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Physical activity and exercise promotion and prescription in undergraduate physiotherapy education: content analysis of Irish curricula

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Abstract

Background Overwhelming evidence shows that physical activity and exercise promotion and prescription are effective in preventing and managing numerous chronic conditions. With physiotherapists commonly referred to as 'exercise prescription experts', an in-depth knowledge of exercise promotion and prescription is assumed. However, to date, no information exists about what is or should be included in terms of undergraduate physiotherapy physical activity and exercise education, nor whether the content prepares graduates to be exercise experts for contemporary practice.

Objectives To provide an accurate, contemporary picture of physical activity and exercise promotion and prescription content within Irish undergraduate physiotherapy curricula.

Method Content analysis was used to explore physical activity and exercise inclusion within four of the five programmes in Ireland. Seven categories were generated. Frequency analysis for each category was used to provide a guide to the extensiveness of physical activity and exercise promotion and prescription content.

Results All curricula included varying quantities of basic exercise science and exercise testing and prescription. Physical activity and exercise promotion and prescription for conditions routinely referred to physiotherapy, such as cardio respiratory disease, were well represented. Three key areas were identified as being absent or needing further emphasis: physical activity/exercise for public health, strategies for changing physical activity behaviour, and physical activity/exercise for lifestyle-related diseases.

Conclusion Results indicate a strong need for re-evaluation of physical activity and exercise education in Irish physiotherapy curricula. There is a lack of explicit exercise content in relation to public health and lifestyle-related disease.

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Keywords: Physiotherapy; Undergraduate education; Physical activity; Exercise promotion and prescription; Content analysis

Background

It is projected that 64 million people will die in 2015, and the cause of death for 41 million of these people will be chronic disease [1]. According to the World Health Organization, urgent preventative action must be taken and this action must include an increased emphasis on physical activity as a public health and medical intervention [1]. With overwhelming evidence that physical activity contributes positively to the prevention and management of over 20 chronic diseases, including coronary heart disease, diabetes, cancer and mental health [2], healthcare professionals are being called upon to become more aggressive in implementing physical activity recommendations [1,3,4].

In concordance with this, physiotherapy professional bodies are recognising that physical activity and exercise are integral to professional practice and are core contributors to public health [5–7]. The World Confederation for Physical Therapy (WCPT) believes that with increasing numbers of people with diverse varieties of conditions leading sedentary lifestyles, it is essential to implement effective strategies for exercise across the lifespan. As experts in movement, and with a thorough knowledge of pathology and its effects on all systems, physiotherapists are the ideal professionals to promote, guide, prescribe and manage exercise activities [5].

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To place physiotherapists as exercise experts in contemporary clinical practice, the WCPT encourages member organisations to 'assure a comprehensive knowledge base in physiotherapy professional education regarding exercise needs across the individual's life span' [5]. To meet this challenge of ensuring exercise expertise, the WCPT has published several suggestions including a review of entry-level curriculum content on physical activity and exercise in all physiotherapy professional education programmes as a priority.

Entry-level to the physiotherapy profession in Ireland is currently attained by means of a 4-year Bachelor of Science (BSc) Honours degree programme. Academic education takes place in university settings and is provided by academic staff, expert clinicians, clinical tutors and postgraduate research students. Clinical education is provided by expert clinicians and clinical tutors in a variety of clinical centres, including public and private hospitals, community services and private practices. Upon attainment of their BSc degree, physiotherapists in Ireland are autonomous practitioners. Regardless of how patients access services, physiotherapists in Ireland independently determine the best physiotherapy intervention for their patients.

This study aimed to provide an accurate, current picture of physical activity and exercise promotion and prescription content within Irish undergraduate physiotherapy curricula. Components of physical activity and exercise promotion and prescription that are absent are also reported.

Methods

Letters of invitation to participate in this study were sent to all physiotherapy institutions in Ireland ($n = 5$). Participation required institutions to permit access to their physiotherapy curriculum documentation. Inclusion criteria for this study were that each participating institution should be delivering physiotherapy education which leads to a qualification recognised by either the Chartered Society of Physiotherapy in the UK or the Irish Society of Chartered Physiotherapy. The curriculum documents analysed for this study represented the intended undergraduate physiotherapy curriculum for the academic year 2008 to 2009.

