Motivation and learning methods of anatomy: Associations with mental well-being

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Abstract
Appropriate anatomy education for speech and language therapists is a crucial part of preparation for clinical practice. While much research has been conducted regarding the anatomical education of medical students, there is a paucity of evidence for speech and language therapy students. This study assessed the methods employed by a cohort of first-year speech and language therapy students to learn anatomy, their perceptions of the clinical importance of anatomy and motivation to learn anatomy (using a modified version of the motivation strategies for learning questionnaire) and how this related to potential barriers to motivation such as mental well-being (using the Warwick-Edinburgh Mental Well-Being Scale [WEMWBS]). Analysis revealed that 92% of students agreed or strongly agreed that a sound knowledge of anatomy is important for clinical practice, 74% agreed or strongly agreed that listening at lectures was how they primarily learned anatomy, and 91% of students agreed or strongly agreed that they worried a great deal about tests. The latter statement was negatively correlated with a number of statements on the WEMWBS. Overall, the data revealed that first-year speech and language therapy students place importance on anatomy and its role in their future clinical practice, that they have different preferences for learning anatomy compared to medical students, and also have significant anxiety surrounding anatomy examinations. Multiple significant correlations between responses to the motivation and mental well-being questionnaires suggest that there is a significant relationship between first-year student motivation to learn anatomy and well-being.

KEYWORDS
anatomy, learning, mental health, motivation

1 | INTRODUCTION

Most research in anatomical education is gleaned from the perspectives and experiences of medical students. While there is a relative paucity of information about the anatomical education of other allied health professionals such as physiotherapy, occupational therapy, radiography, and radiation therapy, a particular area of paucity we identified was that of the anatomical education experiences of speech and language therapy students, especially first-year students.
Speech and language therapists are involved in the screening, assessment and treatment of a myriad of conditions from autism spectrum disorders to stroke with an estimated 6–8 million people in the United States have some form of language impairment, and short of 10% have a swallowing, or communication disorder (Adams et al., 2012; McLaughlin, 2011; O’Hare & Brenner, 2016; Ristori et al., 2019). Over 27,000 Irish children having a speech and language difficulty (Central Statistics Office, 2011) and there is now very strong evidence to suggest that early language disorders increase the risk of poor literacy, mental health, and employment outcomes well into adulthood (Winstanley et al., 2018). Thus, speech and language therapists make up a vital component of the healthcare team, and it is therefore important that their education in the preclinical years be optimized to support their clinical career success.

Anatomy is typically taught during semester one of year one of speech and language therapy program. This is a time for much change and upheaval as students embark on a new course of study in third level education. Therefore, they may not fully appreciate or be aware of the importance of anatomy for their future clinical career. Much of the literature available on students' perspectives on the importance of anatomy to their future clinical careers involves the perceptions of medical students, who overwhelmingly agree on its importance (Bhangu et al., 2010; Böckers et al., 2014; Lazarus et al., 2012; Moxham et al., 2014; Pabst & Rothkötter, 1996; Sbayeh et al., 2016). However, those perspectives may not necessarily reflect the views and experiences of the speech and language therapy student population, especially in first year when they learn anatomy.

Successful outcomes of teaching in terms of establishing a deep understanding of the topic, which will benefit therapists in future practice often depend on the study methods adopted by students when learning anatomy (Criado-Alvarez et al., 2017). While much of the literature comes from studies on medical program (Abdel Meguid & Khalil, 2017; Ang et al., 2018; Bohl & Gest, 2011; Sagoo et al., 2021; Santos et al., 2021; Smith et al., 2014; Smythe & Hughes, 2008; Wormald et al., 2009), relatively little is known about the favored pedagogical approaches for anatomy used in speech and language therapy program. Notwithstanding, while various pedagogies can be employed during teaching (Schofield, 2018; Skinder-Meredith, 2010), student motivation is essential to successfully acquire knowledge. Moreover, the perceived importance of anatomy may be integral in motivation to study anatomy (Abdel Meguid et al., 2020).

Numerous theories of motivation have been proposed; the most widely reported are attribution theory (Weiner, 1985), social cognitive theory (Bandura, 1977), goal orientation theory (Dweck, 1986), and self-determination theory (Ryan & Deci, 2000). These theories form the basis of student motivation assessment questionnaires including the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ is a self-report questionnaire, which was developed in the United States in 1986 and is designed to assess college students' motivational orientation and their use of different learning strategies (Duncan & Mckeachie, 2005). There were two sections to the original MSLQ, a motivation section and a learning strategies section. Motivational components include students' perceptions of the classroom environment as well as their self-related beliefs such as personal goals, self-efficacy, interest, and value beliefs. Learning strategies include rehearsal, elaboration, and organization, and metacognitive strategies such as planning, monitoring, and regulating learning (Pintrich, 1991). The MSLQ is one of the most widely used instruments to measure motivation and self-regulated learning in higher education (Pintrich, 2004; Pintrich et al., 1993; Roth et al., 2016), yet it has never been administered to speech and language therapy students to assess motivation to learn anatomy.

An important factor in relation to enhanced student learning is the relationship between motivation and student well-being, specifically mental health. Mental health is a state of complete physical, mental, and social well-being in which an individual realizes his or her own abilities, is able to cope with the normal stresses of life (Criado-Alvarez et al., 2017), works productively and contributes to his or her community (Drew et al., 2010). Research has established that University students are vulnerable to mental health difficulties due to the transition away from home, lack of traditional social support, and increasing academic stress (Castillo & Schwartz, 2013). Indeed, early college years now constitute a peak period for the onset of mental health disorders (Ibrahim et al., 2013). The impact of untreated mental health problems in college students can be devastating. For example, college students with mental disorders are twice as likely to drop out without obtaining a degree (Hartley, 2010). Moreover, higher levels in stress have been identified in medicine and health science students when compared to college students in general (Elias et al., 2011). While numerous studies have shown that mental health disorders negatively impact academic performance and that motivation is important for academic success (Amrai et al., 2011; Kaufman et al., 2008), there is a dearth of studies that elucidate the relationship between motivation and student well-being in terms of mental health. It is also important to note that no study has assessed speech and language therapy students in this context.

