PHYSICAL EDUCATORS' PERCEPTIONS ABOUT PHYSICAL EDUCATION: AN ANALYSIS OF THE PROSPECTIVE AND PRACTISING TEACHER

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Paper Presented at The Annual Conference of the Australian Association for Research in Education in Brisbane, December 2002.

Prospective teachers enter teacher training with a broad range of experiences affecting attitudes and beliefs about methods of teaching and the value of different subjects. The existence of quality physical education (PE) programs depends largely on the way PE is perceived and valued by those with responsibility for its teaching. This paper reports on the use of four constructs to measure both specialist (n=196) and non-specialist (n=485) teachers' attitudes and beliefs about the teaching of primary school PE. Data were collected from 570 preservice teachers in 2nd, 3rd and 4th year at the University of Newcastle and 111 inservice teachers from state and private schools within New South Wales. The interaction between gender, year level and specialisation was investigated for each attitudinal measure. As hypothesised, non-specialist teachers had significantly lower scores on all measures than specialists. However, post-hoc examination revealed a contrasting pattern of attitudinal development from preservice to inservice. Although non-specialist scores for all constructs were higher for more advanced cohorts in preservice education, their scores were consistently lower at the inservice level. Conversely, specialist scores were higher through preservice to inservice. Gender differences also emerged. The relevance of these findings to teacher educators and the importance of continuing professional development for inservice teachers will be discussed.

INTRODUCTION

The Teacher of Primary School Physical Education

The educational justification of physical education at the primary school level has been well promoted. It is evident that primary school students are at an optimal age in terms of motor skill learning (Anshel, 1990; Ashton, 1988; Branta, Haubenstricker, & Seefeldt, 1984; Gabbard, 1992), developing physical activity habits (Sallis et al., 1992) and for the formation of attitudes regarding physical activity and physical education (Piéron, Telama, Almond, & Carreiro da Costa, 1997). Although recognised as one of the most valuable and important vehicles for encouraging and teaching children to lead active lifestyles, primary school physical education is inhibited by low status, reduced time in the school curriculum, and poor quality programs (Hardman & Marshall, 2001). Primary school physical education in Australia has suffered considerable criticism, with many doubts about the status of the subject and the quality of teaching (see for example Gard & Fry, 1997; Hardman, 2000; Hardman & Marshall, 2001; Moore, 1994; Senate Standing Committee on Environment, Recreation and the Arts [SSCERA], 1992; Smith, 1993; Thompson, 1996; Tinning, 1992;

Tinning, Kirk, & Evans, 1993). It appears that school physical education often fails to provide children with the opportunity to develop physical competencies and positive attitudes to physical activity.

In many Australian primary schools, classroom teachers have total responsibility for the physical education instruction of their students (although specialists are used in some non-state and a minimal amount of state schools, for example, Queensland and Tasmania). However, several Australian studies have described the lack of qualifications of classroom teachers to deliver physical education programs, largely as a result of inadequate teacher training in physical education (Moore, Webb, & Dickson, 1997; Thompson, 1996; Walkley, 1992; Webb, Moore, Gray, & Jessup, 1993). Over the past 40 years, researchers have investigated whether differently trained teachers have similar success in the attainment of appropriate educational outcomes for primary physical education programs. In general, literature has supported the conclusion that primary school children taught by physical education specialists demonstrate significantly better levels of achievement in most outcome measures than those who are taught by non-specialists. For example, superior scores for specialist-taught students are evident in motor performance (Yeatts & Gordon, 1968), academic achievement (Shephard et al., 1982), fitness levels (Zhu, 1997), physical activity levels (Sallis et al., 1997), and attitudes to physical activity (Rahim & Marriner, 1997). Some researchers have indicated that specialists display more effective teaching behaviours than non-specialists (Behets, 1995; Faucette & Patterson, 1990).

The educational argument against the employment of specialist physical education teachers rests largely on the premise that a one teacher per class model allows a holistic delivery of the curriculum and caters for the individual needs of students. Additionally, some studies have reported favourable results for non-specialists in terms of feelings about physical education (Bowyer, 1996), beliefs about the purposes of elementary physical education (Xiang, Lowy, & McBride, 2002), and in improving physical education teaching credentials (Pate et al., 1995). As an alternative to the highly costly proposal of employing specialist physical education teachers in primary schools, several studies have shown that generalist teachers can improve the quality of their physical education lessons with regular training and assistance from specialists (McKenzie et al., 1996; McKenzie, Sallis, Faucette, Roby, & Kolody, 1993; McKenzie, Sallis, Kolody, & Faucette, 1997; Sallis et al., 1997).

Regardless of whether a specialist or non-specialist is responsible for teaching physical education, it is imperative that qualified and competent teachers teach physical education, given the potential benefit to students of involvement in physical education programs. Many classroom teachers consider themselves unqualified to teach physical education, and recognise a number of barriers, which inhibit their ability to effectively teach physical education. Some of the major barriers commonly discussed include inadequate facilities and equipment, feelings of inadequacy, low levels of confidence, and lack of time and interest (Cundiff, 1990; Curtner-Smith, 1999; Graham, 1991; Martens, 1996; Tinning & Hawkins, 1988; Turnbull, 1992). Aside from inadequate facilities and equipment, most of these barriers are linked to a teacher's attitudes and beliefs regarding physical education.