Design

Content analysis was used to analyse the curriculum documentation. Content analysis has been defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding [8–10]. In its most simplistic form, it is a research tool used to determine the presence of certain words and concepts; a means of analysing texts [11]. The aim is to attain concepts or categories describing the phenomenon [12].

There are two types of content analysis: deductive and inductive. Deductive analysis uses either a structured or unconstrained matrix of analysis to test pre-devised categories, which are based on earlier work such as theories, recommendations and literature reviews [13,14]. Inductive content analysis implies that categories are derived inductively from the texts being analysed, and involves open coding, creating categories and abstraction [12].

Both deductive analysis (pre-devised main categories) and inductive approaches were applied when constructing the coding framework for this study. The matrix of analysis was unconstrained. By using an unconstrained matrix, different subcategories could be created within its bounds following the principles of inductive analysis [13]. This combination of inductive and deductive content analysis is considered to be the most realistic form of analysis that uses theory and literature to direct the framework [15].

Procedures

Each institutional curriculum was allocated an identifying code. A set of seven analytical categories was developed. The categories were informed by a comprehensive review of the curricula (noting any word or phrase associated with physical activity and/or exercise), recent physical activity recommendations, published literature (from databases: Pubmed, Cinahl, Scopus, Psychinfo, Educational Resources Information Centre, Academic Search Premier and Web of Science) and best practice guidelines. Upon completion of the initial reviews, the cue words/phrases were grouped according to category.

The seven categories provided a set of broad, umbrella terms for the words/phrases identified. Each category was operationally defined and was represented by cue words/phrases. The categories, definitions and cue words/phrases are presented in Table 1. Identification of the cue word/phrase signified the presence of the category in the text. In order to be included in the analysis, the cue word/phrase identified within the text had to show contextual evidence of a link to physical activity and/or exercise.

Three coders [GO'D (Coder 1), TC (Coder 2), CD (Coder 3)] were used for the study. Each coder was given explicit instructions on coding the documentation. Each category was defined and the cue words/phrases included within the category were detailed within a coding framework given to each coder. Inter- and intracoder agreement for content analysis was implemented on all curricula [9].

Discussion following blinded analysis resulted in some framework modification. The initial seven categories (deductive) remained, but subcategories were introduced within each of the main categories (inductive). As the seven main categories were very broad, subcategories were used to allow for more detailed analysis. Table 2 presents the seven categories and their subcategories. Following these changes, the curricula were re-assessed by the coders. Good agreement was achieved and errors of commission were discussed. Agreement was reached by consensus. Intracoder (Coder 1) and intercoder (Coders 2 and 3) reliability are presented in Tables 3 and 4, suggesting excellent overall agreement [16].

Table 1
Categories, descriptors and examples of cue words/phrases used for analysis.

Category	Definition	Examples of cue words/phrases
Fundamentals of physical activity	Refers to basic information relating to physical activity and exercise	Definitions, prevalence, determinants, patterns, current/temporal trends, disease prevention, public health, evidence, guidelines, recommendations
Exercise science	Refers to subdisciplines of exercise science: physiology, biomechanics, kinesiology, motor learning/control, psychology	Physiological responses, thermoregulation, mechanics and physics, posture/gait, functional analysis, behaviour models/theories, behaviour change, adherence, motivation
Physical activity/exercise testing and measurement	Refers to theory/knowledge and practical application of testing and measurement of structured and non-structured physical activity and exercise	Screening, contraindications, precautions, risks, aerobic, strength, endurance, anthropometry, blood pressure, heart rate, diary, questionnaires, accelerometer, rate of perceived exertion
Exercise prescription and planning	Refers to theory/knowledge and practical application of exercise prescription and planning	Components of an exercise session, progression, maintenance, specificity, overload, FITT (frequency, intensity, time and type), warm-up, cool-down, group, individual, planning, goal setting, outcome measures
Physical activity and exercise prescription for specific populations	Refers to specific considerations when prescribing physical activity and exercise for various healthy groups	Children and adolescents, sedentary adults, older adults (65+ years), pregnancy
Physical activity and exercise prescription for clinical populations	Refers to specific considerations when prescribing physical activity and exercise for different clinical populations	Cardiovascular disease, osteoarthritis, obesity, type II diabetes, stroke, multiple sclerosis, cerebral palsy, pain, rheumatoid arthritis, fibromyalgia, chronic pain, low back pain, osteoporosis, amputation, oncology, anxiety
Physical activity and exercise promotion	Refers to strategies to encourage participation and influences on physical activity and exercise participation	Strategies, community, school, workplace, influences, environment, economic, social, cultural, family, health sector