Previous studies have focused on individual aspects of anatomy education in speech and language therapy program such as the perceived importance of anatomy or a specific anatomy learning method. Motivation to learn is vital for successful learning, and has not been previously examined in a cohort of speech and language therapy students. Therefore, we aimed to ascertain what motivates the learning process in this cohort. While motivation is important, it must be met with appropriate study skills by students and appropriate teaching pedagogies by educators. Thus, we aimed to ascertain the preferred anatomy learning methods of a cohort of first-year speech and language therapy students in order to inform future pedagogical practice. The literature to date reflects the fact that achievement correlates to well-being and motivation correlates to achievement, but we have not been able to identify any study, which ascertains the direct relationship between motivation and well-being in a speech and language therapy cohort. In this regard, we aimed to establish the relationship between motivation to learn and student well-being in a cohort of first-year speech and language therapy students.
2 | MATERIALS AND METHODS

2.1 | Curriculum and study design

First-year speech and language therapy students taking the module Anatomy of Speech and Hearing in the Department of Anatomy and Neuroscience at University College Cork, Ireland participated in this study. The class typically consists of 30 students, the majority of who are new college entrant undergraduate students that have completed the Irish Leaving Certificate State Examination.

Students attended 22 h of lectures and 12 h of cadaveric prosection-based laboratory practicals in one semester and covered the anatomical topics of musculoskeletal and nervous systems, anatomy of respiration (thorax, respiratory viscera, and breathing), phonation (pharynx and larynx), articulation (cranial skeleton, facial muscles, tongue, and dentition), the ear, and the eye. The anatomy module is supported by the university’s web-based learning portal, which allows student access to lecture and practical laboratory notes and multimedia learning resources.

Students were assessed by an end of semester written examination of multiple choice questions (80%) and a continuous assessment composed of five online practical assignments (identification of anatomical and related short answer questions) (20%). A grade of 50% is required to pass the module.

2.2 | Survey instruments

Students were invited to participate by completing three questionnaires.

A 12-statement survey using a five-point Likert scale was administered to evaluate students’ perception of the importance of anatomy for their clinical careers, students’ preference of teaching modalities for anatomy, and students’ learning preferences including engaging with lectures, hands-on practicals, textbooks, anatomical drawings, studying in groups, or online anatomy tutorials.

The second questionnaire utilized was an abbreviated version of “The Motivated Strategies for Learning Questionnaire” (MSLQ). Given that students were asked to complete a number of questionnaires, an abbreviated version was administered to maintain student attention and compliance. To assess student motivation and self-regulated learning strategies to learn anatomy in this cohort of first-year students, 16 statements were selected as representative of each of the headings of the original MSLQ: motivation (intrinsic value, self-efficacy, and test anxiety) and learning strategies (self-regulation and cognitive strategy use). For continuity, we employed a five-response Likert scale.

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) was administered to monitor motivation wellbeing in this cohort of first-year students. The WEMWBS was developed by the University of Warwick and the University of Edinburgh, and is jointly owned by the NHS Health Scotland. This is a 14-question scale validated for use in adults over 16 years (Tennant et al., 2007). The 14 items in the questionnaire cover both hedonic and eudemonic aspects of mental health including positive affect (feelings of optimism, cheerfulness, and relaxation), satisfying interpersonal relationships, and positive functioning (energy, clear thinking, self-acceptance, personal development, competence, and autonomy).

The study received ethical approval from the Institutional Social Research Ethics Committee (Log 2019-099). Participation by students was entirely voluntary and remained anonymous throughout the entire process. Informed consent was obtained and questionnaires were distributed as hard copies to students during the final lecture of the module in December 2018. Students remained in the lecture theater for the duration of the survey and 24 completed questionnaires were anonymously returned at the end of the session.

2.3 | Statistical analysis

Answers on the five-point Likert scale were converted to ordinal data (from 1 = strongly disagree to 5 = strongly agree). Answers to questions on the WEMWBS were converted to ordinal data (1 = none of the time; 2 = rarely; 3 = some of the time; 4 = often; and 5 = all of the time). Not applicable was provided as an option for response. Data were manually entered into Microsoft Excel spreadsheets and were exported to the Statistical Package for Social Scientists, version 22 (IBM Corp., Armonk, NY) andGraph Pad Prism 8. Frequency and percentages were used to summarize the data. Nonresponsive data (left blank) were excluded.

Descriptive statistics were carried out and data were analyzed using χ² tests to assess significant deviations in preferences from chance expectations. Specific preferences were assessed relative to the total number of preferences for a given question. Differences with a p value less than 0.05 were considered statistically significant. Spearman correlation was used to establish the relationship between aspects of motivation and well-being. * or ** denotes relationships/correlations that are statistically significant at 0.05 or 0.01 level, respectively. If 0.1 ≤ r < 0.3, then a weak relationship exists; If 0.3 ≤ r < 0.5, then a moderate relationship exists and if r > 0.5, then a strong relationship exists.