The Importance of Examining the Attitudinal Disposition of the Primary School Teacher

The investigation of the attitudinal disposition of prospective and practising preservice teachers may improve understanding of their perceptions of physical education, their willingness to teach physical education, and how confident they are in their ability to affect student learning in physical education. The logical assumption is that more favourable levels of outcome attainment will be realised by students if they experience lessons implemented by competent and confident teachers who are committed to teaching physical education. The teacher's affective disposition may have a profound affect on a student's attitude to

physical education (Aicinena, 1991) and subsequently exert a significant influence on a pupil's physical education experience (Carlson, 1995; Lawson, 1983c; Williams, 1989a). Smith (1993) reported that the attitude of the teacher was one of the most vital factors in the success of primary physical education programs. Some researchers have found that many non-specialist teachers hold negative attitudes towards physical education (Andrews, 1987; Brumbaugh, 1987; Faucette & Patterson, 1989; Howarth, 1987, Lawson, Lawson, & Stevens, 1982; Portman, 1996; Smith, 1993; Xiang et al., 2002), and question its value for children (Brumbaugh, 1987; Downey, 1979; Faucette & Patterson, 1989). Some more recent studies have attempted to investigate these areas (see Xiang et al., 2002; Faulkner & Reeves, 2000), but further research is necessary to investigate the attitudinal disposition of non-specialists and specialists and to compare results for different groups of preservice and inservice teachers. Xiang et al. examined theattitudinal disposition and beliefs of preservice classroom teachers before and after a fields-based course using two open-ended questions. After this course, half of the preservice classroom teachers indicated that they were not willing to teach physical education. Xiang et al. (2002) found that many classroom teachers recognised that they were not equipped to teach physical education after observing the complex nature of physical education teaching. It is important that the attitudinal disposition of teachers is acknowledged in the development of appropriate physical education teacher education courses, as preservice teachers' views about physical education may need to be challenged or complemented (Portman, 1996).

Many researchers have indicated that early school experiences in physical education provide prospective teachers with a large range of information about physical education, which may potentially affect attitudes, beliefs, and teaching practices (Belka, Lawson, & Cross-Lipnickey, 1991; Doolittle, Dodds, & Placek, 1993; Keating, Silverman, & Kulinna, 2002; Lawson, 1983a; Placek et al., 1995; Morgan, Bourke, & Thompson, 2001). Doolittle et al. (1993) found that preservice teachers' beliefs about physical education, developed during their personal school experiences in physical education, act and persist as a reference point which is used against any different theories they come across during preservice training.

It is well recognised in the literature that teacher educators encounter resistance from students who have been 'socialised' into teaching as a result of their schooling experiences (Doolittle et al., 1993; Graber, 1989; Hutchinson, 1993; Lortie, 1975: 67-70; Zeichner & Tabachnick, 1981). Subsequently, the influence of teacher education is questioned, as school socialisation agencies are often much stronger than preservice teacher training (Curtner-Smith, 1999; Lortie, 1975; Zeichner & Tabachnick, 1981). A variety of studies have consistently testified that teachers' prior experiences are so powerful that preservice training may have little effect on their beliefs, particularly if they contradict already established beliefs (Carney & Chedzoy, 1998; Doolittle et al., 1993; Lortie, 1975; Rovegno, 1993; Tabachnick & Zeichner, 1984; Zeichner & Tabachnick, 1981).

As noted by Lawson (1983b), it would be unwise and unproductive to assume that all preservice education programs have minimal influence on all preservice teachers. For example, some researchers in physical education have provided evidence that ideologies or beliefs may change as a result of field experiences (Clarke & Hubball, 2001; Curtner-Smith, 1996; Xiang et al., 2002) or throughout teacher training (Curtner-Smith, 1998; Ryan, Yerg, & Bridges, 2000; Weinberg, Petrillo, Doering, Lund, & Rowe, 2000). Other researchers have noted the positive effect of tertiary training on preservice teachers' attitudes to physical education (Howarth, 1987), attitudes to physical activity (Barrell & Holt, 1982), and attitudes to movement education (Dansby, 2000). Some researchers have suggested that many of the effects of teacher education on attitudes and beliefs are only temporary (Zeichner & Tabachnick, 1981). Etheridge (1987) described how beginning teachers leave behind innovative teaching strategies and improved attitudes developed during teacher training, as

they are socialised into the teaching profession. This 'wash out' effect has also been identified with beginning physical education teachers (Stroot, Faucette, & Schwager, 1993).

Aim

Given the importance of a teacher's attitudinal disposition, this study sought to examine the attitudes of specialists and non-specialists regarding a range of important constructs related to physical education teaching. The general research aim of the study was to investigate the relationships between these constructs and compare these for important reference groups of interest; specialists and non-specialists, males and females, preservice and inservice teachers. A comparison of scores of relevant variables between preservice teachers (from different years) and inservice teachers may facilitate an improved understanding of the influence of teacher education and entry into schools. A cross-sectional design using cohort comparisons may, at the very least, illustrate a trend of changing attitudes or beliefs. Any differences between specialists and non-specialists may suggest who may be more suited to deliver physical education lessons in the primary school, given arguments for and against specialist employment. Specifically, the research questions of this study include;

1. What are the attitudes to physical activity of each group?

2. What was the nature of beliefs in the benefits of physical education of each group?

3. What are the attitudes towards teaching physical education of each group?

4. What are the levels of perceived competence and confidence in teaching physical

education of each group?

5. What is the impact of gender and age on variables relating to attitudes and beliefs about physical education?

6. What is the extent of cohort effects for the attitudinal constructs?

METHODOLOGY

Sample

The full sample size of this study was 681, comprising 570 (83.7%) preservice teachers from the University of Newcastle and 111 (16.3%) inservice teachers from schools within New South Wales. Overall, there were 485 (71.2%) non-specialists and 196 (28.8%) specialists. Within the preservice group, there were 422 (74.0%) non-specialist and 148 (26.0%) specialist teachers. The non-specialist preservice teacher sample consisted of students studying a double degree (Bachelor of Arts/Bachelor of Teaching), majoring in primary education in the 2nd, 3rd, or 4th year of their higher education at the University of Newcastle during 1999. Primary education students enrol in two physical education courses as part of their primary Key Learning Area (KLA) curriculum method strand. In 2nd Year, contact time involves a one-hour mass lecture and a one-hour tutorial per week for seven weeks. In 3rd Year, a one-hour mass lecture and a two-hour tutorial is undertaken each week over nine weeks. The specialist preservice teacher sample consisted of students studying a double

degree (Bachelor of Health and Physical Education/Bachelor of Teaching) in the 2nd, 3rd, or 4th year of their higher education at the University of Newcastle during 1999. The four-year full-time degree is designed to prepare students for the teaching profession in the key learning area of Personal Development, Health, and Physical Education. The inservice group included 63 (56.8%) non-specialist teachers and 48 (43.2%) specialist physical education teachers.

