

ONLINE LEARNING SELF-EFFICACY IN CARDIOPULMONARY PHYSIOTHERAPY: PERCEPTIONS OF NEW GRADUATES

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ABSTRACT

Purpose: Rapid transition to distance learning during COVID-19 pandemic induced educators of hands-on professions to explore effectiveness of online learning. We aimed to investigate online learning self-efficacy in cardiopulmonary physiotherapy.

Materials and Methods: Group 1 included graduates underwent only face-to-face learning while group 2 consisted of graduates underwent face-to-face and online learning. A questionnaire was developed by the authors including competencies in cardiopulmonary physiotherapy assessment and treatment skills to assess self-efficacy. The questionnaires were sent via e-mail.

Results: Fifty-four graduates in group 1 and 82 graduates in group 2 responded to the questionnaires (response rate: 27%). No significant difference was found between groups in terms of self-efficacy in cardiopulmonary physiotherapy assessment and treatment skills. Self-efficacy in practical domain of exercise tests was higher in group 1 ($p=0.021$). Practical courses related to cardiopulmonary physiotherapy and type of education had negative effects on career plans in cardiopulmonary physiotherapy in group 2 ($p=0.032$ and $p=0.001$, respectively). Duration of clinical practice was positively correlated with practical cardiopulmonary physiotherapy assessment ($p=0.005$) and treatment ($p=0.047$) in group 2.

Conclusion: Online learning seems to be a feasible option to develop adequate self-efficacy in cardiopulmonary physiotherapy. However, practical courses, type of education and duration of clinical internship are important for future career plans in cardiopulmonary physiotherapy.

Key words: Online learning, self-efficacy, cardiopulmonary physiotherapy

INTRODUCTION

Physiotherapy is a practical “hands-on” profession where physical touch is considered as its fundamental element (1,2). Thus, physiotherapy education is based on a performance-based learning approach which aims to increase students’ knowledge and skills by utilizing role modelling, communication, and the development of practical skills to prepare those to meet the demands of clinical

practice (2,3). Learning practical skills is the core component of the physiotherapy curriculum (4).

Therefore, face-to-face learning is considered as the most appropriate teaching method for physiotherapy profession as it allows students to gain required skills and knowledge to work independently after graduation. From the graduating physiotherapy students’ point of view, “connecting theory and practice” and “the role of clinical supervisors” are the

two main factors for professional development indicating the importance of practical classes and clinical placements in physiotherapy education (4).

Outcome measures focusing on student performance in clinical settings, one of which is task-specific confidence or self-efficacy, helps to determine professional development in health professional students. Self-efficacy is suggested to be the link between skills, knowledge and performance (5). Bandura defines self-efficacy as a person's belief about his/her capability to perform at a certain level depending on the capacity to use his/her skills and knowledge (6). Self-efficacy can be influenced by three main factors: 1) performance mastery being the strongest source of self-efficacy for an individual which is related to direct practice, 2) vicarious experiences which is related to observation and modelling of others, 3) verbal or social persuasion which is related to individual's beliefs regarding his/her ability to cope with challenging tasks or situations (7). All of these factors indicate the importance of face-to-face learning, mostly including clinical practice in health professional education. Given the significance of self-efficacy, its assessment in entry-level health professional education is worthy of further consideration, specifically after the mandatory transition to online learning.

The Coronavirus Disease 2019 (COVID-19) pandemic was a challenge for educational systems all over the world. In many countries, governments decided to stop face-to-face education as a part of lockdowns. Council of Higher Education in Turkey suspended education at all universities for a week with the decision taken by the government on March 12, 2020. During this period, the opportunities and capacities of universities for distance education were determined. All decisions taken about curriculum, infrastructure, human resources, content, and implementation were swiftly put into practice (8). Teaching was mandatorily delivered in an online-only mode for the remainder of spring semester. During the early period, classes were taught online via online platforms. Thereafter, our university started to use the institutional online platform (*online.deu.edu.tr*) for both synchronous and asynchronous teaching. For the following academic year, started in October 2020, a hybrid model of education (online and face-to-face learning) was implemented. The rapid switch to online learning method was an unexpected situation rather than a well-planned adaptation for both students and educators.