3 | RESULTS

From a total of 30 students in the class, 24 (80%) participated in the study. However, as one student was aged 17 years and thus a minor at the time of the study, this student’s answers were excluded resulting in data from 23 participants. While the participants’ questionnaires were entirely anonymized, consultation with student records revealed that the age range of respondents was between 18 and 25 years. From the class of 30 students, 28 students were female.

3.1 | Teaching pedagogies and learning preferences

3.1.1 | Students’ perception of the importance of anatomy for clinical practice

For the statement “A sound knowledge of anatomy will be important for my clinical practice after completion of my degree,” 91% of
students had a positive response. Specifically, they either agreed (49%) or strongly agreed (43%) with this statement (mean Likert score = 4.3), \(\chi^2 = 15.78, df = 3, p = 0.001\) (Figure 1A). For the statement “The lectures helped me identify the importance of anatomical knowledge to speech therapy” 83% of students either agreed or strongly agreed (mean Likert score = 4.3), \(\chi^2 = 10.91, df = 3, p = 0.012\). Sixty-one percent of respondents agreed or strongly agreed that “The online assignments helped me identify the importance of anatomical knowledge to speech therapy” (mean Likert score = 3.9), \(\chi^2 = 5.7, df = 3, p = 0.127\) and 27% of students agreed or strongly agreed that “The anatomy practical sessions helped me identify the importance of anatomical knowledge to speech therapy” (mean Likert score = 3.3), \(\chi^2 = 10.73, df = 3, p = 0.013\) (Figure 1B).

### 3.1.2 Preferred methods to learn anatomy

Students were asked to indicate their preferred methods to learn anatomy. Of the respondents, 74% agreed or strongly agreed that listening to lectures was how they primarily learned anatomy (mean Likert score = 3.9), \(\chi^2 = 11.13, df = 4, p = 0.025\); and 71% agreed or strongly agreed that hands on experience in the laboratory was how they learned anatomy (mean Likert score = 3.7), \(\chi^2 = 9.71, df = 4, p = 0.046\) (Table 1).

Reading anatomical facts in textbooks (18% agreed or strongly agreed, \(p = 0.186\)) watching online material such as YouTube videos and podcasts (29% agreed or strongly agreed, \(p = 0.345\)), and participating in discussions at lectures (22% agreed or strongly agreed, \(p = 0.33\)) were the least utilized methods of learning anatomy (mean scores of 2, 2.5, and 2.4, respectively).

### 3.2 Motivation and learning strategies

#### 3.2.1 Motivation

Of the respondents who completed the abbreviated version of the MSLQ, 96% agreed or strongly agreed with the statement “Even when I do poorly on a test, I try to learn from my mistakes” (mean Likert score = 4.5), \(\chi^2 = 9.74, df = 2, p = 0.008\). Furthermore, 87% agreed or strongly agreed that “It is important for me to learn what is being taught in class” (mean Likert score = 4.3), \(\chi^2 = 15.78, df = 3, p = 0.001\) while 48% of the respondents agreed or strongly agreed that they prefer classwork that is challenging so they can learn new things (mean Likert score = 3.3), \(\chi^2 = 15.04, df = 4, p = 0.005\) (Table 2).

For data collected on self-efficacy, only 18% agreed or strongly agreed with the statement “Compared with other students in the class I expect to do well” (mean Likert score = 2.9), \(\chi^2 = 17.09, df = 4, p = 0.002\) and 32% agreed or strongly agreed that “I think I will receive a good grade in this class” (mean Likert score = 3), \(\chi^2 = 9.36, df = 4, p = 0.053\). A majority of 78% of respondents agreed or strongly agreed that “I think what I am learning in this class will be useful for me to know” (mean Likert score = 4.3), \(\chi^2 = 3.74, df = 2, p = 0.154\). Remarkably, 91% of students agreed or strongly agreed that “I worry a great deal about tests” (mean Likert score = 4.7), \(\chi^2 = 40.83, df = 3, p < 0.0005\).

#### 3.2.2 Learning strategies

Pertaining to data collected for learning strategies, 74% of students agreed or strongly agreed with the statement “Before I begin studying I think about the things I will need to do to learn” (mean Likert score = 4), \(\chi^2 = 11.57, df = 4, p = 0.021\). Moreover, 78% of respondents agreed or strongly agreed with the statement “I work hard to get a good grade even when I don’t like a class” (mean Likert score = 4.3), \(\chi^2 = 16.83, df = 3, p = 0.001\). A majority of 91% of students agreed or strongly agreed that “I always try to understand what the lecturer is
### Table 1
Preferred methods to learn anatomy in a cohort of first speech and language therapy students

| Method                                                                 | Agree and strongly agree (%) | $\chi^2$ | df | $p$ value |
|------------------------------------------------------------------------|------------------------------|---------|----|-----------|
| I learn anatomy primarily by reading about anatomical facts in textbooks | 18                           | 3.36    | 2  | 0.186     |
| I learn anatomy primarily by looking at anatomical drawings            | 65                           | 7.78    | 3  | 0.051     |
| I learn anatomy primarily by listening to lectures                     | 74%                          | 11.13   | 4  | 0.025*    |
| I learn anatomy by participating in discussions at lectures            | 22                           | 4.61    | 4  | 0.330     |
| I learn anatomy primarily by hand-on experience in the laboratory      | 71                           | 9.71    | 4  | 0.046*    |
| I learn anatomy by discussing anatomy with classmates                 | 41                           | 1.64    | 4  | 0.802     |
| I learn anatomy primarily by discussing anatomy in study groups        | 47                           | 2.84    | 4  | 0.585     |
| I learn anatomy by watching online material such as Podcasts and YouTube videos | 29                           | 4.48    | 4  | 0.345     |

Note: $\chi^2$, Chi-square.
Abbreviation: df, degrees of freedom.
*p < 0.05.

