

The Role of Psychosocial Factors in Predicting Students' Achievement Outcomes in Physical Education

Peng Zhang ^{1*}, Tao Zhang ², Joonyoung Lee ²

¹ College of Health Sciences, East Stroudsburg University of Pennsylvania, PA, USA

² Department of Kinesiology, Health Promotion, and Recreation, University of North Texas, Denton, TX, USA

*Corresponding Author: pzhang@esu.edu

Abstract Social cognitive theory depicts student learning in terms of the interrelationship among motivational behavior, social environmental factors, and personal factors, which offers an appropriate theoretical framework for understanding student achievement outcomes in education. Limited research, however, has examined how these factors were interacted in a school physical education (PE) setting. The major aim of the present study was to probe the associations among perceived teachers' support for autonomy, competence, relatedness, self-efficacy, persistence/effort, and students' intention for future participation in middle school students by testing a theoretical model based on the social cognitive theory and self-determination theory. 211 students (109 boys, 102 girls; $M_{age} = 12.44$; $SD = .99$) enrolled in a suburban public school in the United States participated into the study. These participants completed validated survey questions that assessed their perceived teachers' support for autonomy, competence, relatedness, self-efficacy, persistence/effort, and intention for future participation in PE. Positive relationships were revealed among the variables through correlation analyses. A structural equation modeling (SEM) analysis revealed that the hypothesized model demonstrated a good fit with the data ($\chi^2/df = 9.1/7 = 1.3$, $p = .249$; RMSEA = .04; CFI = .99; NFI = .98; GFI = .96). Self-efficacy partially mediated the relationship between perceived teachers' support and students' achievement outcomes in PE. The results demonstrated that perceived teachers' support for autonomy, competence, and relatedness may enhance students' self-efficacy and motivated behaviors in PE. Self-efficacy partially mediated the relations of perceived teachers' support and motivated behaviors such as persistence/effort and intention for future participation in PE. Thus, creating a supportive class climate and enhancing students' self-efficacy should foster students' engagement in PE classes.

Keywords: *Social cognitive theory, self-determination theory, supportive environment, learning outcomes, middle school students*

1. Introduction

A primary objective of school physical education (PE) is to support adolescents to remain physically active while receiving health-related physical fitness (SHAPE America, 2013). Physical inactivity may track from adolescents into adulthood where it has consistently been associated with higher risks of obesity and cardiovascular disease (Harding, Page, Falconer, & Cooper, 2015; Thorp, Owen, Neuhaus, & Dunstan, 2011). Previous studies have displayed a decrease of adolescents' motivation levels and motivational outcomes in school PE as they advance through school (Chen et al., 2020; Fredricks & Eccles, 2002). Since regular physical activity participation is associated with multiple health benefits, researchers started to explore if theory-based psychosocial factors

would have an impact on students' achievement motivation and their physical activity engagement (Chu, Zhang, & Cheung, 2019; Zhang, Solmon, & Gu, 2012).

To date, social cognitive theory (SCT) has been evidenced to be a prevailing theoretical framework to comprehend human being's motivated behaviors such as participation in physical activity in PE (Bandura, 2004; Dishman, Saunders, Motl, Dowda, & Pate, 2009). As a key motivational construct of the social cognitive theory (Bandura, 1986, 1997), self-efficacy refers to an individual's confidence in his or her ability to participate in a specific behavior. For instance, students with higher level of self-efficacy are more likely to perform given motivated behaviors at a bigger effort, to explore new behaviors while spending more energies, and to hold in longer once encountering challenges than students with

lower level of self-efficacy (Dishman et al., 2009; Gao, Lee, Solmon, & Zhang, 2009).

Self-efficacy represents an important social cognitive factor to influence individuals' achievement outcomes (i.e., cognitive, affective, and behavioral outcomes) in school PE (Bandura, 1986, 1997). To date, a considerable amount of literature has been conducted on the influence of self-efficacy to students' achievement outcomes in school PE (Dowda, Pfeiffer, Dishman, & Pate, 2007; Duncan, Duncan, Strycker, & Chaumeton, 2007; Gao et al., 2009). For example, Gao and his colleagues (2009) indicated that children who had higher levels of self-efficacy demonstrated higher intention to engage in the future PE classes and also exerted more efforts in PE. Longitudinal studies additionally recommended that declines in physical activity throughout the time of high school are related to reduction in self-efficacy for overcoming barriers and perceived support from important others like teachers and friends (Dowda et al., 2007; Zhang, Solmon, Gao, & Kosma, 2012).

