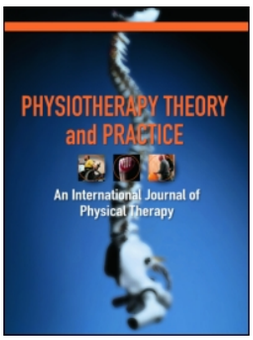

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Augmented behavioral medicine competencies in physical therapy students' clinical reasoning with a targeted curriculum: a final-semester cohort-comparison study

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ABSTRACT

Background: Knowledge regarding the impact of curricula with behavioral medicine content and competencies (BMCC) on physical therapy (PT) students' clinical reasoning skills is lacking.
Objectives: The primary objective was to compare the clinical reasoning skills, focusing on clients' behavioral change, of entry-level PT students with or without BMCC in their curricula. The secondary objective was to compare students' attitudes and beliefs in a biomedical and biopsychosocial practice orientation.
Methods: Swedish final-semester PT students (n = 151) completed the Reasoning 4 Change (R4C) instrument and the Pain Attitudes and Beliefs Scale for Physiotherapists. A blueprint was used for curricular categorization. The independent t-test was used.
Results: Students attending programs with BMCC curricula (n = 61) had superior scores compared with students without BMCC curricula (n = 90) in the following R4C variables, all of which were related to clinical reasoning focused on behavioral change: Knowledge, Cognition, Self-efficacy, Input from the client, Functional behavioral analysis, and Strategies for behavioral change. Students who did not receive BMCC curricula scored higher in the R4C contextual factors and reported a greater biomedical practice orientation than students receiving BMCC curricula. There was no difference in the biopsychosocial practice orientation between groups.
Conclusions: Our findings support the benefit of structured entry-level PT curricula with BMCC on final-semester students' clinical reasoning skills focused on behavioral change and their level of biomedical practice orientation. Further, our findings elucidated educational opportunities to augment students' self-efficacy and strengthen their behavioral competencies in clinical reasoning. For the generalizability of the results further research in other contexts is needed.

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Behavioral Medicine; clinical reasoning; curriculum; education; physical therapy

Introduction

Entry-level physical therapy education curricula play an essential role in providing students with core competencies to meet the needs of clients, health care and society (American Physical Therapy Association, 2014; National Physiotherapy Advisory Group, 2017). Curriculum designs need to address holistic, person-centered care (Gilliland, 2020) and epidemiological trends, such as the increase of lifestyle-related conditions (Dean et al., 2016). Despite the importance of such curriculum components, findings of systematic reviews (Alexanders, Anderson, and Henderson, 2015; Alexanders and Douglas, 2016; Holopainen et al., 2020) and international surveys (Bodner, Rhodes, Miller, and Dean, 2013) have demonstrated insufficient training of incorporating psychosocial aspects in assessment and treatment and supporting lifestyle behavior change within physical therapy curricula.

Clinical reasoning is a core competency in physical therapy practice (World Confederation for Physical Therapy, 2015) and a teaching priority in entry-level education (Ajjawi and Smith, 2010; Christensen et al., 2017; World Confederation for Physical Therapy, 2011). Clinical reasoning is defined as health professionals' thinking and decision-making process that guides clinical actions (Higgs and Jones, 2008). Clinical reasoning in physical therapy is described as an ongoing, cyclical, cognitive and reflective process performed in collaboration with the client and influenced by the context and the nature of the problem (Christensen et al., 2017; Edwards et al., 2004; Elvén, Hochwälder, Dean, and Söderlund, 2015; Jones, Jensen, and Edwards, 2008; McGlinchey and Davenport, 2015). In practice, clinical reasoning includes collecting assessment data, analyzing the findings, generating hypotheses, identifying the client's problem including a diagnosis, activity and

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participation restrictions, selection of interventions, and evaluation (Holdar, Wallin, and Heiwe, 2013; Smith, Higgs, and Ellis, 2008).

In recent years, there has been a shift from a biomedical and practitioner-centered approach toward physical therapy practice based on a biopsychosocial (Driver, Kean, Oprescu, and Lovell, 2017; Foster and Delitto, 2011) and person-centered approach (Dukhu, Purcell, and Bulley, 2018). Additionally, competencies in health promotion and lifestyle-related behavioral change have been identified as professional priorities (Dean et al., 2011). Thus, physical therapists need clinical reasoning skills targeting psychosocial and behavioral aspects of the client's problem (Elvén, Hochwälder, Dean, and Söderlund, 2015; Jones, Edwards, and Jensen, 2019; O'Sullivan et al., 2018) and there is a need to improve students' learning of such skills (Alexanders, Anderson, and Henderson, 2015; Dean et al., 2014; Holopainen et al., 2020; Solvang and Fougner, 2016). Globally, competence in integrating psychosocial and behavioral aspects in clinical reasoning is endorsed by the World Confederation for Physical Therapy (2015) and physical therapy jurisdictions in many countries such as, the US, Canada, Australia, New Zealand, and the Netherlands (American Physical Therapy Association, 2014; De Vries, Hagenaars, Kiers, and Schmitt, 2014; National Physiotherapy Advisory Group, 2017; Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015). This competence is also consistent with the International Classification of Functioning, Disability and Health (World Health Organization, 2001) emphasizing a biopsychosocial view of health and the role of contextual factors, including the environment and personal attributes. Similarly, in the Swedish higher education context, such competence is supported by the national objectives for degrees in physical therapy that, among others, emphasize student capabilities and skills within the context of a biopsychosocial approach, client participation and health promotion (Swedish Council for Higher Education, 1993), implying that physical therapy students must have these capabilities and skills upon graduation.