Instrumentation and Data Collection

The principal method of inquiry involved the collection of quantitative data from all respondents via the administration of a questionnaire. Both select-response and open-ended questions were included. Many of the select-response items involved the use of a Likert scale response system offering five or six alternative responses. A six-point Likert scale was used more frequently in an attempt to elicit some allegiance to a statement from respondents and improve scale reliability. The six-point Likert used in the current study was represented by the following terms; *Strongly Agree, Agree, Agree Slightly, Disagree Slightly, Disagree, Strongly Disagree*. Multivariate constructs were developed from clusters of variables and will be detailed later.

At the time of questionnaire completion, 2nd Year non-specialists had not undertaken any studies in physical education. Third Year non-specialists completed the questionnaire immediately following completion of their compulsory physical education teacher training. Fourth Year students completed their questionnaire in week eight of their final ten week practicum experience at University. Preservice specialists completed their questionnaires at the same time as their respective non-specialist cohorts. Inservice teachers were randomly selected and mailed questionnaires.

The Development of a Causal Model and Data Analysis

Causal methods provide an appropriate way to analyse non-experimental data, as they at least require an informal theory (Keith, 1993; Pedhazur, 1997). Causal modelling has been frequently used in educational research to answer important research questions and provide conceptual frameworks for studies. The causal model is described as a set of linear equations representing causal relationships hypothesised to exist between variables (Keeves, 1988: 564), and its purpose is to reveal the extent of these relationships (Godwin, 1988; Kelloway, 1998: 8). It is acknowledged that inferring causation is a complex issue, however, the causal model in this study has been operationally contextualised as a practical, diagnostic process to display hypothesised relationships between important variables. The causal model examined in the current study was developed using previous research, substantive theory, and time precedence considerations, as recommended by Kenny (1979: 3-4).[1]

Causal models are generally developed preceding the utilisation of structural equation modelling techniques as heuristic devices, which assist the identification of relationships to be tested (Anderson & Gerbing, 1988; Bollen & Long, 1993: 2). It is important to note that structural modelling techniques do not determine the direction of causality between latent variables or conclude that a causal relationship exists (Arnold, 1992; Goldstein, 1995: 12; Haag, 1992). Rather, the purpose of data analysis is to identify variables that predict other variables (Arnold, 1992) and to ascertain whether the theoretical model is consistent with the data (Bollen, 1989: 38). If the data are consistent with the model, this does not represent proof of a theory, it at best lends support to it (Pedhazur, 1997: 768-769). That is, data does not confirm a model, they only fail to disconfirm (Anderson & Gerbing, 1988; Bollen, 1989: 79; Cliff, 1983; Haag, 1992).

A two-stage process was used in this investigation to examine causal relationships. The first stage involved the use of *LISREL 8* (Jöreskog & Sörbom, 1993b) to develop one-factor congeneric measurement models to supply proportionally weighted composites from multiple indicators of latent constructs under restricted sample size conditions. The second stage used the developed constructs in the multilevel analysis program, *MLwiN* (Rasbash, Browne, Healy, Cameron & Charlton, 2000), to determine the significance of individual and cohort effects and establish standardised coefficients at the five per cent significance level appropriate for a two-tailed test. These procedures will be explained in turn.

Development of Constructs and Description of Variables

The majority of theories in educational research are devised in terms of hypothetical constructs or latent variables that are neither directly measurable nor observable (Holmes-Smith & Rowe, 1994). The theoretical relationship between latent variables and observable indicators (Williams, 1988) are depicted by measurement models, which assist the understanding of concepts in the social sciences (Bollen, 1989: 180). One-factor congeneric measurement models were employed in this study to produce estimates for three of the four constructs (refer to Table 1).

These models were developed as a method of data reduction to establish a suitable number of independent variables to be used in further causal path analysis. The measurement model details how the latent variables or hypothetical constructs are measured in terms of the observable variables (Hoyle, 1995; MacCallum, 1995; Stapleton, 1997) and reflect the degree to which the observed variables are assessing the reliability and validity of latent variables (Schumacker & Lomax, 1996: 64). These models take into account measurement error in both observed and latent variables (Jöreskog & Sörbom, 1993a: 16; Williams, 1988) and will only reach an adequate fit when indicator variables are valid measures of the latent variable (Holmes-Smith et al., 1994: 4).

Table 1 displays the multivariate constructs of interest in this study, detailing the initial factors or source of the scale, goodness of fit measures, item examples, and construct reliabilities. The use of fit statistics ensured the indicators validly contributed to the latent construct being estimated. Several indices examined goodness of fit in this study and indicated how well the models accounted for the data. These included: Chi-square index (c^2), Root Mean Square Error of Approximation (RMSEA) and Root Mean Squared Residual (RMR). Maximally weighted proportional factor score regression scores were used to calculate constructs. Generally, fit index values greater than 0.90 were accepted as an adequate fit and RMSEA values less than 0.05 were recognised as a close fit. Many researchers have listed the merits of the use of multiple indexes, which represent incremental and absolute fit measures when assessing model fit (Hair, Anderson, Tatham, & Black, 1995: 661-662; Hu & Bentler, 1995; Kelloway, 1998: 26; Lavee, 1988; Loehlin, 1992: 57).

