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The Development of a Physical Education Teachers' Physical Activity Self-Efficacy Instrument

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In the present investigation a questionnaire was developed to assess physical education teachers' self-efficacy for teaching classes in which their students were engaged in high levels of physical activity (i.e., at least 50% of class time). Exploratory and confirmatory factor analyses resulted in the development of a 16-item, 4-factor, multidimensional physical education teachers' physical activity self-efficacy scale (PETPAS) that produced reliable and valid scores. The Student factor reflected teachers' efficacy for managing students who didn't enjoy or value physical activity. The Time factor was indicative of teachers' efficacy when they didn't have enough time to teach. The Space factor reflected teachers' efficacy perceptions when they had difficulty teaching because of a lack of space. Finally, the Institution factor was composed of questions that represented teachers' efficacy beliefs for overcoming a lack of institutional support. The results of the current study provide preliminary psychometric support for the PETPAS.

Key Words: health, psychology, social cognitive theory

Participation in physical activities declines dramatically as children reach and progress through adolescence (U.S. Dept. of Health and Human Services [USDHHS], 1996). School physical education is one of the few institutions that provides opportunities for youth to be regularly physically active (Sallis, Simons-Morton, Stone, et al., 1992), given that most states have physical education programs (National Association for Sport and Physical Education, 1997) and the majority of children attend school (USDHHS, 1996).

Understanding how teachers promote physical activity through physical education is vital, as leading health and physical activity organizations have all emphasized the importance of providing physical activity in school physical education. The Council for Physical Education for Children (COPEC) has stated, "Regular physical education programs (preferably daily) should provide a significant amount of the time in activity necessary to meet the guidelines in this report" (Corbin & Pangrazi, 1998, p. 14). The Healthy People 2010 objectives for physical education indicate that 50% of class time should be spent with the students be-

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ing physically active (USDHHS, 2000). Finally, the National Center for Chronic Disease Prevention and Health Promotion has suggested that a substantial portion of children's weekly physical activity should be obtained in physical education classes (USDHHS, 2000). They further suggest that physical education teachers should be trained to provide children with moderate to vigorous physical activity during classes. To summarize, school physical education provides an excellent opportunity for children to be physically active and develop healthy behaviors (McKenzie, Feldman, Woods, et al. 1995), although research data supporting this link is limited (Sallis & Owen, 1999).

Teachers are critical in determining the activities children engage in during physical education classes. They can decide to implement curriculums and teach lessons that focus on social skills, sport skills, or health related fitness. The choices teachers make about day-to-day lesson content clearly have an impact on how much activity children will get during class. The research program at San Diego State University affirms the critical influence that teachers have on student behavior, as it has consistently demonstrated that the students of physical education teachers who employ a physical activity oriented curriculum are more physically active than students who are taught by teachers with less professional preparation (McKenzie et al., 1995; McKenzie, Marshall, Sallis, & Conway, 2000; McKenzie, Sallis, Kolody, & Faucette, 1997; McKenzie, Sallis, Faucette, Roby, & Kolody, 1993; McKenzie, Stone, Feldman, et al., 2001; Sallis, McKenzie, Alcaraz, et al., 1997).

According to social cognitive theory (Bandura, 1997), major determinants of the choices teachers make are their self-efficacy judgments. Researchers in physical education and the exercise and sport sciences have recognized the important role that self-efficacy cognitions play in both the initiation of exercise and in sport performance (Kujala, Kaprio, Sarna, & Koskenvuo, 1998; Ross & Gilbert, 1985; Sallis et al., 1997).