A number of studies have addressed self-efficacy specific to different domains in health care education regarding its effect on student motivation, clinical performance and career development (9-11). After the COVID-19 pandemic, researches have focused on the outcomes of online learning mostly in first level of university education (12,13). In addition to the relevant studies in the field of physiotherapy education before (14-16) and after the COVID-19 Pandemic (1,3,17), the aim of the current study was to gain insight into what had happened to cardiopulmonary physiotherapy education during the pandemic through investigating the effect of online learning on new graduate physiotherapists' self-efficacy specific for cardiopulmonary physiotherapy.

MATERIALS AND METHODS

Participants

The entire sample consisted of all graduate physiotherapists of Dokuz Eylül University, Faculty of Physical Therapy and Rehabilitation (formerly School of Physical Therapy and Rehabilitation) between 2018 and 2021 academic years (n=506). Group 1 consisted of the graduates of 2017-2018 and 2018-2019 academic years who underwent only face-to-face learning (n=117 and n=157, respectively). Group 2 consisted of the graduates of 2019-2020 and 2020-2021 academic years who underwent face-to-face learning and online learning (n=111 and n=121, respectively). The data were collected between January 2021 and June 2021.

The study was conducted in accordance with the ethical standards of Helsinki Declaration and was approved by the Institutional Non-invasive Research Ethics Board (Date: 23.11.2020, Decision No: 2020/28-32).

Data collection

A thorough search of the literature yielded no published instrument to measure self-efficacy related to cardiopulmonary physiotherapy in physiotherapy professionals and/or students. Therefore, a survey was designed to measure self-efficacy in cardiopulmonary physiotherapy by the authors including basic theoretical and practical competencies. The survey design was guided by Bandura's theory of self-efficacy scale construction guidelines and was divided into two components as self-efficacy measure and socio-demographic questions (18). Graduates were asked by e-mail

about their willingness to participate in the study before completing the online questionnaire. All the e-mail addresses were recorded from the students' office of the faculty.

Self-efficacy in cardiopulmonary physiotherapy

Self-efficacy is a task-specific confidence. Therefore, Bandura suggests measuring it specific to one area or domain (18). Specific self-efficacy scales are thought to be more predictive for the behavior under study compared to general ones. Therefore, in this current study, we have designed to measure the perceived level of confidence tailored to competencies in cardiopulmonary physiotherapy assessment and treatment skills. Each item was developed based upon the curriculum of undergraduate physiotherapy education at Dokuz Eylul University. All the items were prepared in accordance with the learning objectives and learning outcomes of theoretical and practical courses and clinical practices related to cardiopulmonary physiotherapy. As a result, we have determined 32 items under two main sub-dimensions as "physiotherapy assessment methods" (15 items) and "physiotherapy treatment methods" (17 items) in order to measure self-efficacy in theoretical and practical competencies in cardiopulmonary physiotherapy (Appendix 1). In the self-efficacy questionnaire consisting of 32 items, 5-point Likert type scoring (ranging from 1= very little confidence to 5= a lot of confidence) was used for each item. As a result, five different scores were calculated including assessment methods-theoretical, assessment methods-practical, treatment methods-theoretical, treatment methods-practical and total score. The scores ranged between 17-85 for physiotherapy assessment methods and 15-75 for physiotherapy treatment methods. The total score ranged from 64 to 320, higher scores indicating greater self-efficacy. To pilot the survey, it was sent to five physiotherapy new graduates who were asked to comment on comprehensibility, applicability and feasibility. They have reported that the survey was simple to complete for each item. These respondents were not included in the analysis, only their feedback was used for minor adjustments.

Socio-demographic questions

Socio-demographic data including age, gender, graduation year, type of education for theoretical and practical cardiopulmonary physiotherapy courses

(obligatory and elective), experiences of clinical practical courses, experiences of clinical practice related to cardiopulmonary physiotherapy, career plans and related factors in cardiopulmonary physiotherapy were collected.