Self-perceived levels of competence and confidence in the teaching of 10 physical education content areas; major games, gymnastics, athletics, dance, aquatics, fitness, basic motor movement, outdoor recreation, activities for disabled students, and AUSSIE SPORT were also assessed. Respondents were asked to grade their level of competence and confidence in each content area on a six-point Likert scale by responding to the statement; '*If I were to teach physical education, I would feel confident and competent teaching...*' After considering scores for each content area, respondents were given a mean score out of six.

Table 1 Description of Construct Development using Fitted One-factor Congeneric Measurement Models

Initial Source/Description	CONSTRUCT	Multivariate Construct Description	No. of items	Item/Question Example	c^2	p	*df*	GFI	RMSEA	RMR	ρ_{xx}
The original Physical Activity Questionnaire (Corbin & Lindsey, 1991: 16-17) included a 14-item scale with seven domains (five-point Likert). Only one factor emerged.	Attitude to Physical Activity	Items related to physical activity associated with; fun and enjoyment, challenge and achievement, social, and relaxation/tension domains.	6	'Doing exercise and playing sports is boring'	11.18	0.192	8	0.997	0.024	0.018	0.894
Feelings About Physical Education The Toulmin Elementary Physical Education Attitude Scale (Toulmin, 1973) (a = 0.91) was	Belief in the Benefits of PE	Items related to perceptions of the benefits of physical education for students in physical health, social, lifestyle, and mental health domains.	6	'Physical education encourages lifelong exercise habits'	13.67	0.134	9	0.995	0.028	0.031	0.869

modified to measure teachers' feelings and included 17 items (six-point Likert). The original scale was considered to have high construct validity and internal consistency and was specifically used to evaluate changes in attitudes about a particular program. Two separate factors emerged.	Attitude to Teaching PE	Items concerned general enthusiasm towards PE and PE teaching.	5	'I am generally enthusiastic about teaching physical education'	10.67	0.058	5	0.998	0.041	0.024	0.917

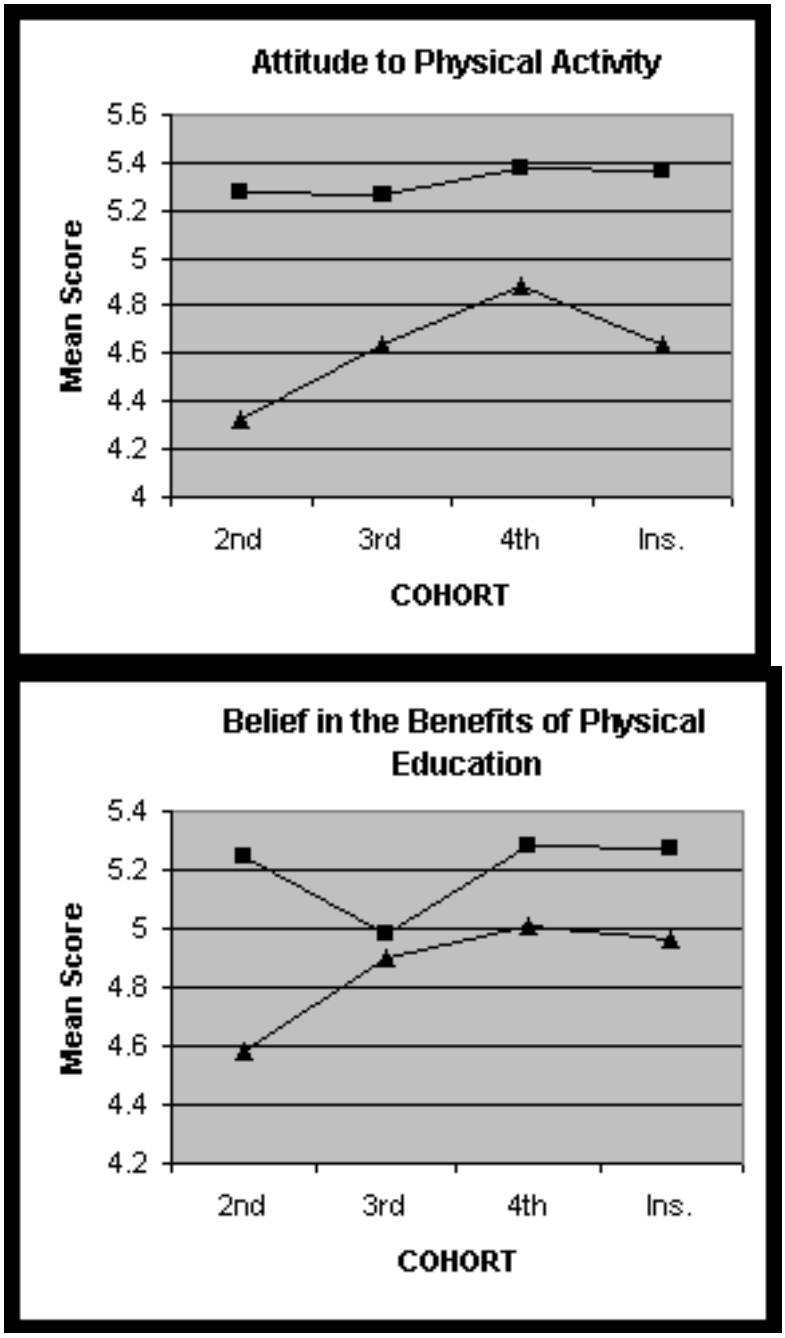
The constructs were developed using the entire sample of 681 for all but the two primary physical education constructs (refer to Figure 2 and Figure 3). The multilevel analysis consisted of 614 subjects with no missing data. There were 67 respondents who did not have primary school physical education and were left out of the *MLwiN* analysis, due to the requirement of a complete data set.