It is evident that teachers determine how students perceive their learning atmosphere (Aelterman, Vansteenkiste, Van den Berghe, De Meyer, & Haerens, 2015), and can develop the class environment in ways in which nurture accommodative motivation patterns that can cause achievement outcomes (Cox & Williams, 2008; Lee, Zhang, Chu, Gu, & Zhu, 2020; Skelly & Zhang, 2016). Teacher's support, like formative appraisals of students' accomplishments, would promote students' awareness of their capacities for learning (Chu et al., 2019; Danielsen, 2009; Lee et al., 2019). According to the self-determination theory (SDT; Deci & Ryan, 2000), teacher can provide their students with three different types of supports. Specifically, *autonomy support* refers to allowing students to make reasonable choices in classrooms when teachers offer them different opportunities to enhance their self-perceptions and personal interest. *Competence support* is found in an environment where students perceive feelings of proficiency and success within a social network. Lastly, *relatedness support* is evident in class contexts wherein students have a good chance to obtain positive relationships and communicate with their teachers and peers (Chu et al., 2019; Lee, Zhang, Chu, & Gu, 2020).

Although the effect of teacher's support to students' cognitive engagement in traditional academic subjects (i.e. math and science) is well documented, teacher's support is an under-researched component of social cognitive models in PE. The relations among teacher's support, motivational constructs, and achievement outcomes remain complex in PE settings (Chu et al., 2019; Yildirim, 2012). For example, Zhang and his colleagues (2012) examined middle school students' perceived teachers' support for autonomy, expectancy-related beliefs, subjective task values, concentration, relatedness, competence, and self-reported persistence/effort during their regular school PE. The findings of this study concluded that teachers' autonomy support and competence support in physical education settings played

an important role in promoting students' achievement outcomes and motivational constructs in a physical education setting. The findings indicated that a supportive environment and high levels of expectancy-related beliefs and subjective task values are positively related to students' learning outcomes in PE. Up to date, however, little is known regarding the influence of the teachers' need support on middle school students' self-efficacy and subsequent motivated behaviors including intention for future participation and persistence/effort in PE. In order to promote adolescents' PA, it is worth of examining the relations between students' self-efficacy and motivated behaviors and teacher's need support. Thus, using the social cognitive theory and self-determination theory as theoretical frameworks, further research is needed to investigate perceived teacher's need support on achievement outcomes in PE mediated by self-efficacy among middle school students.

Previous studies showed that perceived teacher support improves students' motivational beliefs such as self-efficacy (Chu et al., 2019; Cox & Williams, 2008; Hardré & Sullivan, 2008; Urdan & Schoenfelder, 2006; Zhang, Solmon, Kosma, Carson, & Gu, 2011). Teacher-student relationships characterized by warmth and support are believed to promote students' academic self-concept (Huhtiniemi, Sääkslahti, Watt, & Jaakkola, 2019). When students perceive their classroom teacher as supportive, they are more likely to be interested in classroom tasks and are less likely to be anxious about activities (Lapointe, Legault, & Batiste, 2005). As the key type of influence on self-efficacy, verbal persuasion and encouragement from teachers have been shown to help students build their self-efficacy and achievement motivation (Patrick, Ryan, & Kaplan, 2007). It makes logical sense that when students feel supported by their teachers instead of being ignored, they are more likely to feel better in schools. Students are more likely to engage in PE when they are motivated and when PE teachers create a supportive environment that enhances their autonomy, competence, and relatedness (Carson & Chase, 2009; Marshik, Ashton, & Algina, 2017). Thus, teachers need to be responsible for creating a supportive learning environment to confirm that students get enough physical activity for health-related fitness.

Using the self-determination theory and social cognitive theory, the aim of the present study was to examine the relations among perceived teachers' support for autonomy, competence, and relatedness, self-efficacy, persistence/effort, and students' intention for future participation in PE among middle school students. The hypothesis of the study had three folds that: (a) teachers' relatedness support, competence support, and autonomy support would predict students' self-efficacy; (b) students' self-efficacy would positively predict students' intention for future participation and persistence/effort in school PE; (c) perceived teachers' competence support, autonomy support, , and relatedness support would respectively predict students' intention for future participation and persistence/effort in PE, positively. It was expected that self-efficacy would partially mediate

the link between students' persistence/effort and intention for future participation in PE and perceived support from PE teachers (autonomy support, competence support, and relatedness support) in the present study.

2. Method

2.1. Participants and Procedures

211 middle school students (109 boys, 102 girls; $M_{age} = 12.44$; $SD = .99$) participated into the study. The participants were selected from 12 different classes taught by certified PE teachers in a suburban public school in the United States (6th grade, $N = 70$; 7th grade, $N = 69$; 8th grade, $N = 72$). University Institutional Review Board and school district approved the present study, and written parental consent forms and child assent forms were obtained prior to the data collection.