Unfortunately, few researchers have examined the self-efficacy of physical education teachers. No research could be found on physical education teachers' self-efficacy toward overcoming barriers to teaching physically active classes. Given this lack of research and the importance of physically active physical education classes, we sought to develop a physical education teachers' physical activity self-efficacy (PETPAS) scale that would allow researchers to assess teachers' efficacy for teaching classes with high levels of physical activity, defined as at least 50% of class time. Our goal was to provide researchers with a psychometrically sound instrument for assessing and beginning to understand teachers' efficacy for overcoming the barriers they face to teaching physically active physical education classes. Understanding the role of teacher self-efficacy in physical education is a critical step in helping children become more active and healthy.

Self-efficacy research is prolific and numerous meta-analyses have affirmed the critical role that self-efficacy cognitions play in such areas as work-related performance, and child, student, and teacher performance (Holden, Moncher, Schinke, & Barker, 1990; Multon, Brown, & Lent, 1991; Ross, Cousins, & Gadalla, 1996; Stajkovic & Luthans, 1998). Unfortunately, research on teacher self-efficacy has been plagued by methodological and conceptual shortcomings (Bandura, 1997; Woolfolk & Hoy, 1990). Ross' (1994) meta-analytic study, for example, found that virtually all 87 studies he examined viewed teacher efficacy as a generalized expectancy, contrary to the domain- and task-specific conceptualization of self-efficacy (Bandura, 1997). Additionally, self-efficacy has been inadequately assessed with one-item scales that have failed to achieve correspondence between the self-efficacy measure and the behavior of interest (Bandura, 1997).

Definitions of teacher self-efficacy (e.g., Hoover-Dempsey, Bassler, & Brissie, 1987; Hoy & Woolfolk, 1993) have also confounded self-efficacy with outcome expectations and locus of control (Guskey & Passaro, 1994), making it difficult to reach substantitive conclusions in this area. Therefore, reports that teacher self-efficacy is positively related to perceptions of parental involvement (e.g., home tutoring; Hoover-Dempsey et al., 1987), administrative attention and support (Ashton & Webb, 1986; Chester & Beaudin, 1996), colleague collaboration (Chester & Beaudin, 1996; Hoy & Woolfolk, 1993), and a rigorous academic climate (Woolfolk & Hoy, 1990) must be viewed with caution. Thus there is a need for sound self-efficacy measures in physical education that are based on the theoretical underpinnings of social cognitive theory (Bandura, 1997). Our research efforts in this regard mirror current self-efficacy research trends in general education (Henson, 2001; Tschannen-Moran & Woolfolk Hoy, in press) that focus on content area (e.g., physical education) and situation-specific efficacy cognitions.

In summary, school physical education has been specifically identified as an important vehicle for delivering physical activity to millions of children and adolescents in the U.S. Physical education teachers play a vital role in helping children develop the behaviors, attitudes, skills, and knowledge they will need to be physically active for a lifetime. Social cognitive theory (Bandura, 1997) suggests that it is vital to understand physical education teachers' efficacy for overcoming the barriers they face in teaching.

The overall purpose of the present study was to develop a theoretically and empirically driven, psychometrically sound, self-efficacy scale to measure physical education teachers' self-efficacy for teaching physically active classes (i.e., at least 50% of class time). More specifically, the purpose of Study 1 was to use exploratory factor analysis techniques to classify barriers. The purpose of Study 2 was to confirm the four-factor structure of barriers—student, time, space, and institution—found in Study 1 with a second independent sample using confirmatory factor analytic techniques.

Study 1

The purpose of Study 1 was to classify a pool of items for a physical education teacher's physical activity self-efficacy scale (PETPAS).

Method

Participants. Serving as participants were 100 experienced male (n = 39) and female (n = 61) teachers who taught elementary and middle school physical education in both suburban and urban areas in a Midwestern state. They averaged 14.5 years of teaching experience and 96% were Caucasian.