Statistical analysis

Statistical analyses were performed using SPSS Version 24 (Chicago, IL, USA). Continuous variables were expressed as mean and standard deviations while categorical variables were expressed as numbers (n) and percentages (%). Differences between the groups were analyzed with Mann-Whitney U test for age, duration of clinical practice and self-efficacy including four subgroups and total scores. The association between duration of clinical practice and self-efficacy was determined by Spearman correlation coefficient. The strength of correlations was classified as very weak ($r=0-0.19$), weak ($r=0.2-0.39$), moderate ($r=0.40-0.59$), strong ($r=0.6-0.79$), and very strong ($r=0.8-1$). Factors affecting career plans in cardiopulmonary physiotherapy were compared using Chi-Square test. Statistical significance level was set at $p<0.05$.

RESULTS

Fifty-four physiotherapists (20 male, 34 female; 25 ± 1.06 years of age) graduated in 2018 and 2019 who underwent only face-to-face learning (Group 1) and 82 physiotherapists (22 male, 60 female; 23.5 ± 1.07 years of age) graduated in 2020 and 2021 who underwent face-to-face learning and online learning (Group 2) responded to the online survey. The total response rate was 27%. According to post-hoc power analyses the power of the study was 9.036%.

Socio-demographic data collection provided the information of age, gender, clinical placements related to cardiopulmonary physiotherapy, theoretical obligatory and elective courses in cardiopulmonary physiotherapy during the 4-year physiotherapy education. Age was significantly higher in group 1 compared to group 2 ($p<0.01$). Under normal circumstances, four-year physiotherapy education in our faculty includes a 4-week clinical practice in summer after the completion of each second and third years. In the 4th year, the internship includes a 15-week clinical placement in each semester. Group 1 completed all these clinical practice courses, while group 2 completed only 2nd year clinical practice during only face-to-face learning. Fifty-six graduates

Table 1. Socio-demographic data of the groups

	Group 1 (n=54)	Group 2 (n=82)
Age, years	25.0 ± 1.06*	23.5 ± 1.07
Gender, n (%)		
Female	34 (63.0)	60 (73.2)
Male	20 (37.0)	22 (26.8)
Duration of face-to-face clinical placements, months	32.7 ± 14.3*	24.5 ± 13.5
Clinical placements	n (%)	n (%)
Cardiology		
Yes	38 (70.4)	43 (52.4)
No	16 (29.6)	39 (47.6)
Cardiovascular surgery		
Yes	39 (72.2)	46 (56.1)
No	15 (27.8)	36 (43.9)
Chest diseases		
Yes	47 (87.0)	34 (41.5)
No	7 (13.0)	48 (58.5)
Thoracic surgery		
Yes	25 (46.3)	35 (42.7)
No	29 (53.7)	47 (57.3)
Internal medicine		
Yes	41 (76.0)	55 (67.1)
No	13 (24.0)	27 (32.9)
General surgery		
Yes	28 (51.9)	40 (48.8)
No	26 (48.1)	42 (51.2)
Pediatrics		
Yes	47 (87.0)	64 (78.0)
No	7 (13.0)	18 (22.0)
Oncology		
Yes	44 (81.5)	47 (57.3)
No	10 (18.5)	35 (42.7)
Anesthesiology intensive care unit		
Yes	24 (44.4)	28 (34.1)
No	30 (55.6)	54 (65.9)
Internal medicine intensive care unit		
Yes	25 (46.3)	33 (40.2)
No	29 (53.7)	49 (59.8)
Obligatory theoretical courses		
Internal medicine		
Face-to-face	54 (100)	82 (100)
Online	-	-
Surgical medicine		
Face-to-face	54 (100)	78 (95.1)
Online	-	4 (4.9)
Cardiac physiotherapy		
Face-to-face	54 (100)	67 (81.7)
Online	-	15 (18.3)
Pulmonary physiotherapy		
Face-to-face	54 (100)	75 (91.5)
Online	-	7 (8.5)
Pediatric cardiopulmonary physiotherapy		
Face-to-face	54 (100)	61 (74.4)
Online	-	21 (25.6)
Elective theoretical courses**		
Physiotherapy in lung diseases		
Face-to-face	39 (100)	31 (49.2)
Online	-	32 (50.8)
Physiotherapy in palliative care		
Face-to-face	42 (100)	36 (80.0)
Online	-	9 (20.0)
Physiotherapy in organ transplantation		
Face-to-face	38 (100)	35 (83.3)
Online	-	7 (16.7)
Oncologic physiotherapy		
Face-to-face	42 (100)	39 (84.8)
Online	-	7 (15.2)
Home care and physiotherapy		
Face-to-face	37 (100)	40 (83.3)
Online	-	8 (16.7)