We administered previously validated questionnaires in regular PE classes in the middle of the school year. These questionnaires measured middle school students' perceived teachers' autonomy support, competence support, self-efficacy, relatedness support, persistence and effort, and intention for future participation in school PE. Prior to the data collection, all participants completed these questionnaires under the supervision of the researchers. Participants spent approximately 15–20 minutes completing all questionnaires.

2.2. Instrumentation

2.2.1. Demographic variables

Participants self-reported their grade, age, and gender from the surveys for characterizing the sample.

2.2.2. Perceived instructors' support for autonomy, competence, and relatedness

Three previously validated scales have been adopted to assess students' perceived competence support, autonomy support, and relatedness support in the present study. Specifically, a four-item perceived competence support scale was adapted from Standage, Duda, and

Ntoumanisand's (2005) study. One example of the items states "The PE teacher makes us feel like we are able to do the activities in class." A six-item PE-modified health care climate questionnaire (HCCQ; Williams, Grow, Freedman, Ryan, & Deci, 1996) was used for examining the degree of the participants' perceived autonomy support in physical education settings. Two sample items are "My PE teacher listens to how I would like to do things" and "My PE teacher encourages me to ask questions". Furthermore, a five-item scale (Standage et al., 2005) was utilized to measure the perceived relatedness support of students. "The PE teacher encourages us to work together in practice" is an example item. Following the stem "In my PE class", the participants responded to these items on 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Each mean of subscale score was used as an indicator of the latent factor of need support. These three scales were shown to have adequate internal reliability coefficients in the present study (see Table 1), which echo the reliability results from previous research (Standage et al., 2005; Zhang, Solmon, & Gu, 2012),

2.2.3. Self-efficacy in PE

The students' self-efficacy levels in PE were collected through a six-item survey adopted from a previous study with middle school students (Gao et al., 2009). The sample items were (a) *my ability to learn skills well in PE classes*, (b) *my knowledge needed to do well in PE classes*, (c) *my ability to handle the anxiety related to PE classes*. With the stem "With regard to this week's PE classes, I have confidence in...", the participants responded to the six items using a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The mean of these six items was used as a student's self-efficacy during the regular PE classes. This scale has been shown good reliability in the previous study (Gao et al., 2009), and this scale had adequate internal reliability coefficient in the present study (see Table 1).

2.2.4. Persistence/effort

Guan et al.'s (2006) 8-item persistence and effort scale was adapted to measure students' persistence and effort in

Table 1. Descriptive statistics, internal consistency, and correlations among variables ($N = 211$)

Subscale	1	2	3	4	5	6
1. Competence support	(.93)					
2. Autonomy support	.74**	(.92)				
3. Relatedness support	.82**	.81**	(.91)			
4. PE Self-efficacy	.36**	.33**	.32**	(.90)		
5. Persistence/effort	.31**	.24**	.29**	.29**	(.72)	
6. Intention	.29**	.21**	.21**	.35**	.29**	-
<i>M</i>	4.94	3.79	4.40	4.23	4.80	3.82
<i>SD</i>	1.36	1.35	1.47	.83	1.62	.94

Note. Cronbach's alpha coefficients are provided along the diagonal; *M* = mean; *SD* = standard deviation; PE = physical education; Intention = Intention for future participation in PE; Bivariate correlations among the study variables are significant at the $p < .01$ level; ** $p < .01$.

PE. It is a 7-point Likert-type scale, ranging from 1 (*not at all true for me*) through 7 (*very true for me*). Based on the previous research evidence, persistence and effort could be combined into one single construct and named as persistence/effort in data analyses (Guan et al., 2006; Xiang, McBride, & Bruene, 2006). The mean score of all items was calculated to indicate the persistence/effort score. Cronbach alphas for the persistence/effort was .72, which indicates the scale had acceptable internal consistency in the present study.

2.2.5. Intention for future participation in PE

Based on the previous studies (Gao et al., 2009; Xiang et al., 2006; Xiang, McBride, Guan, & Solmon, 2003), intention for future participation in PE has been widely viewed as an achievement outcome in school PE. Adapted from existing questionnaires (Xiang et al., 2003), we used a single question on a 5-point Likert-type scale to assess participants' intention for future participation in PE: "When you get to high school, you will have a choice whether you want to take PE. How much would you want to take it?" (ranging from 1 [*not at all*] through 5 [*very much*]).

2.3. Statistical Analyses

We used three steps to analyze the data in the present study. First, descriptive statistics and internal consistency estimates were calculated on all study variables with using the SPSS 25.0 (IBM Corp., Armonk, NY, USA). Second, we examined the bivariate relationships of the study variables using Pearson product-moment correlations.