Measures and Procedure. From a previous study, the top 20 barriers that physical education teachers face when trying to teach physically active classes were identified (Hodges Kulinna, Martin, Zhu, & Reed, 2002) as a starting point for developing our scale. The frequency with which teachers experienced these barriers ranged from 100% for the top barrier to 85% for the 20th barrier. The top 20 barriers were chosen so they would be commonly experienced barriers valid for future research. A close look at these barriers revealed that they seemed to rep-

Table 1 Item Pool for Study 2

Factor 1: Student

1. My students do not enjoy spending large amounts of class time being physically active.*
2. My students are not concerned with being physically active.*
3. My students do not enjoy being physically active during my classes.*
4. My students do not want to participate in activities that require them to shower afterwards.*
5. My students do not enjoy participating in calisthenic activities.*
6. My students do not highly value physical education.*

Factor 2: Space

7. Inclement weather prohibits outside activities for my class.*
8. Additional students are regularly added to my physical education classes.*
9. More than one class shares the gymnasium (activity facility).*
10. My activity space is used for other purposes.**
11. I have too many students in my physical education classes.**
12. I do not have enough space for all of the students in my physical education classes.**

Factor 3: Time

13. My class sessions are too short in duration.*
14. My physical education classes do not meet enough times per week.*
15. I have too little contact time with my students.*
16. I spend too much of my time on other program goals.*

Item Pool for Study 2

17. I spend too much time on class management.**
18. I do not see my students enough.**
19. I do not have enough time in the semester.**

Factor 4: Institution

20. Other teachers at my school do not highly value physical education.*
21. My principal or athletic director does not provide adequate support for physical education.**
22. I do not have enough equipment for all my students to be active at once.*
23. Funding for the physical education program is insufficient.**
24. The budget for my physical education program is inadequate.*
25. I do not have enough fitness equipment (e.g., steps, weights, bands).*
26. Administrators frequently cancel my class.**

Note: * Items retained from Study 1. ** New items developed for Study 2 from original pool of questions.

resent four themes. Examples of these barriers can be found in Table 1. Teachers viewed a lack of time (e.g., short classes), little space (e.g., small gyms), limited institutional support (e.g., lack of funds), and minimal student interest (e.g., students not motivated) as barriers to their ability to teach physically active lessons. These themes were not unexpected, as researchers, operating from a variety of theoretical perspectives, have found that similar variables impair effective teaching, reduce confidence, and create worry and stress (Boggess, Griffey, & Housner, 1986; Chester & Beaudin, 1996; Guskey & Passaro, 1994; Hastie & Saunders, 1991; Hoy & Woolfolk, 1993; McBride, 1993; Ross, 1994; Smyth, 1995; Stroot, Collier, O'Sullivan, & England, 1994; Wendt & Bain, 1983).

A Likert scale was developed based on Bandura's (1997) recommendations and similar to other psychometrically sound self-efficacy instruments used in educational and human movement settings. The barrier items were transformed into questions addressing teachers' self-efficacy for overcoming these barriers to physically active classes. Teachers read a header, "How confident are you that you can provide large amounts of physical activity (i.e., at least 50% of class time) in your lessons under the following conditions?" This was followed by the 20 questions. For example, one question read, "My students do not enjoy spending large amounts of class time being physically active." Each question was placed on a Likert scale anchored by 0% = *not at all confident* and 100% = *very confident*. Participants then circled one of 11 numbers, in intervals of 10.

Results of Study 1

We conducted an exploratory factor analysis to determine whether our initial visual observations—that there were four types of barriers identified by the teachers—could be substantiated. A principal-components analysis followed by a varimax rotation with Kaiser normalization was conducted. Five factors with eigenvalues over 1 explained 57.18% of the variance. After examining the items constituting each factor, the loading values of each item, cross-loadings, internal consistencies for each factor, and conceptual considerations, we retained 17 items (for use in Study 2) representing four factors and disregarded a fifth factor represented by 3 items.