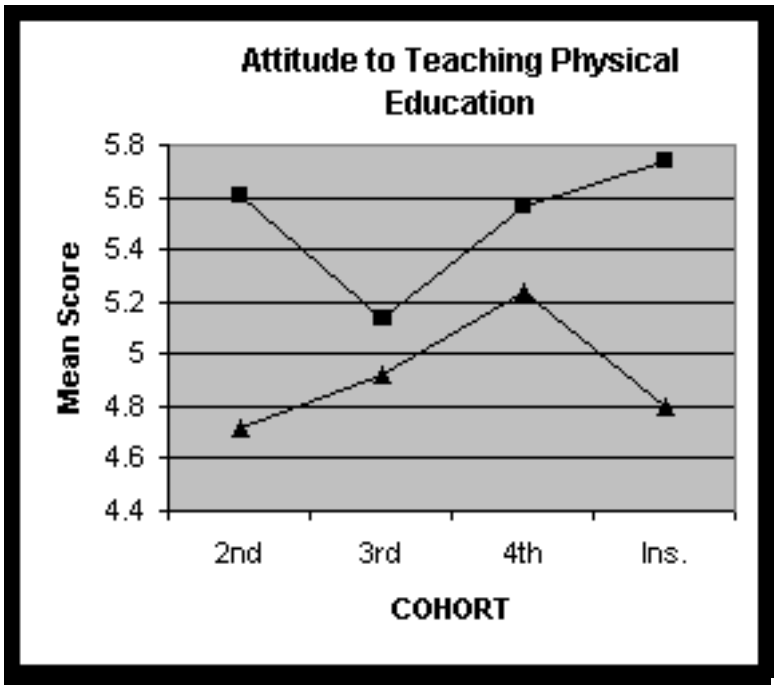
Details for the personal school experience in physical education constructs are found in Morgan et al. (2001).

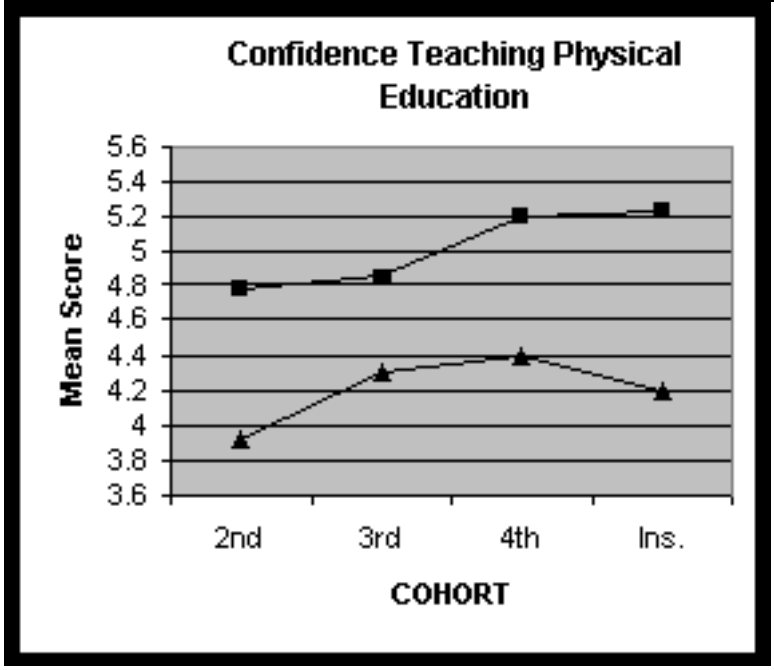
RESULTS

Table 4 in the Appendix displays the correlation matrix for all variables used in the causal model along with relevant descriptive statistics (detail for the personal school experience constructs is included). A graphical representation of cohort and specialisation differences

for attitudinal constructs resulting from preliminary analyses is illustrated in Figure 1. It is evident that specialists scored higher on all constructs for all cohorts. This difference was generally more marked when 2nd Year and inservice groups were compared. Interestingly, the 3rd Year specialists and 3rd Year non-specialists attained similar scores for the *Belief in the Benefits of Physical Education* and*Attitude to Teaching Physical Education* constructs. For non-specialists, scores were generally higher for more advanced cohorts in preservice education, but tended to be lower for inservice teachers. These important findings will be further examined in the ensuing multilevel model discussion.







Applying the Multilevel Regression Model

Contemporary research methodologies acknowledge that data gathered from examinations of educational practice often have a nested structure as a result of different groupings that exist within educational systems. The hierarchical linear model has been widely used in research in education. However, although introduced, many researchers of physical education and exercise science fail to recognise its many advantages and have limited its use. Consequently, analytical models of multilevel data in physical education research are often selected incorrectly due to confusion about units of analysis (Zhu, 1997).

By considering the hierarchical nature of the data, multilevel modelling takes into account clustering effects and assists the understanding of where and how effects occur (Rasbash et al., 2000). For individuals who attend tertiary institutions, learning experiences generally take place in year groups, or as it will be referred to in this study, cohorts. Students from the

same cohort may tend to adopt similar attitudes or display behaviour that is more alike than students from other cohorts and both the cohorts and individuals have qualities at their respective levels of observation (Arnold, 1992; Hox, 1995: 6; Li, Duncan, Harmer, Acock, & Stoolmiller, 1988). In the current study there were 614 respondents in four different year groups (2nd Year, 3rd Year, and 4th Year preservice teachers and inservice teachers, coded as 5th Year). Data from this sample were anticipated to occur in a hierarchical nested structure. Table 2 presents a summary of the hierarchical structure, illustrating the proposed levels for analysis with individuals (preservice and inservice teachers) at level 1 and cohorts at level 2. Cohort variables were created and analysed in the model as dummy variables to recognise potential cohort effects and to test for significant cohort differences at the two levels throughout the model examination.