### Table 2
Statistical summary of responses to the abbreviated MSLQ

| Response                                                                 | Agree and strongly agree (%) | $\chi^2$ | df | $p$ value |
|--------------------------------------------------------------------------|------------------------------|---------|----|-----------|
| I prefer classwork that is challenging so I can learn new things         | 48                           | 15.04   | 4  | 0.005*    |
| Compared with other students in this class I expect to do well           | 18                           | 17.09   | 4  | 0.002*    |
| It is important for me to learn what is being taught in this class       | 87                           | 15.78   | 3  | 0.001*    |
| I think I will receive a good grade in this class                        | 32                           | 9.36    | 4  | 0.053     |
| Even when I do poorly on a test I try to learn from my mistakes         | 96                           | 9.74    | 2  | 0.008*    |
| I think what I am learning in this class is useful for me to know        | 78                           | 3.74    | 2  | 0.154     |
| I worry a great deal about tests                                         | 91                           | 40.83   | 3  | <0.0005*  |
| I ask myself questions to make sure I know the material I have been studying | 70                           | 2.44    | 2  | 0.296     |
| When work is hard I either give up or study only the easy parts         | 26                           | 7.65    | 4  | 0.105     |
| I always try to understand what the lecturer is saying even if it does not make sense | 91                           | 6.35    | 2  | 0.042*    |
| I work on practice exercises and answer sample questions even when I do not have to | 39                           | 2.00    | 4  | 0.736     |
| Even when study material is dull and uninteresting I keep working until I finish | 70                           | 7.78    | 3  | 0.051     |
| When I study for a test I practise saying the facts over and over to myself | 83                           | 17.65   | 4  | 0.001*    |
| Before I begin studying I think about the things I will need to do to learn | 74                           | 11.57   | 4  | 0.021*    |
| When I’m reading material for this class I say the words over and over to myself to help remember | 77                           | 8.18    | 3  | 0.042*    |
| I work hard to get a good grade even when I do not like a class         | 78                           | 16.83   | 3  | 0.001*    |

Note: $\chi^2$, Chi-square.
Abbreviations: df, degrees of freedom; MSLQ, Motivated Strategies for Learning Questionnaire.
*p < 0.05.
saying even if it doesn’t make sense” (mean Likert score = 4.4), ($\chi^2 = 6.35, df = 2, p = 0.042$) with 83% of students agreed or strongly agreed that “when I study for a test I practise saying the facts over and over to myself” (mean Likert score = 4.1), ($\chi^2 = 17.65, df = 4, p = 0.001$). Furthermore, 77% agreed or strongly agreed that “I think I will receive a good grade in this class” (MSLQ) ($r = -0.53$), “I’ve been feeling relaxed” (WEMWBS) ($r = -0.436$) (WEMWBS). The statement “Even when study material is dull and uninteresting, I keep working until I finish” (MSLQ) also negatively correlated with “I’ve been dealing with problems well” (WEMWBS) ($r = -0.55$), “I’ve been feeling relaxed,” and “I’ve been thinking clearly” ($r = -0.46$ and $-0.44$, respectively). Positive correlations existed between the statement “I prefer classwork that is challenging so I can learn new things” (MSLQ) and both “I’ve had energy to spare” (WEMWBS), and “I’ve been feeling cheerful” (WEMWBS) ($r = 0.497$ and 0.442, respectively). A positive correlation was also noted between the statements “I think I will receive a good grade in this class” (MSLQ) and “I’ve been interested in new things” ($r = 0.431$) (WEMWBS).

### 3.3 Mental well-being

Of the respondents who completed the WEMWBS, 78% of students agreed or strongly agreed with the statement “I’ve been feeling optimistic about the future” (mean Likert score = 4.0), ($\chi^2 = 7.91, df = 2, p = 0.019$). Furthermore, 70% of students agreed or strongly agreed that they have been interested in new things (mean Likert score = 3.9), ($\chi^2 = 11.13, df = 4, p = 0.025$) (Table 3).

The majority of respondents (78%) agreed and strongly agreed with the statement “I’ve been feeling interested in other people” (mean Likert score = 4.0), ($\chi^2 = 13.7, df = 3, p = 0.003$) and 65% of students agreed or strongly agreed that they have been feeling close to other people (mean Likert score = 3.8), ($\chi^2 = 9.83, df = 4, p = 0.043$).

However, only 43% of respondents agreed and strongly agreed with the following statements: “I have been dealing with problems well” (mean Likert score = 3.3), ($\chi^2 = 11.57, df = 4, p = 0.021$), “I’ve been feeling useful” (mean Likert score = 3.4), ($\chi^2 = 8.96, df = 2, p = 0.011$) and “I’ve been feeling cheerful” (mean Likert score = 3.4), ($\chi^2 = 13, df = 3, p = 0.005$) and only 22% of respondents agreed or strongly agreed with the statement “I’ve been feeling confident” (mean Likert score = 3), ($\chi^2 = 11.26, df = 3, p = 0.010$), and 9% agreed or strongly agreed that “I’ve had energy to spare” (mean Likert score = 2.48), ($\chi^2 = 7.78, df = 3, p = 0.051$).

