7-1-2008

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Journal of Teaching in Physical Education, 2008, 27, 292-307

The Influence of Professional Development on Teachers' Psychosocial Perceptions of Teaching a Health-Related Physical Education Curriculum

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The impact of a yearlong professional development intervention on physical education teachers' psychosocial perceptions was investigated. Experienced mentor teachers (n = 15) were paired with inexperienced protégé teachers (n = 15) who helped them learn how to teach a health-related physical education curriculum (i.e., the Exemplary Physical Education Curriculum). Using the theory of planned behavior as the guiding theory, it was hypothesized that teachers would experience favorable increases in various psychological constructs (e.g., attitude) and variables reflecting the social culture of their schools (e.g., administrator's perceptions) as compared with control teachers (n = 17). A variety of statistically significant main and interaction effects with mean scores in expected directions were found. In general, mentors and protégés developed a more positive view of their own psychological state (e.g., perceived behavioral control) and of the immediate school social environment (i.e., support from administrators and fellow teachers). The significant results, combined with meaningful effect sizes, supported the effectiveness of this intervention.

Keywords: training, Exemplary Physical Education Curriculum, EPEC, mentoring

The potential of school-based interventions to improve physical education and physical activity is promising (e.g., Centers for Disease Control and Prevention [CDC], 1997; Harper, 2006), but implementing new curricular programs is not easy for teachers (Hargreaves, 1998). Teachers' interpersonal and emotional lives influence the process (Hargreaves, 1998), as well as the requirement to develop new curricular and instructional knowledge and skills (Cothran, McCaughtry, Hodges-Kulinna, & Martin, 2006). Many physical educators have been trained to provide

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a sport-based curriculum (Steinhardt, 1992) and have never received training to teach a health-related elementary physical education curriculum (Cothran et al., 2006). This study, grounded in the social-cognitive theory of planned behavior (TPB) examines the impact of a yearlong professional development program on teachers' perceptions and behaviors when implementing a health-related elementary physical education curriculum, namely, the Exemplary Physical Education Curriculum, or EPEC.

The TPB posits that individuals with strong intentions to do something are more likely to do it than individuals with weaker intentions (Ajzen, 1991, 2002). Intentions are also affected by important social groups (i.e., subjective norm), teachers' attitudes, and their perceptions of control. According to the TPB, it can be assumed that teachers with a supportive social environment, a positive attitude, and a strong sense of control over what and how they teach will develop stronger intentions to teach a health-related physical education curriculum and teach more content from the curriculum (Ajzen, 1991, 2002). The TPB has been used to study many different phenomena; for example, Hausenblas, Carron, and Mack (1997) conducted a meta-analysis on 31 studies that used the TPB to study exercise behaviors.

The TPB has been very useful in adding to the field of physical education pedagogy's knowledge base of youth physical activity determinants. For example, using the TPB model, children's psychosocial perceptions of important social groups (e.g., classmates, parents) and their perceived control over their behaviors were significant predictors of their intentions to be physically active (Martin, Oliver, & McCaughtry, 2007). Children's moderate-to-vigorous physical activity was also a significant predictor of their cardiorespiratory endurance (Martin, Kulinna, McCaughtry, Cothran, Dake, & Fahoome, 2005; Martin, et al., 2007). The TPB has also been useful in understanding teachers' intentions and behaviors related to teaching physically active classes (Martin & Kulinna, 2004, 2005). Because the TPB appears to be successful in explaining youth physical activity and teachers' intentions to teach physically active classes (i.e., 50% of class time in moderate-to-vigorous physical activity), the researchers believed it may help to improve our understanding of teachers' perceptions of learning to teach a new physical activity curriculum (EPEC) through a mentorship program.

An important aspect of this intervention was its grounding in mentoring processes (Bey & Holmes, 1990). The benefits include having mentors assist newer teachers in their transition into education (Little, 1990) and help them implement new curricula (Bey & Holmes, 1990). Mentoring programs are frequently designed to provide for one-on-one interaction between mentors and protégés (Bey & Holmes, 1990; Smith & Ingersoll, 2004). Mentoring may occur throughout the lifespan and mentoring relationships may take the form of communities of practice. Mentoring also leads to the development of new skills and insights, and mentor training programs may lead to increased mentor competence, as well as increased protégé views of the mentoring process and teaching (Ayers & Griffin, 2005).

No research studies on mentoring have used the TPB to examine how mentoring might influence teachers' thinking, in this case about learning to teach a new health-related physical education curriculum. Therefore, the purpose of the current study was to add depth to the existing literature on the effects of mentoring programs on teacher development by using the TPB to examine whether a year-long physical education intervention consisting of multiple workshops and continuous mentoring

would increase teachers' behaviors, intentions, attitudes, social groups priorities (subjective norms) and perceptions of control regarding teaching a health-related physical education curriculum, that is, EPEC. Specifically, it was hypothesized that over the course of the yearlong intervention, compared with control teachers, the mentor and protégé teachers would teach more of the health-related curriculum (both fitness activity and activity-related knowledge), gain more favorable attitudes toward it, develop stronger feelings of control, and have stronger intentions to teach the fitness activity and activity-related knowledge (similar to previous work, such as Martin & Kulinna, 2004, 2005). Furthermore, it was hypothesized that the teachers would also notice favorable increases in four important social reference groups comprising the physical education environment: administrators, parents, other teachers, and students.