Lastly, a structural equation modeling (SEM) analysis with maximum likelihood estimation was conducted to investigate the hypothesized model by using AMOS 25. Specifically, the confirmatory factor analysis was conducted first to verify the measurement model, and then

the hypothesized structural model was examined based on the factor analytic-SEM approach (see Figure 1).

The hypothesized model was determined as a good fit to the data according to the recommendation of Hu and Bentler (1999): the chi-square test ($\chi^2 < 5$), Root Mean Square Error of Approximation (RMSEA; $< .08$), Comparative Fit Index (CFI; $> .90$), Bentler-Bonett Nonnormed Fit Index (NFI $> .90$), and Goodness of Fit Index (GFI $> .90$). It is worth noting that perceived support from teachers, as a latent variable, reflects construct the researchers formulate based on previous studies and SDT (Standage et al., 2005; Zhang et al., 2011). Given the research purpose in the present study, the following factors were treated as observed variables: autonomy support, self-efficacy, competence support, persistence and effort, relatedness support, and intention for future participation in PE. Previous research in physical education has also applied the same procedures to simplify the models among middle school students (Standage et al., 2005; Zhang et al., 2011).

3. Results

Results in Table 1 showed that self-report study variables had an acceptable level of internal reliability for exceeding Nunnally's criterion of .70 (Nunnally, 1978). The means of the study variables were above the average, indicating positive perceptions of the study constructs. Moreover, positive correlations at a significant level ($p < .01$) were revealed among perceived teachers' competence support, autonomy support, self-efficacy, relatedness support, and achievement outcomes. Furthermore, teachers' autonomy, relatedness, and competence support were positively associated with self-efficacy, persistence/effort, and students' intention for future participation in PE. In addition, self-efficacy was

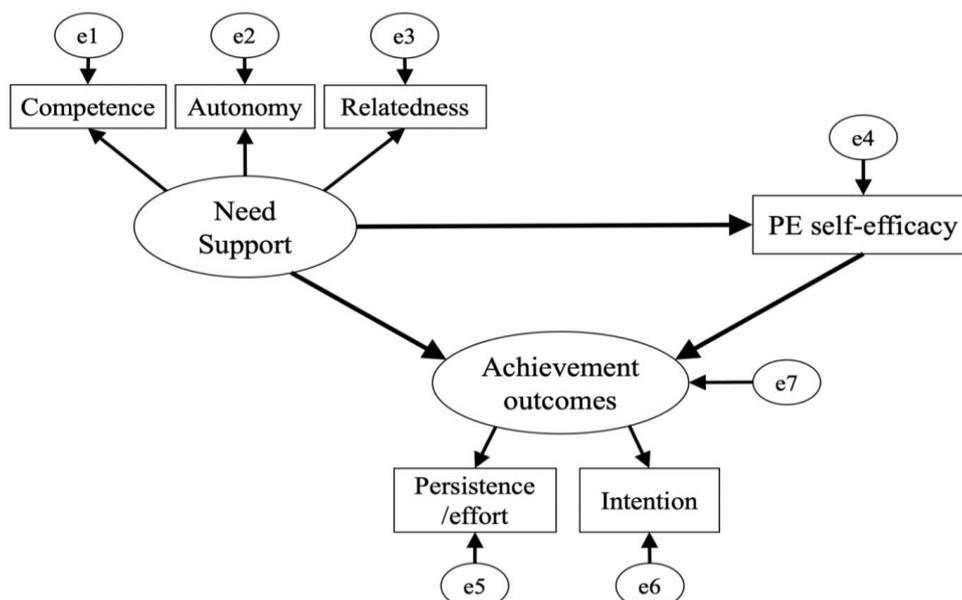


Figure 1. Hypothesized model illustrating relationships among study variables. Solid lines represent positive relationships; PE = physical education; Intention = Intention for future participation in PE.

positively related to persistence/effort and students' intention for future participation in the present study.

A confirmatory factor analysis was conducted for testing the measurement model before testing the hypothesized structural model. This procedure aimed to evaluate examine whether each latent variable can explain the covariance among its observed variables. After that, we examined the hypothesized structural model based on the factor analytic-SEM approach (Zhang et al., 2011). The measurement model consisted of two factors: teachers' support and achievement outcomes in PE. Meanwhile teacher's competence support, autonomy support, relatedness support, persistence/effort, self-efficacy, and students' intention for future participation in PE) were processed as observed variables in current study.

