

# The Relationship Between Physical Education Teacher Candidates' Epistemological Beliefs and Academic Self-Efficacy

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## Abstract

The aim of this study was to examine the relationship between physical education teacher candidates' epistemological beliefs and academic self-efficacy beliefs. The research group consisted of a total of 220 preservice physical education teachers (age =  $22.32 \pm 1.514$ ), 99 female (45%) and 121 male (55%), studying at the Faculties of Sport Sciences of four different universities in the 2022–2023 academic year. A correlational survey model was adopted to examine the relationship between physical education teacher candidates' epistemological beliefs and academic self-efficacy levels. The personal information form and Epistemological Belief Scale that Schommer (1990) developed and Deryakulu and Büyüköztürk (2002) adapted and the Academic Self-Efficacy scale that Ekici (2012) developed consisting of three sub-dimensions and 33 questions were used as data collection tools. It was found that preservice physical education teachers had high levels of epistemological beliefs, and it was determined that the academic self-efficacy levels of the teachers were low.

**Keywords:** epistemological belief, prospective physical education teachers, self-efficacy

## 1. Introduction

Researchers have stated that epistemological beliefs (Schommer, 1994), which express individual beliefs about what knowledge is and is not and about how learning occurs, have a decisive effect on the learning experience (Chan & Elliott, 2004). The first of the studies revealing this effect was conducted with university students, finding that epistemological beliefs are realized in four stages: dualism, pluralism, relativism, and persistence in relativism (Perry, 1970). In another noteworthy study, it was stated that epistemological beliefs consist of five dimensions: (a) belief in the source of knowledge, (b) belief in the structure of knowledge, (c) belief in the certainty of knowledge, (d) belief in the speed of knowledge, and (e) belief in the stability of knowledge (Schommer, 1994).

Some researchers have stated that there are three groups of research related to epistemological beliefs (Erdamar & Alpman, 2015; Hofer & Pintrich, 2002). Researchers in the first group are interested in how individuals interpret their own educational experiences (Magolda, 1987; Perry, 1970), researchers in the second group are interested in the analysis of thinking and reasoning processes (Kitchener & King, 1981), and researchers in the third group are interested in investigating the relationship between epistemological beliefs and factors affecting learning (Howard et al., 2000; Rodriguez & Cano, 2006; Erdem, 2008).

In recent studies on preservice teachers, it was observed that the number of researchers in the third group has increased. The main reason for this situation is that epistemological beliefs affect many things, from teachers' classroom behaviors to teaching strategies (Brown & Rose, 1995; Hashweh, 1996). Scholars have observed that epistemological belief is a type of belief that affects motivation and academic achievement during learning (Aşut & Köksal, 2015) and individuals with developed epistemological beliefs have characteristics such as being active, independent, determined, flexible and broad-minded (Jehng et al., 1993). In this direction, authors have stated that academic self-efficacy is another issue that is thought to be effective on preservice teachers' epistemological beliefs in their educational processes (Kandemir & Eǧmir, 2021).

Academic self-efficacy refers to a person's belief that they can accomplish an academic task at the desired level or achieve an academic goal (Pajares, 2012). It also refers to a student's belief that they can successfully complete an academic task (Chun & Choi, 2005). Accordingly, a theoretical relationship can be established between epistemological beliefs and academic self-efficacy. For example, Alemdağ (2015) found that students

with high academic self-efficacy were willing to use deep learning approaches. Özbay (2016) stated that the dimensions of certainty, development, and verification, which are the sub-dimensions of scientific epistemological belief, predicted academic achievement positively and the source sub-dimension predicted academic achievement negatively.

The literature contains some studies emphasizing the relationship between epistemological beliefs and the self-efficacy concept. Kandemir and Eđmir (2021) studied secondary school students to examine the relationship between epistemological beliefs and academic self-efficacy and reported that epistemological beliefs significantly predicted the academic self-efficacy concept.

Uysal and Kösemen (2013) found a negative and moderate relationship between pedagogical formation program students' general self-efficacy and the "belief that learning depends on effort," which is a sub-dimension of epistemological belief.

