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OBSERVING THE RELATIONSHIP BETWEEN PHYSIOTHERAPY UNDERGRADUATE STUDENTS INDIVIDUAL INNOVATION LEVEL AND LIFELONG LEARNING TENDENCIES

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Abstract: Technological developments in neurorehabilitation are rapidly increasing. Students who grow up in the field of rehabilitation should be open to innovation and eager to learn in order to keep up with this rapid development. The purpose of this study was to observing the relationship between physiotherapist candidates' individual innovation levels and lifelong learning tendencies. A relational screening model is used in the study. The study included 7 state universities in Türkiye to assess the relationship between these two dimensions. The demographic form, the "Lifelong Learning Tendency Scale" to determine undergraduate students' lifelong learning tendencies, and the "Individual Innovation Scale" to determine individual innovativeness levels were used in the research. There is a statistically significant relationship to the overall score of the undergraduate students who participated in the research with the total score of innovation, motivation, resilience, lack of learning regulation, absence of curiosity and overall scores of lifelong learning trends in a positive direction (r= 0.44, 0.44, 0.38, 0.48; P<0.05). There are many studies that evaluate innovation and lifelong learning. But, as far as we know, no such work has been done in the rehab field. This study is believed to contribute to literature in terms of innovation against rapid technological developments and the development of new educational and teaching strategies that will enhance lifelong learning.

Keywords: Individual innovativeness, Lifelong learning tendencies, Physiotherapy

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1. Introduction

In today's changing global economic system, individuals with the most innovative science and technology, the most advanced and innovative innovative skills are more advantageous. Countries around the world are planning innovation-oriented development strategies (Brottman et al., 2020). The need to build an innovative society has led to the pursuit of innovative talent and the cultivation of innovative talents at various universities (Meng et al., 2021). The renewed European Union (EU) agenda for higher education institutions has emphasized that higher education plays an important role in contributing to innovation. Although humans are the central object of education in the development of innovation skills, various studies show that higher education institutions are inadequate in human-centric innovation processes (Meng et al., 2021). Previous studies indicate that the skills needed to participate in innovation activities are not yet part of real teaching (Tynjälä, 1999; Villa Sánchez and Poblete Ruiz, 2011). Therefore, the curriculum centered on innovation in higher education needs to be updated (Edwards-Schacter et al., 2015; Kivunja, 2014).

1.1. Innovation

It is difficult to define innovation because it is a complex concept (Tellis et al., 2009). Innovation can be defined as the improvement of an existing product in a more

beneficial direction (Tellis et al., 2009). In this sense, innovation is different from the invention, which is the process of transforming ideas into a tangible new work (Trott, 2012). With innovation, small changes are made that improve a new product or service, a new strategy, the opening of a new market, or the processes of an organization. This process can also be described as productivity (Trott, 2012; Hisrich and Kearney, 2014).

1.2. Physiotherapy and Innovation

Some people are more open to innovations than others. This phenomenon can also be explained by what Rogers describes as Personal Innovation "is related to how early an individual adopts a new idea." Innovation is an indispensable process for organizational evolution, growth, efficiency, competitive advantage and profitability. Furthermore, it is inevitable that organizations are constantly open to innovation for survival and sustainable success.

Innovation features such as the potential to re-invent or change innovation, the observable benefit, the level of simplicity and the ease of understanding determine the power of innovation. As physiotherapists (FTs) work in the field of healthcare, innovations in this field must be based on scientific evidence. Innovation is destructive; it is unlikely that innovation alone will be perceived positively by the members of the organization. But FTs largely acknowledge that changing practical models and adapting to a dynamic healthcare climate is a professional responsibility.

2. Materials and Methods

This study was planned in accordance with the Helsinki Criteria and received ethical approval from the local University Health Sciences Ethics Board (Registration Number: 2021/12-58). Students studying in the physiotherapy departments of seven universities in Türkiye participated in the study and their consent was obtained.

2.1. Participants

The study consisted of 600 physiotherapist candidates over the age of 18 who were actively learning during the 2021-2022 training period. Used from the universe sample table edited by Gay et al. (2012) to determine the number of samples.