The final stage of the analysis was the tabulation of frequencies of each of the categories across all the curricula to provide a guide to the comprehensiveness of physical activity and exercise promotion and prescription content. The components of physical activity and exercise promotion and prescription that are omitted are also reported.

Results

Curricula were obtained from four of the five physiotherapy institutions. One institution chose not to participate in this study.

The content analysis of the physiotherapy undergraduate curricula was classified under seven categories. All curricula featured all categories but not all subcategories were included in all curricula. The most frequently occurring category across all curricula was exercise science, followed by physical activity/exercise testing and measurement, and exercise prescription and planning. Physical activity and exercise prescription for clinical populations was featured in all curricula, but several common clinical populations were omitted from all but one. Physical activity and exercise promotion was the least common category throughout all curricula, followed closely by fundamentals of physical activity and physical activity for specific populations. Fig. 1 illustrates the number of curricula that showed evidence of physical activity and exercise promotion and prescription content distinguished by category and subcategory.

While the existence of categories and subcategories in the curricula gives some indication of content inclusion, it provides little insight into the quality of content included. Discursive commentary is provided to illuminate the nature and omissions in physical activity and promotion and prescription content.

Fundamentals of physical activity

This category was very limited throughout all curricula (Fig. 1a). Definitions of physical activity, exercise and physical fitness were only included in one curriculum and the benefit of physical activity was only included in two curricula. Prevalence/trends in inactivity and physical activity for public health were omitted from all curricula. Government reports/strategies were also omitted. None of the physiotherapy courses reviewed featured guidelines for physical activity and exercise prescription, such as those issued by the American College of Sports Medicine, recognised globally as the criterion guidelines.

Exercise science

This category was the most comprehensively covered in all curricula (Fig. 1b). All institutions covered biomechanics of human motion and analysis of human movement, which included gait and functional analysis. Likewise, physiological adaptations to exercise for both cardiovascular and

Table 2
Main categories and subcategories.

Main category	Subcategories
Fundamentals of physical activity	Definitions of physical activity, exercise and physical fitness General benefits of physical activity and exercise Physical inactivity as a public health issue/risk factor for disease Temporal and current trends in inactivity Department of Health and Children reports/strategies and physical activity Recommendations and guidelines
Exercise science	Physiological basis for exercise Cardiovascular and respiratory response to exercise Muscle physiology and exercise Psychological factors/psychological models Motor control Mechanics and physics Movement analysis
Physical activity/exercise testing and measurement	Pre-screening Contraindications Precautions/health and safety Laboratory testing (aerobic) Field testing (aerobic) Strength testing Flexibility testing Anthropometry Subjective and objective assessment
Exercise prescription and planning	Principles of prescription Principles of training Rate of progression Aerobic programme Resistance programme Flexibility programme Goal setting Outcome measurement
Physical activity and exercise prescription for specific populations	Children and adolescents Healthy sedentary adults Older adults (65+ years) Pregnancy/post-partum
Physical activity and exercise prescription for clinical populations	Cardiovascular disease Respiratory disease Osteoarthritis and rheumatoid arthritis Stroke Other neurological conditions Osteoporosis Type II diabetes Obesity Immunological/haematological conditions Neoplastic disease
Physical activity and exercise promotion	Physical activity promotion Environmental influences on physical activity Economic influences on physical activity Societal and cultural influences on physical activity

respiratory systems were included in all curricula. Three of the four curricula covered muscular response to exercise. However, only two curricula included essential aspects relating to the basics of exercise physiology, such as energy production, selection of energy sources during exercise, and short-/long-term adaptations to anaerobic and aerobic exercise training. Motor control and motor learning were missing from two curricula. Exercise psychology, including motivation, adherence and theories about changing behaviour, was the subcategory least commonly included. Some appreciation for motivation and improving adherence was noted in one curriculum.