In a study by Hendrick, Bond, Duncan, and Hale (2009), year 2, 3 and 4 students from New Zealand demonstrated clinical reasoning skills on a continuum from less to more sophisticated regardless of their year of the program. A therapist-centered approach was evident throughout the program and only year 3 and 4 students were able to use a higher degree of focus on the client. The clinical reasoning of final year Portuguese students has demonstrated to be disease-oriented with a focus on client symptoms and impairments instead of focused on the clients' problem in integration with their needs, preferences and context (Cruz, Moore, and Cross, 2012). Findings from a qualitative case study with students from Doctor of Physical Therapy programs in the US (Gilliland and Wainwright, 2017), showed that the students' clinical reasoning patterns were mainly focused on biomedical aspects of the client problem and their attention to psychosocial and behavioral aspects was limited. In an Australian study, Stoikov et al. (2020) reported that new graduate physical therapists working in hospitals perceived that they were ill-prepared to address psychosocial factors in their clinical reasoning. Also, experienced clinicians in many countries have demonstrated challenges in applying a client-centered approach and consideration of psychosocial and behavioral aspects in practice (Driver, Kean, Oprescu, and Lovell, 2017; Fritz, Söderbäck, Söderlund, and Sandborgh, 2019; Synnott et al., 2015). Together these findings point in the same direction, that many physical therapy students have limited skills in addressing a broad perspective of health (i.e. biomedical, physical, psychosocial and behavioral aspects) and integrating the clients' needs and preferences into their reasoning process. The clinical reasoning variability among students seems to be related to both individual and curriculum level factors (Gilliland and Wainwright, 2017). The variability in the curriculum content could explain part of the variability in physical therapy students' capabilities and skills regarding assessment, analysis and intervention (i.e. the overall clinical reasoning process) (Elvén, Hochwälder, Dean, and Söderlund, 2019). Thus, students' performance in clinical reasoning can be viewed as an essential outcome of entry-level physical therapy education curricula.

According to a systematic review including 17 empirical studies conducted in European countries, the US, Canada and Australia, health professionals' attitudes and beliefs in a biomedical or biopsychosocial practice orientation are associated with their clinical decisions (i.e. their clinical reasoning) (Darlow et al., 2012; Simmonds, Derghazarian, and Vlaeyen, 2012). These relationships are further strengthened by a Swedish study demonstrating that physical therapy students' attitudes toward behavioral considerations in clinical reasoning explain a substantial proportion of their clinical reasoning outcomes (Elvén, Hochwälder, Dean, and Söderlund, 2019). Thus, students' practice orientation, along with their clinical reasoning performance, is of interest to better understand the impact of curriculum designs on students' clinical reasoning skills.

Although studies have identified the educational challenges in entry-level physical therapy education and have highlighted the need for curriculum

modifications (Alexanders, Anderson, and Henderson, 2015), questions remain regarding if and how students' clinical reasoning skills, focused on behavioral change, and their biomedical and biopsychosocial practice orientations differ based on unique curriculum goals and content. The integration of behavioral medicine content and competencies (BMCC) in physical therapy curricula is one example of such a curriculum focus. Behavioral medicine in physical therapy includes the integration of biomedical, psychosocial and behavioral knowledge in assessments and analyses of clients' behaviors in activities of importance for participation, and the selection of treatments and behavior change methods targeted to clients' needs (Sandborgh et al., 2020). Given that global and national objectives for entry-level physical therapy curricula should produce similar outcomes in students upon graduation, our null hypothesis was that there are no differences in the clinical reasoning outcomes among students who receive and do not receive behavioral medicine content and competencies (BMCC) in their professional education. The primary objective was to compare the clinical reasoning skills, focusing on clients' behavioral change, of entry-level physical therapy students attending programs with or without BMCC integrated in their curricula. The secondary objective was to compare students' attitudes and beliefs in a biomedical and biopsychosocial practice orientation.

Methods

Design

A final-semester cohort-comparison study was conducted. This study was part of a larger project reviewed by the Regional Ethical Review Board, Uppsala, Sweden, Dnr 2013/020, and met the ethical requirements consistent with Swedish law and the Helsinki declaration related to human research.