Method

Procedures and Participants

Overview of the Project. Before this current project, elementary physical education teachers ($N = 30$) from a large urban school district had gone through extensive learning, experimentation, and implementation of EPEC over the previous years (McCaughtry, 2004). Fifteen teachers who effectively taught the EPEC curriculum in their schools were selected from the original pool of 30 to be trained as mentors for a new group of protégé teachers who were learning to teach the EPEC curriculum at their schools. Mentor teachers had high levels of EPEC knowledge and were observed effectively implementing the EPEC in their classes by the research team (during the previous academic years).

Protégé teachers were 15 newer elementary physical education teachers who agreed to be mentored in the EPEC. They were either newer teachers (i.e., first 3 years of teaching) or teachers new to EPEC having been recently reassigned (e.g., moved from secondary physical education to elementary physical education). In addition, all remaining elementary teachers in the district were asked to be part of a control group ($n = 60$) and 17 teachers agreed to participate.

Participants

Mentor and protégé participants were male ($n = 12$) and female ($n = 18$) and either African-American ($n = 14$) or Caucasian ($n = 15$), with one teacher indicating "Other" ($n = 1$), from a large urban school district in the Midwestern United States. The control teachers ($n = 17$) had limited exposure to EPEC (they had attended one mandatory workshop sometime during the previous 6 years). The control teachers had chosen not to adopt the curriculum and the district did not have the human resources to hold them accountable. They were recruited to participate in the current project for comparison purposes. Mentor teachers had significantly more teaching experience than protégés and controls, $F(2, 4) = 5.24$, $p < .01$. Teacher demographic information by group is available in Table 1. Reported class size averages ranged from 23 (K) to 27 (5th grade) students with all schools providing one 60-min physical education class per week. The district primarily served students with an African-American heritage (about 90%).

Table 1 Teacher Demographic Characteristics

	Gender		Ethnicity			Years teaching PE		
Teacher	Male	Female	Caucasian	African American	Other ethnicities	Range	*M*	*SD*
Protégé (n = 15)	9	6	8	6	1	0–19	5.3	5.7
Mentors (n = 15)	3	12	7	7	1	3–37	22.5	10.3
Controls (n = 17)	8	9	4	13	0	1–33	16.4	12.9

Curriculum

The district's recently adopted curriculum, the Exemplary Physical Education Curriculum (EPEC), was used in the intervention. This health-related physical education curricular program (Michigan's EPEC, 2002) has been recognized at the national level and includes content in four areas: (a) physical activity knowledge, (b) personal/social skills, (c) motor skills, and (d) physical activity and fitness.

Workshops

All teachers had participated in one mandatory district workshop on the EPEC conducted by the Michigan Fitness Foundation (MFF), a state-level organization and EPEC headquarters before the intervention. In the current project, the MFF presented one workshop to the protégé teachers in October. Protégés also received curriculum materials (e.g., manuals and posters) and all the physical education equipment (e.g., balls and cones) needed to teach the EPEC.

Subsequent workshops were conducted by the research team. The 15 mentor teachers attended a daylong workshop in November to learn how to mentor their protégés. The sessions were dialogical, and teachers discussed mentoring principles, the struggles of new teachers, the difficulties of learning to teach the EPEC, and how to communicate effectively.

Both mentors and protégés together attended three additional workshops (December, January, March) covering EPEC content and technology. At the workshops, mentors and protégés peer-taught EPEC lessons to one another. Mentor–protégé teams also met and discussed topics of individual interest. The mentor–protégé pairs also participated in videotape analyses of the protégé teaching, 1-day school visits to both schools, and regular chat room discussions (monitored by research staff) as part of the intervention.

Data Collection and Instruments

Control teachers were individually visited by the research team at their schools to collect pretest and posttest TPB and demographic data. Data collection took place at the beginning of the initial workshops for the protégés (EPEC content workshop) and mentors (mentoring training workshop) in October/November. The protégé and mentor teachers were also visited at their schools at the end of the school year to obtain the postintervention data in May/June.

Teachers completed a TPB questionnaire and reported their gender, age, ethnic background, and years of teaching experience. The development of items for the TPB questionnaire followed the same guidelines that have been used by numerous researchers that have measured variables from the TPB for the last 25 years (e.g., Ajzen, 1991, 2002; Fishbein & Ajzen, 1975; Martin & Kulinna, 2004, 2005).

The following paragraphs describe in detail the instrumentation and provide evidence that the TPB scales produced reliable and valid scores. Teachers completed two sets of similar TPB scales. The instrument comprised descriptions and outcomes directly from the curriculum. The first set of scales defined EPEC Fitness Activity as including activities in four areas: aerobic fitness (e.g., exercise up to 12 min), arm/shoulder strength (i.e., modified push-ups), hip/low back flexibility (i.e., sit and lean stretch), and abdominal/low back strength (i.e., abdominal curls). This scale consisted of 24 TPB items about teaching EPEC fitness activity content, for example "providing EPEC fitness activity during my lesson is" with the opposing adjectives of *harmful/beneficial*.