The fit indices showed that the measurement model depicted the data well (e.g., $\chi^2/df = 2.5 < 5$; RMSEA = .07; CFI = .99; NFI = .98; GFI = .98; Hu & Bentler, 1999) demonstrating the measurement model was supported. Therefore, we tested the structural model to assess the relationship among perceived teachers' self-efficacy competence support, autonomy support, and relatedness support, persistence/effort, and students' attempt for future participation among middle school students. The results of the goodness-of-fit statistics, displayed an acceptable fit to the hypothesized structural model (e.g., $\chi^2/df = 1.3 < 5$, $p = .249$; RMSEA = .04; CFI = .99; NFI = .98; GFI = .96; Hu & Bentler, 1999). As illustrated in Figure 2, perceived support from PE teachers had a major influence on self-efficacy ($\beta = .36$), which had an impact on achievement outcomes ($\beta = .47$). In addition, perceived support from PE teachers had a large influence on achievement outcomes in PE ($\beta = .35$). The variance explained in the dependent variables was as follows: η^2 for self-efficacy =

13%, and η^2 for achievement outcomes in PE = 46%. The indirect effects of perceived support from PE teachers on achievement outcomes in PE were moderate and thus the mediating role of self-efficacy between perceived support from PE teachers and achievement outcomes in PE was partially supported.

4. Discussion

The primary purpose of this study, guided by social cognitive theory and self-determination theory, was to investigate the relations among perceived teachers' competence support, autonomy support, and relatedness support, self-efficacy, persistence/effort, and middle school students' intention for future participation of physical education. The findings of the present study highlight the importance of teachers' support in fostering students' self-efficacy and achievement outcomes in PE. Therefore, creating a supportive climate and enhancing students' self-efficacy are important considerations in enhancing students' engagement in PE classes. These findings indicated that teachers' support positively influenced students' self-efficacy and engagement in PE (Kavussanu & Roberts, 1986; Standage, Duda, & Ntoumanis, 2003).

Specifically, the findings of this study demonstrate that promoting students' self-efficacy could play an important role in promoting students' persistence/effort and intentions toward PE. Exploring how teachers' support relates to students' self-efficacy can provide valuable insight into ways to design a supportive class climate aimed at the promotion of self-efficacy and achievement outcomes among students. In fact, self-efficacy is

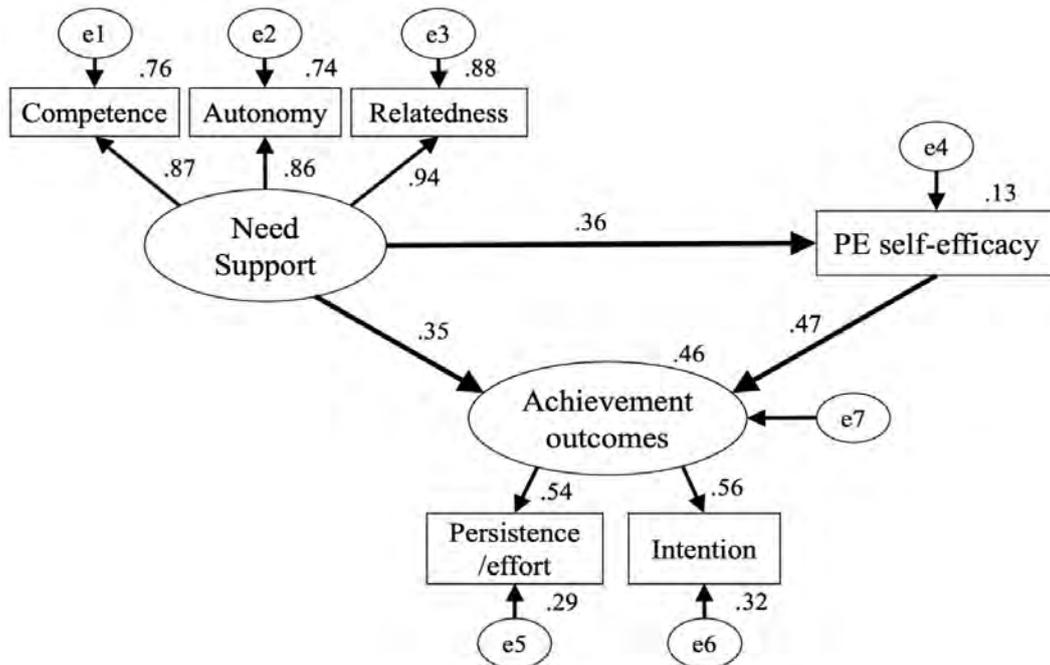


Figure 2. Final model illustrating relationships among study variables. Solid lines represent positive relationships; PE = physical education; Intention = Intention for future participation in PE.

considered a key predictor for middle school students to participate and put more efforts in PE, which is supported in the previous studies (Chase, 2001; Gao et al., 2009). This finding suggests that PE teachers should focus on enhancing students' confidence in classes by promoting positive learning experiences to encourage them to engage in activities within and outside PE classes.

