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Abstract

This non-experimental descriptive survey study examined the relationship between occupational therapy (OT) graduate students', recent graduates', and educators' values of the regional and specific anatomy knowledge required for OT clinical practice. The researcher collected survey data from 94 OT graduate students, recent graduates, and educators at a private university. Data analysis consisted of descriptive statistics used to analyze the value of anatomical regions and structures and a one-way ANOVA with a post-hoc Tukey to compare the group means on the value of anatomical structures. Results revealed that the regions of the highest value were the back and spine, thorax, and head and neck. The results further revealed that the anatomical structures of the highest value generally included skeletal, muscular, and nervous system structures. Structures rated with the least value included abdominal and reproductive viscera. Statistically significant results revealed that generally, OT graduate students found anatomy knowledge of greater value than recent OT graduates and educators. The results suggest a gap between OT anatomy education and the anatomy needed for OT clinical practice. This study helps educators better understand the education practice gap and provides data on the anatomical knowledge that the prospective groups find valuable for competent clinical practice.

Keywords

Human anatomy, occupational therapy, curriculum

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ABSTRACT

This non-experimental descriptive survey study examined the relationship between occupational therapy (OT) graduate students', recent graduates', and educators' values of the regional and specific anatomy knowledge required for OT clinical practice. The researcher collected survey data from 94 OT graduate students, recent graduates, and educators at a private university. Data analysis consisted of descriptive statistics used to analyze the value of anatomical regions and structures and a one-way ANOVA with a post-hoc Tukey to compare the group means on the value of anatomical structures. Results revealed that the regions of the highest value were the back and spine, thorax, and head and neck. The results further revealed that the anatomical structures of the highest value generally included skeletal, muscular, and nervous system structures. Structures rated with the least value included abdominal and reproductive viscera. Statistically significant results revealed that generally, OT graduate students found anatomy knowledge of greater value than recent OT graduates and educators. The results suggest a gap between OT anatomy education and the anatomy needed for OT clinical practice. This study helps educators better understand the education practice gap and provides data on the anatomical knowledge that the prospective groups find valuable for competent clinical practice.

Occupational therapy (OT) programs have no current standard for the regional and specific anatomical structures that educators should include in the content of their anatomy courses (Giles et al., 2021; Latman & Lanier, 2001; Schofield, 2014, 2017). A lack of standards for anatomy course content leaves instructors teaching anatomy to OT students with few to no guidelines, resulting in the course content not being specific to OT. Anatomy educators are left wondering if they are teaching too much anatomy and whether the anatomy is relevant to the student's needs or the treatment of patients

within their discipline (Schofield, 2014, 2017). Students often learn all aspects of the human body, despite some anatomical structures not being related to their work as clinicians. There is a need to determine what anatomical structures OT graduate students, recent OT graduates, and OT educators find of value to be competent in their careers.

This non-experimental descriptive survey study examined the relationship between OT graduate students', recent graduates', and educators' perceived values of regional and specific anatomy knowledge at a chosen private university. More specifically, this study identified the value of the specific anatomical structures that OT graduate students, recent graduates, and educators perceived as essential to be competent in their clinical careers.

Background

Anatomy knowledge is vital for clinical competence in many healthcare professions (Romo-Barrientos et al., 2019). Students' foundational understanding of regional and specific anatomy knowledge contributes to their ability to diagnose and treat patients. Unfortunately, evidence suggests that entry-level OTs do not have the appropriate anatomical knowledge to be competent in clinical practice (Schofield, 2017). Clinicians and anatomy educators are concerned with entry-level OT anatomy knowledge, associating it with a decrease in curriculum hours, vague accreditation criteria, and a lack of standards in the anatomy course content (Carroll & Lawson, 2014; Drake et al., 2009; Lazarus et al., 2012; Schofield, 2014, 2017). These concerns result in faculty creating an anatomy course curriculum with little guidance at each institution. The lack of consistency in course content means that the curriculum varies among institutions and can affect a student's ability to practice competently (Adam et al., 2013; Schofield, 2017). The Accreditation Council for Occupational Therapy Education (ACOTE, 2020) is the academic accrediting body responsible for educational standards among OT programs. No evidence discloses the specific anatomy knowledge required for OT clinical practice (Giles et al., 2021; Schofield, 2017). Without a standard for anatomy course curriculum, OT students' competence to use anatomical knowledge in clinical settings may be affected.