The second set of scales included the same 24 TPB items except they were modified to pertain to teaching EPEC Activity-Related Knowledge. They included a description of EPEC activity-related knowledge and presented the beneficial effects of activity such as (a) heart function; (b) heart rate and activity; (c) lung function, respiration, and activity; (d) temperature and activity; (e) aerobic fitness and activity; (f) muscular fitness and activity; (g) psychological well-being and activity; (h) physical well-being and activity; (i) effects of activity on fitness; and (j) effects of activity on well-being. This scale consisted of 24 TPB questions about EPEC activity-related knowledge.

TPB Instruments. In the following discussion of the TPB instruments, all sections of the instrument are described using the EPEC Fitness Activity set of questions (see also Table 2). Readers please be advised that the second set of questions were identical except for the substitution of EPEC Activity-Related Knowledge in the place of EPEC Fitness Activity.

Intention (I). Teachers responded to five questions on a 7-point Likert-type scale for intention. The statements used are consistent with Ajzen (1991, 2002) and have been successfully used to measure exercise intention (e.g., Dzewaltowski, 1989). An example question is, "I am determined to teach lessons that provide EPEC fitness activity" with the anchors of *definitely false/definitely true*.

Attitude (AT). Seven questions were used as suggested by Ajzen (1991, 2002) to assess attitude with scoring based on a 7-point Likert scale. Teachers responded to seven sets of anchors for the stem "Providing EPEC fitness activity during my lesson is. . . ." Three examples of anchors are *unenjoyable/enjoyable*, *unhealthy/healthy*, and *bad/good*.

Perceived Behavioral Control (PBC). The PBC scale was modeled after similar scales used in previous studies (e.g., Ajzen & Madden, 1986; Dzewaltowski, Noble, & Shaw, 1990; Yordy & Lent, 1993) and asked participants to respond to three statements, such as, "If I want to, I can teach EPEC fitness activity in my lessons," with *strongly disagree* and *strongly agree* anchoring a 7-point Likert-type scale.

Table 2 Items from the TPB Instrument

Item	Anchors
Providing **EPEC Fitness Activity** during my lessons is	bad / good
Providing **EPEC Fitness Activity** during my lessons is	unpleasant / pleasant
Providing **EPEC Fitness Activity** during my lessons is	harmful / beneficial
Providing **EPEC Fitness Activity** during my lessons is	useless / useful
Providing **EPEC Fitness Activity** during my lessons is	unenjoyable / enjoyable
Providing **EPEC Fitness Activity** during my lessons is	unhealthy / healthy
Providing **EPEC Fitness Activity** during my lessons is	not important / important
The administrators (e.g., principal, supervisor) at my school believe that it is important that I include **EPEC Fitness Activity** in my lessons.	strongly disagree / strongly agree
How motivated are you to comply with the belief of your school's administrators (e.g., principal, supervisor) that you should include **EPEC Fitness Activity** in your lessons?	not at all motivated / extremely motivated
The parents of students at my school believe that it is important that I include **EPEC Fitness Activity** in my lessons.	strongly disagree / strongly agree
How motivated are you to comply with the belief of your students' parents that you should include **EPEC Fitness Activity** in your lessons.	not at all motivated / extremely motivated
The other teachers at my school believe that it is important that I include **EPEC Fitness Activity** in my lessons.	strongly disagree / strongly agree
How motivated are you to comply with the belief of your fellow teachers that you should include **EPEC Fitness Activity** in your lessons?	not at all motivated / extremely motivated
The students in my classes believe that it is important that I include **EPEC Fitness Activity** in my lessons.	strongly disagree / strongly agree
How motivated are you to comply with the belief of your students that you should include **EPEC Fitness Activity** in your lessons?	not at all motivated / extremely motivated
How much control do you have over whether you teach **EPEC Fitness Activity** in your lessons?	absolutely no control / complete control
It is mostly up to me whether I teach **EPEC Fitness Activity** in my lessons.	strongly disagree / strongly agree
If I want to, I can teach **EPEC Fitness Activity** in my lessons.	strongly disagree / strongly agree
I intend to teach lessons that provide **EPEC Fitness Activity.**	definitely do not / definitely do
I will try to teach lessons that provide **EPEC Fitness Activity**.	definitely will not / definitely will
I am determined to teach lessons that provide **EPEC Fitness Activity**.	definitely false / definitely true
I plan to teach lessons that provide **EPEC Fitness Activity**.	definitely do not / definitely do
I have decided to teach lessons that provide **EPEC Fitness Activity**.	definitely false / definitely true
In the last month, how often have you taught **EPEC Fitness Activity** in your classes?	no classes / all of my classes

Note. All items used 7-point scales except the final item, which used a 6-point scale.

Subjective norm (SN). Subjective norm was determined by examining teachers' perceptions of the beliefs of four groups of important social influences—their administrators, parents, other teachers, and students—in the same way as previous studies investigating important social influences have measured this construct (e.g., Chester & Beaudin, 1996; Hoover-Dempsey, Bassler, & Brissie 1987; Hoy & Woolfolk, 1993). Eight items were used to measure this variable and, as stipulated by the TPB, subjective norm was determined by multiplying teachers' perceptions of important social groups' beliefs by their motivation to comply with those beliefs. An example of one pair of items, with appropriate anchors following, was, "The parents of the students at my school believe that it is important that I include EPEC fitness activity in my lessons" (*strongly disagree/strongly agree*) and "How motivated are you to comply with the belief of your students' parents that you should include EPEC fitness activity in your lessons?" (*not at all motivated/extremely motivated*). Participants responded on a 7-point Likert-type scale. Answers for each question in a pair were multiplied together, resulting in scores ranging from 0 to 49 for each of the four social groups. Social group scores were then divided by 7 to put them on the same scale as the other measures (i.e., 0–7) for Tables 5 and 6.