*Mann Whitney U test; p<0.01. ** For the elective courses, percentages were calculated according to the total number of students who has selected the related course.

Table 2. Comparison of the groups in terms of self-efficacy in cardiopulmonary physiotherapy

	Group 1 (M ± SD)	Group 2 (M ± SD)	p
Assessment-Theoretical (Min:17-Max:85)	69.2 ± 8.3	69.6 ± 10.3	0.659
Assessment-Practical (Min:17-Max:85)	68.5 ± 10.0	66.2 ± 11.6	0.428
Treatment-Theoretical (Min:15-Max:75)	65.8 ± 7.8	65.7 ± 7.3	0.955
Treatment-Practical (Min:15-Max:75)	63.8 ± 7.9	62.3 ± 9.1	0.462
Total score (Min:64-Max:320)	267.4 ± 30.1	263.9 ± 34.2	0.681

Min: Minimum, Max: Maximum, M: Mean, SD: Standard Deviation; Mann Whitney U test

Table 3. Comparison of the groups in terms of self-efficacy in cardiopulmonary physiotherapy-Assessment

Competencies		Group 1 (M ± SD)	Group 2 (M ± SD)	p
Chest circumference measurement	T	4.1 ± 0.8	4.1 ± 0.8	0.632
	P	4.0 ± 0.8	4.0 ± 0.9	0.698
Measuring respiratory rate	T	4.7 ± 0.4	4.7 ± 0.4	0.436
	P	4.6 ± 0.4	4.5 ± 0.6	0.356
Measuring heart rate	T	4.7 ± 0.4	4.7 ± 0.4	0.973
	P	4.6 ± 0.5	4.4 ± 0.7	0.312
Measuring blood pressure	T	4.3 ± 0.7	4.3 ± 0.7	0.867
	P	4.1 ± 0.9	4.1 ± 0.8	0.607
Palpation of peripheral pulses	T	4.2 ± 0.7	4.1 ± 0.8	0.787
	P	4.1 ± 0.7	3.8 ± 0.9	0.251
Monitorization	T	3.0 ± 1.0	3.3 ± 1.1	0.228
	P	3.1 ± 1.1	3.1 ± 1.1	0.954
Inspection	T	4.3 ± 0.6	4.4 ± 0.7	0.312
	P	4.1 ± 0.8	4.0 ± 0.9	0.688
Assessment of dyspnea	T	4.4 ± 0.6	4.3 ± 0.7	0.955
	P	4.2 ± 0.6	4.2 ± 0.8	0.835
Assessing symptoms of respiratory distress	T	4.4 ± 0.5	4.4 ± 0.6	0.511
	P	4.2 ± 0.6	4.1 ± 0.8	0.635
Assessment of accessory muscles for breathing	T	4.3 ± 0.6	4.2 ± 0.7	0.806
	P	4.2 ± 0.7	3.9 ± 0.9	0.128
Assessment related to mechanical ventilation	T	3.3 ± 1.08	3.4 ± 1.09	0.532
	P	3.2 ± 1.09	3.1 ± 1.08	0.462
Auscultation	T	3.2 ± 1.12	3.5 ± 1.06	0.221
	P	3.3 ± 1.2	3.1 ± 1.07	0.181
Chest wall palpation	T	4.1 ± 0.8	4.1 ± 0.7	0.998
	P	4.1 ± 0.8	4.0 ± 0.8	0.578
Assessment of chest pain	T	4.1 ± 0.8	4.1 ± 0.8	0.632
	P	4.0 ± 0.8	4.0 ± 0.9	0.698
Exercise testing	T	3.9 ± 0.9	3.8 ± 1.14	0.796
	P	3.8 ± 1.04	3.4 ± 1.07	0.021*
Assessment of respiratory muscle strength	T	3.7 ± 1.06	3.6 ± 1.17	0.623
	P	3.6 ± 1.07	3.5 ± 1.1	0.355
Assessment of peripheral muscle strength	T	4.2 ± 0.8	4.3 ± 0.7	0.473
	P	4.1 ± 0.9	4.1 ± 0.8	0.897