Despite a lack of standards for anatomy courses in OT programs, anatomy plays a valuable role in OTs' treatment of patients. According to the American Occupational Therapy Association (AOTA, 2021), OTs treat individuals who have lost their ability to perform daily tasks. Occupational therapists analyze functional performance and design specific intervention strategies to increase the patient's occupational performance (Carroll & Lawson, 2014; Schofield, 2017). To design interventions, clinicians must understand the human body's structures and functions to successfully treat patients and analyze functional performance (Carroll & Lawson, 2014; Schofield, 2017). A few anatomy applications in OT clinical practice include goniometry, muscle strength testing, and regaining functional mobility (Schofield, 2017).

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Researchers have used survey designs to determine the regional anatomy required for clinical practice only from a clinician's view. A study conducted by Latman and Lanier (2001) was one of the first studies identified that gathered clinicians' recommendations for the curricular content of gross anatomy courses. Latman and Lanier (2001) evaluated OT, physician assistant, and physical therapy programs. Data suggested that different anatomical structures were important for each specialty. For OT anatomy courses, clinicians recommended including the following: upper limb, lower limb, thorax, head and neck, and the back (Latman & Lanier, 2001). The study was not exclusive to the specific anatomical structures of value.

Few studies have addressed anatomical education solely in OT programs. Schofield (2014, 2017) used mixed methods survey designs to gather perspectives of OT clinicians' views on anatomy course structure across the United States. Clinicians reported that the essential regional anatomy for an OT to know would be the "upper limb, lower limb, head and neck, and thorax/back" (Schofield, 2014, p. 103). The essential systems recommended by clinicians were the "skeletal, muscular, and nervous systems" (Schofield, 2014, p. 103).

Regarding the value of anatomy in OT programs**,** clinicians from the above studies have provided the anatomical regions of importance to OT graduates. However, research on the regional and specific anatomical structures of value for clinical competence from the perspectives of OT students, recent graduates, and educators is absent from the mentioned studies.

This study had two objectives: 1) to determine if there was a relationship between OT graduate students', recent graduates', and educators' perceived value of anatomical regions and structures, and 2) to determine what OT graduate students, recent graduates, and educators rated the value of anatomical regions and structures.

Methods

Survey

The data gathering tool used was a survey created consisting of close-ended questions. The survey was distributed through SurveyMonkey and was designed by the author. The survey aimed to gather OT graduate students', recent graduates', and educators' perceptions of the value of regional and specific anatomy knowledge required for competent clinical practice. Additionally, the researcher used the survey data to compare how participants viewed the value of anatomy.

For this study, the importance of six regions of the body was assessed on a five-point Likert scale. These regions included the back and spine, the thorax, the abdomen, the pelvis and perineum, the lower limb, and the head and neck. The upper limb region was not included because it was the only region deemed essential for OT clinical competence in previous research studies (Schofield 2014, 2017). The participants rated the value of each anatomical region on a five-point Likert scale, ranging from 1 (strongly agree) to 5 (strongly disagree).

After rating each anatomical region of the human body, participants were asked to rate the value of anatomical structures found in each body region (e.g., bones, muscles, nerves, arteries, veins, and organs (if applicable)). The same five-point Likert scale was used, as discussed previously. For this study, the number of anatomical structures rated by participants was limited to under 20.

The survey was reviewed by two expert anatomists and one practicing OT outside of the private university to ensure the validity of the survey. Face validity and content validity of the survey were achieved through the review to ensure the appropriateness of the content and that the survey questions measured the concepts of this study.

Participants and Data Collection

The convenience sample was derived from a private graduate health professional university. The target groups were OT graduate students, recent graduates, and educators.