Behavior (B). A 1-item scale was used to assess self-reported teaching behavior. Teachers were asked, "In the last month, how often have you taught EPEC fitness activities in your classes?" *No classes* and *all of my classes* anchored the 6-point Likert behavioral scales.

Convergent Validity and Internal Consistency. Convergent validity in the current study is demonstrated in two ways. First, through the positive and significant correlations among the TPB variables for both teaching EPEC fitness activity (ranging from .44 to .95) and for teaching EPEC activity-related knowledge (ranging from .35 to .94). Second, the two instruments (fitness activity and activity-related knowledge) are highly correlated on the measures for the same constructs (e.g., attitude), with correlations ranging from .88 for subjective norm for "other teachers" to .96 for attitude. Based on the correlational results and the large body of research establishing validity of scores from the instruments measuring the TPB constructs described earlier, the research team was confident in the validity of scores from the present instruments. Internal consistency scores were also calculated for each scale (see analyses/results sections and Tables 3 and 4).

Data Analysis

Data were screened for incorrect entries (through frequencies and fixed errors) or missing data (and concluded that little missing data were found). Next the internal consistency reliability of the measures was examined along with descriptive statistics conducted for all measures at the pre- and postassessment periods. Then two repeated-measures multivariate analyses of variance analyses (RM-MANOVAs) were conducted to test for changes in the EPEC fitness activity and activity-related knowledge dependent measures across the three groups over time. Finally, a series of follow-up RM-ANOVAs and ANCOVAs were run to examine differences across teacher groups on the dependent measures of EPEC fitness activity and EPEC activity-related knowledge followed by Tukey post hoc tests.

Table 3 Correlations Among Constructs of the Theory of Planned Behavior—Teaching Fitness Activity

	Attitude	Control	Intention	Behavior	SN1	SN2	SN3	α
Attitude								.99
Control	.92							.98
Intention	.94	.87						.99
Behavior	.71	.66	.76					
SN1	.54	.44	.56	.44				
SN2	.51	.46	.53	.51	.87			
SN3	.58	.54	.61	.61	.82	.92		
SN4	.66	.59	.68	.74	.64	.77	.75	
SN total	.63	.55	.67	.62	.91	.97	.95	.90

Note. SN1 = subjective norm administrators; SN2 = subjective norm parents; SN3 = subjective norm teachers; SN4 = students. All correlations significant at $p < .01$; α values from posttesting; no α values for behavior and SN1–SN4 owing to one-two items variables.

Table 4 Correlations Among Constructs of the Theory of Planned Behavior—Teaching Activity Knowledge

	Attitude	Control	Intention	Behavior	SN1	SN2	SN3	α
Attitude								.99
Control	.87							.99
Intention	.91	.83						.99
Behavior	.68	.62	.75					
SN1	.51	.45	.49	.35				
SN2	.58	.50	.54	.53	.77			
SN3	.62	.55	.59	.52	.80	.84		
SN4	.68	.58	.64	.69	.66	.86	.81	
SN Total	.65	.57	.61	.57	.89	.94	.94	.90

Note. SN1 = subjective norm administrators; SN2 = subjective norm parents;SN3 = subjective norm teachers; SN4 = students. All correlations significant at $p < .01$; α values from posttesting; no α values for behavior and SN1–SN4 owing to one-two items variables.

Results

Descriptive Statistics for Mentors, Protégés, and Controls

Pre and Post Scores. All instruments had acceptable internal consistency reliability (see Tables 3 and 4). Means and standard deviations for each of the three groups on all instruments can be found in Tables 5 and 6. Intervention teachers' (i.e., both protégés and mentors) scores for the TPB variables at posttest suggest that these teachers held positive attitudes toward teaching EPEC fitness activity and EPEC activity-related knowledge, and had a strong sense of control over their ability to teach EPEC fitness activity and EPEC activity-related knowledge. Furthermore,

Table 5 Mentor, Protégé, and Control Teacher's Means and *SD*s for Teaching Fitness Activity

	Pre						Post					
	Mentor		Protégé		Control		Mentor		Protégé		Control	
TPB construct	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Subjective norm (*M*)	3.21	1.70	3.37	1.63	4.22	1.58	3.52*	2.08	3.41*	1.60	2.23	.98
Administrators	3.17	2.15	4.30	1.90	4.80	2.39	3.59	2.64	4.05	2.02	1.68	1.82
Parents	3.10	2.00	3.17	1.98	3.82	2.22	3.21	2.55	3.23	1.81	1.32	1.37
Teachers	2.71	1.92	3.32	1.88	3.82	2.14	3.41	2.33	3.43	1.61	1.23	1.32
Students	3.86	2.11	3.12	1.89	4.43	1.99	4.89	1.62	2.97	1.99	1.29	1.33
Attitude	6.07	1.12	6.38	.60	6.59	.35	6.80*	.37	6.52*	.51	3.44	2.03
Control	6.58	.79	6.44	.91	6.92	.22	6.98*	.09	6.80*	.37	3.65	2.24
Intention	6.47	.50	6.27	.69	6.32	1.51	6.76*	.70	6.64*	.44	2.77	1.81
Behavior	4.40	1.55	1.36	1.08	5.18	1.70	4.73*	1.22	3.40*	1.06	1.38	1.26

Note. Range for the TPB constructs was 1–7; for behavior, 1–6.