The first four factors were retained because all of the items constituting each factor loaded over .40 (one item loaded at .38), which is considered substantial (Safrit & Wood, 1989). Equally important, all items constituting the four factors were conceptually consistent. For example, items "My students are not concerned with being physically active" and "My students do not enjoy being physically active during my classes" both loaded on the Student factor. Cross-loadings over .40 for these four factors were minimal ($n = 2$). The discarded fifth factor was uninterpretable, as all three items composing it were conceptually inconsistent and it lacked internal consistency ($\alpha = .50$).

We labeled Factor 1 "Student." Student was constituted by 6 items which all loaded between .48 and .83, with one cross-loading over .40. Internal consistency was strong ($\alpha = .85$). The second factor, Space, had 3 items which loaded between .38 and .81 with a low level of internal consistency ($\alpha = .53$). We named Factor 3 "Time" and it was represented by 4 items loading between .40 and .78, with no cross-loadings over .40. Internal consistency was borderline ($\alpha = .69$). Factor 4, Institution, was composed of 4 items loading between .46 and .77, with one cross-loading over .40. Internal consistency was borderline ($\alpha = .68$). Our concerns over inadequate to marginal internal consistency, a desire to improve the reliability and validity of the scores, the importance of finalizing a reasonable number of questions that best defined each factor, and the need to confirm the factor structure with a larger independent sample prompted Study 2.

Study 2

The purpose of Study 2 was to establish factor validity by confirming the revised PETPAS scale with a new independent and larger sample of teachers. A confirmatory factor analysis was deemed most appropriate because we had identified the expected factors and items expected to load on each factor. Equally important, we also sought to reduce the number of items defining each factor by retaining only the best fitting items. Thus we used an iterative variable reduction procedure with confirmatory analysis techniques (Hofmann, 1995).

Method

Participants. Physical education teachers ($N = 309$) were recruited from a single Midwestern state ($n = 100$) from mailings to members of a state American Alliance of Health Physical Education, Recreation and Dance (AAHPERD) organization. Participants ($n = 209$) were also recruited attending the expo of the 2001 National AAHPERD conference.

Participants completed a consent form, a demographic scale, and the revised PETPAS scale. To justify combining participants from both sample sites, we conducted two ANOVAs to determine whether the samples differed on demographic variables (e.g., years of teaching) and mean barrier efficacy for each item. The only significant demographic difference among the samples was a higher percentage of Caucasian teachers from the single Midwestern state compared to teachers surveyed at the AAHPERD conference. Teachers did not differ on any of the efficacy items. Because both groups were essentially similar, the two samples were combined for further analyses.

The teachers had an average of 14.3 years of teaching experience (SD = 10.2). The ratio was 37.2% male and 62.8% female. The majority, 85.5%, were Caucasian, with 5.9% Hispanic American, 4.9% African American, and 1.0% Asian American; the remaining 2.7% did not report their ethnicity. Teachers varied according to their primary teaching responsibility grade level and were spread across elementary (41.3%), middle (20.1%), junior (5.3%), and high school (20.8%). The remaining teachers (12.5%) taught combinations of two grade levels, for example middle and high school. Teachers differed in their education, with most holding bachelors (42.7%) or masters (45.3%) degrees. The remaining teachers had Specialist (10.4%) or PhD (1.6%) degrees. Teachers also varied in how often they taught physical education, with 34.0% of teachers noting 5 days a week, 16.5% noting 3 days a week, and 33.3% noting 2 days a week.

Measures and Procedure. The goal of this study was to confirm the four factors discovered in the exploratory factory analysis and finalize a set of items that best defined each factor. Based on Study 1 we retained 17 items and added 9 new questions, resulting in a revised 26-item PETPAS scale with four factors (see Table 1). Factor 1 (6 items), Student, was deemed acceptable in its present condition and no additional items were developed for it.

In order to strengthen the Space, Time, and Institution scales, we added 3 new items for each subscale. The additional 9 items were obtained from the bottom 37 items remaining from the original 57-item list of which the top 20 were used in Study 1 (i.e., Hodges Kulinna et al., 2002). The 9 new items were chosen so as to be conceptually consistent with the Space, Time, and Institution scales.