Setting

In Sweden, eight universities offer undergraduate programs in physical therapy. The duration of the program is three years, leading to a Bachelor's of Science Degree in Physical Therapy (Häger-Ross and Sundelin, 2007). Clinical reasoning competencies are incorporated within the learning objectives of entry-level education programs (Swedish Council for Higher Education, 1993) and the means of achieving these objectives are established by each university, in turn resulting in some variations in their curricula. Universities with physical therapy programs have made efforts to incorporate theoretical and practical components pertaining to a biopsychosocial and behavioral approach into their curricula. One university in Sweden has recently reported its processes for integrating behavioral medicine content and competencies throughout its curriculum (Sandborgh et al., 2020). Behavioral medicine is defined as a multidisciplinary field dealing with the integration of biomedical and behavioral knowledge in relation to diagnosis, treatment, rehabilitation, care, health promotion and disease prevention (Dekker et al., 2020). Implementing a behavioral medicine approach in physical therapy implies that the bi-directional relationship between people's daily living behaviors and diseases, disorders and health are the focus in client management and that associations between biomedical, psychosocial and behavioral factors underpin assessment, analysis, intervention, and evaluation (Åsenlöf, Denison, and Lindberg, 2005; Sandborgh et al., 2020).

Participants

Students (N = 369) enrolled in the final semester in the 8 entry-level physical therapist programs in Sweden were invited to participate in the study.

Categorization of programs with and without behavioral medicine content and competencies

A blueprint including four steps was used to identify programs with or without BMCC integrated in their curricula. Firstly, the program-level curricula of the eight entry-level physical therapy programs were identified on the Universities' external websites as these documents are publicly available in Sweden. Secondly, the curricula were thoroughly read, and words or sentences related to a biopsychosocial perspective, lifestyle, client behaviors, and behavior change were highlighted. Thirdly, the curricula were checked against predefined criteria based on interpretation of key elements in the definition of behavioral medicine in physical therapy: 1) a behavioral medicine approach to physical therapy practice was explicitly stated in the goal of the program; 2) an explicitly stated focus on the interaction between human behaviors and biopsychosocial factors was expressed in the description of curricula content; and 3) an explicit focus on the inclusion of behavioral medicine and associated capabilities and skills in physical therapy assessment, analysis, treatment and evaluation was expressed in the description of curricula content (Sandborgh et al., 2020). Describing physical therapy practice originating on a biopsychosocial perspective was not sufficient. All criteria were checked by

two investigators independently. To be identified as a curriculum with BMCC all criteria needed to be fulfilled according to both investigators. Fourthly, the program director was contacted in case of uncertainty regarding the curriculum content as described on the website.

Assessment

Reasoning 4 change instrument

The Reasoning 4 Change (R4C) instrument is a web-based instrument designed to assess physical therapy students' and physical therapists' clinical reasoning with a focus on supporting clients' behavioral change. This instrument consists of 4 domains (D) (Elvén, Hochwälder, Dean, and Söderlund, 2018; Elvén, Hochwälder, Hällman, Dean, and Söderlund, , 2018). The first domain includes self-assessments of knowledge (D1.1), cognitive (D1.2) and metacognitive (D1.3) capabilities and skills, attitudes and self-efficacy toward a behavioral approach in clinical reasoning (D.1.4) and contextual factors (D1.5). The response scales of D1.1-D1.5 include 6- or 11-point Likert scales. The second, third and fourth domains comprise the clinical reasoning process in three phases: input from the client (D2 IC) including the client narrative, observation and examination; functional behavioral analysis (D3 FBA) including the synthesis and analysis of the biopsychosocial factors likely affecting the client's problem and target behavior; and strategies for behavioral change (D4 SBC) including the selection of interventions and management planning. Domains 2, 3 and 4 consist of case scenarios from various medical fields (e.g. neurology and musculoskeletal) and contexts (e.g. primary care and elderly care) and include information regarding biomedical and psychosocial factors expressed as symptoms, narratives, examination findings and treatment outcomes. The case scenarios are gradually extended with new information to reflect several client encounters and progression over time. The cases together with their associated items assess the ability to identify, prioritize, analyze and interpret the key features in the management of the cases. The response options vary and include Likert-scales, lists of options and free-text answers. The scoring is based on the response distribution provided by an expert-panel of physical therapists. The response options of each item are assigned a credit corresponding to the proportion of experts that have selected that option. Total scores are calculated for each subscale of D1, D2 IC, D2 FBA and D3 SBC separately. Higher scores on the domains indicate better clinical reasoning focused on behavioral change. A detailed description of the items and response scales has been reported previously (Elvén, Hochwälder, Dean, and Söderlund, 2018; Elvén, Hochwälder, Hällman, Dean, and Söderlund, 2018). The R4C instrument has demonstrated excellent content validity based on relevance ratings by physical therapy experts (Domain Content Validity Index range: 0.78 to 1.0) (Elvén, Hochwälder, Dean, and Söderlund, 2018). Psychometric analyses based on the responses by physical therapy students in their final semester have shown satisfactory internal consistency for the subscales of D1(α range 0.74–0.91), satisfactory test-retest reliability for D1-D4 (ICC range for the subscales of D1: 0.81–0.92; ICC D2 = 0.72; ICC D3 = 0.60; ICC D4 = 0.55), and acceptable construct validity in terms of convergent validity (r range 0.06–-0.38) (Elvén, Hochwälder, Hällman, Dean and Söderlund, 2018).