### 3.4 Relationship between motivation and well-being

Spearman correlations were performed to determine the relationship between the motivation responses in the abbreviated MSLQ to responses in the WEMWBS questionnaire (Table 4). Negative correlations existed between the statement “I worry a great deal about tests” (MSLQ) and “I’ve been thinking clearly” (WEMWBS) ($r = -0.50$) and “I’ve been dealing with problems well” (WEMWBS) ($r = -0.436$) (WEMWBS). The statement “Even when study material is dull and uninteresting, I keep working until I finish” (MSLQ) also negatively correlated with “I’ve been dealing with problems well” (WEMWBS) ($r = -0.55$), “I’ve been feeling relaxed,” and “I’ve been thinking clearly” ($r = -0.46$ and $-0.44$, respectively). Positive correlations existed between the statement “I prefer classwork that is challenging so I can learn new things” (MSLQ) and both “I’ve had energy to spare” (WEMWBS), and “I’ve been feeling cheerful” (WEMWBS) ($r = 0.497$ and 0.442, respectively). A positive correlation was also noted between the statements “I think I will receive a good grade in this class” (MSLQ) and “I’ve been interested in new things” ($r = 0.431$) (WEMWBS).

### 4 Discussion

This study determined that a cohort of first-year speech and language therapy students, which were predominantly female, place great

| TABLE 3 | Summary of WEMWBS questionnaire and responses |
|----------|------------------------------------------------|
|          | Agree and strongly agree (%) | $\chi^2$ | df | $p$ value |
| I’ve been feeling optimistic about the future | 78 | 7.91 | 2 | 0.019* |
| I’ve been feeling useful | 43 | 8.96 | 2 | 0.011* |
| I’ve been feeling relaxed | 26 | 5.76 | 3 | 0.127 |
| I’ve been feeling interested in other people | 78 | 13.76 | 3 | 0.003* |
| I’ve had energy to spare | 9 | 7.78 | 3 | 0.051* |
| I’ve been dealing with problems well | 43 | 11.57 | 4 | 0.021* |
| I’ve been thinking clearly | 57 | 10.57 | 3 | 0.014* |
| I’ve been feeling good about myself | 43 | 3.61 | 3 | 0.307 |
| I’ve been feeling close to other people | 65 | 9.83 | 4 | 0.043* |
| I’ve been feeling confident | 22 | 11.26 | 3 | 0.010* |
| I’ve been able to make up my own mind about things | 91 | 5.55 | 2 | 0.062 |
| I’ve been feeling loved | 70 | 2.44 | 2 | 0.296 |
| I’ve been interested in new things | 70 | 11.13 | 4 | 0.025* |
| I’ve been feeling cheerful | 43 | 13 | 3 | 0.005* |

Note: $\chi^2$: Chi-square.
Abbreviations: df, degrees of freedom; WEMWBS, Warwick-Edinburgh Mental Well-being Scale.
*p < 0.05.
**TABLE 4** Correlations between responses from the abbreviated MSLQ and the WEMWBS questionnaires

| I've been feeling optimistic about the future | I've been feeling useful | I've been feeling relaxed | I've been feeling interested in other people | I've had energy to spare | I've been dealing with problems well | I've been thinking clearly | I've been feeling good about myself | I've been feeling close to other people | I've been feeling confident | I've been able to make up my own mind about things | I've been feeling loved | I've been interested in new things | I've been feeling cheerful |
|-----------------------------------------------|-------------------------|--------------------------|---------------------------------------------|-------------------------|--------------------------------------|--------------------------|-----------------------------------|--------------------------------------|-----------------------------------|-------------------------------------------------|-----------------------------|---------------------------------|-------------------------------|
| I prefer classwork that is challenging so I can learn new things | 0.194                   | 0.103                    | 0.243                                       | 0.280                   | 0.497*                               | 0.118                    | 0.195                             | 0.307                                | 0.220                             | 0.343                                           | 0.226                       | 0.389                           | 0.294                         | 0.422*                          |
| Compared with other students in this class I expect to do well | -0.170                  | -0.011                    | 0.126                                       | 0.094                   | 0.221                               | -0.022                   | 0.279                             | 0.184                                | 0.186                             | 0.204                                           | 0.054                       | -0.106                          | 0.249                         | 0.164                           |
| It is important for me to learn what is being taught in this class | -0.244                  | -0.034                    | 0.077                                       | 0.262                   | 0.044                               | 0.123                    | 0.301                             | -0.055                               | 0.417*                            | -0.008                                           | 0.140                       | 0.317                           | 0.202                         | -0.058                           |
| I think I will receive a good grade in this class | -0.230                  | -0.133                    | 0.109                                       | 0.242                   | 0.000                               | 0.018                    | 0.261                             | 0.181                                | 0.314                             | 0.101                                           | -0.302                      | 0.431*                          | -0.060                        |                                   |
| Even when I do poorly on a test I try to learn from my mistakes | 0.259                   | 0.043                     | 0.265                                       | 0.382                   | 0.141                               | 0.156                    | 0.399                             | 0.161                                | 0.143                             | 0.366                                           | 0.398                       | -0.222                          | 0.330                         | 0.161                           |
| I think what I am learning in this class is useful for me to know | -0.073                  | -0.057                    | -0.242                                      | 0.084                   | -0.328                              | -0.303                   | -0.115                            | -0.048                               | -0.019                            | -0.063                                           | 0.270                       | -0.271                          | 0.062                         | -0.060                           |
| I worry a great deal about tests | -0.039                  | -0.041                    | -0.528**                                    | -0.338                  | -0.180                              | -0.502*                  | -0.436*                           | -0.375                               | -0.300                            | -0.261                                           | -0.235                      | -0.040                          | -0.168                        | 0.071                           |
TABLE 4  (Continued)