T: Theoretical, P: Practical, M: Mean, SD: Standard Deviation; *p<0.05, Mann Whitney U test

in group 2 accomplished 3rd and first semester of 4th year clinical practice courses while 31 graduates completed second semester's clinical placement in the 4th year. During the online learning process, all these clinical practices were postponed and clinical scenarios, clinical problem solving, and case studies were implemented through synchronous and

asynchronous methods. As a result, 26 graduates completed 3rd year's and 51 graduates completed 4th year's clinical practices through online learning in group 2. Duration of face-to-face clinical placements in group 1 was significantly higher than group 2 (p<0.01) (Table 1).

Table 4. Comparison of the groups in terms of self-efficacy in cardiopulmonary physiotherapy-treatment

Competencies		Group 1 (M ± SD)	Group 2 (M ± SD)	p
Breathing control	T	4.5 ± 0.5	4.5 ± 0.5	0.779
	P	4.4 ± 0.5	4.4 ± 0.6	0.978
Active cycle of breathing technique	T	4.5 ± 0.5	4.5 ± 0.5	0.779
	P	4.4 ± 0.5	4.4 ± 0.6	0.978
Thoracic expansion exercises	T	4.5 ± 0.5	4.5 ± 0.5	0.926
	P	4.4 ± 0.6	4.3 ± 0.6	0.588
Diaphragmatic breathing exercise	T	4.5 ± 0.5	4.5 ± 0.5	0.971
	P	4.4 ± 0.6	4.3 ± 0.6	0.457
Forced expiration technique	T	4.4 ± 0.6	4.4 ± 0.5	0.821
	P	4.4 ± 0.6	4.2 ± 0.7	0.204
Coughing	T	4.4 ± 0.6	4.4 ± 0.5	0.821
	P	4.4 ± 0.6	4.2 ± 0.7	0.204
Incentive spirometry	T	3.9 ± 0.9	4.1 ± 0.8	0.236
	P	3.8 ± 0.9	3.9 ± 0.9	0.635
Postural drainage techniques	T	4.1 ± 0.9	4.1 ± 0.6	0.985
	P	4.1 ± 0.8	3.9 ± 0.8	0.197
Manual techniques (percussion, vibration, shaking)	T	4.4 ± 0.6	4.4 ± 0.6	0.935
	P	4.3 ± 0.6	4.2 ± 0.6	0.340
Mobilization	T	4.5 ± 0.6	4.5 ± 0.5	0.364
	P	4.5 ± 0.5	4.3 ± 0.6	0.251
Transfer activities	T	4.5 ± 0.6	4.4 ± 0.5	0.551
	P	4.4 ± 0.6	4.3 ± 0.6	0.297
Management of dyspnea	T	4.4 ± 0.6	4.4 ± 0.7	0.984
	P	4.2 ± 0.6	4.3 ± 0.7	0.495
Inspiratory muscle training	T	4.1 ± 0.7	4.1 ± 0.7	0.946
	P	3.9 ± 0.9	3.8 ± 0.9	0.972
Therapeutic exercises	T	4.3 ± 0.6	4.2 ± 0.7	0.747
	P	4.3 ± 0.6	4.1 ± 0.9	0.338
Aerobic exercise training	T	4.4 ± 0.6	4.3 ± 0.6	0.319
	P	3.3 ± 0.6	3.1 ± 0.8	0.121

