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A Study on Mediating Effects of Outcome Expectancy on Relationships among Perceived Caring Climate, Task Engagement and Task Persistence in Physical Education

Ki-Hyun Song[1] and Seung-Yong Kim[2*]

[1]Department of Physical Education, Korea National University of Education, South Korea; vtr886@naver.com
[2]Division of Sports and Well-Being, Hanyang University, South Korea; sykim@hanyang.ac.kr

Abstract

Background/Objectives: The purpose is to identify the mediating effects of outcome expectancy on the relationships among the caring climate perceived by students, their task engagement and task persistence in physical education. Methods/Statistical Analysis: Participants were 343 students at four middle schools in metropolitan areas. The goodness of fit of the entire model was verified through SPSS 18.0 and AMOS 18.0 and the hypotheses were tested. Findings: First, the caring climate involved a positive prediction of the outcome expectancy. The caring climate had positive effects on the task engagement and task persistence of students. Second, outcome expectancy in physical education class has positive effects on task engagement and task persistence; those are active class participation behaviors. Third, the outcome expectancy in a physical education class had mediating effects on the relationship among the caring climate perceived by students, their task engagement and task persistence. Findings concluded that a caring climate should be established for the students and their positive expectancy can lead to active participation. Applications/Improvements: Physical education teachers should establish a student-centered class climate to provide high quality education. Also, they should select proper tasks and adjust the level of difficulty to live up to the student expectancy.

Keywords: Caring Climate, Outcome Expectancy, Physical Education, Task Engagement, Task Persistence

1. Introduction

One of the most important goals of school physical education is to offer the skills, knowledge and competence for actively engaging in diverse leisure physical activities, beyond the lifetime physical education[1]. To inspire active learning and progress, one of the first priorities of teachers should be offering a positive learning environment and understanding the essence of learner motivation[2]. In school education, the learning environment can be a critical variable affecting the psychological and emotional characteristics of students. Also, the environment can affect the cognitive learning outcomes of students in a positive or negative way[3].

In particular, physical education is a subject that often uses the concept of caring as it involves frequent physical contact and communications[4]. Thus, the concept of caring has been increasingly emphasized[5–7] and the key elements include the relationship between those exchanging care[8]. In the field of physical education, however, there are few studies on the diverse motivations and class behavioral changes of students under a caring climate, despite its importance.

*Author for correspondence

However, 'caring' has been used as a key concept of student programs for adapting to the school society and engaging in it more actively[9]. In physical education studies, the roles and effects of caring were verified as an expanded dimension of motivations[8,10]. Given that students often encounter the meaning of caring in physical education, it is imperative to carry out more studies on the subject.

'Caring climate' was first studied by[8] who developed the Caring Climate Scale (CCS). In recent years, very few studies have explored the caring climate, intrinsic motivations[5,11] and class attitude[5]. Therefore, it is necessary to examine how the diverse motivational variables and class participation behaviors change under the caring climate perceived by students in physical education class.

There are a variety of factors that affect the student learning in physical education class. For example, the following factors are linked to the behaviors related to student achievement: Learning atmosphere; attitude; level of tasks; goal orientation; outcome expectancy; competence; relationship with teacher; fun; emotions; self-efficacy; experience and knowledge; physical conditions[12]. In particular, the beliefs that one can accomplish the given tasks influence the student's active participation behaviors in physical education[13]. To inspire such active participation, the most important thing is to motivate students to engage in diverse physical activities in class.

There are various learning motivation studies with diverse theoretical perspectives. The motivation theories (e.g. achievement goal theory, self-determination theory, self-efficacy theory, expectancy-value theory) have been applied to physical education and find that motivations is a key variable affecting the task persistence, efforts and behavioral changes of students[3]. Among them, 'expectancy-value theory' by Eccles and Wigfield[14] focuses on student cognition and the role of perceived task value and expectancy-related beliefs. According to the study, the degree of values given to learning tasks and the outcome expectancy of students affect their task selection, task engagement, persistence and efforts[15,16]. Thus, the outcome expectancy in learning situations becomes a variable inspiring motivated behaviors[17]. As a result, the outcome expectancy of students can change depending on the caring climate in learning situations.