Pain attitudes and beliefs scale for physiotherapists

The Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT) is a questionnaire designed to determine physical therapists' biomedical and biopsychosocial practice orientations in patient management (Houben et al., 2005; Ostelo et al., 2003). Physical therapists are asked to rate statements about the management of non-specific low-back pain on a 6-point Likert scale, ranging from totally disagree to totally agree. Higher scores on a subscale indicate a stronger practice orientation. In the present study, a Swedish translation (Overmeer, Boersma, Main, and Linton, 2009) of the 19-item version of the PABS-PT (Houben et al., 2005) was used. The PABS-PT has satisfactory construct validity, test-retest validity and responsiveness (Mutsaers et al., 2012). The internal consistency assessed with Cronbach's alpha has ranged from 0.73 to 0.84 for the biomedical subscale and from 0.54 to 0.68 for the biopsychosocial subscale (Eland, Kvale, Ostelo, and Strand, 2017; Houben et al., 2005; Mutsaers et al., 2012; Ostelo et al., 2003).

Procedure

The directors of the eight entry-level physical therapy education programs provided written informed consent that their students could be asked about participation in the study. The students were provided with verbal and written information about the study and an invitation to participate. The verbal information was given in various ways depending on what was most appropriate for each university, such as face-to-

face or via a video distributed on the students' learning web-platform or by e-mail. Data were collected in a computer room at the participants' University with the primary investigator present. A consent form, the PABS-PT questionnaire, a demographic questionnaire including age and work experience,e and private password-secured log-in details for the R4C instrument were provided to the participating students. The students gave their written informed consent to participate prior to data collection. The students were asked to respond as honestly as possible and reminded their responses being confidential.

Data analysis

The analyses were carried out using the Statistical Package for Social Sciences (SPSS) for Macintosh, Version 24.0 program (Armonk, NY: IBM Corp). The descriptive statistics for the demographic variables and the scores of the domains and subscales of the PABS-PT and R4C instruments were used. The differences in the demographic variables between the two student groups were analyzed using Pearson's chi-square test or Fisher's exact test for categorical variables and independent t-tests for continuous variables. Differences in the scores of the PABS-PT and R4C instruments were analyzed with independent t-tests. Effect sizes were computed using Cohen's *d* with pooled standard deviations. The data was checked to ensure the assumptions of normal distribution and homogeneous variance (Field, 2013). Alpha was set at 0.05.

Results

There was uncertainty regarding curriculum content of one program. The director of that particular program was contacted and confirmed the investigators' interpretation of the curriculum content. Two of the eight physical therapy programs fulfilled the three predefined criteria, thus were identified as having curricula with BMCC. Five of the programs did not fulfil any of the criteria for BMCC curriculum and one program fulfilled one of the criteria (the second criteria), thus six programs were identified as having curricula without BMCC.

In total, 151 students participated, corresponding to a response rate of 41%. All 8 programs were represented in the sample. The mean age of the sample was 25 years and 65% were women. Forty percent of the sample attended a program with BMCC formalized within the curriculum and 60% attended a program without such content and competencies formalized within the curriculum. There were no differences between the two student groups (i.e. students receiving BMCC curricula and students receiving curricula without BMCC) regarding sex, age, work experience and general studies. A flow diagram of the participating students is shown in Figure 1, and the demographic characteristics of the two student groups are presented in Table 1.

Students receiving BMCC curricula scored significantly higher than students receiving curricula without BMCC in six R4C variables all related to clinical reasoning focused on behavioral change. The *p*-values varied between $p < .001$ and $p = .04$ with effect sizes that varied between −0.35 and −0.74. The variables were: D1.1 Knowledge, D1.2 Cognition, D1.4 Self-Efficacy, D2 IC, D3 FBA, and D4 SBC (Table 2). For D1.5 contextual factors, students receiving curricula without BMCC scored significantly lower ($p = < 0.001$; effect size = 1.14) (i.e. they reported less support in the clinical practice context for a behavioral approach in clinical reasoning) than students receiving curricula without BMCC (Table 2). There were no differences between the groups for D1.3 Metacognition and D1.4 Attitudes toward clinical reasoning focused on behavioral change. For attitudes and beliefs toward a biomedical practice orientation (i.e. the biomedical subscale of the PABS-PT) students receiving BMCC curricula scored significantly lower ($p = .01$; effect size = 0.46) (i.e. had a lower biomedical practice orientation) than students receiving curricula without BMCC. There was no difference between groups for the biopsychosocial subscale of the PABS-PT (Table 2).