Physical activity/exercise testing and measurement

On the whole, this category was relatively well covered (Fig. 1c). All curricula included strength, flexibility and aerobic fitness testing. In terms of aerobic testing,

Table 3
Intracoder reliability: Coder 1 test–retest.

	No. of valid cases	Kappa value	Standard error	Significance
Fundamentals of physical activity	29	0.828	0.115	<0.001
Exercise science	26	0.406	0.188	0.036
Physical activity/exercise testing and measurement	31	0.807	0.106	<0.001
Exercise prescription and planning	24	0.508	0.187	0.045
Physical activity and exercise prescription for specific populations	18	0.780	0.143	0.001
Physical activity and exercise prescription for clinical populations	23	1	0.000	<0.001
Physical activity and exercise promotion	27	1	0.000	<0.001

Table 4
Intercoder reliability: Coder 2/Coder 3.

	No. of valid cases	Kappa value	Standard error	Significance
Fundamentals of physical activity	29	0.642	0.326	0.003
Exercise science	26	0.505	0.195	0.008
Physical activity/exercise testing and measurement	31	0.618	0.172	0.005
Exercise prescription and planning	24	0.469	0.202	0.040
Physical activity and exercise prescription for specific populations	18	0.737	0.167	0.003
Physical activity and exercise prescription for clinical populations	23	0.539	0.180	0.016
Physical activity and exercise promotion	27	0.603	0.154	0.002

field testing was mentioned in all four curricula, while only one curriculum included laboratory testing (maximum oxygen consumption). The fourth component of exercise testing (anthropometry) was essentially omitted from all curricula, apart from two curricula mentioning body mass index.

Contraindications to exercise were only included in one curriculum, with health and safety issues included in all four curricula. Pre-exercise screening was missing from all curricula. There was insufficient emphasis on physical activity and exercise measurement in all curricula. Objective activity measurement, such as accelerometry and pedometry, and subjective (self-report measures) activity assessment were absent from three of the four curricula.

Exercise prescription and planning

The basic principles of training and prescription were missing from two curricula (Fig. 1d). Only one curriculum included both training and prescription principles. All curricula included varying levels of prescribing exercise programmes for flexibility, strength and aerobic fitness. Exercise progression was only included in relation to musculoskeletal conditions. It was not mentioned in cardio respiratory or neurology modules in any curricula. The exercise prescription and planning subcategories least commonly included were related to measurement. No curriculum placed any emphasis on outcome measurement or goal setting. Two curricula included specific exercise modules (exercise science, exercise therapy and clinical exercise), while the other two curricula included physical activity and exercise education as a component of other modules, such as movement studies or health, behaviour and society.

Physical activity and exercise prescription for specific populations

Physical activity recommendations/guidelines for sedentary adults and children were missing from all curricula (Fig. 1e). Exercise prescription for older adults (65+ years) was mentioned in two of the curricula within specific gerontology modules. However, none of the curricula included specific physical activity recommendations for this population. Likewise, the importance of exercise during pregnancy and post-partum was mentioned in two curricula but no recommendations were included.

Physical activity and exercise prescription for clinical populations

Clinical conditions traditionally associated with physiotherapy in terms of exercise promotion and prescription, such as cardiovascular and respiratory disease and arthritis, were well represented in all curricula.

Notably, exercises for stroke and other neurological conditions were only included in two curricula. Physical activity and exercise promotion and prescription for lifestyle-related diseases, such as osteoporosis, type II diabetes and obesity, were not included in the majority of curricula. Similarly, exercises for cancer and haematological conditions were missing from three of the four curricula (Fig. 1f).