T: Theoretical, P: Practical, M: Mean, SD: Standard Deviation; Mann Whitney U test

When the groups were compared in terms of self-efficacy in cardiopulmonary physiotherapy, no significant difference was found (Table 2). Table 3 shows the comparison of the groups in terms of each item within theoretical and practical domains for assessment skills in cardiopulmonary physiotherapy. Self-efficacy of the new graduates in group 1 was significantly higher than group 2 in terms of practical component of “exercise testing” ($p=0.021$). Table 4 presents the data regarding the comparison of the groups in terms of each item within theoretical and practical domains for treatment skills in cardiopulmonary physiotherapy. No significant difference was found in terms of any items between the groups. Duration of face-to-face clinical placement was positively correlated with self-efficacy in practical domains of both assessment ($r=0.304$, $p=0.005$) and treatment ($r=0.220$, $p=0.047$) parameters, and total self-efficacy ($r=0.255$, $p=0.021$) in group 2.

We also surveyed the factors, which have the possibility to have negative or positive effect on career plans of new graduate physiotherapists in cardiopulmonary physiotherapy. “Practical courses related to cardiopulmonary physiotherapy” and “type of education” were the two negative factors for group 2 compared to the graduates of group 1 (Table 5).

DISCUSSION

This study has provided insight into the effects of online learning during the COVID-19 pandemic on the self-efficacy of new graduate physiotherapists in cardiopulmonary physiotherapy. Our main findings indicated no significant difference in terms of self-efficacy in both theoretical and practical cardiopulmonary physiotherapy skills between new graduates undergone only face-to-face learning and new graduates undergone face-to-face and online learning. The only significant difference occurred in terms of the practice of the item including “exercise

testing” which requires mainly practical experience among theoretical and practical competencies of all items. Moreover, “practical courses related to cardiopulmonary physiotherapy” and “type of education” negatively affected future career plans of new graduated physiotherapists in cardiopulmonary physiotherapy who had undergone face-to-face and online learning.

The drastic transition to online learning during the COVID-19 pandemic was an unexpected obligation rather than a well-planned, informed choice. This global situation prompted the researchers to investigate the perceptions of students/educators, advantages or disadvantages of online learning, specifically for the higher-level education relying on hands-on practice, such as physiotherapy. Physiotherapy students preferred traditional classes compared to online sessions for achieving learning outcomes of practical skills and social competencies in Yan et al.’s study (17). Parallel to the findings, Ranji et al. also indicated a preference of physiotherapy students on behalf of traditional classroom teaching to develop better hands-on skills (19). Despite

students’ point of view, physiotherapy educators found online learning partially effective, even though it was impossible to teach psychomotor and communication skills in an online-only platform (1). Similarly, in another study, physiotherapy educators from three different countries described teaching during the pandemic as one of the most challenging experiences of their professional careers due to difficulties in making authentic connections with students, adapting to technological interruptions, assessment of student understanding of content, and managing work-life balance (20).

In spite of abovementioned studies, online learning self-efficacy of physiotherapy students during the COVID-19 pandemic has rarely been investigated. There is limited data indicating controversial results. In Madi et al.’s study, online learning self-efficacy and academic self-efficacy were found to be significantly decreased, in which those were assessed at the initial stages of online learning and 12 months thereafter (21). However, Szekeres and MacDermid compared the results of in-person stake-holder-hosted, interactive, problem-based seminars versus online

Table 5. Factors affecting career plans in cardiopulmonary physiotherapy.