Meanwhile, 'engagement' is defined as the attitude and behaviors of people motivated to focus and participate in certain activities steadily[18]. In other words, engagement is the state of being interested in a certain stimulation. It is the opposite concept of rejection and ignorance and inspires participation by stimulating and satisfying individual desires[19]. 'Task persistence' refers to the behavior of steadily carrying out a given task[20], which is an important strategy for learning and completing the task successfully[21]. Thus, task engagement and persistence are useful concepts for explaining student achievement behaviors based on active class participation. However, no studies have proved the following theory: In physical education, a caring climate affects the task engagement and persistence of students through their outcome expectancy.

In Korea, studies have explored the learning environment and outcome expectancy in physical education[3], behavioral activation/inhibition environment, task engagement and persistence[22], motivational environment and intrinsic motivations[23], teacher autonomy supporting environment and class attitude[24]. According to the empirical findings and theoretical basis, the caring climate perceived by students affects their expectancy, task engagement and task persistence directly or indirectly. However, no studies have verified the relevance among such measurement variables.

Thus, this study aims to identify the structural relationship among the following factors: Caring climate perceived by students; outcome expectancy; task engagement; task persistence. Also, this study intends to verify the mediating effects of outcome expectancy on the relationship among the caring climate, task engagement and task persistence. The purpose of this study is to offer basic data for establishing effective class strategies and related studies in the future.

2. Research Method

2.1 Subjects

Purposive sampling method, a type of non-probability sampling method, was used to select 400 students in four middle schools in the metropolitan areas as the subjects. A total of 343 copies of the survey were used as the valid sample, excluding 57 copies with insincere responses. The survey was filled out through a self-administration method. As for the subjects, there were 168 male students (49%) and 175 female students (51%). Among them, there were 92 first-year students (26.8%), 88 second-year students (25.7%) and 163 third-year students (47.5%).

2.2 Research Tools

2.2.1 Caring Climate

The Caring Climate Scale (CCS) developed by[8] was used to measure the caring climate of physical education class perceived by students. The validity was verified by[25] regarding middle school students in physical education class in Korea. The scale consists of 13 questions with a single factor and the survey questionnaire is based on the 5-point Likert scale. In terms of skewness and kurtosis, there were no items with values above ±1. The Cronbach's alpha reliability coefficient was .955, which is at a stable level.

2.2.2 Outcome Expectancy

The outcome expectancy in physical education class was assessed through the Physical Education Outcome-Expectancy Questionnaire developed by[12],[26]. It consists of 8 questions with a single dimension and based on the 5-point Likert scale. In terms of skewness and kurtosis, there were no items with values above ±1. The Cronbach's alpha reliability coefficient was .936, which is at a stable level.

2.2.3 Task Engagement

To identify the student engagement in physical education task activities, the questionnaire developed by[27] that measures the task engagement of middle school students in physical education class was used. It was adapted by Park[28] to fit the physical education situations in Korea. The 5 items of the revised version were used in this study and the questionnaire is based on the 5-point Likert scale. In terms of skewness and kurtosis, there were no items with values above ±1. The Cronbach's alpha reliability coefficient was .860, which is at a stable level.

2.2.4 Task Persistence

The task persistence of physical education students was examined through the 4 items developed by Park and[12]. The adapted version is based on the items used by[29] that measure the task persistence behaviors of students in physical education class. In this study, the survey questionnaire is based on the 5-point Likert scale. In terms of skewness and kurtosis, there were no items with values above ±1. The Cronbach's alpha reliability coefficient was .900, which is at a stable level.

2.3 Research Procedures

A survey was conducted in line with each school schedule after the purpose and objectives were explained to the senior physical education teachers of four middle schools. Also, the purpose of this study and the survey method were explained to the students in detail. After that, physical education class was conducted by full-time instructors for each year of students. It was supervised by the senior physical education teacher at each school.

Prior to the survey, the students were given a copy of research agreement indicating that their personal information will not be used for any other purposes. The agreement also says that they can take part in the survey at their own will and may cancel their participation if they wish to do so. The survey took 10-15 minutes depending on the student and the results were collected as soon as a survey was completed. A total of 343 copies were used for analysis, excluding those with no or insincere responses and missing values (Missing one item of each scale included).