*Significantly different from control group at $p < .05$.

Table 6 Mentor, Protégé, and Control Teacher's Means and *SD*s for Teaching Activity-Related Knowledge

	Pre						Post					
	Mentor		Protégé		Control		Mentor		Protégé		Control	
TPB construct	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Subjective norm (*M*)	3.11	1.57	3.76	1.70	3.46	2.39	3.88*	1.96	3.54*	2.26	1.33	1.20
Administrators	3.35	2.18	4.40	2.10	4.26	2.79	3.66	2.90	3.94	2.49	1.48	1.43
Parents	3.23	1.96	3.31	2.10	3.26	2.69	3.54	2.38	3.26	2.18	1.19	1.13
Teachers	2.55	1.43	3.97	1.76	3.14	2.53	3.79	2.29	3.62	2.22	1.30	1.33
Students	3.31	1.89	3.34	1.89	3.17	2.36	4.53	1.73	3.36	2.57	1.34	1.62
Attitude	6.47	.46	6.16	.81	5.94	1.43	6.87*	.27	6.31*	.89	3.44	2.06
Control	6.44	.98	6.49	.95	6.98	.08	6.98*	.09	6.82*	.38	3.65	2.43
Intention	6.49	.64	6.15	.73	5.48	1.89	6.80*	.59	6.41*	.88	2.58	1.64
Behavior	4.23	1.58	1.36	1.08	4.53	1.70	4.67*	1.23	3.07	1.10	1.38	1.26

Note. Range for the TPB constructs was 1–7; for behavior, 1–6.

*Significantly different from control group at $p < .05$.

they perceived that significant others (i.e., administrators, other teachers, parents, students) thought that it was somewhat important for them to teach EPEC fitness activity and EPEC activity-related knowledge. Intervention teachers also reported strong intentions to teach EPEC fitness activity and EPEC activity-related knowledge and reported that they had taught the curricular content in "quite a few classes" over the last month (items ranged 1 = *no classes* to 6 = *all of my classes*).

Group Differences

RM-MANOVAs. First, two overall RM-MANOVAs were conducted to investigate pre/post differences among the groups on the dependent measures (i.e., attitude, subjective norm, perceived behavioral control, intention, behavior) for EPEC fitness activity and for EPEC activity-related knowledge. The mentors, protégés, and control teacher groups were significantly different on teaching EPEC fitness activity; that is, there was a significant Group × Time interaction, $F(10, 76) = 12.51$, $p < .01$; partial eta squared, $\eta = .62$. A Group × Time interaction was also found for teaching EPEC activity-related knowledge, $F(10, 76) = 8.72$, $p < .01$; $\eta = .53$.

RM-ANOVAs and ANCOVAs. Repeated-measures ANOVA tests were then performed to investigate group differences on the dependent measures followed by Tukey post hoc tests. Group differences were present at pretest for the dependent measures of subjective norm (social influence) and behavior (with control teachers lower in reported subjective norm and higher in reported teaching behaviors than both mentors and protégés). Therefore, ANCOVA tests were used for these two analyses (controlling for pretest values). Because post hoc tests are only performed on unadjusted means, they are not calculated for the two ANCOVA analyses.

Attitude. For attitude toward teaching EPEC fitness activity, the RM-ANOVA results showed a significant Group × Time interaction, $F(2, 43) = 30.35$, $p < .01$, $\eta = .59$. Post hoc tests indicated a significant difference ($p < .01$) between protégés and controls as well as between mentors and controls at the posttest, with controls scoring lower. An examination of the means shows that both intervention groups increased their attitudes toward teaching EPEC fitness activity over the year, whereas the control group decreased in attitude. Similarly, for attitude toward teaching EPEC activity-related knowledge, a significant Group × Time interaction was present, $F(2, 43) = 15.49$, $p = .01$, $\eta = .42$, also suggesting differences among the groups over time. Post hoc differences were also present between the control group and the intervention groups, with the protégé and mentor groups both increasing in their attitudes toward teaching EPEC activity-related knowledge, whereas the control group teachers' attitudes decreased across the school year.

Perceived Behavioral Control. Significant Group × Time interactions were also found for both teachers' perceived behavioral control for teaching EPEC fitness activity, $F(2, 43) = 31.27$, $p < .01$, $\eta = .59$, and for teaching EPEC activity-related knowledge, $F(2, 43) = 28.72$, $p < .01$, $\eta = .57$. Post hoc analyses suggested that protégé and mentor teachers both increased in their perceptions of control over the project, whereas control teachers' perceptions of control over teaching EPEC fitness activity and teaching EPEC activity-related knowledge decreased over the intervention.