|                                                                 | I've been feeling optimistic about the future | I've been feeling useful | I've been feeling relaxed | I've been feeling interested in other people | I've had enough to spare | I've been dealing with problems well | I've been thinking clearly | I've been feeling good about myself | I've been feeling close to other people | I've been feeling confident | I've been able to make up my own mind about things | I've been feeling loved | I've been interested in new things | I've been feeling cheerful |
|-----------------------------------------------------------------|----------------------------------------------|--------------------------|--------------------------|---------------------------------------------|--------------------------|----------------------------------|-----------------------------|----------------------------------|------------------------------------------|--------------------------|---------------------------------------|------------------------|----------------------------------|--------------------------|
| I ask myself questions to make sure I know the material I have been studying | 0.247                                        | 0.197                    | -0.111                   | -0.119                                      | -0.077                   | -0.333                           | -0.295                      | -0.083                           | -0.211                                    | -0.068                   | -0.164                                | -0.118                 | -0.068                           | 0.074                    |
| When work is hard I either give up or study only the easy parts | 0.400                                        | 0.266                    | -0.297                   | 0.082                                       | -0.035                   | 0.001                            | -0.282                      | 0.024                            | 0.010                                    | -0.040                   | 0.102                                | 0.187                  | 0.259                            | 0.168                    |
| I always try to understand what the lecturer is saying even if it does not make sense | -0.080                                        | -0.090                   | -0.325                   | 0.043                                       | 0.179                    | -0.192                           | -0.129                      | 0.032                            | 0.186                                    | 0.127                    | 0.268                                | 0.214                  | 0.133                            | 0.415*                   |
| I work on practice exercises and answer sample questions even when I do not have to | 0.134                                        | 0.068                    | -0.401                   | -0.302                                      | 0.160                    | -0.190                           | -0.336                      | -0.103                           | -0.245                                    | -0.075                   | 0.143                                | -0.036                 | 0.168                            | 0.178                    |
| Even when study material is dull and uninteresting I keep working until I finish | -0.326                                        | -0.114                   | -0.461*                  | -0.081                                      | -0.181                   | -0.554**                         | -0.440*                     | -0.364                           | -0.080                                    | -0.199                   | 0.071                                | -0.106                 | -0.214                           | -0.092                   |
| When I study for a test I practise saying the facts over and over to myself | 0.039                                        | 0.386                    | 0.349                    | 0.269                                       | 0.174                    | 0.311                            | 0.273                       | 0.153                            | 0.580**                                   | -0.180                   | -0.055                               | 0.381                  | 0.239                            | -0.002                   |
|                      | I’ve been feeling optimistic about the future | I’ve been feeling useful | I’ve been feeling relaxed | I’ve been feeling interested in other people | I’ve been dealing with problems well | I’ve been thinking clearly | I’ve been feeling good about myself | I’ve been feeling close to other people | I’ve been feeling confident | I’ve been able to make up my own mind about things | I’ve been feeling loved | I’ve been interested in new things | I’ve been feeling cheerful |
|----------------------|---------------------------------------------|--------------------------|---------------------------|---------------------------------------------|-------------------------------------|---------------------------|-----------------------------|-----------------------------------|-----------------------------------|---------------------------------|---------------------------|-------------------------------|-----------------------------|
| Before I begin studying | 0.003                                       | 0.091                    | 0.085                     | 0.163                                       | −0.021                             | 0.127                     | 0.013                        | 0.365                             | 0.270                             | −0.038                           | 0.173                      | 0.225                          | −0.053                      | −0.147                            |
| When I’m reading material for this class | −0.085                                      | 0.283                    | −0.194                    | 0.085                                       | −0.030                             | 0.044                     | 0.014                        | −0.011                            | 0.378                             | −0.051                           | 0.152                      | 0.008                          | 0.440*                       | 0.092                             |
| I work hard to get a good grade even when I do not like a class | 0.204                                       | −0.150                   | −0.143                    | −0.184                                      | 0.078                              | −0.217                   | −0.099                       | −0.042                            | −0.212                            | −0.121                           | −0.207                     | −0.080                         | −0.030                       | 0.307                             |

Note: Data are presented as r values.
Abbreviations: MSLQ, Motivated Strategies for Learning Questionnaire; WEMWBS, Warwick-Edinburgh Mental Well-being Scale.
*Indicates where the correlations are statistically significant at 0.05 level.
**Indicates where the correlations are statistically significant at 0.01 level.
importance on a knowledge of anatomy for clinical practice, and that listening at lectures was how they primarily learned anatomy. It also revealed that this cohort has significant anxiety surrounding anatomy examinations, and that some aspects of mental well-being relating to energy and confidence were compromised at the time of the study.