Discussion

Based on the global and national objectives of entry-level physical therapy education curricula, all Swedish programs are required to include a targeted biopsychosocial perspective and health promotion content. Two of the eight physical therapist programs also stressed the integration of behavioral medicine content and associated capabilities and skills, such as behavioral change competencies. The key findings of this study showed that students' skills in integrating a biopsychosocial and behavioral approach in clinical reasoning differed depending on the inclusion of the BMCC content, and they were in favor of the BMCC's inclusion. Thus, our hypothesis was rejected. Specifically, students attending a curricula with BMCC had superior self-perceived knowledge, cognitive capabilities and skills in clinical reasoning focused on behavioral change and superior skills throughout the reasoning process including Input from the client (IC), Functional behavioral analysis (FBA), and Strategies for behavioral change (SBC) compared with students from programs without BMCC within their curricula. Students receiving BMCC

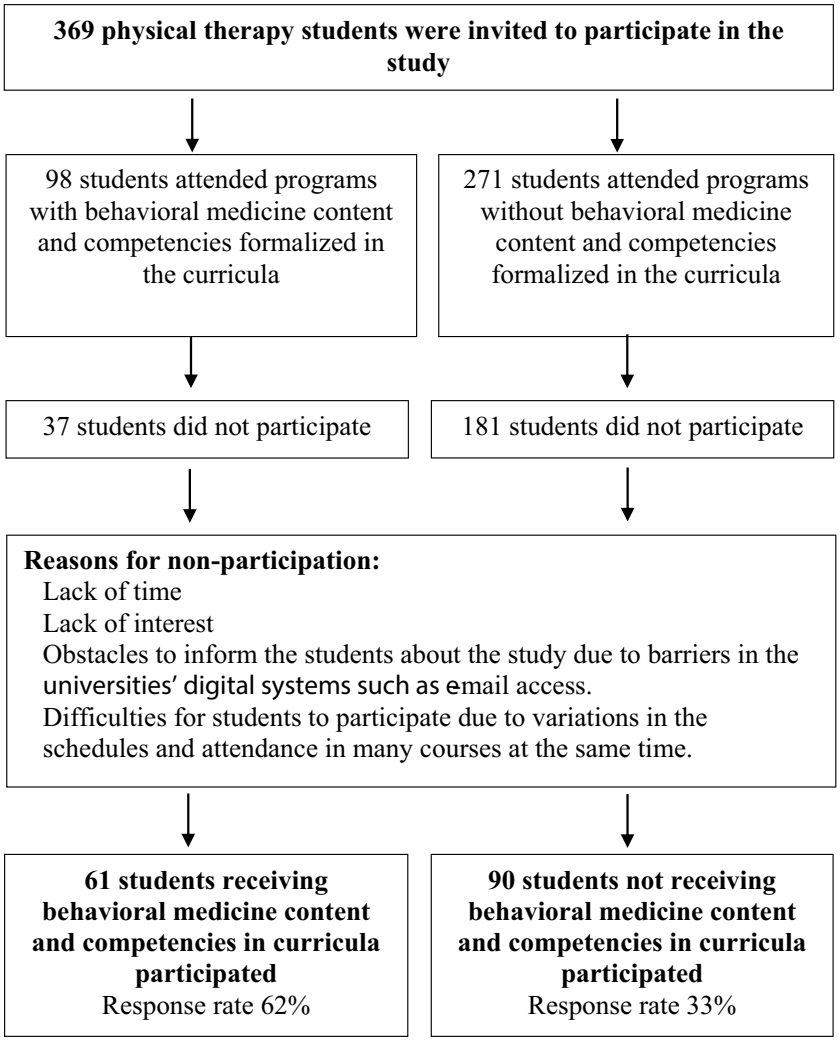

Figure 1. Flow diagram of participants in the study and reasons for nonparticipation.

curricula perceived their self-efficacy beliefs in clinical reasoning focused on behavioral change, as superior compared with the beliefs of students not receiving structured BMCC curricula. The students' practice orientation differed somewhat between groups. Students receiving BMCC curricula had less biomedical practice orientation than students not receiving BMCC curricula, but there was no difference between groups with respect to their attitudes toward and beliefs in a biopsychosocial practice orientation.

Our results have provided insights into the explicit role of the physical therapy curricula on students' clinical reasoning skills. Harden (2001) described three aspects of curriculum, including the declared, the thought, and the learned curriculum, which may differ in their educational praxis. Our study focused on the declared curriculum, i.e., what it is assumed the students are learning; and the learned curriculum, i.e., what students actually learn; and revealed associations among these aspects. These results challenge previous explanations of students' development of clinical reasoning skills. In a qualitative longitudinal study, Gilliland (2017) reported that all physical therapy students improved how they manage biomechanical issues throughout their education, but their competencies in addressing psychosocial aspects, the clients' life situation and needs varied greatly among the students. Similarly, Furze et al. (2015) reported that some students consider clients' preferences and psychosocial aspects in their clinical reasoning process early in their education while others continue with a procedural and biomedical approach until their graduation. This variability in students' biomedical, behavioral, and person-centered clinical reasoning processes have largely been explained by individual factors such as the students' personalities and prior experiences (Gilliland and Wainwright, 2017), which are factors beyond the declared curriculum. However,

Table 1. Demographic characteristics of the two groups of physical therapy students.