There is not enough research examining the relationship between epistemological beliefs and academic self-efficacy for preservice physical education teachers. Şahin and Karakaya (2023) conducted one of these –teachers from different regions in Turkey participated in this study. The results showed that preservice teachers' epistemological beliefs about learning and self-efficacy beliefs were at an average score level. The correlation analysis results showed that the relationship between them was positive and weak. Canbolat (2019), Mellat and Lavasani (2011), and Senemođlu (2018) found that epistemological beliefs have a direct effect on academic self-efficacy.

Based on these studies, the epistemological beliefs and academic self-efficacy of preservice teachers and physical education teachers is examined in more detail. The aim of this study is to examine the relationship between physical education teacher candidates' epistemological beliefs and academic self-efficacy. Additionally, as a sub-objective, epistemological beliefs and academic self-efficacy levels are compared according to gender and class variables.

## **2. Method**

### *2.1 Research Model*

A correlational survey model was adopted to examine the relationship between physical education teacher candidates' epistemological beliefs and academic self-efficacy levels. Further, the relational survey model was adopted to determine the existence and amount of interaction among multiple variables (Karasar, 2007).

### *2.2 Research Group*

The research group consisted of a total of 220 preservice physical education teachers (age =  $22.32 \pm 1.514$ ), 99 female (45%) and 121 male (55%), studying at the Faculties of Sport Sciences of four different universities in the 2022–2023 academic year. To make the results as objective as possible, the research group members were selected from among third- and fourth-grade physical education teacher candidates. Accordingly, there were 104 (47%) third-grade preservice physical education teachers and 116 (53%) fourth-grade preservice physical education teachers.

## **3. Data Collection Tools**

### *3.1 Individual Information Form*

This form included items related to the gender, age, and grade level of the prospective physical education teachers who participated in the study.

### *3.2 Epistemological Belief Scale*

The Epistemological Belief Scale that Schommer (1990) developed and Deryakulu and Büyüköztürk (2002) adapted was used. The original scale had five sub-dimensions and 63 items. It was found to be a multidimensional scale that could be easily applied to high school and university students and to adults. In the adaptation study, the scale consisted of three sub-dimensions and 35 items. The first dimension was the belief that learning depends on effort (items 1–18), the second dimension was the belief that learning depends on ability (items 19–26), and the third dimension was the belief that there is only one truth (items 27–35). Cronbach's alpha reliability coefficients were .83 for the first sub-dimension, .62 for the second sub-dimension, and .59 for the third sub-dimension.

Similar to the adaptation study, Cronbach's alpha value was calculated as .82 for the first subscale, .71 for the second subscale, .74 for the third subscale and .79 for the total scale. A Likert-type five-point scale ranging from (1) Strongly Disagree to (5) Strongly Agree was used for the level of agreement with each item in the scale. The

lowest and highest value of the first sub-dimension was 19.00–86.00; that of the second sub-dimension was 8.00–40.00, and that of the third sub-dimension was 9.00–42.00. A high score in each factor of the scale indicated that the individual had immature beliefs about that factor, whereas a low score indicated that the individual had mature beliefs about that factor.

### 3.3 Academic Self-Efficacy Scale

The Academic Self-Efficacy scale that Ekici (2012) developed, consisting of three sub-dimensions and 33 questions, was used to measure the academic self-efficacy of the BSEC candidates. The questionnaire was a 5-point Likert-type questionnaire: Extremely High (5 points), High (4 points), Partially High (3 points), Low (2 points), and Extremely Low (1 point). The reliability Cronbach's alpha coefficient of the scale was calculated as 0.71. The social status dimension consisted of 10 items (items 2, 3, 4, 11, 14, 15, 16, 17, 25, and 27 in the scale). This subscale was used to measure the social status dimension of the participant. The cognitive practices dimension consisted of 19 items (items 1, 5, 6, 7, 8, 9, 10, 10, 12, 13, 18, 19, 20, 21, 22, 24, 30, 31, 32, 33). This subscale was used to measure participants' cognitive practices dimension. The technical skills dimension consisted of four items (23, 26, 28, 29). It was used to measure participants' technical skills dimension. For this study, the internal consistency coefficient was recalculated, and the Cronbach's alpha value was calculated as .96.