	Group 1 (n=54) n (%)	Group 2 (n=82) n (%)	p
Type of education (face-to-face or online learning)			
<i>Negative</i>	2 (3.7)	22 (26.8)	0.001^v
<i>Positive</i>	52 (96.3)	60 (73.2)	
Practical courses related to cardiopulmonary physiotherapy			
<i>Negative</i>	3 (5.6)	15 (18.3)	0.032*
<i>Positive</i>	51 (94.4)	67 (81.7)	
Theoretical courses related to cardiopulmonary physiotherapy			
<i>Negative</i>	3 (5.6)	7 (8.5)	0.515
<i>Positive</i>	51 (94.4)	75 (91.5)	
My practical knowledge in cardiopulmonary physiotherapy			
<i>Negative</i>	12 (22.2)	27 (32.9)	0.177
<i>Positive</i>	42 (77.8)	55 (67.1)	
My theoretical knowledge in cardiopulmonary physiotherapy			
<i>Negative</i>	5 (9.3)	16 (19.5)	0.105
<i>Positive</i>	49 (90.7)	66 (80.5)	
My professional competency in cardiopulmonary physiotherapy			
<i>Negative</i>	17 (31.5)	35 (42.7)	0.188
<i>Positive</i>	37 (68.5)	47 (57.3)	
Role model characteristics of lecturers of the department of cardiopulmonary physiotherapy			
<i>Negative</i>	3 (5.6)	8 (9.8)	0.379
<i>Positive</i>	51 (94.4)	74 (90.2)	
Job opportunities in cardiopulmonary physiotherapy			
<i>Negative</i>	9 (16.7)	11 (13.4)	0.601
<i>Positive</i>	45 (83.3)	71 (86.6)	

*p<0.05, ^vp<0.01; Chi-Square test

problem-based tutorials on self-efficacy to implement outcome measures in practice among physical and occupational therapists and found no significant difference between the two methods six months following the interventions suggesting online learning was as good as face-to-face learning for improving and retaining self-efficacy (22). Similarly, Scott et al. indicated no significant difference between pediatric physical therapy curriculum delivered via classroom-based, online, or hybrid instruction in promoting pediatric-specific growth in student self-efficacy (23). Our findings are parallel to the results of the last two studies indicating similar effects of online learning and face-to-face learning on physiotherapy students' self-efficacy. However, in contrast to similar studies, we have investigated domain-specific self-efficacy rather than general self-efficacy, in line with Bandura's self-efficacy theory suggesting measuring it specific to one area or domain. As a result, we have detected similar levels of self-efficacy within both groups received only face-to-face learning and face-to-face and online learning specific to cardiopulmonary physiotherapy. The perceptions of the new graduates were congruent on behalf of their theoretical and practical competencies in the field. We have constructed the survey based on the learning outcomes of our 4-year undergraduate physiotherapy education of the faculty including basic assessment and treatment skills specific to cardiopulmonary physiotherapy. The only significantly different item between our groups was the practical part of "exercise testing". Self-efficacy of new graduates received only face-to-face learning in practicing exercise testing was significantly higher than the new graduates received face-to-face learning and online learning. This finding seems reasonable as exercise testing is a substantially practical competency requiring specific equipment and experience of practice. However, self-efficacy of all other cardiopulmonary physiotherapy assessment and treatment competencies were similar between the two groups.

Duration of face-to-face clinical practice was significantly lower in the group received face-to-face learning and online learning. It was significantly and positively correlated with self-efficacy in total and in practical domains of assessment and treatment competencies in the new graduates received face-to-face learning and online learning, but not in the group received only face-to-face learning. This finding indicates the importance of clinical practice to

enhance a better-perceived self-efficacy in practical domains of physiotherapy. In parallel to this finding, the new graduates received face-to-face learning and online learning believed "type of education" and "practical courses related to cardiopulmonary physiotherapy" were the two negative factors affecting their future career plans in cardiopulmonary physiotherapy. These findings highlight the importance of lack of practical sessions in physiotherapy education in case of a distance learning.