	PT Students Receiving BMCC (n = 61)		PT Students Not Receiving BMCC (*n* = 90)	
Characteristics[a]	No.	%	No.	%
Sex				
Women	44	72	54	60
Men	17	28	36	40
Age (y)[bc]				
22–24	36	59	53	59
25–29	22	36	26	29
30–34	1	2	8	9
35–41	2	3	3	3
Work experience in health care				
Yes	43	70	64	71
No	18	30	26	29
Work experiences in other areas				
Yes	54	88	82	91
No	7	12	8	9
Higher education studies other than physical therapy (credits[d])				
None	30	49	52	58
>0–7.5	13	21	8	9
>7.5–30	9	15	13	14
>30–120	8	13	11	12
>120	1	2	6	7

PT: physical therapy
BMCC: behavioral medicine content and competencies
[a]No significant differences between groups existed.
[b]The mean age was 25 y (SD 3.7) for students receiving BMCC curricula
[c]The mean age was 25 y (SD 3.5) for students not receiving BMCC curricula
[d]1.5 credits correspond to 1 wk of full-time studies

Table 2. Comparisons of the scores of the R4C instrument and the PABS-PT for the two groups of physical therapy students.

Outcomes	Mean (SD)[c]		Between-Group Difference			
R4C instrument: Domain and Subscale[a]	PT Students Receiving BMCC (*n*= 61)	PT Students Not Receiving BMCC (*n*= 90)	95% CI	*t*	*P*	*d*
D1.1 PT: Knowledge	35.7 (4.8)	32.6 (4.7)	−4.6 to −1.5	−3.9	<.001	−0.65
D1.2 PT: Cognition	34.9 (5.8)	30.6 (5.6)	−6.1 to −2.4	−4.5	<.001	−0.74
D1.3 PT: Metacognition	37.4 (5.8)	38.4 (5.3)	−0.7 to 2.8	1.2	.25	
D1.4 PT: Attitudes toward CR focused on behavior change	80.5 (10.4)	80.9 (9.9)	−3.0 to 3.6	−0.2	.84	
D1.4 PT: Self-efficacy in CR focused on behavior change	70.4 (12.6)	64.8 (11.5)	−9.6 to −1.7	−2.8	.01	−0.47
D1.5 PT: Contextual factors	14.9 (4.7)	20.1 (4.4)	3.7 to 6.6	6.8	<.001	1.14
D2 Input from client	38.5 (7.2)	36.3 (5.7)	−4.4 to −0.1	−2.1	.04	−0.35
D3 Functional behavioral analysis	23.8 (2.9)	22.6 (2.5)	−2.0 to −0.3	−2.5	.01	−0.42
D4 Strategies for behavior change	19.6 (3.7)	18.0 (3.3)	−2.8 to −0.5	−2.8	.01	−0.47
PABS-PT: Subscale[b]						
Biomedical subscale	32.0 (6.1)	35.2 (7.4)	0.9 to 5.4	2.7	.01	0.46
Biopsychosocial subscale	38.7 (4.3)	38.2 (3.9)	−1.8 to 0.8	−0.8	.44	

PT: physical therapy; BMCC: behavioral medicine content and competencies; [a] Theoretical min-max scores of the Reasoning 4 Change instrument: D1.1 = 8–48, D1.2 = 7–46, D1.3 = 8–48, D1.4 attitudes = 0–100, D1.4 self-efficacy = 0–100, D1.5 = 5–30, D2 = 0.6–66.1, D3 = 3.8–34.3, D4 = 0–36.4; [b] Theoretical min-max scores of the Pain Attitudes and Beliefs Scale for Physical Therapists: Biomedical subscale = 10–60 and Biopsychosocial subscale = 9–54; [c] Comparisons of means with independent t-test, two-tailed.

Elvén, Hochwälder, Dean, and Söderlund (2019) showed that curriculum content was the only variable predicting physical therapy students' clinical reasoning skills across the phases of the reasoning process (i.e. assessment, analysis, and intervention). Attending programs with a biopsychosocial and behavioral focus in the curricula was associated with superior clinical reasoning skills focused on behavioral change in clients. Although the investigators concluded that variables other than curricula contribute to clinical reasoning outcomes, the findings highlight that program-specific factors determine students' clinical reasoning skills, which supports the findings of the current study. Even though the current study did not explore the taught curriculum (i.e. what is delivered to the students) the revealed associations between what students actually learn (i.e. the learned curriculum) regarding clinical reasoning focusing on behavioral change and the declared curriculum support the benefits of explicit curricula including clear academic curriculum goals, scope and content related to behavioral medicine. Such declared curriculum seems to better prepare

physical therapists for health-focused practice including behavioral change, which is essential for supporting lifestyle changes and sustainable health (Dean et al., 2016), in addition to augmenting conventional physical therapy outcomes.