We were limited to a total of 9 new items, spread across the three factors (3 new items per factor), from the original pool of 57 items (Hodges Kulinna et al., 2002) because after using the top 20 items in Study 1 and the above 9 items, the remaining 28 items were not reflective of our a priori factors of Space, Time, Student, and Institution.

To summarize, we now had a revised 26-item questionnaire with four subscales labeled Student (6 items), Space (6 items), Time (7 items), and Institution (7 items). The Student factor reflected teachers' efficacy for teaching physically active lessons when their students didn't enjoy, value, or want to participate in classes with a great deal of physical activity. The Time factor was indicative of teachers' efficacy when they didn't have enough time during individual lessons, or across the week or semester, to adequately teach lessons with high levels of physical activity. The Space factor was reflective of teachers' efficacy perceptions that they had difficulty teaching physically active lessons because they didn't have enough space due to small facilities or too many students. Finally, the Institution factor was composed of questions that represented teachers' beliefs that a lack of funds, equipment, and collegial support presented obstacles to their ability to teach physically active lessons.

Results of Study 2

Teachers ($N = 309$) completed the revised 26-item scale, and maximum-likelihood structural equation modeling procedures (EQS: Bentler, 1995) were used to conduct a confirmatory factor analysis (CFA). A CFA was performed to determine whether the data fit the four-factor measurement model. Standard conditions were specified based on the four-factor structure identified in the exploratory factor analysis. Items were uniquely loaded on the appropriate factors, the variance of each factor was set at 1.0 to define the scale of latent factors, factors were allowed to correlate, and measurement errors were not allowed to correlate.

Results suggested that the fit of the data to the model could be improved, as the comparative fit index was .79 and below the traditionally accepted criterion of .90. We examined the modification indexes for guidance and the variables contributing to the largest standardized residuals. Based on the above considerations, one question per run was eliminated and subsequent CFAs were run on the new models. Using the above procedures, we made 10 runs of the model. Each run improved the fit of the model (see Table 2). Common goodness-of-fit indexes (Bentler-Bonett Normed Fit Index [NFI], Bentler-Bonett Non-Normed Fit Index [NNFI], and Comparative Fit Index [CFI]) all increased and the average absolute residuals decreased, suggesting an improved fit of the model with each run and support for continued reduction of the variables (Hofmann, 1995).

The final run was conducted on 16 items with 4 items hypothesized to load on each of the four factors (see Figure 1). We found an acceptable fit of our data to the model, as indicated by common goodness-of-fit indexes (NFI = .89, NNFI = .91, CFI = .93). Based on the CFI statistic, considered the index of choice (Bentler, 1990), it was concluded that the data adequately fit the model and we stopped the iterative process of item reduction.

Additional criteria used to determine the plausibility of model fit were also supportive of the decision to stop the iterative process. For instance, the average standardized residual of .0367 and the average off-diagonal standardized residual of .0416 both indicated a good fit of the model to the data. The distribution of

Table 2 Model Summary Statistics by Iteration

Iteration	NFI	NNFI	CFI	Avg absolute residual	Item dropped
0	.74	.77	.78	.0611	17
1	.75	.78	.80	.0596	16
2	.77	.80	.82	.0541	23
3	.80	.83	.85	.0514	18
4	.81	.84	.86	.0468	25
5	.82	.85	.87	.0452	5
6	.83	.86	.88	.0447	7
7	.84	.87	.89	.0440	8
8	.86	.89	.91	.0408	4
9	.87	.89	.91	.0386	24
10	.89	.91	.93	.0367	–

Note: Item number corresponds to items noted in Table 1.

the 136 standardized residuals showed little evidence of significant over-or-under estimation of the fitted correlations, with 97.06% of the residual values between –.1 and .1, and 2.94% between .1 and .2. Finally, the internal consistencies of each factor exceeded the minimum recommended value of .70 (Nunnally, 1978); that is, the alpha values for the Student, Space, Time, and Institution factors were .86, .75, .78, and .73, respectively.