The vast majority of the respondents (91%) agreed or strongly agreed that a sound knowledge of anatomy is important for their clinical practice after completion of their degree. Further, they also agreed that lectures (83%), online assignment assignments (61%), and practicals (27%) helped them to identify the importance of anatomical knowledge to speech therapy. This is in line with the findings of various studies, which have previously established the importance of anatomy for clinical practice of medical students. It is important to note however, that while a majority agreement on the importance of anatomy for clinical practice has been previously established, most previous studies have only surveyed medical students (Moxham & Plaisant, 2007; O’Mahony et al., 2016; Waseem et al., 2018). The one study, undertaken with speech and language therapy students also yielded similar results, with 96% of participants reporting that a sound knowledge of anatomy is important for their clinical practice (Weir, 2008). However, this study did not evaluate the students’ approaches to learning anatomy nor did it investigate motivational barriers such as well-being as we have in the current study. It would be interesting to dissect this statement further in future, given that the participants were in their first semester of first year and like the majority students in speech and language therapy program in Ireland, have had no exposure to clinical practice, and thus students may not have an accurate understanding of what their future clinical practice entails. This is supported by results from another Australian study, which reported that the majority of prospective speech and language therapy students who were in their final year of secondary school and attending a speech and language therapy career information day cited parents/family as the factor which predominantly influenced their choice of speech and language pathology as a career rather than having exposure to a speech and language pathologist through work experience (Byrne, 2008). Moreover, the study by Weir (2008) revealed that only 40% of speech and language therapy students indicated that they had a clear understanding of the nature of clinical practice in speech pathology (Weir, 2008). This was highlighted by (Martin et al., 2014) who assessed the perceptions of the importance of anatomy to speech and language clinical practice using a qualitative approach. Eight practicing speech and language therapists participated in the study, and during discussions suggested that it was only after they were faced with authentic clients that they had a real understanding of anatomy and neuroanatomy. Participants also noted that anatomy and neuroanatomy were taught in brief blocks early in the degree program and once passed, were forgotten. They proposed that the material should be integrated throughout the program in order to consolidate learning (Martin et al., 2014). Taken together, these findings suggest that speech and language therapy students who study anatomy in the first semester of their program may have very little if any exposure to clinical practice and little knowledge of what clinical practice entails. Thus, while students may agree that anatomy is important, it is likely that they do not exactly understand how it fits into the nuances of their future practice. The important implication of this from a learning perspective is reflected in the results from a study that reported that students who perceive learning objectives as relevant to their personal or career goals are more likely to be motivated to learn (Frymier & Shulman, 1995) and to become interested in the course material (Gorst & Lee, 2005). Moreover, the driving force behind a student’s motivation to learn determines, in part, whether they adopt surface or deep-learning approaches to a given task (Wang et al., 2013).

It is therefore imperative to understand students’ preferred methods to learn anatomy in order to support them in their understanding of anatomy. In the current study, we have identified that the majority of students (74%) agreed or strongly agreed that listening at lectures was how they primarily learned anatomy. This is at odds with some previous studies in the literature, albeit on different cohort of students, which cite cadaveric dissections as the preferred method of learning anatomy (Aziz et al., 2002; Snelling et al., 2003; Sugand et al., 2010). One such study revealed that the overall preferred method was cadaveric dissection and the least preferred method was didactic lectures in a cohort of second year medical students (Kerby et al., 2011), which is in contrast to the findings in this study. The reason for this difference may be twofold; first, the majority of studies on anatomy learning methods are undertaken in cohorts of medical students rather than speech and language therapy students who often have less access to cadavers than medical students do. Thus, cadaveric dissection is not always offered as a method of anatomy learning for speech and language students. Second, many studies of this nature are undertaken using postgraduate students in countries such as the United States where a previous primary degree is required for medicine and speech pathology programs. As the cohort studied here was entirely an undergraduate cohort of first-year students undertaking a primary degree, it may explain why a more secondary school/high school approach of didactic lectures is preferred. Another interesting result came from the fact that only 29% of student respondents agreed or strongly agreed that they used YouTube or podcasts as a method to study anatomy. Studies such as using an application-oriented approach allow anatomy to be taught via interactive live stream surgeries and have shown a statistically significant increase in grades in the group who utilized the application. Therefore, the relevance of these study methods could be emphasized to the student cohort (Shiozawa et al., 2017).

In relation to the learning strategies component of the abbreviated SLQ, repetition was a technique frequently employed by this cohort of first-year speech and language students; 83% agreed or strongly agreed with the statement “When I study for a test I practise saying the facts over and over to myself” and 77% agreed or strongly agreed with “When I’m reading material for this class I say the words over and over to myself to help remember.” The success of repetition as a technique was reported in a study of 78 medical students who reported that repetitive studying of the subject increased retention of knowledge to a greater extent than stricter assessment (Bergman et al., 2013). This approach of repetition for learning may also be in
line with the experience of this first-year cohort of students, coming relatively recently from secondary school, where repetition in learning is common practice.

On aspects relating to motivation and specifically to anxiety, the response to the statement “I worry a great deal about tests” on the abbreviated MSLQ revealed the largest statistical change compared to chance expectation with 91% of students agreeing or strongly agreeing with this statement. In line with this, only 18% agreed or strongly agreed that “Compared with other students in the class I expect to do well.” It is important to note that to reach the grade requirement for entry into the speech and language therapy course, students needed to obtain 517 Irish Leaving Certificate points. To put this in context, only 12% of all Irish Leaving Certificate students scored above 500 points in 2017, therefore the cohort surveyed in the current study is comprised of high achieving students. It is also important to note that while these students reported feeling worried about the anatomy examination and grade, this was not borne out as 70% (1st class honors) was the average final grade for the class (range 47%–92%). This suggests that a lack of confidence and/or a high level of anxiety rather than a lack of knowledge were the reason for the responses to the questionnaire. Interestingly, the current cohort is predominantly female, with only two male students in the class, and it has been reported that female students experience significantly more anxiety or admit to experiencing more exam anxiety than their male counterparts experience (Ballen et al., 2017).