Examples of key elements in a physical therapy curriculum with integrated BMCC are the inclusion of established behavioral change theories and training of a systematic analytical clinical reasoning process model for integrating behavioral medicine into assessment and intervention (Sandborgh et al., 2020). With a theoretical foundation and teaching focus on behavioral medicine, the students receiving BMCC curriculum seemed to have developed self-perceived knowledge expertise (D1.1) and the capability to apply this knowledge in analytical reasoning processes (D1.2). These results were supported by the findings that these students also demonstrated superior outcomes in the clinical reasoning phases of IC, FBA and SBC. The associations between the curriculum content and knowledge and cognition are important findings since theoretical and experience-based knowledge and analytical skills are the building blocks of effective clinical reasoning processes (Higgs and Jones, 2008; Norman, 2005). Furthermore, the evidence shows that clinical reasoning errors are mainly consequences of knowledge deficits and cognitive bias (Norman et al., 2017), which may be minimized by emphasizing the application of essential knowledge in learning activities (e.g. the application of knowledge of biopsychosocial and behavioral aspects on health) (Eva, 2004). The findings of our study indicate that the theoretical foundation provided in the education affects students' knowledge and analytical skills that are essential for effective clinical reasoning, which in turn may affect their clinical behaviors (Godin, Bélanger-Gravel, Eccles, and Grimshaw, 2008).

Independent of the type of curriculum (i.e. BMCC or not) students had similar attitudes and beliefs toward a biopsychosocial practice orientation, which aligns well with all the Swedish universities' efforts to achieve the common objectives of physical therapy education (Swedish Council for Higher Education, 1993) and objectives of physical therapy practice globally (American Physical Therapy Association, 2014; Physiotherapy Board of Australia and Physiotherapy Board of New Zealand, 2015; World Confederation for Physical Therapy, 2015). Both student groups demonstrated a greater biomedical practice orientation, but had a similar biopsychosocial practice orientation, compared with the findings of an earlier study that included experienced Swedish physical therapists (Overmeer, Boersma, Main, and Linton, 2009). However, students receiving BMCC curricula were less biomedically oriented compared with those receiving curricula without BMCC. Together, these findings support that physical therapy students have a rather strong biomedical practice orientation but students receiving BMCC curricula have developed skills for weighing the relative importance of biomedical and psychosocial factors when individualized decisions are made in the reasoning processes of IC, FBA and SBC. Such skills are key in practice to make informed clinical decisions that support clients in their health-related behavioral change (Elvén, Hochwälder, Dean, and Söderlund, 2015).

The findings of particular interest in this study included students' attitudes toward clinical reasoning focused on behavioral change and their self-efficacy beliefs in such reasoning. The two student groups reported similar, and relatively positive, attitudes toward the use of core elements in a biopsychosocial and behavioral approach in clinical reasoning, such as identifying a target behavior and goal-setting based on SMART goals (i.e. specific, measurable, activity-related, realistic, and time-specific). Thus, the entry-level physical therapy programs included in the present study apparently created educational contexts that promote positive attitudes among the students. This was an important finding since positive attitudes toward clinical reasoning focused on behavioral change tend to predict clinical reasoning outcomes (Elvén, Hochwälder, Dean, and Söderlund, 2019). The findings that students from curricula without BMCC reported better support in the clinical practice context for a behavioral approach in clinical reasoning compared with students receiving BMCC curricula was surprising. One explanation is that students from curricula without BMCC might have lower expected outcomes for support of clinical reasoning focused on behavioral change, given that such skills were not explicitly formalized within their curricula, which may lead to a higher degree of satisfaction with the support received. Further study is needed to elucidate these factors. The students' self-efficacy beliefs differed between the two groups in that students receiving BMCC curricula had greater self-efficacy compared to students not receiving BMCC in their curricula. The evidence for the impact of self-efficacy beliefs on human behaviors is extensive (Glanz, Rimer, and Viswanath, 2015), which also pertains to health professionals' clinical behaviors (Godin, Bélanger-Gravel, Eccles, and Grimshaw, 2008). According to Bandura (1997), self-efficacy is strongly influenced by previous experience with a particular behavioral task, which in turn increases the likelihood that the person will repeat the task. Active learning strategies that coach a person to

master a task will lead to greater self-efficacy and improved task performance. There are reasons to believe that students receiving BMCC curricula have had more opportunities to apply knowledge in behavioral medicine and use capabilities and skills in clinical reasoning focused on behavioral change, throughout their preclinical and clinical courses, compared with students receiving curricula without BMCC. Thus, these experiences strengthened students' self-efficacy beliefs.

Overall, our findings support that physical therapy education curricula in Sweden need to be further developed to better provide students with skills in integrating behavioral and psychosocial aspects throughout their clinical reasoning process. We also hope that current findings will contribute to the global discussion about physical therapy educational development with the goal to better prepare physical therapists to address societal demands for sustainable change in population health. The increasing number of persons with lifestyle-related diseases (World Health Organization, 2018), which are also a part of all the patient populations that physical therapists meet in their daily practices (e.g. musculoskeletal pain, neurological, cardiovascular and respiratory diseases), put us in a position where competencies in clinical reasoning focused on behavioral change are urgently needed. Thus, the entry-level physical therapy education curricula content and scope need to be aligned with societal needs. Not only does the physical therapy profession need to establish standards for the inclusion of BMCC in physical therapy education curricula, but it also needs to promote students' self-efficacy in clinical reasoning focused on behavioral change. To augment the further development of physical therapy education with the inclusion of BMCC, a definition of clinical reasoning in behavioral change has been recently advanced (Elvén, 2019) (Appendix).