Physical activity and exercise promotion

This category was the least commonly occurring of all seven categories throughout the curricula; it was essentially missing from all curricula (Fig. 1g). The subcategory of health promotion was mentioned in all curricula; however,

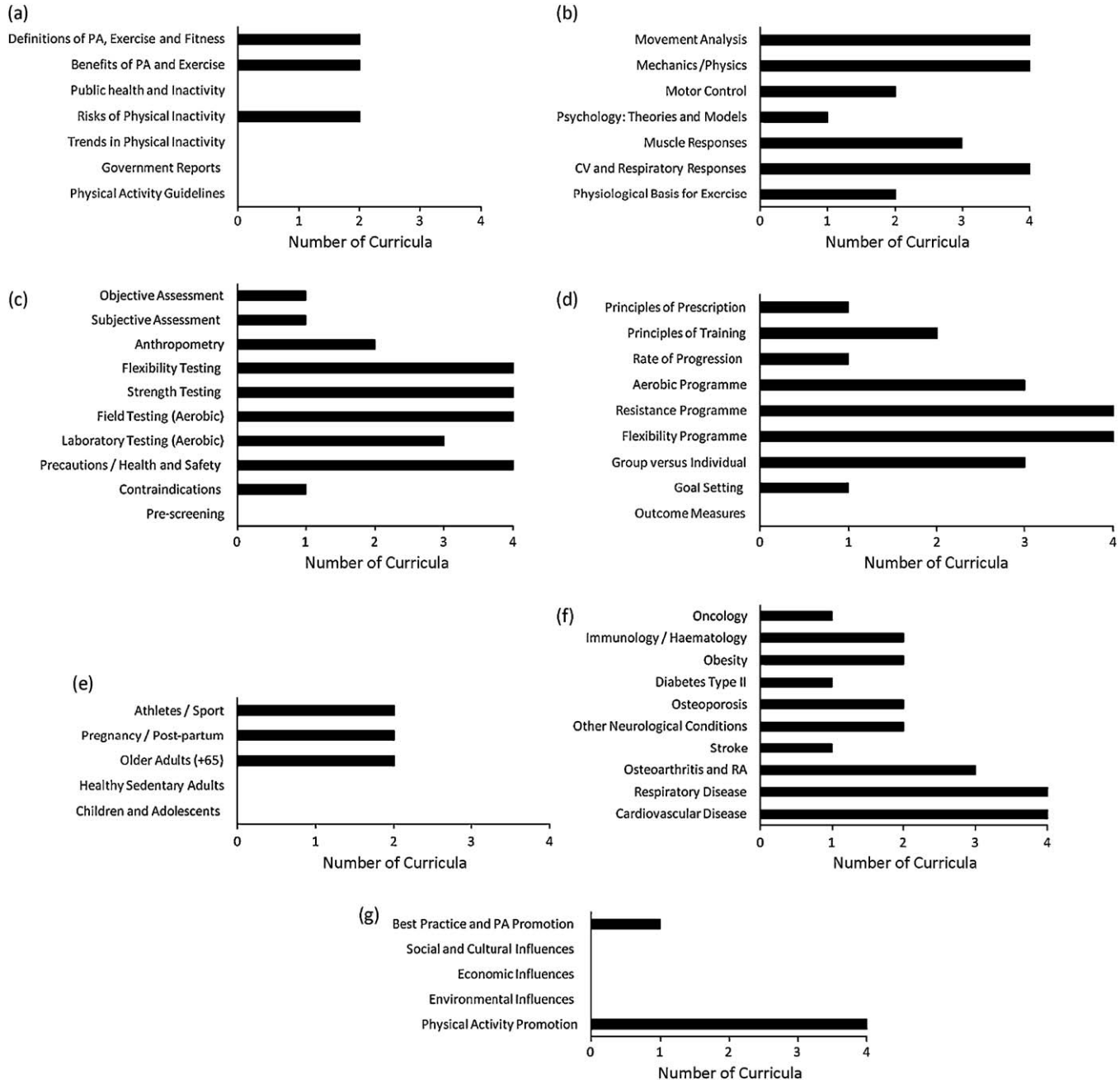

Fig. 1. Number of physiotherapy curricula showing evidence of physical activity (PA) and exercise content (according to category). (a) Fundamentals of PA. (b) Exercise science. (c) PA/exercise testing and measurement. (d) Exercise prescription and planning. (e) PA and exercise prescription for specific populations. (f) PA and exercise prescription for clinical populations. (g) PA and exercise promotion. CV, cardiovascular; RA, rheumatoid arthritis.

specifics relating to physical activity promotion, such as environmental, economic, societal and cultural factors, were not included.