All participants surveyed included those that had or were pursuing a doctorate or a master's degree in OT. All current students and recent graduates surveyed included those who had completed Level II fieldwork and had zero to four years of OT clinical experience in all practice areas. All educators included faculty in the private university's OT department who were instructors, full, associate, assistant, or adjunct professors.

The university's Institutional Review Board approved the study. Before beginning the data collection process, the researcher obtained graduate students' and educators' university emails from the OT administrative assistant. Personal email addresses for recent OT graduates were acquired from the alumni association on campus. Certain precautions were taken to ensure the confidentiality of all participants. Further, surveys were sent individually to the email addresses of all participants to ensure participant anonymity. If a participant consented to be part of the study, SurveyMonkey automatically opened the survey on their device. After the initial email, two email reminders were sent to all participants to improve the response rate. Participants had two and a half weeks to complete the survey, which took approximately 10 minutes.

Data Analysis

Following the two-and-a-half-week timeline for participants to complete the survey, the survey was closed, and data analysis began. The data was imported into IBM SPSS Statistics (Version 26) predictive analytics software for data analysis using descriptive and inferential statistics. The level of significance was set at $p = .05$.

Descriptive statistics were used to describe the demographic data collected. The demographic information collected included gender, age, degree, years of clinical experience, and educators' academic rank. The frequency, mean, and standard deviation for the anatomical regions and structures important for an OT to be a competent clinician were determined using SPSS.

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To determine the relationship between OT graduate students', recent graduates', and educators' perceived values of regional and specific anatomical knowledge. One-way analysis of variance (ANOVA) with a post-hoc Tukey was used to assess the survey data by comparing the means of multiple participant groups to determine if the groups had significantly different perspectives.

Results

Participants

Three hundred and eleven surveys were distributed electronically via SurveyMonkey. The researcher received a total of 110 electronic responses and removed 16 responses due to being incomplete. The overall response rate was 30% (*N* = 94).

The convenience sample consisted of 50% (*n* = 47) OT graduate students, 39.4% (*n* = 37) recent OT graduates, and 10.6% (*n* = 10) OT educators. The majority of participants were females in each of the three sample groups.

Thirty-seven recent OT graduates participated, and 89.2% (n = 33) reported being licensed OTs. Of the 47 OT graduate students, 87.2% (*n* = 41) were pursuing a doctoral degree in OT. Additionally, 43.2% (*n* = 16) of the recent OT graduates had 0-1 years of clinical experience, 40.5% (*n* = 15) had 2-3 years of clinical experience, and 16.2% (*n* = 6) had four or more years of clinical experience. Of the educators that completed the survey, participants included assistant professors (*n* = 4), associate professors (*n* = 2), adjunct professors (*n* = 2), an instructor (*n* = 1), and a full professor (*n* = 1).

Descriptive Statistics

Participant Ratings of the Value of Body Regions

Forty-seven OT graduate students completed the survey. Findings indicated that OT graduate students strongly agreed or agreed that all regions of the human body were of value for clinical competence. The top three regions rated as more important were the head and neck, the back and spine, and the thorax.

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Findings indicated that the OT educators strongly agreed or agreed that all regions of the human body were of value for clinical competence. The anatomical region rated as most important was the head and neck.

Participant Ratings of the Value of Anatomical Structures

The five-point Likert scale was 1 (very important) to 5 (not important). Occupational therapy graduate students rated 68 structures as valuable to being competent in their clinical careers. Most students rated 46 anatomical structures between very important and important, 22 between important and moderately important, and zero as slightly important or unimportant.

Most recent OT graduates rated 12 anatomical structures as very important and important, 38 anatomical structures between important and moderately important, and 18 rated between moderately important and slightly important. Most recent OT graduates determined no anatomical structures to be between slightly important and not important.

Most of the OT educators rated 29 of the anatomical structures as very important and important. Twenty-three anatomical structures were rated between important and moderately important. Most determined sixteen anatomical structures to be slightly important or not important. Table 1 depicts the results.