Study strengths and limitations

This is the first study to examine the effect of the inclusion of BMCC curricula on physical therapy students' clinical reasoning with special attention given to behavioral change. Entry-level health professional education needs to be designed in accordance with societal needs. A behavioral approach to practice is singularly important in contemporary physical therapy in particular to prevent and manage non-communicable diseases and to maximize conventional outcomes.

The study's limitations include the apparently low response rate in the group of students receiving curricula without BMCC (33%) in combination with the overall response rate of 41%, which is consistent with potential sample bias. However, the results were strengthened by the relatively large sample size in the group of students receiving curricula without BMCC (n = 90) and that all physical therapist programs without BMCC built into their curricula were represented by responding students (i.e. the responses of the sample reflected less exposure to BMCC). Furthermore, the moderate response rate overall was strengthened by student participation across all universities where a physical therapy program is given. A further limitation could be the challenges in objectifying and categorizing content and educational practices in curricula, given that the purpose of a curriculum is to describe learning outcomes and guide course content, educational processes and praxis (Smith, 2000). In other words, what is stated in the curricula should permeate educational content and methods throughout the program, which was essential in the decision to base the assessment of BMCC in the program on their curricula. A stepwise method with predefined criteria was used for curricula categorization and the primary investigator contacted the program director for one particular program to confirm its curriculum content, hence strengthening the validity of our categorization. Thus, reviewing curricula across academic programs, which at one time necessitated contact with the program director, was considered an optimal way to distinguish curricula regarding BMCC. Triangulation of methods for curricular categorization could have further decreased the risk of assessment bias, for example by the addition of reviews of intended learning outcomes in course syllabuses and should be considered in future studies.

Previous studies examining the psychometric properties of the PABS-PT have reported modest Cronbach's alpha values for the biopsychosocial subscale (Eland, Kvale, Ostelo, and Strand, 2017) and the discriminative ability of the two subscales has been questioned (Eland et al., 2019). This suggests that the biopsychosocial subscale may not sufficiently capture this dimension and it is doubtful that the PABS-PT can detect differences between subgroups. The R4C instrument assesses situations reflecting reality and not clinical reasoning in clinical practice, which needs to be considered when interpreting the findings. However, such written assessments including patient cases have demonstrated their value in capturing core thinking activities in clinical reasoning (Bordage and Page, 2018). Finally, response bias due to social desirability or response patterns may have occurred in our assessments.

Conclusions

The findings address the importance of explicit curricula goals and content based on evidence and identified societal health care needs. The differences in clinical reasoning focused on clients' behavioral change between students attending programs with or without BMCC in their curricula support that entry-level curricula impacts students'

clinical reasoning skills upon graduation. Students receiving curricula without BMCC had a stronger biomedical practice orientation than students receiving BMCC curricula. Although overall the students had a biopsychosocial attitude toward practice irrespective of curriculum, those with a BMCC curricula had greater self-efficacy in clinical reasoning focused on behavioral change. Thus, supporting students' self-efficacy in a behavioral approach in clinical reasoning is a recommended educational opportunity. The insights we gained related to the curriculum's impact on students' clinical reasoning focused on behavioral change may have critical implications for curriculum design, teaching, learning, and graduation competence in physical therapy students. Physical therapy graduates with clinical reasoning competencies to support behavioral change could reduce lifestyle-related diseases by effectively changing patients' lifestyles, thus meeting societal health priorities. Furthermore, they could augment the outcomes of conventional physical therapy practices that are largely reliant on behavioral change competencies. Given the Swedish education context of this study, further research in other countries is warranted. Further research is also needed to examine the implementation of evidence-based teaching and learning methods in clinical reasoning combined with BMCC to maximize physical therapy students' clinical reasoning focused on behavioral change.

Declaration of Interest

The authors report no conflict of interest.

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Appendix

Appendix – Definition of clinical reasoning focusing on clients' behavior change.

From: (Elvén M 2019) Clinical Reasoning Focused on Clients' Behavior Change. Development and Evaluation of the Reasoning 4 Change Instrument, p 58. Doctoral dissertation No 289. Mälardalen University, Västerås, Sweden.

"Clinical reasoning in physiotherapy integrates a cognitive, reflective and iterative process with the process of behavior change in clients and guides physiotherapists' practice actions. It is pervaded by a biopsychosocial perspective and individualized to the client's needs. It is dependent on the context and influenced by psychological factors pertaining to the physiotherapist. The reasoning process comprises multiple interrelated reasoning levels in which central elements in behavioral assessments and interventions are incorporated to support behavioral change. The physiotherapist and client in partnership identify and collect information regarding biopsychosocial factors of relevance for the client's activity-related target behavior, conduct a functional behavioral analysis, select intervention strategies to support behavior change or maintenance, and evaluate the outcomes."