Intentions. RM-ANOVA results for intentions indicated a significant Group × Time interaction in teachers' intention to teach EPEC fitness activity, $F(2, 43) = 42.52$, $p < .01$, $\eta = .66$. Post hoc results indicated that intervention teachers increased in their intentions to teach EPEC fitness activity, whereas control teachers' intentions decreased. RM-ANOVA results for teachers' intentions to teach EPEC activity-related knowledge were similar with a significant Group × Time interaction, $F(2, 43) = 19.23$, $p < .01$, $\eta = .47$). Post hoc differences among the groups showed intervention teachers increasing in intentions to teach EPEC activity-related knowledge over time, whereas control teachers' intentions decreased.

Behavior. Greater intentions appear to have led to more teaching behaviors, particularly with the mentor teachers. ANCOVA results indicated that the groups were significantly different at posttest in self-reported EPEC fitness activity taught over the last month, $F(2, 41) = 34.96$, $p < .01$, $\eta = .63$, as well as in EPEC activity-related knowledge, $F(2, 41) = 29.09$, $p < .01$, $\eta = .59$, with mentors teachers tending to report more content taught than protégés and with protégés tending to report more content taught than control teachers.

Subjective Norm. For SN, ANCOVA results indicated that the groups were significantly different at posttest in subjective norm related to teaching EPEC fitness activity, $F(2, 41) = 11.95$, $p < .01$, $\eta = .37$, with control teachers reporting social influences as less influential than protégés and mentors. In a similar vein, groups were also significantly different in subjective norm related to teaching EPEC activity-related knowledge at posttest, $F(2, 41) = 12.62$, $p < .01$, $\eta = .38$, and again lower levels of social influence were reported by control teachers. At posttest, mentors tended to rank students higher, followed by administrators, other teachers, and parents, whereas protégés tended to rank administrators higher, followed by teachers, parents, and students. The mentor teachers appeared to have the most favorable increases in perceptions of the four important social reference groups comprising the physical education environment because their scores positively changed for all four social reference groups related to teaching EPEC fitness activity and activity-related knowledge. Protégé teachers had favorable changes in perceptions of social reference groups for EPEC fitness activity and a slight decrease in social group perceptions of teaching EPEC activity-related knowledge.

Discussion

The purpose of this study was to determine how a yearlong mentoring-based professional development intervention influenced teachers' psychosocial perceptions about teaching a new health-related physical education curriculum, that is, EPEC. These findings were quite supportive of the beneficial impact of the intervention activities because all 12 major analyses indicated either main effects over time or interaction effects with mean scores mostly in the predicted direction (i.e., improved psychosocial perceptions). The mentor and protégé teachers involved in the intervention showed increases in attitude, perceived behavioral control, intention, teaching behavior, and some positive changes in social group influence across the project, whereas control teachers perceptions were stable or decreased.

Previous school-based research findings have shown similar positive findings. Studies in school settings have shown positive outcomes related to increasing teachers' efficacy toward teaching curriculum objectives and involving the community in school reform efforts (Martin, McCaughtry, Hodges-Kulinna, & Cothran, 2008), as well as increasing teachers' efficacy toward using technology (Martin, McCaughtry, Kulinna, Cothran, & Faust, 2008). Other studies have used the TPB with classroom teachers to predict their intentions to teach physical education (Faulkner, Reeves, & Chedzoy, 2004), as well as to examine their intentions and behaviors related to exercising (Chi & Shu, 2002) and exercise behavior in general (Hausenblas et al., 1997).

The findings from the current study support the use of the TPB variables to frame intervention studies aimed at increasing psychosocial perceptions of teachers toward teaching health-related physical education curriculum. More research is needed, however, on how interventions might influence psychosocial perceptions with different curricular models (Schempp, Dorgo, Hall, Liu, & Smith, 2000). It is also encouraging that the curriculum used in this project has shown improved students' fitness and personal/social outcomes (Kulinna, Zhu, Kuntzleman, & DeJong, 2006).

In addition to being statistically significant, these program effectiveness findings were also meaningful, as the effect sizes were moderate (i.e., .37–.66). It should be noted that the effect sizes are based on "partial" eta squared values, which usually account for a larger amount of variance compared with "classical" eta squared values (Pierce, Block, & Aguinis, 2004).

The ANCOVA results for teaching behaviors indicated group differences were present with mentor and protégé teachers reporting much higher levels of teaching EPEC fitness activities and activity-related knowledge than control teachers at postintervention. Because mentor teachers' behaviors were high at pretest, they reported slightly higher behaviors at posttest, whereas protégé teachers were low at pretest and made significant progress in teaching more EPEC fitness activities and activity-related knowledge content.

Interestingly, the control teachers reported teaching high levels of content at pretest and low levels of content at posttest. This may be attributed to control teachers' optimism and energy at the beginning of the school year followed by many ongoing challenges that were difficult to handle without support whereas our intervention participants had worked in highly supportive mentor/protégé teams.

Mentor and protégé teachers also had very strong intentions to teach EPEC fitness activity and activity-related knowledge, similar to previous cross-sectional studies of teachers' intentions to provide physically active physical education classes (Martin & Kulinna, 2004, 2005). In the current intervention study, teachers' intentions were related to their self-reported behaviors. Teachers' reported teaching this curriculum content "quite often." This is encouraging because researchers have had difficulty supporting the intention to behavior link (Norman & Conner, 2005).