Table 2 Multilevel Structure of the Data

n = 614	**Total**	**Non-specialists**	**Specialists**
Cohort 2	*188*	*143*	*45*
Cohort 3	*179*	*127*	*52*
Cohort 4	*150*	*116*	*34*
Cohort 5	*97*	*53*	*44*
Level-2 units 4 Cohorts *(j)*	Level-1 units 614 Individuals *(i)*	***n = 439***	***n =175***

Background to the Model for Analysis

As recommended by Pedhazur (1997: 800), comparisons were drawn both within and between groups by referring to standardised and unstandardised coefficients for non-specialists and specialists respectively. Separate multilevel regression models were examined for non-specialists and specialists, rather than developing a model that included specialisation as a separate explanatory variable in a single model. This decision was based on an expectation that sets of relationships would differ between specialists and non-specialists and the imbalanced gender distribution of these two groups. After including all predictors in the regression models, the relationships for all variables and developed constructs were examined. The proportion of variance explained in the response variables was found by examining the effects of explanatory variables with the sample structure of the data taken into account (refer to Table 5 and Table 6 for details of total variance explained for each respective response variable).

The model was developed so that variables included were potentially influenced by all prior variables. The pattern of causation moved from higher-level units to lower-level units and from left to right, meaning the outcome variables were potentially influenced by all variables to the left. As recommended by Keith (1988: 348), logical time precedence and informed decisions based on prior research were key considerations in the decisions made regarding

the sequence and selection of appropriate variables in the design of the model. The numbers shown on the paths in all models are standardised path coefficients (b).

Non-specialist Multilevel Regression Model

Figure 2 highlights the significant direct fixed effects of the full standardised model for the 439 non-specialist preservice and inservice teachers. As gender and age were considered background variables in the model, they were included as explanatory variables in all submodels. The non-specialist sample consisted mainly of females who comprised 85.2 percent of all respondents. Approximately 90.4 percent of the sample was less than 30 years of age.

Attitudinal Categories

Attitude to Physical Activity

Non-specialists possessed a fairly positive attitude to physical activity. When the cohorts were entered as dummy variables in the regression equation, 2nd Year respondents were the only cohort found to be significantly different. It was revealed that respondents from 3rd Year, 4th Year, and inservice cohorts had more favourable attitudes to physical activity than the 2nd Year university students.

Belief in the Benefits of Physical Education

Respondents generally believed that participation in physical education leads to a variety of benefits. *Gender* was a significant explanatory variable, suggesting that females held stronger beliefs about the benefits of physical education than males. However, indirect effects mediating through personal school experiences in physical education and *Commitment to Sport and Physical Activity* negated any direct gender effects. The last significant explanatory variable was at level 2. By entering cohorts as dummy variables, it was found that 2nd Year respondents represented the only cohort that was significantly different. Respondents from 3rd Year, 4th Year, and inservice groups held stronger beliefs about physical education benefits than 2nd Year university students.

Attitude to Teaching Physical Education

Non-specialists generally held positive attitudes towards the teaching of physical education. When cohorts were entered as dummy variables, 3rd Year and 4th Year university students were found to be significantly different regarding their attitude to physical education teaching. These results suggested that 3rd Year and 4th Year preservice teachers were more positive about teaching physical education than 2nd Year preservice and inservice teachers.

Confidence Teaching Physical Education

Non-specialists held a 'moderate' level of confidence in their physical education teaching abilities. At the individual-level, *Age* was a significant explanatory variable. Respondents who reported high levels of confidence teaching physical education were generally younger. After entering cohorts as dummy variables, 2nd Year preservice teachers were the only cohort level found to be significantly different. Respondents from 3rd Year, 4th Year, and inservice cohorts reported higher levels of confidence in teaching a variety of physical education activities than 2nd Year preservice teachers.

Level 2

Level 1

Specialist Multilevel Regression Model

Figure 3 highlights the significant direct fixed effects of the full standardised model for the 175 specialist preservice and inservice teachers. There were slightly more females (approximately 57%) in the specialist group than males. Most of the specialist respondents were less than 30 years of age.

Level 2

Level 1

Attitudinal Categories

Attitude to Physical Activity

The specialists possessed a very positive attitude to physical activity. Considering indirect influences, males tended to have more positive attitudes to physical activity than females. However, this effect was quite small.

Belief in the Benefits of Physical Education

Specialists held very strong beliefs about the benefits of participation in physical education. *Gender* was a significant explanatory variable (b = 0.320) and, notwithstanding negative indirect effects, results suggested that females held stronger beliefs about the benefits of physical education than males. The last significant explanatory variable was at level 2. It was found that 3rd Year preservice teachers were the only cohort significantly different, and held weaker beliefs in the benefits of physical education than respondents from other groups (2nd Year, 4th Year, and inservice).

Attitude to Teaching Physical Education

Specialists possessed a very positive attitude towards teaching physical education. At level 2, 3rd Year preservice teachers were significantly different from other groups. The results suggested that 3rd Year preservice teachers were less positive about physical education than 2nd Year and 4th Year preservice and inservice teachers.

Confidence Teaching Physical Education

Specialists possessed a high level of confidence in their physical education teaching abilities. Females recorded higher levels of confidence teaching physical education than males. After entering cohorts as dummy variables, 2nd Year and 3rd Year preservice teachers were found to be significantly different. Respondents from 4th Year and inservice cohorts reported higher levels of confidence in teaching a variety of physical education activities than 2nd Year and 3rd Year preservice teachers.