The findings of this study also showed that self-efficacy partially mediated the relations of perceived teachers' support and students' achievement outcomes including their intention for future participation in PE, persistence, and effort. Consistent with previous studies (Dishman et al., 2009; Zhang, Solmon, & Gu, 2012), these findings suggest that the relationship between perceived teacher support and students' achievement outcomes is not simply a bivariate relation, but it can be better expressed through the mediating role of self-efficacy. Thus, providing learning activities to promote students' positive ability perceptions can serve as an effective motivational method enhancing students' class persistence/effort and intention for future participation in PE. Developing strategies that help students feel socially related in their PE classes may promote self-efficacy in PE, and in turn, greater classroom persistence/effort and intention for future participation in PE. This suggestion is in line with previous studies showing that a need-supportive class climate was efficacious in PE settings to promote students' motivation, physical activity, and skill learning (Christodoulidis, Papaioannou, & Digelidis, 2001; Chu, Zhang, Thomas, Zhang, & Gu, 2019, 2020; Digelidis, Papaioannou, Lapidis, & Christodoulidis, 2003; Zhang et al., 2011).

The findings of the present study indicated that teachers should find ways to improve middle school students' self-efficacy in order to enhance their persistence/effort and intention for future participation. According to the social cognitive theory, self-efficacy is related to the belief in one's ability to conduct a challenging task despite barriers and adverse experiences. Individuals who feel more efficacious about their performance should be more apt to engage in self-regulation and motivated behavior. Therefore, effective teaching strategies in PE should enhance students' self-efficacy with bringing mastery experience, vicarious experiences, social persuasion, and psychological states (Bandura, 1997), which may positively promote their adaptive outcomes in PE. Specifically, self-efficacy can be accomplished by observing other students' mastery performance and getting positive persuasion from their classmates (Bandura, 1997). Once students perform a task with high success rate, they must have an increased level of self-efficacy toward that task. Social persuasion can be increased through a robust social support network including encouragement and caring from teachers and peers. Further, establishing attainable and specific goals with a timeframe that challenge the students would be a helpful strategy to boost self-efficacy (Bandura, 1986). It additionally suggests that physical activity opportunities, as well as successful experiences, collaborating with peers, and goal settings, ought to be encouraged during school PE classes.

The major strength of the present study is that it investigated the relations among perceived teachers' support for autonomy, competence, and relatedness, self-efficacy, persistence/effort, and students' intention for future participation among middle school students by using the SEM technique guided by social cognitive theory and self-determination theory. However, we need to acknowledge that the present study includes several limitations. Due to the relatively small sample size from a middle school, the first limitation is related to the generalizability of our findings. Thus, future study is needed to recruit participants from multiple schools in diverse school districts to enhance the generalizability. Second, all scales used in this study were based on self-reported surveys, which may lead to participants either over or under-reporting their perceptions. Future studies could incorporate objective achievement outcomes such as physical activity using accelerometers or physical fitness using FITNESSGRAM fitness testing. Finally, it is difficult to establish cause and effect relationships among the study variables by using a cross-sectional research design. Therefore, longitudinal studies and experimental research designs are warranted to further investigate how the changes in teachers' support for autonomy, competence, and relatedness affect students' self-efficacy and achievement outcomes over time.

In conclusion, the findings of the present study revealed that perceived teachers' support for autonomy, competence, and relatedness may influence self-efficacy and achievement outcomes in PE among middle school students. Self-efficacy had a mediating role between the relations of perceived teachers' support and students' achievement outcomes in PE. Therefore, developing a supportive class climate while emphasizing students' self-efficacy should foster students' persistence/effort and intention for future participation in school PE.

Author Disclosure Statement

No potential conflict of interest was reported by the authors.

References

- Aelterman, N., Vansteenkiste, M., Van den Berghe, L., De Meyer, J., & Haerens, L. (2015). Fostering a need-supportive teaching style: Intervention effects on physical education teachers' beliefs and teaching behaviors. *Journal of Sport and Exercise Psychology, 36*(6), 595–609. <https://doi.org/10.1123/jsep.2013-0229>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior, 31*(2), 143–164. <https://doi.org/10.1177/1090198104263660>
- Carson, R., & Chase, M. (2009). An examination of physical education teacher motivation from a self-determination theoretical framework. *Physical Education & Sport Pedagogy, 14*(4), 335–353.
- Chase, M. A. (2001). Children's self-efficacy, motivational intentions, and attributions in physical education and sport. *Research Quarterly for Exercise and Sport, 72*(1), 47–54. <https://doi.org/10.1080/02701367.2001.10608931>