Social influence differences may be due to teachers' previous experience, with mentor teachers having significantly more teaching experience. The powerful influence of students on teacher behavior has been demonstrated in previous studies of mathematics (Raymond, 1997) and physical education teachers (Cothran & Ennis, 1997). Chen and Rovegno (2000) also found expert teachers were more

likely to facilitate constructivist-oriented teaching practices such as linking new learning to students' previous knowledge and emerging relevance. Newer teachers may be particularly sensitive to the wishes of adult figures such as administrators, fellow teachers, and parents. O'Sullivan (1989) found that first-year teachers were respected for managing their classes effectively, rather than for their instructional capabilities.

At the end of the project, parents were the least influential social reference group for mentors, protégés, and control teachers for teaching EPEC activity-related knowledge. This suggests that parents may not have inquired about student knowledge gains from the teachers' physical education programs. It is critical that students gain knowledge in this content area to develop healthy and active lifestyles. Researchers have shown that youth have many misconceptions about physical activity and fitness concepts (e.g., Kulinna & Zhu, 2001; Placek, Griffin, Dodds, Raymond, Tremino, & James, 2001).

Before concluding, a couple of limitations of the current study should be acknowledged. First, generalizations from this study should be made with caution because of the small sample size. Second, owing to the multicomponent study design (such as in-service workshops and mentoring pairs), the data do not provide information identifying a particular component of the intervention that was the most effective in increasing teachers' psychosocial perceptions. Although it is beyond the scope of this investigation to explain, it is interesting to speculate about what may have caused the intervention differences. Was it knowledge and experience alone that provided the teachers with greater feelings of control? Or was it the social support mechanisms provided by the mentoring? Or was it some combination of both? Additional work in this area testing the prediction model (i.e., how well attitudes, subjective norm and perceived control predict teachers intentions and behavior) across groups could also contribute to our understanding of intervention program outcomes.

To conclude, this study is one of the first to examine the impact of a mentoring intervention program on the TPB constructs toward teaching a health-related physical education curriculum. It was found that the intervention program was successful in providing the needed support for teachers to favorably increase their psychosocial perceptions. Positive psychosocial changes were found with the intervention teachers (mentors and protégés) for all of the TPB model predictor variables (attitude, subjective norm, perceived behavior control), as well as for teachers' intentions to teach EPEC fitness activity and activity-related knowledge content and their self-reported teaching behaviors. These findings support the use of the TPB for framing intervention efforts and can inform future physical education teacher in-service programming.

Acknowledgments

This study was conducted as part of a larger project called the *Detroit Healthy Youth Initiative* funded by a Carol M. White Physical Education Program (PEP) grant. The contents of this report were developed under a grant from the U.S. Department of Education. However, those contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the federal government.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* 179–211.

Ajzen, I. (2002). Constructing a TPB questionnaire: Conceptual and methodological considerations. Retrieved September 1, 2004, from http://www-unix.oit.umass.edu/~aizen/

Ajzen, I., & Madden, T.J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology, 22,* 453–474.

Ayers, S., & Griffin, L.L. (2005). Chapter 5: PETE mentoring as a mosaic [monograph]. *Journal of Teaching in Physical Education, 24*, 368–379.

Bey, T.M., & Holmes, C.T. (Eds.). (1990). *Mentoring: Developing successful new teachers*. Reston, VA: Association of Teacher Educators.

Centers for Disease Control and Prevention (CDC). (1997). Guidelines for School and Community Programs to Promote Lifelong Physical Activity Among Young People. *Morbidity and Mortality Weekly Report, 46,* 1–36.

Chen, W., & Rovegno, I. (2000). Examination of expert and novice teachers' constructivist-orientated teaching practices using a movement approach to elementary physical education. *Research Quarterly for Exercise and Sport, 71,* 357–372.

Chester, M.D., & Beaudin, B.Q. (1996). Efficacy beliefs of newly hired teachers in urban schools. *American Educational Research Journal, 33,* 233–257.

Chi, L., & Shu, J.C. (2002). Prediction of regular exercise intention and behavior among elementary school teachers: Test of the theory of planned behavior. *Journal of Sport and Exercise Psychology, 24*(Suppl.), S44–S45.

Cothran, D.J., & Ennis, C.D. (1997). Students' and teachers' perceptions of conflict and power. *Teaching and Teacher Education, 13,* 541–554.

Cothran, D.J., McCaughtry, N., Hodges-Kulinna, P.H., & Martin, J. (2006). Top-down public health curricular change: The experience of physical education teachers in the United States. *Journal of In-service Education, 32*(4), 533–547.

Dzewaltowski, D.A. (1989). Towards a model of exercise motivation. *Journal of Sport and Exercise Psychology, 11,* 251–269.

Dzewaltowski, D.A., Noble, J.M., & Shaw, J.M. (1990). Physical activity participation: Social cognitive theory versus the theories of reasoned action and planned behavior. *Journal of Sport and Exercise Psychology, 12,* 388–405.