Table 1

Means and Standard Deviations of OT Graduate Students, Recent Graduates, and Educators' Ratings of Anatomical Structures

Structure	Graduate students		Recent graduates		Educators	
	M	*SD*	*M*	*SD*	*M*	*SD*
Back and spinal cord						
Vertebral column	1.26	0.57	1.70	0.85	1.20	0.42
Suboccipital triangle	2.15	1.06	3.00	1.29	2.40	0.84
Superficial muscles	1.17	0.43	1.65	0.82	1.40	0.52
Deep muscles	1.30	0.55	1.84	0.87	1.40	0.52
Spinal cord	1.13	0.50	1.35	0.72	1.10	0.32
Spinal meninges	1.87	0.96	2.92	1.21	2.30	1.16
Blood vessels	1.70	0.78	2.76	1.16	2.60	0.84
Nerves	1.09	0.28	1.54	0.93	1.20	0.42
Lower limb						
Osteology	1.87	1.08	1.84	0.90	1.60	0.52
Joints	1.38	0.61	1.65	0.86	1.40	0.52
Muscles	1.45	0.65	1.81	0.88	1.30	0.48
Blood vessels	2.00	0.96	2.78	1.06	2.50	1.08
Nerves	1.60	0.80	2.30	1.15	1.40	0.52
Fascial compartments	1.60	1.11	3.22	1.21	2.70	0.82
Thorax						
Osteology	1.45	0.72	2.05	0.97	1.60	0.52
Muscles	1.19	0.45	1.86	0.89	1.30	0.48
Heart & great vessels	1.43	0.68	2.16	1.01	1.90	1.10
Lungs	1.38	0.57	2.03	0.93	2.00	1.05
Trachea	1.43	0.85	2.54	1.04	2.20	1.14
Bronchi	1.62	0.92	2.76	1.04	2.50	1.36
Esophagus	1.43	0.72	2.46	1.12	2.30	1.50
Blood vessels	1.85	0.88	2.76	1.26	2.70	1.16
Nerves	1.34	0.56	2.27	1,12	1.50	0.53

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Structure	Graduate students		Recent graduates		Educators	
	M	*SD*	*M*	*SD*	*M*	*SD*
Abdomen						
Abdominal wall	1.81	0.83	2.27	1.05	2.20	1.32
Diaphragm	1.60	0.77	2.08	0.95	1.60	0.52
Stomach	2.17	1.13	2.57	1.09	2.60	1.17
Small intestines	2.53	1.08	3.19	1.24	3.10	1.37
Large intestines	2.53	1.08	3.19	1.22	3.10	1.37
Pancreas	2.53	1.10	3.35	1.14	3.60	1.27
Liver	2.51	1.10	3.35	1.16	3.60	1.27
Gallbladder	2.60	1.16	3.46	1.17	3.60	1.27
Spleen	2.64	1.19	3.43	1.17	3.60	1.27
Kidneys	2.47	1.10	3.05	1.15	3.50	1.27
Blood vessels	2.21	1.06	3.00	1.20	2.70	0.68
Nerves	1.68	0.86	2.43	1.17	1.90	0.74
Pelvis & perineum						
Osteology	1.57	0.95	1.81	0.74	1.80	0.63
Joints	1.53	0.93	1.81	0.81	1.70	0.95
Ligaments	1.77	0.98	2.22	1.00	1.80	0.92
Muscles	1.79	0.98	2.38	1.16	2.40	1.27
Pelvic viscera	2.49	1.12	3.27	1.27	3.40	1.17
Anal triangle	2.77	1.24	3.38	1.28	3.70	1.42
Internal reproductive organs	2.64	1.29	3.46	1.15	3.60	1.35
External reproductive organs	2.64	1.29	3.30	1.05	3.10	1.20
Perineum	2.74	1.24	3.38	1.19	3.50	1.18
Blood Vessels	2.43	1.16	3.19	1.20	3.30	0.95
Nerves	1.91	1.10	2.43	1.26	2.10	0.88
Head & neck						
Bones of the skull	1.62	0.77	2.54	1.15	1.70	0.68
Bones of the face	1.74	0.92	2.76	1.21	2.00	0.82
Fascial layers of the neck	1.87	1.01	2.81	1.08	2.60	1.35
Cranial meninges	1.74	0.99	2.81	1.08	2.30	1.16
Scalp	2.09	1.06	3.16	1.26	3.00	1.25
Muscles of facial expression	1.45	0.72	2.32	1.20	1.50	0.97
Ear	2.04	1.02	2.78	1.21	2.70	1.49
Extraocular muscles	1.60	0.83	2.32	1.06	2.50	1.65
Intrinsic eye muscles	1.55	0.80	2.46	1.15	2.00	1.25
Nasal cavity	2.11	1.03	3.03	1.09	3.00	1.56
Oral cavity	1.62	0.87	2.41	1.09	1.70	1.06
Tongue	1.64	0.87	2.24	1.12	1.80	1.23
Palate	1.72	0.88	2.70	1.36	2.00	1.49
Pharynx	1.79	0.91	2.59	1.24	1.50	1.48
Laryngeal cartilage	1.96	0.96	2.78	1.30	2.40	1.43
Thyroid	2.13	1.06	2.97	1.28	3.20	1.32
Vocal cords	1.96	0.91	2.95	1.31	2.50	1.58
Carotid sheath	2.09	0.95	3.14	1.25	3.20	1.32
Cranial nerves	1.30	0.62	32.00	1.02	1.40	0.52
Nerves of the head & neck	1.28	0.58	1.95	1.10	1.40	0.52
Blood vessels of the head & neck	1.62	0.77	2.59	1.28	2.30	1.16
Infratemporal fossa	2.23	1.03	3.05	1.20	3.10	1.37