- Chen, C., Zhang, T., Gu, X., Lee, J., Ren, S., & Wang, H. (2020). Understanding adolescents' need support, need satisfaction, and health-related outcomes: A Self-Determination Health Behavior perspective. *International Journal of Environmental Research and Public Health*, 17(1), 104. <https://doi.org/10.3390/ijerph17010104>
- Christodoulidis, T., Papaioannou, A., & Digelidis, N. (2001). Motivational climate and attitudes towards exercise in Greek senior high school: A year-long intervention. *European Journal of Sport Science*, 1, 144–152.
- Chu, T. L., Zhang, T., & Cheung, H. Y. (2019). The roles of need-supportive social environments in university physical education courses. *International Journal of Sport and Exercise Psychology*, 17(3), 1–20. <https://doi.org/10.1080/1612197X.2017.1339727>
- Chu, T. L., Zhang, T., Thomas, K. T., Zhang, X., & Gu, X. (2020). School environments predict Hispanic children's physical education related outcomes through basic psychological need satisfaction. *Learning and Individual Differences*, 80, 101844.
- Chu, T. L., Zhang, T., Thomas, K. T., Zhang, X., & Gu, X. (2019). Predictive strengths of basic psychological needs in physical education among Hispanic children: A gender-based approach. *Journal of Teaching in Physical Education*, 1–8. <https://doi.org/10.1123/jtpe.2018-0126>
- Cox, A., & Williams, L. (2008). The roles of perceived teacher support, motivational climate, and psychological need satisfaction in students' physical education motivation. *Journal of Sport & Exercise Psychology*, 30(2), 222–239.
- Danielsen, A. B. (2009). School-related social support and students' perceived life satisfaction. *Journal of Educational Research*, 102(4), 303–320.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227–268.
- Digelidis, N., Papaioannou, A., Lapididis, K., & Christodoulidis, T. (2003). A one-year intervention in 7th grade physical education classes aiming to change motivational climate and attitudes toward exercise. *Psychology of Sport and Exercise*, 4, 195–210.
- Dishman, R. K., Saunders, R. P., Motl, R. W., Dowda, M., & Pate, R. R. (2009). Self-Efficacy moderates the relation between declines in physical activity and perceived social support in high school girls. *Journal of Pediatric Psychology*, 34(4), 441–451. <https://doi.org/doi:10.1093/jpepsy/jsn100>
- Dowda, M., Pfeiffer, K., Dishman, R., & Pate, R. (2007). Associations among physical activity, health indicators, and employment in 12th grade girls. *Journal of Women's Health*, 16(9), 1331–1339. <https://doi.org/doi:10.1089/jwh.2006.0302>
- Duncan, S. C., Duncan, T. E., Strycker, L. A., & Chaumeton, N. R. (2007). A cohort-sequential latent growth model of physical activity from ages 12 to 17 years. *Annals of Behavioral Medicine*, 33(1), 80–89. https://doi.org/doi:10.1207/s15324796abm3301_9
- Fredricks, J. A., & Eccles, J. S. (2002). Children's competence and value beliefs from childhood through adolescence: Growth trajectories in two male-sex-types domains. *Developmental Psychology*, 38, 519–533. <https://doi.org/doi:10.1037/0012-1649.38.4.519>
- Gao, Z., Lee, A. M., Solmon, M. A., & Zhang, T. (2009). Changes in middle school students' motivation toward physical education over one school year. *Journal of Teaching in Physical Education*, 28, 378–399.
- Guan, J., Xiang, P., McBride, R., & Bruene, A. (2006). Achievement goals, social goals, and students' reported persistence and effort in high school physical education. *Journal of Teaching in Physical Education*, 25(1), 58–74. <https://doi.org/10.1123/jtpe.25.1.58>
- Harding, S. K., Page, A. S., Falconer, C., & Cooper, A. R. (2015). Longitudinal changes in sedentary time and physical activity during adolescence. *International Journal of Behavioral Nutrition & Physical Activity*, 12, 1–7.
- Hardré, P. L., & Sullivan, D. W. (2008). Student differences and environment perceptions: How they contribute to student motivation in rural high schools. *Learning & Individual Differences*, 18(4), 471–485. <https://doi.org/doi:10.1016/j.lindif.2007.11.010>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Huhtiniemi, M., Sääkslahti, A., Watt, A., & Jaakkola, T. (2019). Associations among basic psychological needs, motivation and enjoyment within Finnish physical education students. *Journal of Sports Science and Medicine*, 18(2), 239–247.
- Kavussanu, M., & Roberts, G. C. (1986). Motivation in physical activity contexts: The relationship of perceived motivational climate to intrinsic motivation and self-efficacy. *Journal of Sport & Exercise Psychology*, 18, 264–280.
- Lapointe, J. M., Legault, F., & Batiste, S. J. (2005). Teacher interpersonal behavior and adolescents' motivation in mathematics: A comparison of learning disabled, average, and talented students. *International Journal of Educational Research*, 43(1–2), 39–54.
- Lee, J., Zhang, T., Chu, T. L., & Gu, X. (2020). Effects of a need-supportive motor skill intervention on children's motor skill competence and physical activity. *Children*, 7(3), 21. <https://doi.org/https://doi.org/10.3390/children7030021>
- Lee, J., Zhang, T., Chu, T. L., Gu, X., & Zhu, P. (2020). Effects of a fundamental motor skill-based afterschool program on children's physical and cognitive health outcomes. *International Journal of Environmental Research and Public Health*, 17(3), 733. <https://doi.org/10.3390/ijerph17030733>
- Lee, J., Zhang, T., Chu, T. L., Zhang, X., Weiller-abels, K. H., & Keller, J. (2019). Comprehensive school physical activity program and physical literacy: Exploring preservice elementary classroom teachers' perspectives. *Advances in Physical Education*, 9, 314–330. <https://doi.org/10.4236/ape.2019.94022>
- Marshik, T., Ashton, P., & Algina, J. (2017). Teachers' and students' needs for autonomy, competence, and relatedness as predictors of students' achievement. *Social Psychology of Education*, 20(1), 39–67.
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York, NY: McGraw-Hill.
- Patrick, H., Ryan, A. M., & Kaplan, A. (2007). Early adolescents' perceptions of the classroom social environment, motivational beliefs, and engagement. *Journal of Educational Psychology*, 99(1), 83–98. <https://doi.org/doi:10.1037/0022-0663.99.1.83>
- SHAPE America. (2013). National Standards for K-12 Physical Education. Retrieved from <https://www.shapeamerica.org/standards/pe/>
- Skelly, K., & Zhang, Y. (2016). Teacher support and engagement in math and science: Evidence from the high school longitudinal study. *High School Journal*, 99(2), 141–165.
- Standage, M., Duda, J. L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology*, 95(1), 97–110.
- Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. *British Journal of Educational Psychology*, 75, 411–433. <https://doi.org/10.1348/000709904X22359>
- Thorp, A. A., Owen, N., Neuhaus, M., & Dunstan, D. W. (2011). Sedentary behaviors and subsequent health outcomes in adults: A systematic review of longitudinal studies, 1996–2011. *American Journal of Preventive Medicine*, 41(2), 207–215.
- Urduan, T., & Schoenfelder, E. (2006). Classroom effects on student motivation: Goal structures, social relationships, and competence beliefs. *Journal of School Psychology*, 44(5), 331–349.
- Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology*, 70(1), 115.
- Xiang, P., McBride, R. E., & Bruene, A. (2006). Fourth-grade students' motivational changes in an elementary physical education running program. *Research Quarterly for Exercise and Sport*, 77(2), 195–207. <https://doi.org/10.1080/02701367.2006.10599354>
- Xiang, P., McBride, R., Guan, J., & Solmon, M. (2003). Children's motivation in elementary physical education: An expectancy-value model of achievement choice. *Research Quarterly for Exercise and Sport*, 74(1), 25–35. <https://doi.org/10.1080/02701367.2003.10609061>