Faulkner, G., Reeves, C., & Chedzoy, S. (2004). Nonspecialist, preservice primary-school teachers: predicting intentions to teach physical education. *Journal of Teaching in Physical Education, 23*, 200–215.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Hargreaves, A. (1998). The emotional practice of teaching. *Teaching and Teacher Education, 14,* 835–854.

Harper, M.G. (2006). Childhood obesity strategies for prevention. *Family & Community Health, 29*(4), 288–298.

Hausenblas, H.A., Carron, A.V., & Mack, D.E. (1997). Application of the theories of reasoned action and planned behavior to exercise behavior: A meta-analysis. *Journal of Sport and Exercise Psychology, 19,* 36–51.

Hoover-Dempsey, K.V., Bassler, O.C., & Brissie, J.S. (1987). Parent involvement: Contributions of teacher efficacy, school socioeconomic status, and other school characteristics. *American Educational Research Journal, 24,* 417–435.

Hoy, W.K., & Woolfolk, A.E. (1993). Teachers' sense of efficacy and the organizational health of schools. *Elementary School Journal, 93,* 355–372.

Kulinna, P.H., & Zhu, W. (2001). Fitness portfolio calibration for first through sixth- grade children. *Research Quarterly for Exercise and Sport, 72,* 324–334.

Kulinna, P.H., Zhu, W., Kuntzleman, C., & DeJong, G. (2006). Evaluating multilevel school data: An example using HLM to study a physical activity curriculum. *International Journal of Physical Education, 43*, 109–121.

Little, J.W. (1990). The mentor phenomenon and the social organization of teaching. *Review of Research in Education, 16,* 297–351.

Martin, J.J., & Kulinna, P.H. (2004). Self-efficacy theory and the theory of planned behavior: Teaching physically active physical education classes. *Research Quarterly for Exercise and Sport, 75,* 288–297.

Martin, J.J., & Kulinna, P.H. (2005). A social cognitive perspective of physical-activity-related behavior in physical education. *Journal of Teaching in Physical Education, 24,* 265–282.

Martin, J.J., Kulinna, P.H., McCaughtry, N., Cothran, D., Dake, J., & Fahoome, G. (2005). The theory of planned behavior: Predicting physical activity and cardiorespiratory fitness in African American children. *Journal of Sport and Exercise Psychology, 2*, 456–469.

Martin, J.J., McCaughtry, N., Kulinna, P.H., & Cothran, D. (2008). The effectiveness of a physical activity-based physical education intervention on teacher self-efficacy. *Physical Education and Sport Pedagogy, 13,* 68–82.

Martin, J. J., McCaughtry, N., Kulinna, Cothran, D., & Faust, R. (2008). The effectiveness of a mentoring based physical education intervention on pedometer and computer efficacy and anxiety. *Journal of Teaching in Physical Education, 27,* 68–82.

Martin, J.J., Oliver, K., & McCaughtry, N. (2007). The theory of planned behavior: Predicting physical activity in Mexican American children. *Journal of Sport and Exercise Psychology, 29,* 225–238.

McCaughtry, N. (2004, April). *Pedagogy Symposium: The Detroit Healthy Youth Initiative*. Paper presented at the American Alliance for Health, Physical Education, Recreation and Dance, New Orleans, LA.

Michigan's Exemplary Physical Education Curriculum (EPEC). (2002). *EPEC lessons: Grades K, 1, 2, 3, 4, 5, and user's manual*. Lansing, MI: Michigan Fitness Foundation.

Norman, P., & Conner, M. (2005). The theory of planned behavior and exercise: Evidence for the mediating and moderating roles of planning on intention-behavior relationships. *Journal of Sport and Exercise Psychology, 27,* 488–504.

O'Sullivan, M. (1989). Failing gym is like failing lunch or recess: Two beginning teachers' struggle for legitimacy. *Journal of Teaching in Physical Education, 8,* 227–242.

Pierce, C.A., Block, R.A., & Aguinis, H. (2004). Cautionary note on reporting eta-squared values from multifactor anova designs. *Educational and Psychological Measurement, 64,* 916–924.

Placek, J.H., Griffin, L.L., Dodds, P., Raymond, C., Tremino, F., & James, A. (2001). Middle school students' conceptions of fitness: The long road to a healthy lifestyle. *Journal of Teaching in Physical Education, 20,* 314–323.

Raymond, A.M. (1997). Inconsistency between a beginning elementary schools teacher's mathematics beliefs and teaching practices. *Journal for Research in Mathematics Education, 28,* 550–576.

Schempp, P.G., Dorgo, S., Hall, T., Liu, W., & Smith, M. (2000). A review of curriculum scholarship in Physical Education (1998-2000): Analyzing innovations. *International Journal of Physical Education, 37*, 84–93.

Smith, T.M., & Ingersoll, R.M. (2004). What are the effects of induction and mentoring on beginning teacher turnover? *American Educational Research Journal, 41,* 681–714.

Steinhardt, M.A. (1992). Physical Education. In P. Jackson (Ed.), *Handbook of Research on Curriculum* (pp. 964–1001). New York: MacMillan Publishing.

Yordy, G.A., & Lent, R.W. (1993). Predicting aerobic exercise participation: Social cognitive, reasoned action, and planned behavior models. *Journal of Sport and Exercise Psychology, 15,* 363–374.