Discussion

The purpose of this study was to provide an accurate, current picture of physical activity and exercise promotion and prescription content within Irish undergraduate physiotherapy curricula, and to identify components of physical activity and exercise education that are absent. The findings indicate that physical activity and exercise content is featured within all reviewed curricula, but is idiosyncratic with content being determined by the school providing the undergraduate programme. This is not an unusual finding as there is a general consensus amongst physiotherapy institutions that the diversity of curriculum approaches and content gives strength to individual courses [17].

Nonetheless, irrespective of various approaches and content, it is evident that not all aspects of physical activity and

exercise are addressed in the analysed curricula. Areas of exercise science traditionally associated with physiotherapy, such as movement analysis, posture and gait analysis, are well represented. Likewise, cardiovascular, respiratory and muscular responses to exercise are well covered. For exercise testing and prescription, all curricula encompassed the components of strength and flexibility in detail. In terms of exercise prescription for clinical populations, content pertaining to cardiovascular and respiratory diseases took precedence over all others.

Evidence of this type of curricular content suggests that physiotherapy students are presented with a foundation of knowledge and understanding relating to basic physiology, movement analysis and exercise prescription for conditions traditionally referred for physiotherapeutic intervention. However, nowhere in the analysed curricula does this basic knowledge appear to be consolidated and developed further. For example, curricula content in relation to the principles of exercise prescription and progression is nominal in the early stages of the courses, and at no point are these vital principles revisited.

Previous research has shown that students succeed best in developing higher order knowledge and skills when given multiple opportunities to practice what is learned throughout their educational programme [18,19]. As topics such as exercise prescription are revisited, the complexity increases, as does the link which forms between the various components of the programme, allowing students to engage in the process of sorting, comparing, prioritising and critiquing what they have learnt [20]. With the evidence suggesting that topics should be revisited to ensure consolidation, educators and curriculum designers may need to review the composition of their curricula and modify them to address this issue as indicated.

Further examination highlighted universal gaps throughout all curricula. These included physical activity and exercise for public health, strategies for changing physical activity behaviour, and exercise prescription for lifestyle-related diseases; key foci for health care worldwide.

Physical inactivity as a public health issue, its prevalence, determinants and patterns are not included in any curricula. Furthermore, public health guidelines for physical activity are missing. This is a disconcerting discovery considering the worldwide action to shift the focus of health care from a sickness service, which treats disease, to a service which focuses on prevention and health promotion [21,22]. An unambiguous emphasis on population-based health must be integrated into the physiotherapy undergraduate curriculum to allow the profession to move their focus from impairment, ill health, injury and disability to one that also legitimises health and wellbeing in the context of the general public [23].

Another topic highlighted by this study which requires considerable expansion in the curriculum is psychology; strategies to change behaviour, overcoming barriers and improving adherence. The absence of education relating to such strategies from curricula has implications for the effectiveness of any lifestyle-related intervention, including physical activity. It has been shown that physical activity interventions remain modestly effective, unless psychosocial and socio-ecological influences are also addressed [24,25]. In order to address these influences and, in turn, optimise physical activity interventions, contemporary physiotherapists need to be equipped with theories and techniques that aid in changing behaviour, such as the transtheoretical model [26] and physical activity counselling [27,28], or, at a minimum, have the knowledge to initiate such strategies and work collaboratively with other team members depending on the individual's needs [29].

Physical activity and exercise prescription for lifestyle-related diseases was a further area of deficiency identified in the curricula. Lifestyle conditions such as hypertension, type II diabetes and obesity are expected to dominate illness care for the foreseeable future, given demographics, lifestyle profiles and changing life expectancies [1,2,23,29,30], so including them in physiotherapy curricula is crucial. Currently, 40% of Irish adults report at least one lifestyle condition, the most common being hypertension and high cholesterol, and 23% are obese [30,31]. Furthermore, it is estimated that the prevalence of diabetes in 2015 will be 6% (194,000), representing an increase of 37% over 10 years. This will largely be due to an increase in the incidence of childhood and adolescent obesity [30].

