proper use of orthoses or prostheses) <i>Is aware of and makes appropriate use of patient education resources in various media. Answers questions of patients, family and caregivers correctly, completely and appropriately.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Computer technology</b> <i>Is able to utilize current CAD-CAM technology to design and produce an orthosis or prosthesis.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Gait analysis</b> <i>Is able to collect and analyze data from patients using force plates, strain gauges and other technologies</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Data interpretation</b> <i>Is able to form a hypothesis and interpret the data collected as to distribution and significance</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**3. Do you feel your orthotic and/or prosthetic training has relied too heavily on the residency training program to “fill in the gaps” of your orthotic and prosthetic education? Please check the appropriate answer.**

\_\_\_ Yes      \_\_\_ No

4. **What is your concept of the ideal residency program?  
Please rank order of importance (1 = Highest, 5 = Lowest) the following descriptions  
that best fit your concept of the ideal residency**

A year of training where the didactic is put into practice (clinical patient care) \_\_\_\_\_

A year of training that emphasizes finances and law \_\_\_\_\_

A year of training that emphasizes office and personnel management \_\_\_\_\_

A year of training emphasizing research \_\_\_\_\_

A year of training emphasizing the fabrication techniques and component  
parts of orthoses and prostheses \_\_\_\_\_

6. **Beyond any of the above questions and comments, what course work do you believe  
to be critical to the education of new orthotic and prosthetic practitioners in the  
future?**

7. **If there were a master's level degree available in orthotics and prosthetics, would  
you have chosen a masters level degree over a certificate or baccalaureate degree?  
Why or why not?**

Thank you for completing this survey.

If you have any questions about this survey, please contact either Alicia J. Davis, CPO at: 734-973-2400 Ext. 248, e-mail at: [aliciad@umich.edu](mailto:aliciad@umich.edu) or you may contact the principle investigator:

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**Appendix C**  
History of Orthotics and Prosthetics Schools and Degrees Awarded

### **Current Orthotic and Prosthetic Schools (2002)**

<b><u>School</u></b>	<b><u>Discipline</u></b>	<b><u>Degree</u></b>
University of Texas	Orthotics/Prosthetics	Baccalaureate
University of Washington	Orthotics/Prosthetics	Baccalaureate
California State University	Orthotics/Prosthetics	Baccalaureate
Northwestern University	Orthotics/Prosthetics	Certificate
Century College	Orthotics/Prosthetics	Certificate
Rancho Los Amigos National Rehabilitation Center	Orthotics	Certificate
California State University, Dominguez Hills	Orthotics/Prosthetics	Certificate
Newington O&P	Orthotics/Prosthetics	Certificate
Rutgers University	Prosthetics	Certificate

### **Schools that are Represented in Survey, but no Longer Active**

<b><u>School</u></b>	<b><u>Discipline</u></b>	<b><u>Degree</u></b>
New York University	Orthotics/Prosthetics	Baccalaureate
Florida International University	Orthotics/Prosthetics	Certificate
Shelby State College	Orthotics/Prosthetics	Certificate

**Appendix D**

**Difference in Average Salaries between ABC and BOC Certified Practitioners**



**Average Annual Salary Difference Between  
ABC Certified Practitioners and BOC Certified Practitioners (2000)**

**ABC Certified Practitioner**

	< 2 Years	2-5 Years	> 5 Years
<b>All Participants</b>	<b>\$48,760</b>	<b>\$64,857</b>	<b>\$91,455</b>
<b>Location</b>			
Northeast	\$42,275	\$61,349	\$79,667
South	\$52,488	\$64,356	\$89,877
Central	\$49,516	\$63,560	\$82,368
West	\$49,163	\$68,467	\$85,885
<b>Firm Size</b>			
Small	\$50,601	\$66,566	\$98,501
Medium	\$46,572	\$62,211	\$80,643
Large	\$39,600	\$56,700	\$73,700

**BOC Certified Practitioner**

	< 2 Years	2-5 Years	> 5 Years
<b>All Participants</b>	<b>\$36,527</b>	<b>\$46,993</b>	<b>\$57,880</b>
<b>Location</b>			
Northeast	\$25,700	\$36,200	\$63,000
South	\$30,802	\$50,952	\$57,053
Central	\$47,317	\$51,783	\$56,218
West	\$43,000	\$48,000	\$52,500
<b>Firm Size</b>			
Small	\$36,306	\$46,845	\$56,882
Medium	\$38,333	\$47,333	\$60,000
Large	\$33,100	\$47,300	\$61,500

Source: Adapted from American Orthotic and Prosthetic Association 2000. Business and Salary Survey Report. 2000. Retrieved December 1, 2001 from the World Wide Web: <http://www.aopanet.org/opcareerctr/salary-bene.htm>

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