Individual scale of innovation and the Scale of lifelong learning were used to measure the attitudes and views of Physiotherapy undergraduate students on individual levels of innovation and lifelong learning tendencies.

Individual scale of innovation (ISI), developed by Hurt, Joseph and Cook (Pallister and Foxall, 1998) has been adapted to Turkish by Kılıçer and Odabaşı (2010). The scale has a four-factor structure of 20 elements. "Change Resistance", "Ideal Leadership", "Openness to Experience" and "Risk Taking" are the factors on the scale. If the calculated score is above 80 points, it is classified as "Innovator", between 69 and 80 points and between 57 and 68 points, "Inquirer", between 46 and 56 points, and under 46 points as "Traditional".

The lifelong learning Scale (LLS), developed by Coşkun Diker and Demirel (2012), has a 27 item and four-factor structure. The dimensions of the scale "Ludging" and "Sad" consist of positive substances, the dimensions "Lack of Regulation of Learning" and the "Loss of Interest" also consist of negative substances.

These scales and physiotherapist candidates were asked research questions about lifelong learning and individual innovation:

1. What are the individual levels of innovation of physiotherapist candidates?
2. What are the lifelong learning tendencies of physiotherapist candidates?
3. Is there a meaningful relationship between physiotherapist candidates' lifelong learning tendencies and individual levels of innovation?

2.2. Statistical Analysis

The Cronbach Alpha internal coherence test was used to test the reliability of individual innovation scale and lifelong learning trend scale scores. In the scale reliability study, the Cronbach Alfa coefficient was calculated as 0.89 for the individual innovation scale and 0.80 for the lifelong learning trend scale.

All data was analyzed by recording on the computer in the SPSS (statistical package for social sciences) for Windows 22. Assumptions to be met in order to decide which tests (parametric/non-parameter tests) will be applied first in the analysis of the data have been tested. In order to determine the normality of the distribution, the Kolmogorov-Smirnov and Shapiro Wilk tests used the values of compression and compression. In the comparison of two independent groups, the T-test (Independent sample t-test) used the Bonferroni test from post-hoc tests to determine the source of the difference. The relationship between variables is considered by the Pearson correlation coefficient. The 0.05 level of significance was used as a criterion for interpreting whether the values obtained were meaningful or not (Önder, 2018).

3. Results

3.1. Demographic Characteristics

81.8% of the study sample (n=491) men, 21.8% (n=131) University5, 29.3% (n=176) 3. Class student, 54.2% of mother education level primary school, 40.3% (n=234) father education status secondary school and 38.8% family income level below TL 8500 (Table1 and Table2).

3.2. The First Related Problems

The first underlying question of the study is "What is the level of individual innovation of candidates for physiotherapists?" form is indicated (Table 2 and Table 3). Individual innovation scores total statistically significant differences according to the gender of students ($t=2.40$; $P<0.05$). On average, female (68.13±8.12) had higher overall individual innovation scores than male (66.14±7.72) (Table 2).

Table 1. Distribution of demographic characteristics

		n	%
Gender	Boy	491	81.8
	Girls	109	18.2
University	University1	104	17.3
	University2	83	13.8
	University3	79	13.2
	University4	67	11.2
	University5	131	21.8
	University6	93	15.5
	University7	43	7.2
Class	1.	152	25.3
	2.	120	20.0
	3.	176	29.3
	4.	153	25.5
Mother's level of education	Primary	312	54.2
	Secondary School	175	30.4
	Senior High School	81	14.1
	University	8	1.4
Father's level of education	Primary	187	32.2
	Secondary School	234	40.3
	Senior High School	138	23.8
	University	22	3.8
The level comes	8500<	232	38.8
	8500-15000	227	38.0
	15000-25000	116	19.4
	20000+	23	3.8

Table 2. Results relating to the comparison of ISI and sub-parameter scores by gender

		n	$\overline{X}$±Ss	t	sd	P
Resistance to change	Male	491	20.72±4.36	0.27	598	0.79
	Female	109	20.59±5.39			
The Idea Leadership	Male	491	18.17±2.92	-3.57	598	0.01
	Female	109	19.28±3.00			
Openness to Experience	Male	491	20.06±2.31	-1.43	598	0.15
	Female	109	20.41±2.45			
Risk Taking	Male	491	6.63±1.57	-2.42	598	0.02
	Female	109	7.02±1.38			
ISI Total Points	Male	491	66.14±7.72	-2.40	598	0.02
	Female	109	68.13±8.12			

t= Independent Sample t test, n= participant number, sd= standart deviation.