## 4. Findings

Table 1 shows the arithmetic averages, standard deviations, and internal consistency coefficients of the scales for the epistemological beliefs and academic self-efficacy levels of preservice physical education teachers participating in the current study.

Table 1. Descriptive findings on epistemological beliefs and academic self-efficacy levels

Variables	$\bar{X}$	Ss	$\alpha$
<b>Belief That Learning Depends on Effort</b>	70.60	6.908	.82
<b>Belief That Learning Depends on Ability</b>	22.10	6.299	.71
<b>Belief That There Is Only One Truth</b>	27.91	5.212	.74
<b>Epistemological Belief (Total)</b>	120.61	12.379	.79
<b>Academic Self-efficacy</b>	78.65	25.352	.96
$\bar{X}$ age = 22.32 ± 1.514; n = 220			

Table 1 shows that the levels of epistemological beliefs of preservice teachers were high. Additionally, it showed that the first sub-dimension, the belief that learning depends on effort, was at a high level; the second sub-dimension, the belief that learning depends on ability, was at a medium level; and the third sub-dimension, the belief that there is only one truth, was at a medium level.

Academic self-efficacy levels were found to be low.

Table 2 shows the t-test results of the difference between the means of epistemological beliefs and academic self-efficacy levels in independent groups according to the gender variable.

Table 2. Examination of epistemological beliefs and academic self-efficacy levels in terms of the gender variable

Variables	Gender	n	$\bar{X}$	Ss	sd	t	p
<b>Belief That Learning Depends on Effort</b>	Woman	99	70.48	7.267	218	-0.223	0.824
	Male	121	70.69	6.628			
<b>Belief That Learning Depends on Ability</b>	Woman	99	21.58	5.456		-1.095	0.275
	Male	121	22.52	6.907			
<b>Belief That There Is Only One Truth</b>	Woman	99	27.55	5.345		.0921	0.358
	Male	121	28.20	5.105			
<b>Epistemological Belief (Total)</b>	Woman	99	119.62	11.622		-1.070	0.286
	Male	121	121.42	12.958			
<b>Academic Self-efficacy</b>	Woman	99	78.75	24.48		0.054	0.957
	Male	121	78.57	26.14			

Note. \*\*p < 0.01, \*p < 0.05.

According to Table 2, no significant difference was found in the epistemological belief levels and academic

self-efficacy levels of preservice physical education teachers in terms of the gender variable.

Table 3 shows the t-test results of the difference between the means of epistemological beliefs and academic self-efficacy levels in independent groups according to the grade variable.

Table 3. Examination of epistemological beliefs and academic self-efficacy levels in terms of the grade variable

Variables	Classroom	n	$\bar{X}$	Ss	sd	t	p
<b>Belief That Learning Depends on Effort</b>	3	104	70.39	7.607	218	-0.418	0.677
	4	116	70.78	6.242			
<b>Belief That Learning Depends on Ability</b>	3	104	22.99	6.642	1.998	0.047*	
	4	116	21.30	5.890			
<b>Belief That There Is Only One Truth</b>	3	104	28.40	5.612	1.323	0.187	
	4	116	27.47	4.808			
<b>Epistemological Belief (Total)</b>	3	104	121.78	13.301	1.335	0.183	
	4	116	119.56	11.116			
<b>Academic Self-efficacy</b>	3	104	79.60	26.560	0.526	0.599	
	4	116	77.80	24.303			

Note. \*\*p < 0.01, \*p < 0.05.

Table 3 showed that the mean values of third-grade preservice physical education teachers were higher than those of fourth-grade preservice physical education teachers in regard to the belief that learning depends on the ability sub-dimension of the epistemological belief sub-dimension. No significant difference was found in the total values of the epistemological beliefs, other sub-dimensions, and academic self-efficacy levels.