WEMWBS is widely regarded as one of the few available scales that uses positive questions to monitor the mental well-being of the general population (Fung, 2019; Lloyd & Devine, 2012; Tennant et al., 2007). In the current study, 52% of participants scored less than 51 points, which was the average score in a Scottish adult population during validation studies for the WEMWBS questionnaire (Stewart-Brown et al., 2009). These scores are also in line with the only two other student population studies undertaken in Spain and China in which Spanish graduate students had a mean WEMWBS score of 53.5, and students in a Chinese study had a mean score of 47 (Fung, 2019; López et al., 2013). It is important to note that the WEMWBS questionnaire was administered at the end of semester and just 2 weeks prior to exams. Given that 91% of respondents agreed or strongly agreed with the statement “I worry a great deal about tests” (MSLQ), perhaps this anxiety should be taken into account when considering the responses on the well-being focused WEMWBS questionnaire. Also interesting is the fact that the cardinal symptoms of depression required for Diagnostic and Statistical Manual of Mental Disorders (DSM-5) diagnosis of depression (Vandeleur et al., 2017) do not seem to be overexpressed in this cohort. For example, 78% of students agreed or strongly agreed that they had been feeling optimistic about the future. Similarly, 78% of students also agreed or strongly agreed that they were interested in other people and 70% of students agreed or strongly agreed with the statement “I’ve been interested in new things.” It may be possible therefore that the lower average scores gleaned from this cohort in response to some questions on WEMWBS are a transient reflection of exam anxiety rather than true decline in well-being. This hypothesis is further supported by the fact that only 18% of respondents reported that they agreed, or strongly agreed that they were feeling confident, and it is noteworthy that none of the students strongly agreed with the statements “I’ve been feeling relaxed” and “I’ve got energy to spare.” Thus, it is reasonable to suggest that at the point in time at which the questionnaires were administered, these students were a tired and anxious cohort with their well-being acutely and negatively impacted upon prior to the examination period. It would be interesting to assess this or a similar cohort at the start of the semester to rule out any influences of the imminent exam period.

The motivation statement responses from the abbreviated MSLQ were correlated with those from the WEMWBS by Spearman correlation in order to assess the impact of mental well-being to motivation to learn anatomy. Interestingly, the two motivation statements “I worry a great deal about tests” and “Even when study material is dull and uninteresting I keep working until I finish” were both significantly negatively correlated with the three WEMWBS statements “I’ve been feeling relaxed,” “I’ve been dealing with problems well,” and “I’ve been thinking clearly.” This highlights the significant anxiety that surrounds examinations for this cohort of first-year speech and language students and suggests that it may affect their well-being or at least their responses to the WEMWBS questionnaire. Exam stress in university students has been shown to produce immunological, neuroendocrine, and psychological alterations; therefore, the significance of test anxiety in this cohort cannot be overlooked. Specifically, levels of the inflammatory molecules IL-6, IL-10, and of the stress hormone cortisol were elevated in gingival crevicular fluid in 20 healthy dental hygiene students during a major exam period (Johannsen et al., 2010). Alterations in levels of cortisol were also noted in a group of medical students undertaking a major exam when compared to another group of medical students not undertaking the exam (Weik & Deinzer, 2010). In a study of fifth year medical students who were undertaking midcourse examinations, 65% of students suffered from anxiety, and female students experienced more stress compared to their male counterparts (Khoshhal et al., 2017). This is in line with the results from the cohort assessed in this study, who were predominantly female.

Significant positive correlations between responses to the WEMWBS statements and motivation statements from the MSLQ, respectively, include “I’ve been interested in new things” with “I think I will receive a good grade in this class” and the statements “I’ve been feeling cheerful” and “I’ve had energy to spare” with “I prefer coursework that is challenging so that I can learn new things.” The results suggest that when students are feeling positive, (e.g., more interested in things and feeling cheerful), that there is greater motivation for challenging themselves with new work and persevering with seemingly difficult coursework. At the very least, the fact that there are multiple significant correlations between responses in the two questionnaires suggests that there is a significant relationship between student motivation and well-being and warrants further exploration.

The current study is not without limitations. As a cohort of first-year undergraduate speech and language therapy students were selected, the numbers were small and this meant some statistical analysis might be limited due to power. Notwithstanding, results revealed different
preferences for learning anatomy compared to medical students, and that there is significant anxiety surrounding anatomy examinations in this cohort. Because the questionnaires were distributed at the end of term, as is standard practice for end of module questionnaires in the university, a potential preexamination bias may have influenced student responses to both motivation and well-being questionnaires.

In conclusion, there is strong agreement from this cohort of first-year speech and language therapy students on the importance of anatomy for future clinical practice. In contrast to previously reports from medical students, here we provide a perspective from a potentially younger, majority female, anatomy naïve cohort, who are also likely to be naïve to exactly how anatomy fits into the puzzle of their future clinical careers due to the fact that the cohort are predominantly recent school-leavers. Future curriculum design may benefit from an earlier introduction of clinical placement with horizontal integration of anatomy throughout the entire speech and language therapy program. In contrast to that reported from cohorts of medical students, this study has shown that lectures are valued most as a method to learn anatomy. This suggests that a one-size fits all approach may not be appropriate in anatomy curriculum design. From the results of the current study, it is possible that cohorts of first-year students will underutilize methods such as online learning using YouTube and podcasts. Due to the proven success of these methods (Azer, 2012; Jaffar, 2012), perhaps the multifaceted approach to stimulate deep learning could be highlighted to first-year students who are very much new to college and seem to have a strong affinity to the didactic methods they had previously utilized in secondary school. We have shown here that a cohort of predominantly female first-year speech and language therapy students experience a significant amount of anxiety regarding examinations. This is not surprising given that female students are reported to experience significantly more exam anxiety than their male counterparts do (Ballen et al., 2017), and that these first-year students have recently transitioned from secondary school. While some reports show that successful assessment or examinations can be as a motivator to student learning, the motivation gained should not be at the expense of student well-being. The fact that there are multiple significant correlations between responses to the motivation and mental well-being questionnaires suggests that there is a significant relationship between student motivation and well-being.

ACKNOWLEDGEMENT
Open access funding provided by IRel.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

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How to cite this article: Fives, C., Lone, M., & Nolan, Y. M. (2022). Motivation and learning methods of anatomy: Associations with mental well-being. *Clinical Anatomy, 35*(1), 26–39. [https://doi.org/10.1002/ca.23781](https://doi.org/10.1002/ca.23781)