The standardized maximum-likelihood factor loadings and error variances estimated in the confirmatory analyses can be found in Figure 1. All the items are strong indicators of the factors they are hypothesized to measure, with standardized maximum likelihood factor loadings ranging from .55 to .89.

The items on the final 16-item PETPAS scale are presented in Table 3. Ultimately, 10 of the original 17 items retained from Study 1 and 6 of the 9 items developed for Study 2 were retained for the final 16-item PETPAS scale. The final set of 4 items retained for Factor 1, Student, were derived from the original set of 6 items developed in Study 1. No new items were retained for it because no new items were developed. For Factor 2, Space, we retained 1 of the 3 items from Study 1 and kept all 3 new items developed for it in Study 2. Factor 3, Time, was composed of 3 of the 4 original items retained from Study 1, and 1 of the 3 new items developed for it in Study 2. Finally, Factor 4, Institution, was represented by 2 of the 4 original items retained from Study 1, and 2 of the 3 new items developed for it in Study 2.

Although Study 2 indicated that a four-factor model adequately described the data, we also ran a first-order one-factor model represented by all 16 items to determine whether a more parsimonious representation of the data was plausible. If a first-order one-factor model resulted in a superior fit, compared to the four-factor

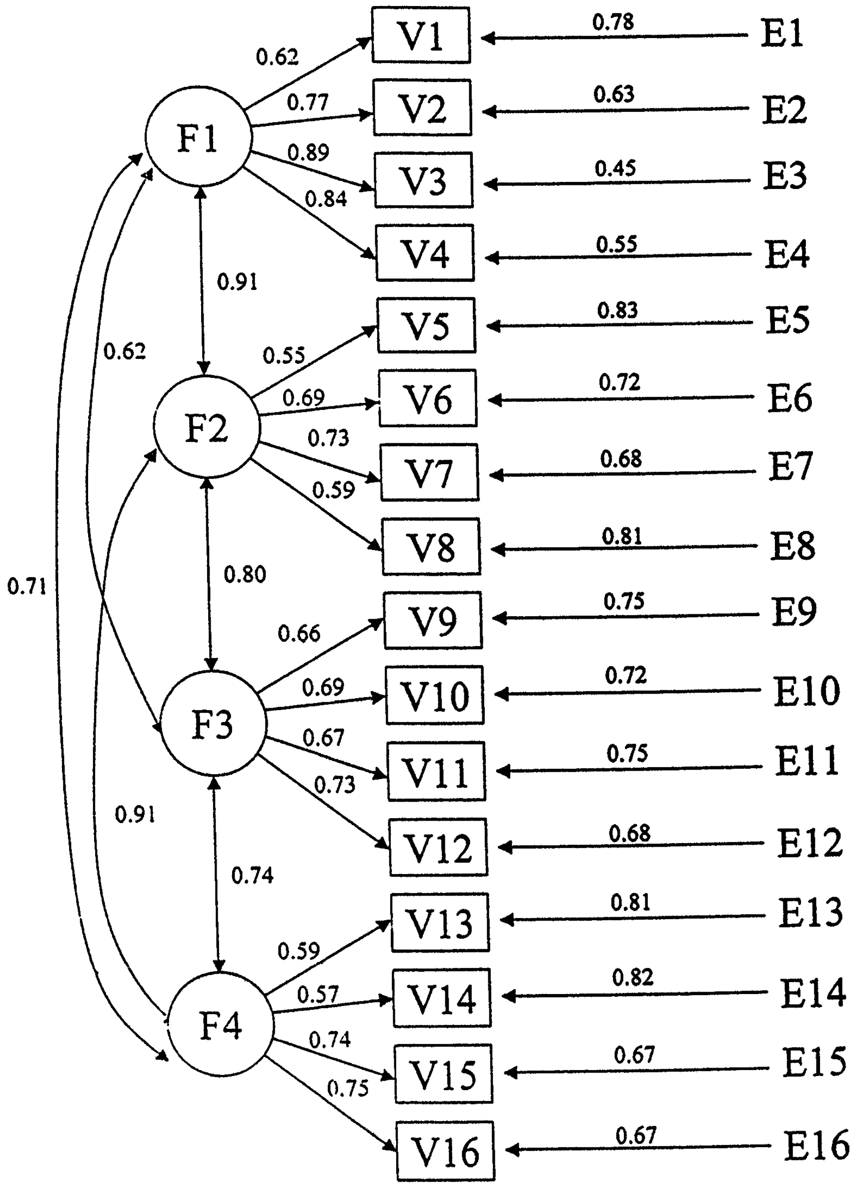

Figure 1 — PETPAS scale factors and CFA results: (i) Student (F1), Space (F2), Time (F3), and Institution (F4); (ii) One-headed arrows from factors (circles) to variables (squares) represent factor loadings; (iii) Two-headed arrows represent correlations.

Table 3 Final PETPAS Instrument

Factor 1: Student

1. My students do not enjoy spending large amounts of class time being physically active.*
2. My students are not concerned with being physically active.*
3. My students do not highly value physical education.*
4. My students do not enjoy being physically active during my classes.*

Factor 2: Space

5. My activity space is used for other purposes.**
6. I have too many students in my physical education classes.**
7. I do not have enough space for all of the students in my physical education classes.**
8. More than one class shares the gymnasium (activity facility).*

Factor 3: Time

9. My class sessions are too short in duration.*