In Table 4, the correlation analysis results revealed the level and direction of the relationship among age, gender, grade level, epistemological belief levels, and academic self-efficacy levels.

Table 4. Correlation analysis of the relationships among variables

Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
(A)	1							
(B)	.015	1						
(C)	.121	.022	1					
(D)	.004	.015	.028	1				
(E)	-.051	.074	-.134*	.084	1			
(F)	-.111	.062	-.089	.051	.421**	1		
(G)	-.071	.072	-.090	.622**	.733**	.664**	1	
(H)	.023	-.004	-.036	-.065	-.118	-.126	-.149*	1

\*\*p < 0.01

- (A) Age
- (B) Gender
- (C) Grade Level
- (D) The Belief That Learning Depends on Effort
- (E) The Belief That Learning Depends on Ability
- (F) Belief That There Is Only One Truth
- (G) Epistemological Beliefs (Total)
- (H) Academic Self-efficacy

Table 4 shows that there was a negative low-level relationship between physical education teacher candidates' grade levels and their belief levels that learning depends on ability, which was one of the sub-dimensions of epistemological beliefs. Further, the table shows that there was a low-level negative relationship between physical education teacher candidates' epistemological belief levels and their academic self-efficacy levels. No relationship was found in terms of the other variables.

### 5. Discussion and Conclusion

When the arithmetic averages of the epistemological belief levels of the preservice physical education teachers participating in the study were examined, it was found that the levels were high. Additionally, the first sub-dimension, the belief that learning depends on effort, was at a high level; the second sub-dimension, the

belief that learning depends on ability, was at a medium level; and the third sub-dimension, the belief that there is only one truth, was at a medium level. Deryakulu and Büyüköztürk (2002) stated that a high score obtained from each factor of the scale is an indicator that the individual has immature beliefs about that factor, whereas a low score is an indicator that the individual has mature beliefs about that factor. Accordingly, it can be concluded that physical education teacher candidates' epistemological beliefs are immature, mostly because of the immaturity of the belief that learning depends on effort. Although there are studies that support this result (Karabulut & Ulucan, 2012, Şenler & İrven, 2016), studies with different results also exist (Aypay, 2011; Güven & Belet, 2010; Özşaker et al., 2011). Şenler and İrven (2016), in their study conducted with preservice primary school teachers, stated that preservice teachers had sophisticated epistemological beliefs, especially in the dimension of justification of knowledge, whereas their beliefs about the evolving nature of knowledge were not well developed.

Next, the finding that epistemological beliefs are at different levels from each other seems to be different and worthy of attention. However, this finding is actually in line with the view Sommer (1990) put forward that epistemological beliefs are independent of each other.

It was found that the academic self-efficacy levels of preservice physical education teachers were at a low level. The literature's findings were generally different from this finding (Durdukoca, 2010; Eroğlu et al., 2017; Yalmanlı & Aydın, 2014; Yılmaz, Gürçay, & Ekici, 2007). In a similar study (Özsüer et al., 2011), such a result was due to the prospective teachers' concerns about finding a job, being appointed, and constant updates. Although the same reasons were considered for the results of the current study, it was ultimately concluded that the reason was as follows: physical education teacher candidates do not consider the basic education they receive before undergraduate education as sufficient for their undergraduate education and beyond.

When the epistemological belief levels of preservice physical education teachers were compared in terms of gender, no significant difference was found in terms of the gender variable. Similar studies (Aksan, 2006; Biçer et al., 2013; Karabulut & Ulucan, 2012; Karhan, 2007) supported this result. Other studies (Can & Arabacıoğlu, 2009; Özşaker et al., 2011) did not. Schommer (1993) stated that gender has a significant effect on epistemological beliefs. The fact that the study was conducted only at the level of the third and fourth grades and that the number of women was lower than the number of men was considered responsible for this result.