Due to the remarkable association with lifestyle practices and a clear scientific evidence base which shows that prevention and resolution of lifestyle-related conditions are most effectively addressed with non-invasive interventions [23,29], physiotherapists, by drawing on their non-invasive specialities of education and exercise, are pre-eminently well positioned to manage these conditions and fill this critical healthcare niche [23,29]. To guarantee that future physiotherapists can fill this niche, it is imperative that they acquire the knowledge and develop the necessary skills at undergraduate level.

Limitations

Firstly, this study only used Ireland as its sampling frame. Although Ireland may represent a small number of physiotherapy entry-level programmes, this work could present an important prototype for other countries and WCPT regions.

Secondly, using documentation as a sole means of gaining an insight into the curriculum is, in itself, a limitation. Previous studies have suggested that analysis of documentation rarely gives a reliable and realistic view of the curriculum [32], and similarly, differences in the way in which content is described and documented by individual institutions has been seen to create divergence [32]. Furthermore, examining one subject within an entire curricula can be misleading [18]. Neither academic nor clinical tuition hours allocated to categories and subcategories were available. Therefore, mention of a topic was sufficient to consider that a curriculum

addressed the subject. Specific tuition hours would provide more specific information about the physical activity and exercise education in the curricula.

To increase credibility of these findings, additional complimentary studies are ongoing. Academic and clinician interviews, student feedback sessions and gathering of expert opinion about what is and what should be included in physiotherapy undergraduate curricula in relation to physical activity and exercise promotion and prescription will provide the complete overall picture.

Conclusion

This study highlighted important issues related to future physiotherapy undergraduate education. Results indicate a strong need for re-evaluation of physical activity and exercise promotion and prescription education. The current Irish undergraduate physiotherapy curricula still focus solely on impairment, injury and disability. There is a lack of explicit exercise content in relation to public health and lifestyle-related disease. Epidemiological trends and priorities, the elements of health, proficiency in promoting self-efficacy and behavioural change, identifying health risk and chronic conditions need to be included in undergraduate physiotherapy education.

However, it must be noted that changing the curriculum is only one important step towards changing the physiotherapy profession's way of working [33]. If the healthcare context in Ireland, and indeed in the UK, is not established to focus on prevention and health promotion, the treatment of disease will continue to be the only physiotherapy priority. A multipronged approach to implementing change, demanding commitment on professional, clinical, research and educational levels, is required. As lifestyle conditions are predicted to become the greatest healthcare priorities for the next 75 years [29], the physiotherapy profession needs to become serious about translating the well-established body of evidence that supports physical activity and exercise in their prevention and management into clinical practice.

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References

[1] World Health Organization. Chronic diseases and health promotion. Switzerland: WHO Press; 2006. Accessed January 2009: http://www.who.int/chp/chronic_disease_report/part1/en/index3.html.

[2] Thompson PD, Buchner D, Piña IL, Balady GJ, Williams MA, Marcus BH, *et al.* Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease. A statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity). Circulation 2003;107:3109–16.

[3] Blair SN. Physical inactivity: the biggest public health problem of the 21st century. Br J Sport Med 2009;43:1–2.

[4] Sallis RE. Exercise is medicine and physicians need to prescribe it! Br J Sport Med 2009;43:3–4.

[5] World Confederation of Physical Therapy. WCPT position statements. London: World Confederation of Physical Therapy; 2009. Accessed June 2009: http://www.wcpt.org/sites/wcpt.org/files/WCPT_Position_Statement.pdf.

[6] American Physical Therapy Association. Education strategic plan (2006–2020). Virginia: American Physical Therapy Association; 2006. Accessed June 2009: http://www.apta.org/AM/Template.cfm.section=Education&ContentID=60377&TEMPLATE=/CM/ContentDisplay.cfm.

[7] Chartered Society of Physiotherapy. Move for health practice initiative. London: Chartered Society of Physiotherapists; 2010. Accessed January 2009: http://csp.org.uk/director/members/practice/practiceinitiatives/movehealth.cfm.

[8] Berelson B. Content analysis in communication research. Glencoe, IL: Free Press; 1952.

[9] Krippendorff K. Content analysis: an introduction to its methodology. Newbury Park, CA: Sage; 1980.