10. My physical education classes do not meet enough times per week.*
11. I have too little contact time with my students.*
12. I do not have enough time in the semester.**

Factor 4: Institution

13. Other teachers at my school do not highly value physical education.*
14. My principal or athletic director does not provide adequate support for physical education.**
15. I do not have enough equipment for all my students to be active at once.*
16. Administrators frequently cancel my class.**

Note: * These items were developed for the 26-item scale used in Study 1 and retained in Studies 1 and 2. ** Items developed for Study 2 and retained after Study 2 analyses.

model, this would suggest that a total score based on all 16 questions would best represent teachers' efficacy. Results indicated that a first-order one-factor model composed of all 16 items was not an adequate representation of data, as the fit indexes (NFI = .78; NNFI = .79; CFI = .81) did not meet the .90 acceptable level. Thus the overall evidence suggested a favorable fit of the data to the hypothesized 16-item, four-factor model.

One final analysis was conducted to determine whether teachers ($n = 264$) who taught exclusively at the elementary (Grades 1 to 5), middle/junior (Grades 6 to 8), and high school levels differed in their efficacy judgments. Four one-way ANOVAs indicated that teachers did not differ in their efficacy judgments for the Student, $F(2, 261) = 1.05$, $p < .35$; Space, $F(2, 261) = 2.58$, $p < .08$; Time, $F(2, 261) = 1.22$, $p < .30$; or Institution factors, $F(2, 261) = .72$, $p < .49$; although the Space factor approached significance. These results suggest that the PETPAS is valid across teaching levels although, as Yun and Ulrich (2002) argue, validity evidence cannot be generalized to all situations.

Discussion

In the current study we developed a valid and reliable physical education teachers' physical activity self-efficacy (PETPAS) scale. Based on research conducted by Hodges Kulinna et al. (2002), we selected barriers commonly faced by teachers when trying to teach physically active physical education lessons. Using confirmatory factor analysis techniques, we then developed a psychometrically sound instrument that would be applicable to most teachers (elementary, middle, and high school), keep participant burden to a minimum, and provide future researchers with an instrument to assess physical education teachers' efficacy for teaching physically active lessons.