Table 3. findings related to the distribution of innovation categories according to ISI scores

	n	%
The Innovator	4	0.67
Early Adopters	43	7.15
Early Majority	327	54.41
Late Majority	198	32.95
Laggards	29	4.83

When distribution was examined by individual innovation categories, it was found that 54.41% (n=327) of students were in the Early Majority category and 32.95% (n=198) of students were in the Late Majority category. 39.93% of students (n=240) were found to have low levels of innovation, and 37.77% (n=227) to have high levels of innovation when the distribution of individual levels of innovation was assessed (Table 4).

Individual innovation scores show statistically significant gender differences overall (t=2.40; P<0.05). The overall individual innovation scores of female were higher than those of males on average (68.13 8.12 vs. 66.14 7.72) (Table 4).

There is no statistically significant difference between the student's mother's education levels and sub-parameter scores on the individual innovation scale (P>0.05). The lower aspects of the individual innovation scale's ideological leadership scores reveal a statistically significant difference between the parental education levels of the adolescents (F=3.73, F=5.92, P<0.05). There

is no statistically significant difference between the class levels of the children on the individual innovation scale or sub-parameters scores (P>0.05). A statistically significant difference between students' family income levels may be seen in their ideological leadership scores on the individual innovation scale's sub-parameters (F=4.68, P>0.05). It has been discovered that students with family income levels of less than 8500 TL and between 8500 and 15000 TL perform lower on opinion leadership tests than students with income levels of at least 20000 TL.

3.3. The Second Related Problems

"What are the lifelong learning tendencies of physiotherapy candidates?" is the second fundamental question of the study.

According to the gender of the students, there is a statistically significant difference in the scores for regulating learning from the lower dimensions of the LLS (t=4.21; P<0.05). Female were shown to have lower scores in controlling learning on average than male (26.75 6.19 vs. 29.19 5.30) (Table 5).

A statistically significant difference between students and their mother's educational level is demonstrated using the absence (F1) and lack of curiosity (F2) scores in regulating learning from the sub-parameters of the lifelong learning tendency scale (F1=5,05, F2=5,01; P<0,05). Students with their mother's education in high school and university have been found to have lower curiosity scores than those with primary school education. The overall scores of the LLS were found to be lower than those in primary and secondary schools (F=4.56; P<0.05).

LLS and sub-parameters scores do not show a statistically significant difference between students' university and class levels (P>0.05).LSS and lower-size scores show no statistically significant difference between students' family income levels (P>0.05).

3.4. The Third Related Problems

The third sub-problem of the study is "Is there a meaningful relationship between physiotherapist candidates' lifelong learning tendencies and individual levels of innovation?" form is indicated.

The general scores of lack of learning regulation, lack of curiosity, and tendency to lifelong learning have a statistically significant medium-level relationship with the motivation and perseverance scores with the resistance scores to change at the opposite low level (r=-0.23, -0.23, -0.43 and -0.38, -0.40; P<0.05) (Table 6).

There is a statistically meaningful relationship between motivation and persistence scores with ideas leadership scores in a positive direction, the general scores of lack of regulation of learning, lack of curiosity and tendency to lifelong learning, and the positive direction (r= 0.36, 0.35, 0.17, 0.15, 0.28, P<0.05 respectively).

There is a statistically meaningful relationship between the overall scores of motivation, persistence and tendencies towards lifelong learning with the experience-open scores and the positive scores for lack and lack of curiosity in order to regulate learning (r= 0.46, 0.45, 0.38, 0.21, 0.25, P<0.05).