[10] Weber RP. Basic content analysis. Newbury Park, CA: Sage; 1990.

[11] Bos W, Tarnai C. Content analysis in empirical social research. Int J Edu Res 1999;31:659–71.

[12] Elo S, Kyngas H. The qualitative content analysis process. J Adv Nurs 2008;62:107–15.

[13] Polit DF, Beck CT. Nursing research, principles and methods. Philadelphia, PA: Lippincott, Williams & Wilkins; 2004.

[14] Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qualit Health Res 2005;15:1277–88.

[15] Patton MQ. Qualitative research and educational methods. Thousand Oaks, CA: Sage; 2002.

[16] Miles MB, Hubermann AM. Qualitative data analysis: an expanded sourcebook. London: Sage; 1994.

[17] McMeeken J, Webb G, Kranse KL, Grant R, Garnett R. Learning outcomes and curriculum development in Australian physiotherapy education. Melbourne: Department of Education, Science and Training; 2005. Accessed March 2009: http://www.altc.edu.au/grants-2005-learningoutcomes-physiotherapy-finalreport-march05.pdf.

[18] Diamond RM. Designing and assessing courses and curricula: a practical guide. 3rd ed. San Francisco, CA: Jossey-Bass; 2009.

[19] Gardiner LF. Redesigning higher education: producing dramatic gains in student learning. ASHE Higher Education Report. San Francisco (CA): Jossey-Bass; 1996.

[20] Clark D, Linn MC. Designing for knowledge integration: the impact of instructional time. J Learn Sci 2003;12:451–93.

[21] Department of Health and Children. Primary care. A new direction. quality and fairness; a health system for you. Dublin: Department of Health and Children; 2001. Accessed June 2009: http://www.dohc.ie/publications/primary_care_a_new_direction.html.

[22] Department of Health. Let's get moving–introducing a new physical activity care pathway. Dublin: Department of Health and Children; 2006. Accessed June 2009: http://www.dh.gov.ik/en/PublicHealth/Healthimprovement/PhysicalActivity/DH099438.

[23] Dean E. Physical therapy in the 21st century (Part I): toward practice informed by epidemiology and the crisis of lifestyle conditions. Physiother Theory Prac 2009;25:330–53.

[24] Goldstein MG, Whitlock EP, DePue J. Multiple behavioural risk factor interventions in primary care: summary of research evidence. Am J Prev Med 2004;27:S61–79.

[25] Orleans CT. Addressing multiple behavioral health risks in primary care. Broadening the focus of health behavior change research and practice. Am J Prev Med 2004;27:S1–3.

[26] Prochaska JO, Redding CA, Evers KE. The transtheoretical model and stages of change. In: Glanz K, Rimer BK, Lewis FM, editors.

Health behavior and health education theory, research and practice. San Francisco, CA: Jossey-Bass; 2002.
[27] McClellan W. The physician and patient education: a review. Patient Educ Counsel 1986;8:151–63.
[28] Logsdon DN, Lazaro CM, Meier RV. The feasibility of behavioral risk reduction in primary medical care. Am J Prev Med 1989;5:249–56.
[29] Dean E. Physical therapy in the 21st century (Part II): toward practice informed by epidemiology and the crisis of lifestyle conditions. Physiother Theory Prac 2009;25:354–68.
[30] Health Services Executive. Health status of the population of Ireland. Dublin: Health Services Executive; 2008. Accessed March 2009: http://www.hse.ie/eng/services/Publications/HealthProtection/Public_Health_/Health_Status_of_the_Population_of_Ireland_2008.html.
[31] Department of Health and Children. SLAN 2007: survey of lifestyle, attitudes and nutrition in Ireland. Dublin: Department of Health and Children; 2008. Accessed March 2009: http://www.slan06.ie/SLAN2007MainReport.pdf.
[32] Scholes J, Endacott R, Chellel A. A formula for diversity: a review of critical care curricula. J Clin Nurs 2000;9:382–3.
[33] Allan J, Barwick T, Cashman S, Cawley J, Day C, Douglass C, *et al.* Clinical prevention and population health: curriculum framework for health professionals. Am J Prev Med 2004;27:471–6.

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