- Yıldırım, S. (2012). Teacher support, motivation, learning strategy use, and achievement: A multilevel mediation model. *Journal of Experimental Education, 80*(2), 150–172.
- Zhang, T., Solmon, M. A., Gao, Z., & Kosma, M. (2012). Promoting school students' physical activity: A social ecological perspective. *Journal of Applied Sport Psychology, 24*(1), 92–105. <https://doi.org/10.1080/10413200.2011.627083>
- Zhang, T., Solmon, M. A., & Gu, X. (2012). The role of teachers' support in predicting students' motivation and achievement outcomes in physical education. *Journal of Teaching in Physical Education, 31*(4), 329–343. <https://doi.org/10.1016/j.psychsport.2013.04.006>
- Zhang, T., Solmon, M. A., Kosma, M., Carson, R. L., & Gu, X. (2011). Need support, need satisfaction, intrinsic motivation, and physical activity participation among middle school students. *Journal of Teaching in Physical Education, 30*(1), 51–68. <https://doi.org/10.1123/jtpe.30.1.51>

Suggested Citation:

- Zhang, P., Zhang T., & Lee, J. (2020). The role of psychosocial factors in predicting students' achievement outcomes in physical education. *Journal of Teaching, Research, and Media in Kinesiology, 6*, 7–14.