One-Way ANOVA

Anatomical Regions

The researcher ran a one-way ANOVA to compare the means of the values that participants placed on anatomical regions among the sample of OT graduate students, recent graduates, and educators. For the anatomical regions, this analysis produced a statistically significant result for the back and spine ($F(2, 91) = 3.67$, $p = 0.03$) and head and neck ($F(2, 91) = 5.93$, $p = 0.004$). For the back and spine, post-hoc Tukey tests revealed that the only significant difference between groups was between OT graduate students ($M = 1.26$) and recent OT graduates ($M = 1.68$), with the OT graduate students rating the back and spine significantly more valuable than recent OT graduates. For the head and neck, Post-hoc Tukey tests revealed that the only significant difference between groups was between OT graduate students ($M = 1.21$) and recent OT graduates ($M = 1.59$). Once again, the OT graduate students rated the head and neck to have greater value than the recent OT graduates. The researcher found no significant differences between groups for the lower limb regions, thorax, abdomen, pelvis, and perineum.

Anatomical Structures

The researcher conducted a one-way ANOVA to compare the means of the value that participant groups placed on anatomical structures. There was a significant difference between groups, with OT graduate students rating most anatomical structures as more significant than recent OT graduates and educators at the $p < 0.05$. There were no significant differences for the following anatomical structures: the spinal cord, abdominal wall, stomach, esophagus, lower limb osteology, joints, muscles, pelvis osteology, joints, ligaments, and nerves.

Discussion

A survey study was conducted to determine if there was a relationship between OT graduate students', recent graduates', and educators' perceived value of anatomy. Additionally, this study identified the value of specific anatomical structures that OT graduate students, recent graduates, and educators perceived as essential to be competent in their clinical careers. The results showed that OT graduate students rated the regions of the back and spine and head and neck significantly higher compared to recent OT graduates. Occupational therapy graduate students also rated most anatomical structures as more significant than recent OT graduates and educators.

Occupational therapy graduate students finding certain regions more valuable could represent the exposure to anatomy in their coursework. For example, the rating of the back and spine and head and neck as significantly higher could be because many students who took the survey were currently enrolled in or had recently completed a neuroscience course. These same students had also completed an in-depth gross anatomy course. The same could be true for anatomical structures. Occupational therapy graduate students could have rated most anatomical structures to be of high value simply because of what was emphasized in their anatomy course, not necessarily because they perceived the anatomy as valuable for being competent in the clinical setting.