2.4 Data Analysis Method

To identify the general characteristics of the subjects, a frequency analysis was conducted through SPSS 18.0 and AMOS 18.0 with the valid data of 343 copies. To verify the construct reliability and discriminant validity of the measurement model, a confirmatory factor analysis was conducted with maximum likelihood method. Also, a structural equation modeling analysis was performed to test the hypotheses and the mediating effects were verified through bootstrapping. The goodness of fit of the measurement model and the structural model was verified through x^2, TLI, CFI and RMSEA. All statistical significance values were verified at the level of $\alpha = .05$. The detailed analysis procedures are as follows:

2.4.1 Measurement Model Validation

Prior to validating a structural model, the validity has to be verified first[30]. If a measurement model is valid, each latent variable can explain the observation variables well. If the latent variable correlation is low, it means that the construct is independent. In the measurement model, estimation was done through maximum likelihood method, which was also used to validate the structural model. To verify the goodness of fit, TLI, CFI and RMSEA were used as the indicators. They are highly recommended as they take into account the model's goodness of fit and its degree

of simplicity (except for CFI). Also, the indicators are not heavily influenced by the sample size. As for the goodness of fit standards, TLI and CFI consider values above .90 as acceptable and RMSEA establishes values below .80 as acceptable[31]. The standard was applied to validating the structural model as well.

2.4.2 Structural Model Validation and Mediating Effect Analysis through Bootstrapping

To validate the structural model, the perceived caring climate was established as an exogenous variable. The outcome expectancy, task engagement and task persistence were established as endogenous variables. It was done to model the structural relationship and based on preceding studies. After that, bootstrapping was used to verify the mediating effects of outcome expectancy on the relationship among the perceived caring climate, task engagement and task persistence[32]. According to a study, verifying the mediating effects is meaningful only when there are significant paths between the following in a constraint model: Independent variables and mediating variables; mediating variables and dependent variables[33]. In this study, the goodness of fit of the structural model was verified as acceptable. The significance of the indirect effects was verified through bootstrapping in line with the procedure suggested by[32].

3. Research Results

3.1 Measurement Model Evaluation

To verify the convergent validity and discriminant validity of the entire research units, a confirmatory factor analysis was conducted. The results are shown in Table 1. As for detailed analysis, Maximum Likelihood (ML) method with multivariate normality was used to evaluate the goodness of fit. The results are as follows: χ^2 = 622.632; df = 269; Q = 2.315; TLI = .928; CFI = .936; RMSEA = .071. The goodness of fit is at a decent level.

To verify the convergent validity, the construct reliability values, Average Variance Extracted (AVE) values and the standard load values were compared. The results are as follows. The construct reliability values ranged from .894 to .971, satisfying the standard value (.7 or above). The AVE values also satisfied the standard from .680 to .768, verifying the reliability (.5 or above). As for observation variables, the coefficients ranged from .670 to .893 and the overall construct reliability and AVE values were at a decent level, verifying the convergent validity. Meanwhile, the correlation among the four variables stood below .80, indicating a low probability of multicollinearity in the measured variables. Thus, the relevance among the variables for conducting a confirmatory fac-

Table 1. Construct reliability and discriminant validity of measurement model

	Construct reliability	AVE	Correlation coefficient			
			1	2	3	
Caring climate	.971	.768	1			
Outcome expectancy	.950	.732	.63**	1		
Task engagement	.894	.680	.59**	.69**	1	
Task persistence	.928	.763	.52**	.58**	.70**	1

**p<.01

Table 2. Structural model path

path	Estimate	S.E.	C.R.	P	Assessment
Caring climate → Outcome expectancy	.603	.058	10.391	***	Adoption
Caring climate → Task engagement	.201	.070	2.867	.004	Adoption
Caring climate → Task persistence	.247	.082	2.995	.003	Adoption
Outcome expectancy → Task engagement	.691	.088	7.868	***	Adoption
Outcome expectancy → Task persistence	.609	.096	6.353	***	Adoption

*p<.05, **p<.01, ***p<.001

tor analysis is adequate. The detailed results are shown in Table 1.

3.2 Structural Model Evaluation

After the reliability and validity of the measurement model were verified, the hypothetical research model was evaluated as the second step. When a structural equation modeling analysis was conducted with the entire sample, the goodness of fit of the model was as follows: χ^2 = 683.762; df = 270; Q = 2.532; TLI = .916; CFI = .925; RMSEA = .077. Thus, the model was appropriate as a structural model. When the size and direction of each path were verified, all five paths were significant as shown in Table 2. (P<.01).