The exploratory factor analysis reported in Study 1 provided statistical support for our observation that the most common barriers teachers face when teaching physically active lessons were clustered around four areas, specifically, student, time, space, and institution characteristics. Related research also provided empirical support for these conceptual distinctions (Boggess et al., 1986; Chester & Beaudin, 1996; Guskey & Passaro, 1994; Hastie & Saunders, 1991; Hoy & Woolfolk, 1993; McBride, 1993; Ross, 1994; Smyth, 1995; Stroot et al., 1994; Wendt & Bain, 1983).

In Study 2 the PETPAS was refined and 16 questions representing four factors with 4 items per factor were ultimately selected. Structural equation modeling indicated that the data adequately fit the a priori four-factor model identified through the exploratory factor analysis in Study 1 by meeting all acceptable criteria conventionally used to evaluate model fit. Henson (2001) reports that CFA methodology, testing specific hypotheses about instrument structure, is virtually nonexistent in the development of teacher efficacy instruments. The current research effort is an initial step in addressing this shortcoming in both general education and physical education.

As Hofmann (1995) indicates, confirmatory factor analysis is a deductive process whereas the variable reduction method in the context of confirmatory factor analysis reflects an inductive approach. However, as Hofmann argues, each run of the model retains the general structure of the original model (i.e., all original variable level hypotheses are tested for items not eliminated) while eliminating the poorest fitting items and retaining the best fitting questions—a major goal of test development.

In addition to the test development information and psychometric data provided, the descriptive data also warrant comment. As Table 4 indicates, most teachers were somewhat efficacious (e.g., approximately 60% on the 0–100% scale) in their ability to overcome the barriers they faced. The large standard deviations indicate, however, that many teachers reported quite tenuous efficacy (< 50%) whereas others were much more efficacious (>70%) about being able to overcome the barriers they faced. Clearly, teachers exhibited a wide range of confidence in their ability to teach physically active lessons. Future researchers are encouraged to examine potential sources, such as previous mastery experiences, of variation in teacher efficacy.

We also encourage future researchers to continue to examine the psychometric properties of the PETPAS. The current study provides psychometric support for the PETPAS, but it is important to keep in mind that validation is a continuous process. Although the CFA analysis supported the factor structure found in the EFA, we developed new, albeit conceptually consistent, items for Study 2. Thus, in Study

Table 4 Means, *SD*, Range, and Reliability Coefficients for All Factors

Factor	*Mean*	*SD*	Range	Alpha
Student	58.95	22.12	10–100	.86
Space	55.70	22.29	10–100	.75
Time	58.98	22.10	07–100	.78
Institution	56.36	20.66	07–100	.73

2 the exact same instrument tested in Study 1 was not tested, as is conventionally done with CFA procedures. Rather, CFA procedures and accompanying fit indices were used as tools to decide which items best represented the latent factors.

A follow-up CFA with a larger sample (e.g., $N = 600$), allowing for cross-validation, would provide further information about the validity of the factor structure of the final 16-item PETPAS. We also do not know if PETPAS scores predict actual teaching behavior, and establishing such a relationship would provide further construct (predictive) validation. One limitation of the current scale is its very specific focus on efficacy cognitions related to teaching physically active lessons. However, many of the barriers, and teachers' efficacy about managing those barriers, would seem to logically hinder teachers from reaching other outcome goals for physical education classes, such as skill development. Thus, other researchers may want to explore whether the current PETPAS scale generalizes (with refinements) to teachers trying to achieve other lesson and program objectives such as motor skill development.

In conclusion, the current study represents an initial research effort aimed at understanding physical education teachers' efficacy in overcoming barriers to teaching physically active classes, defined as at least 50% of class time. The results of the current study offer preliminary support for the psychometric properties of the PETPAS. We hope that researchers interested in physical education, the sport and exercise sciences, and public health will continue to investigate this important research area.

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