Table 4. Results relating to the comparison of ISI and sub-parameters scores by gender

		n	$\bar{X}$±Ss	t	sd	P
Resistance to change	Male	491	20.72±4.36	0.27	598	0.79
	Female	109	20.59±5.39			
The Idea Leadership	Male	491	18.17±2.92	-3.57	598	0.01
	Female	109	19.28±3.00			
Openness to Experience	Male	491	20.06±2.31	-1.43	598	0.15
	Female	109	20.41±2.45			
Risk Taking	Male	491	6.63±1.57	-2.42	598	0.02
	Female	109	7.02±1.38			
Individual Innovativeness Total Score	Male	491	66.14±7.72	-2.40	598	0.02

t= Independent Sample t test.

Table 5. Lifelong learning tendencies scale and comparison of sub-parameters by gender

		n	$\bar{X}$±Ss	F	sd	P
Motivation	Male	491	29.94±4.37	1.08	598	0.28
	Female	109	29.42±5.15			
Perseverance	Male	491	58.19±8.77	1.16	598	0.25
	Female	109	57.10±9.43			
Lack of Regulating Learning	Male	491	29.19±5.30	4.21	598	0.01
	Female	109	26.75±6.19			
Lack of Curiosity	Male	491	39.57±8.07	3.93	598	0.01
	Female	109	36.21±7.96			
Lifelong Learning Tendency Scale Total Score	Male	491	126.95±18.93	3.47	598	0.01
	Female	109	120.06±17.80			

F= One Way ANOVA.

Table 6. Investigates the relationship between dimensions

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Resistance to change (1)	r	1.00									
	P										
The Idea Leadership (2)	r	-0.18	1.00								
	P	0.01									
Openness to Experience (3)	r	-0.30	0.57	1.00							
	P	0.01	0.01								
Risk Taking (4)	r	-0.07	0.17	0.27	1.00						
	P	0.10	0.01	0.01							
Individual Innovativeness	r	-0.76	0.69	0.74	0.39	1.00					
Total Score (5)	P	0.01	0.01	0.01	0.01						
Motivation (6)	r	-0.23	0.36	0.46	0.16	0.44	1.00				
	P	0.01	0.01	0.01	0.01	0.01					
Perseverance (7)	r	-0.23	0.35	0.45	0.18	0.44	0.93	1.00			
	P	0.01	0.01	0.01	0.01	0.01	0.01				
Lack of Regulating Learning	r	-0.43	0.17	0.21	0.03	0.38	0.42	0.41	1.00		
(8)	P	0.01	0.01	0.01	0.40	0.01	0.01	0.01			
Lack of Curiosity (9)	r	-0.38	0.15	0.25	0.14	0.38	0.49	0.52	0.71	1.00	
	P	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
Lifelearning (10)	r	-0.40	0.28	0.38	0.15	0.48	0.77	0.82	0.79	0.89	1.00
	P	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	

r= Pearson correlation coefficient.

There is a statistically significant relationship to the overall score of motivation, persistence, lack of curiosity and tendency to life learning with the risk-taking scores in a positive direction (r= 0.16, 0.18, 0.14, 0.15, P<0.05 respectively).

The trends of motivation, perseverance, lack of learning regulation, curiosity, and lifelong learning have a middle level statistically significant connection to the total score of innovation (r= 0.44, 0.48, 0.38, 0.48, P<0.05, respectively).

4. Discussion

In this study, the relationship between the individual innovation levels of physiotherapy undergraduate students and their lifelong learning tendency was investigated. Looking at the findings on the demographic characteristics of the students involved in the survey, it was found that the vast majority of students were male participants. 54.4 percent of the students' mothers and 32.2 percent of their fathers' education are primary school graduates. Approximately 38.8% of families have incomes below TL 85,000. Individual perceptions of innovation vary by gender. The fact that there is a significant differentiation in the main demographic variables contradicts literature (Rogers Everett, 2003; Çuhadar et. al., 2013). However, one study concluded that students' individual perceptions of innovation vary according to gender, academic averages and the department they study (Coşkun Diker and Demirel, 2012).