3.3 Mediating Effects

As the goodness of the fit of the structural model was acceptable, the significance of the indirect effects was verified in line with the procedures suggested by[32]. 'Bootstrapping' is a method that estimates the standard errors of indirect effects, which may appear when verifying the mediating effects. It involves a confidence interval; if it doesn't include '0,' the indirect effects are statistically significant. In this study, the number of repeated estimation was set as 2,000 and verification was done in the 95% confidence interval.

The results indicate that the indirect effects are statistically significant as the lower and upper bounds of all the following paths do not include '0': Caring climate → Outcome expectancy → Task engagement; Caring climate → Outcome expectancy → Task persistence. The detailed results of the mediating effect analysis with bootstrapping are shown in Table 3.

4. Discussion

This study was carried out to identify the structural relationship among the caring climate perceived by students, the outcome expectancy, task engagement and task persistence in physical education class. The findings and analysis results are as follows.

First, the caring climate involved a positive prediction of the outcome expectancy. The caring climate had positive effects on the task engagement and task persistence of students. Such finding has supported by domestic and overseas studies[5,34–36]. The intrinsic student motivation can be enhanced in physical education class by offering the following competence information and environment: Compliments and feedback from teachers; peer comparison; indirect experience. Also, such environment can offer behavioral and emotional benefits. Supporting the teacher autonomy and the behavioral and emotional involvement of teachers inspire active class participation behaviors of students[37].

Thus, when students feel that their class atmosphere is friendly and safe and that they are valued individuals, they are likely to have positive attitudes. Thus, teachers need to establish a caring climate that leads to successful experience and active class participation of students.

Second, outcome expectancy in physical education class has positive effects on task engagement and task persistence; those are active class participation behaviors. The expectancy on the performance of a particular activity leads people to engage in it, which have significant effects on the task persistence[38]. Such finding has supported by preceding studies[12,16,39].

According to related theories, self-efficacy is necessary for the outcome expectancy to influence behaviors[40]. However, individuals do not act if they have low expectations on the results. It is because their intrinsically motivated behaviors are inspired only when the probability of task performance results and the perceived values match. Thus, motivational variables such as the outcome expectancy can play a key role in determining the behaviors of individuals[39]. It can inspire them to have passion and positive attitudes towards their learning.

Finally, the outcome expectancy in physical education class had mediating effects on the relationship among the caring climate perceived by students, their task engagement and task persistence. No other studies have the same variables as those established by this study. Thus, it is difficult to compare the finding with other studies. However, the following was clearly proved: When students feel that they receive care in a physical education class, their expectations become higher, leading to more active class participation. Such finding has supported by preceding studies[5,41]. Caring-based physical education class makes students become more active.

In physical education, recognizing the motivational climate is an important variable for inspiring student motivation[42]. Such motivational variable has positive effects on the physical activity intention[23]. It has significant implications for teachers, the entity of class climate and their students. Based on the findings, physical education teachers should establish a student-centered class climate

Table 3. Mediating effect analysis through bootstrapping

path					BC 95% confidence interval		Estimated bootstrapping values		sig.
					Lower	Upper	β	S.E.	
Caring climate	→	Outcome expectancy	→	Task engagement	.314	.523	.401	.062	.000
				Task persistence	.231	.444	.324	.064	.000

Note. BC (Bias Corrected) bias corrected accelerated; 2,000 bootstrap samples.

*p<.05.

to provide high quality education. Also, they should select proper tasks and adjust the level of difficulty to live up to the student expectancy. And, teachers should pursue the teaching and learning strategies that can inspire positive participation attitudes.

5. Conclusion and Suggestions

This study has identified the structural relationship among the caring climate perceived by middle school students, the outcome expectancy, task engagement and task persistence. By verifying the mediating effects of the outcome expectancy in the relationship among the caring climate, task engagement and persistence, the following results were verified.

First, the caring climate involved a positive prediction of the outcome expectancy. The caring climate had positive effects on the task engagement and task persistence of students. Second, outcome expectancy in physical education class has positive effects on task engagement and task persistence; those are active class participation behaviors. Third, the outcome expectancy in a physical education class had mediating effects on the relationship among the caring climate perceived by students, their task engagement and task persistence.

In conclusion, a caring climate is associated with active class participation behaviors directly or indirectly. However, a variety of variables such as the characteristics, tasks and facilities of each school influence the student motivation towards their physical education class and behavior levels. Thus, more related variables should be examined steadily through follow-up studies.

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