Comparison of Non-specialist and Specialist Multilevel Regression Models

Taking into account mean scores, specialists scored significantly higher on all attitudinal constructs. However, the difference in scores for the *Belief in the Benefits of Physical Education* construct was not as marked as for the other attitudinal constructs. Previous studies have also shown that specialists and non-specialists hold similar views about the benefits of physical education (Lambdin & Steinhardt, 1992; Placek et al., 1995; Xiang et al., 2002). The results support findings of Xiang et al. (2002), Thompson (1996), and Hickey (1992) and suggest that while non-specialists may not feel particularly confident about teaching physical education, they still recognise its potential value. However, results contrast with the assertions of Downey (1979) who indicated that non-specialists do not consider physical education to be of any value for children.

Unstandardised regression coefficients were examined to compare multilevel models for non-specialists and specialists. Similarities and differences between the two models are outlined in Table 3, which presents the significant explanatory variables for each sub-model. The unstandardised regression coefficient is displayed in parentheses for both non-specialists (NS) and specialists (S).

Table 3 Comparison of Non-specialist and Specialist Models

Focus Response Variables	*NS/S*	Significant Explanatory Variables (*b* x100)	Coefficient Comparisons
Attitude to Physical Activity (ATPA)	***NS***	· 2^{ND} (-31)	The non-specialist sub-model included the 2^{ND} Year cohort at level 2. The amount of variation explained for the non-specialist sub-model was much higher.
	S		
Belief in the Benefits of PE (BBPE)	***NS***	· GENDER (22) · 2^{ND} (-37)	Gender effects were far greater for specialists (*b* = 39) over non-specialists (*b* = 0.22). Level-2 effects were apparent for both groups. 2^{ND} Year non-specialist preservice teachers and 3^{RD} Year specialist preservice teachers scored significantly lower for BBPE than their respective groups. The non-specialist sub-model explained a greater amount of variation in BBPE.
	S	· GENDER (39) · 3^{RD} (-30)	
Attitude to Teaching PE (ATPE)	***NS***	· 3^{RD} (23) · 4^{TH} (39)	Level-2 effect differences were found. 3^{RD} Year (*b* = 0.23) and 4^{TH} Year (*b* = 0.39) non-specialist preservice teachers possessed more positive attitudes to physical education than 2^{ND} Year preservice and inservice teachers. However, 3^{RD} Year specialist preservice teachers recorded significantly lower scores than all other cohorts, recording an unstandardised coefficient more than twice as large as the 3^{RD} Year non-specialist path (*b* = -51). The non-specialist sub-model explained a far greater amount of variation.
	S	· 3^{RD} (-51)	
Confidence Teaching PE (CTPE)	***NS***	· AGE (-11) · 2^{ND} (-42)	AGE was included in the non-specialist sub-model and GENDER was included in the specialist sub-model for the CTPE construct. Level-2 effects were comparable for the 2^{ND} Year cohort for both non-specialists (*b* = -42) and specialists (*b* = -53). A negative significant pathway from the 3^{RD} Year specialist cohort also existed. The variance explained was higher for non-
	S	· GENDER (19)	

		· 2ND (-53) · 3RD (-38)	specialists.

DISCUSSION

Impact of the Background Variables Gender and Age on Attitudinal Constructs about Physical Education

For non-specialists, males tended to score more highly on the attitudinal constructs and perceived confidence teaching constructs than females. This has been previously established to be a result of males being more involved in sporting activities and remembering their school physical education experiences more favourably than females (Morgan et al., 2001). A significant relationship was established between *Gender* and *Belief in the Benefits of Physical Education*. For both non-specialists and specialists, females tended to hold stronger beliefs regarding the benefits of physical education. Female specialists possessed higher levels of confidence relating to teaching physical education. Younger non-specialists were also more confident in their ability to teach a number of physical education content areas. The negative influence of *Age* on teaching confidence in physical education has been previously supported by Thompson (1996).

Cohort Effects for the Attitudinal Constructs

Non-specialists

A teacher education effect remains a plausible explanation for the tendency for the 2nd Year cohort to record lower scores than the other cohorts for all attitudinal constructs. It is worth noting that the 2nd Year cohort had not completed any physical education teacher training at the time of questionnaire completion. Additionally, a probable teacher education effect was apparent as 3rd Year and 4th Year cohorts were more likely to possess more positive attitudes to physical education teaching than 2nd Year and inservice cohorts.

Of particular interest was a definite trend for scores on each variable to increase from 2nd through to 4th year and decrease for inservice respondents. This decrease was particularly marked for attitude to teaching physical education, but also to some extent for *Attitude to Physical Activity*, and *Confidence Teaching Physical Education*. The decrease in scores between 4th year students and inservice teachers for the *Belief in the Benefits of Physical Education* construct was minimal. Perhaps the inservice teachers' beliefs in the value of physical education remains stable, whereas their attitudes and confidence regarding physical education teaching wanes to various extents upon entry into schools. Previous research may provide some explanation for these tendencies. Zeichner and Tabachnick (1981) suggested that many of the effects of teacher education on an individual's attitudes and beliefs are only temporary. They described the 'wash out' effect that occurs during the first years of employment in schools.

Specialists

There also existed evidence of a possible teacher education effect for specialists. The 2nd Year and 3rd Year preservice teachers possessed lower levels of confidence teaching

physical education than the other cohorts. Surprisingly, 3rd Year preservice teachers scored lower than other cohorts for *Attitude to Teaching Physical Education*and *Belief in the Benefits of Physical Education*. These results were surprising and unexpected. It was hypothesised that scores for all specialist cohorts would be high, or that at least a pattern of increasing scores would be evident throughout preservice education, as was the case for the non-specialists. However, the nature of the findings required an examination of other potential factors.