In our study, the average score given by physiotherapist students from ISI is 67.13±7.92, and students have "pioneering" and "questioning" attributes. It has been found that women have higher overall individual innovation scores than men. The analysis found that there were no significant differences between the universities studied except for the underlying parameter of risk taking. In the research carried out, the average level of individual innovation of university students was 62.09, and the total score of the individual innovation (innovation) levels of nursing students were 63,12 (Erdoğan and Güneş, 2013). In our study, students' individual levels of innovation were identified as "questioning" with 54.1%. This result is parallel to other studies in Türkiye that assess the level of individual innovation of university students (Korucu and Olpak, 2015; Genç et al., 2017). According to the results of this research conducted at different times, we can say that university students generally approached innovations with certainty and expected innovations to be accepted first by the community, after observing a tangible perception of benefit, they accepted the innovations. Those who see trying out new ideas and taking risks as a way of life are described as innovators. Therefore, it is believed that giving students a course of technological rehabilitation in the first and second classes of the university will play an important role in gaining this awareness.

The World Physiotherapy Confederation (WCPT) defined the necessity of lifelong learning at all stages of physiotherapy practices in its 2021 definition (Kılıçer, 2011). In the study, the lifelong learning tendencies of physiotherapy students were at a good level and the total score was 123.50±18.36. It is seen that the highest score was obtained from the "Persistence" sub-dimension and the lowest score from the "Deprivation in Organizing Learning" sub-dimension. In our study, physiotherapist candidates expressed an opinion on the items of the

lifelong learning tendencies scale at the level of "Partially Fits" (Yenice and Tunç, 2019). Kılıçer concluded in his study that teachers expressed an opinion on the items of the lifelong learning tendencies scale at the level of "Partially Fits" (Yenice and Tunç, 2019). In this context, our study is compatible with the literature.

There is a statistically significant relationship to the overall score of motivation, persistence, and lack of regulation of learning, curiosity and lifelong learning trends with the total score of being innovative in a positive direction. Correlation implies that physiotherapy students will continue to learn new and up-to-date knowledge and skills and will contribute significantly to the care of healthy/sick individuals and to the protection and improvement of human health.

There has been a positive medium-level relationship between the lifelong learning trends of physiotherapist candidates and their individual levels of innovation. As physiotherapist candidates tend to learn throughout life, they have been found to be more courageous in embracing innovations and implementing them in their lives. According to the literature, individuals tend to learn throughout life, while they are observed to be more cautious about individual innovation (Savcı and Çil Akıncı, 2022). This result was evaluated as an indicator that the university environment, educational and teaching activities are carried out with an approach that supports students' lifelong learning trends.

In literature, the knowledge and experience learned in the family is a significant factor affecting the tendency to learn throughout life (Dikmen et. al., 2017). Lower dimensions of the lifelong learning trend scale have found that students who are mother of educated high school and university lack of curiosity scores are lower than those who are primary school with mother education level. In line with this conclusion, it can be concluded that students with a low level of education of their mother tend to be better at lifelong learning and generating curiosity due to the fact that most opportunities are reached by them. There are different results in literature. This research is limited because it consists of assessments based on individual perceptions of physiotherapist candidates about themselves.

5. Conclusion

Literary knowledge about the individual levels of innovation and tendencies to lifelong learning of physiotherapist candidates is limited. This study is believed to contribute to literature in terms of innovation against rapid technological developments and the development of new educational and teaching strategies that will enhance lifelong learning.

Author Contributions

The percentages of the authors' contributions are presented below. All authors reviewed and approved the final version of the manuscript.

	F.E.	Z.B.	İ.C.	Ö.İ.Ö.	Ö.Ö.	B.T.	A.G.	D.T.
C	20	20	10	10	10	10	10	10
D	20	20	10	10	10	10	10	10
S	20	20	10	10	10	10	10	10
DCP	20	20	10	10	10	10	10	10
DAI	20	20	10	10	10	10	10	10
L	20	20	10	10	10	10	10	10
W	20	20	10	10	10	10	10	10
CR	20	20	10	10	10	10	10	10
SR	20	20	10	10	10	10	10	10
PM	20	20	10	10	10	10	10	10
FA	20	20	10	10	10	10	10	10

C= concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management, FA= funding acquisition.

Conflict of Interest

The authors declared that there is no conflict of interest.

Ethical Consideration

This study was planned in accordance with the Helsinki Criteria and received ethical approval from the local University Health Sciences Ethics Board (approval date: 11 June 2021, protocol code: 2021/12-58). Students studying in the physiotherapy departments of seven universities in Türkiye participated in the study and their consent was obtained.

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