The most important limitation of the study was the method for data collection. The data were collected using an online survey, which may not be suitable for students due to their negative attitudes towards online learning. Moreover, during the period numerous studies included students collected their data using online questionnaires in Türkiye like all other countries. As a result, our response rate cannot be considered acceptable. Therefore, the findings need to be interpreted with caution. However, there is no study investigating the effect of online learning on self-efficacy in cardiopulmonary physiotherapy. From this aspect, we have assessed domain-specific self-efficacy using a constructed questionnaire including theoretical and practical competencies based on the learning outcomes of cardiopulmonary physiotherapy lectures and clinical practices during the 4-year physiotherapy undergraduate education. We believe that, the questionnaire we have developed will guide to future validation and research studies in the field.

CONCLUSION

In conclusion, the result of the current study suggests favorable outcomes of a combination of face-to-face learning and online learning compared to only face-to-face learning in order to construct adequate self-efficacy in cardiopulmonary physiotherapy, even under the obligatory circumstances without any preliminary preparation. Therefore, we believe that online learning will give an opportunity for future higher-level of educational system supporting traditional face-to-face activities, specifically to resolve problems due to time and distance. An integrated approach of online theoretical and face-to-face practical sessions along with clinical practices will no doubtfully provide adequate self-efficacy in cardiopulmonary physiotherapy as a future educational option.

Appendix 1. Assessment of self-efficacy in cardiopulmonary physiotherapy

(1: very little confidence-- 5: a lot of confidence)

	Theoretical					Practical				
Competencies										
Physiotherapy Assessment Skills										
Chest circumference measurement	1	2	3	4	5	1	2	3	4	5
Measuring respiratory rate	1	2	3	4	5	1	2	3	4	5
Measuring heart rate	1	2	3	4	5	1	2	3	4	5
Measuring blood pressure	1	2	3	4	5	1	2	3	4	5
Palpation of peripheral pulses	1	2	3	4	5	1	2	3	4	5
Knowledge of monitorization	1	2	3	4	5	1	2	3	4	5
Inspection	1	2	3	4	5	1	2	3	4	5
Assessment of dyspnea	1	2	3	4	5	1	2	3	4	5
Assessing symptoms of respiratory distress	1	2	3	4	5	1	2	3	4	5
Assessment of accessory muscles for breathing	1	2	3	4	5	1	2	3	4	5
Assessment related to mechanical ventilation	1	2	3	4	5	1	2	3	4	5
Auscultation	1	2	3	4	5	1	2	3	4	5
Chest wall palpation	1	2	3	4	5	1	2	3	4	5
Assessment of chest pain	1	2	3	4	5	1	2	3	4	5
Exercise testing	1	2	3	4	5	1	2	3	4	5
Assessment of respiratory muscle strength	1	2	3	4	5	1	2	3	4	5
Assessment of peripheral muscle strength	1	2	3	4	5	1	2	3	4	5
Physiotherapy Treatment Skills										
Breathing control	1	2	3	4	5	1	2	3	4	5
Active cycle of breathing technique	1	2	3	4	5	1	2	3	4	5
Thoracic expansion exercises	1	2	3	4	5	1	2	3	4	5
Diaphragmatic breathing exercise	1	2	3	4	5	1	2	3	4	5
Forced expiration technique	1	2	3	4	5	1	2	3	4	5
Coughing	1	2	3	4	5	1	2	3	4	5
Incentive spirometry	1	2	3	4	5	1	2	3	4	5
Postural drainage techniques	1	2	3	4	5	1	2	3	4	5
Manual techniques (percussion, vibration, shaking)	1	2	3	4	5	1	2	3	4	5
Mobilization	1	2	3	4	5	1	2	3	4	5
Transfer activities	1	2	3	4	5	1	2	3	4	5
Management of dyspnea	1	2	3	4	5	1	2	3	4	5
Inspiratory muscle training	1	2	3	4	5	1	2	3	4	5
Therapeutic exercises	1	2	3	4	5	1	2	3	4	5
Aerobic exercise training	1	2	3	4	5	1	2	3	4	5

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