When the academic self-efficacy belief levels of prospective physical education teachers were compared in terms of gender, no significant difference was found in terms of the gender variable. Many studies (Alemdağ, 2015; Eroğlu et al., 2017; Gülü, 2015; Karabulut & Ulucan, 2012; Pekel, 2016) supported this result. Eroğlu et al. (2017), in their study conducted with students of the faculty of sport sciences, stated that academic self-efficacy levels did not differ in terms of gender and that variables within the school had a feature that determined self-efficacy more effectively than the demographic variables of individuals. Based on this idea, the authors stated that it is possible that self-efficacy may differ in places with different in-school variables. The same factor may be applicable in this study. Other studies (Pekdemir, 2015; Yağcı & Aksoy, 2015) did not support this result.

When the epistemological beliefs and academic self-efficacy of preservice physical education teachers were analyzed in terms of the grade variable, it was determined that the mean values of third-grade preservice physical education teachers were higher than those of fourth-grade preservice physical education teachers in the epistemological belief sub-dimension of the belief that learning depends on ability. This situation showed that third-grade preservice teachers' belief that learning depends on ability has not yet matured compared to that of fourth-grade preservice teachers. No significant difference was found between the total values of epistemological beliefs and other sub-dimensions. Although some studies (Biçer et al., 2013; Karabulut & Ulucan, 2012) supported this result, others did not. Some studies (Green & Parker, 1989; Schommer, 1994) found that preservice teachers expand their perspectives on knowledge as a result of the information conveyed and the research conducted at the university and that university education improves students' scientific epistemological beliefs. These findings supported the findings of the current study.

The academic self-efficacy levels of prospective physical education teachers did not show significant differences in terms of the grade variable. Although some studies supported this result (Eroğlu et al., 2017), other studies did not (Koçer, 2014; Oğuz, 2012; Pekel, 2016; Yağcı & Aksoy, 2015). Eroğlu et al. (2017) stated that this result was due to the fact that all departments and classes were teaching in the same environment, that the in-school factors affecting self-efficacy were similar, and that there were differences in the sample group. Similar reasons were attributed to the results of the current study.

An analysis was conducted to reveal the level and direction of the relationship among age, gender, grade levels,

epistemological belief levels, and academic self-efficacy levels of preservice physical education teachers. The results showed that there was a low-level negative relationship between grade level and epistemological belief sub-dimensions of belief that learning depends on ability. Further, the results showed that there was a low-level negative relationship between physical education teacher candidates' epistemological belief levels and their academic self-efficacy levels. No relationship was found in terms of the other variables. Şahin and Karakaya's (2023) results supported the current study's results. Arguing that it is necessary to have a high level of epistemological belief in learning to have qualifications in field knowledge, professional knowledge, general culture, and so on—counted among the general competencies of the teaching profession—they concluded that having a high level of epistemological belief in learning will provide teachers with skills in learning, knowing, obtaining knowledge, and determining how to access knowledge. This in turn will contribute to teachers' increased self-efficacy beliefs in teaching processes. Gürol et al.'s (2010) emphasized the importance of preservice teachers' maturing in the dimensions of belief that learning depends on effort. They concluded that teacher training institutions should increase their efforts in this direction. Kandemir and Eǧmir (2021) stated that epistemological beliefs significantly predict academic self-efficacy and that critical-thinking disposition has a full mediation effect in this relationship.

In line with all these findings, it is concluded that for prospective physical education teachers to have general competencies for the teaching profession, practices are needed that will include more experiential learning of prospective teachers in curricula. School climates should be created that allow prospective physical education teachers to appreciate the importance of their future profession. Practices that will improve the scientific thinking skills of prospective teachers should be added to school curricula. With these practices, preservice physical education teachers will be able to use strategies such as analysis, evaluation, classification, and synthesis that involve abstract thinking skills and will attempt to provide the most up-to-date and accurate information to students using their professional experience. In conclusion, their epistemological beliefs should be matured to teach preservice teachers how to learn and increase their professional competencies.

In future studies, it is recommended that different variables in addition to gender and grade level be taken into consideration and examined in more detail and that the relationship between epistemological beliefs and academic self-efficacy be explored.

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