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Recent OT graduates' lower rating of regions and structures could be because they work in the clinical setting. As recent graduates enter the clinical environment, they could better understand what is beneficial to know as practicing OTs rather than seeing everything as valuable. What recent graduates perceived as beneficial could also be related to the practice areas of recent OT graduates. Often, clinicians in different specialty areas may find different anatomical regions and structures of varying importance. For example, Schofield (2017) found that practice areas such as orthopedics and neurorehabilitation may require a more in-depth understanding of anatomical knowledge than other clinical practice areas.

The results suggest there are gaps between OT anatomy education and the anatomy needed for OT clinical practice that can be narrowed. This study helps educators understand the education practice gap and supports a need for collaboration between educators and clinical partners to ensure that OT students are learning essential competencies. The data further adds to the small body of literature that examines the anatomy of value for OTs. Future studies should focus on surveying OT clinicians to aid in bridging the gap between the anatomy taught in the classroom and the anatomy important for OT clinical practice.

Limitations

This study was limited to a convenience sample of 94 OT graduate students, recent graduates, and educators from one university. Due to the convenience sampling and low numbers of OT educators and recent OT graduates, the generalizability of this study's findings is limited.

The survey consisted of over 68 questions to be answered, which is not a minimal survey. Of the participants who opened the survey link, 16 only responded to demographic questions and left the remainder blank. Those with strong opinions about the value of anatomy may have been the only individuals that completed the survey. It could also be the case that recent OT graduates who use anatomical knowledge more in their specific practice area were more likely to complete the survey. This would lead to recent OT graduates' results being biased and perhaps unrelated to the anatomical knowledge that OTs need to succeed as entry-level clinicians but for a specific clinical area of practice.

The OT graduate students rated most of the regions and structures as important. This could be due to a lack of OT graduate students' clinical experience, suggesting that the students do not know what specific anatomy is important to be a competent clinician. Further, because most participants rated anatomical structures important, this may suggest that the survey tool was not sensitive enough to determine the level of importance of each anatomical structure.

The researcher did not include the upper limb in this study because prior studies found the upper limb essential to include in OT anatomy education (Schofield 2014, 2017). Future studies are needed to determine what specific anatomical structures of the upper limb educators could include in OT anatomy course content.

Future Research

Researchers could expand this survey study to include participants from other universities. Expanding the study to other geographical regions could provide additional data for analyses and make the data generalizable to the population.

Further, researchers could also alter this study to determine the anatomy required for each clinical specialty. Often, clinicians in different specialty areas may find different anatomical regions and structures of varying importance.

Implications for Occupational Therapy Education

The OT anatomy curriculum should be designed to include anatomical knowledge that is important to know in the clinical setting. Implementing anatomical knowledge that is of value in the clinical setting can be done by including clinicians in the curricular development process. Additionally, teaching anatomy courses based on what is clinically relevant and of value to the profession of OT could promote learner motivation, student engagement, and retention of anatomy knowledge and lead to increased student confidence and attention to the material (Abdel Meguid et al., 2020; Eccles & Wigfield, 2020; Parkinson et al., 2006). The results from this study can serve as a reference for anatomy educators until others gather evidence in future studies.

Conclusion

The survey outcomes based on the perception of OT graduate students, recent graduates, and educators revealed that all participant groups found all surveyed anatomy to be of some level of value. All participant groups placed a high value on the head and neck, back and spine, and thorax region. Anatomical structures of the most value included skeletal, muscular, vascular, and nervous structures, and abdominal and reproductive viscera were valued the least. The data from this study also revealed that OT graduate students found most anatomical structures to be significantly more valuable for clinical practice than recent OT graduates and educators. Educators instructing OT anatomy courses may consider consulting OT clinicians to ensure students receive anatomical knowledge that will promote academic success and prepare them for entry-level clinical practice.

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