The most likely explanation was developed from a review of the extent and nature of teaching experiences of the various cohorts. Some explanation for the decline in enthusiasm may be attributed to the fact that the 3rd Year specialists had completed a five-day 'rolling practicum' just prior to the questionnaire administration. Essentially, the 'rolling practicum' involves one day of teaching per week for five weeks. In rating their teacher education in another context, some students expressed disappointment in the 'rolling practicum' structure because they felt detached from the school and students and subsequently recognised this form of practicum experience as a weakness in their university course structure. Replacing the 'rolling practicum' with block teaching experiences was also one of the suggested changes recommended by some 3rd Year specialists. Teaching for only one day each week can be particularly difficult and challenging because management and discipline surface as major issues that arise when students are not as familiar with the teacher or the class. One could understand the lesser enthusiasm of the student teachers if they struggled to assert control over their students. A block practicum, where a student teacher is in attendance at the school every day, allows a greater 'feel' for the class and usually results in the teacher becoming more comfortable and confident about teaching as the practicum continues.

Feelings of dissatisfaction with the practicum structure were highlighted in an external review of aspects of the field experience program at the University of Newcastle conducted in 1999. A review committee prepared a report to comment on the appropriateness of current arrangements within the Faculty of Education and to identify strengths and weaknesses of the program (Martinez & McCulla, 1999). Part of the findings identified that the 'rolling days idea' was extremely disruptive to the teaching and learning process. The report concluded that block practicums constituted a better field experience component and that 'rolling days' could only reach their potential if they were closely integrated with university-based subjects, and with adequate opportunity for structured reflection.

CONCLUSIONS

There were a number of key findings for the attitudinal constructs, primarily identified in comparing results for specialists and non-specialists, and preservice and inservice teachers. For non-specialists, there was a tendency for scores on constructs relating to physical education teaching to be higher for more advanced cohorts in preservice education, but to wane to various extents for inservice teachers. Results suggested that preservice teachers' physical education teacher education may have had a positive effect on their attitudinal disposition. However, contrary to a number of previous studies, scores for attitudinal constructs relating to physical education teaching for non-specialists were relatively positive. Scores were generally high for all constructs for specialists, notwithstanding the lower and previously explained scores of the 3rd Year specialist cohort. As such, the impact of the nature of various teaching experiences needs to be more fully explored.

Implications of Established Cohort Effects

A range of implications for professional development (for inservice teachers) and physical education teacher education (for preservice teachers) arose from the findings. The role of ongoing professional development for classroom teachers was magnified considering the pattern of lower scores for inservice teachers on a range of important variables relating to physical education teaching. The interpretations of these results is that inservice teachers' beliefs in the value of physical education remain stable, however, their attitudes and confidence regarding physical education teaching appears to diminish upon entry into schools. Additionally, inservice courses and further support for classroom teachers need to be provided to nullify the 'wash out' effect that has been confirmed, to some extent, in this study. The success and provision of appropriate professional development courses for this purpose should be more extensively researched, as some writers have questioned the influence of these courses on the attitudes and teaching quality of non-specialists (Carney & Chedzoy, 1998; Secker, 1988; Williams, 1979). The importance of early successful teaching experiences is highlighted to reinforce any favourable improvements in attitudes and efficacy beliefs developed during preservice education. Based on these findings, more extensive support for classroom teachers may be a more worthy and realistic alternative than the full-time employment of specialist teachers.

Teacher educators who determine physical education programs in teacher training occupy one of the most important positions relating to primary physical education. Teacher educators need to improve their understanding of the attitudinal disposition of both preservice and inservice teachers to ensure relevant and appropriate learning experiences are presented. Physical education teacher educators may be advised to challenge or complement intentionally and explicitly the attitudes and beliefs of preservice teachers that exist as a consequence of their school experiences. As Silverman and Subramaniam (1999) noted, "Change in attitude can be brought about by uncovering the reasons for an individual's unfavorable attitude toward a situation or object, and making the necessary adjustments or manipulations" (p.98). Doolittle et al. (1993) expressed the important role of teacher educators in discussing, comparing, analysing, and detailing belief systems of specialist preservice teachers.

More detailed analysis of cohort differences would require an examination of the influence of various practicums on relevant variables. The lower scores for the 3rd Year specialist cohort warrants further investigation. Although prior research has identified the development of relevant variables throughout a practicum experience, data could be collected assessing the impact of different practicum structures on attitudes and beliefs. Pre-and post-testing of measures at the beginning and end of a practicum, accompanied by a description and analysis of lessons taught would be valuable.

It is likely that teachers of physical education who are enthusiastic and exhibit positive attitudes towards teaching physical education and physical activity will be more successful in motivating students and increasing their enjoyment of physical education by delivering better quality lessons. The findings of this study have to some extent indicated a potential improvement in a range of important variables concerning effective teaching in physical education throughout preservice education. However, the tendency for less positive attitudes and weaker beliefs regarding physical education teaching confidence of inservice non-specialist teachers remains a concern. Strategies employed at the tertiary level, such as increased opportunities to improve mastery expectations, should be complemented with regular and ongoing professional development for all classroom teachers. If not, the case for a physical education specialist needs to be promoted to at least ensure that physical education, as one of the six KLAs of the primary curriculum, is given the attention it requires.

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APPENDICES

The correlations for the non-specialists are shown below the diagonal, and the correlations for the specialists above the diagonal. These are considered separately here because the models are consistent with the structure and strategy of analysis employed in this study where separate multilevel regression models were examined for non-specialists and specialists.

Table 4 Correlation Matrix for Model Variables (Non-Specialist and specialist)

Specialist **Non-** **Specialist**	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**Mean** (SD)
1. Gender		*-09*	*21***	*-09*	*-02*	*-22***	*08*	*29***	*02*	*07*	***1.57*** *(0.50)*
2. Age	*-19***		*-07*	*-07*	*-13*	*-06*	*-04*	*-00*	*14*	*18**	***2.30*** *(1.49)*
3. Quality of Primary PE	*09*	*-06*		*36***	*23***	*-12*	*09*	*13*	*-06*	*08*	***3.92*** *(0.99)*
4. Primary PE Outcome	*-12**	*-02*	*51***		*49***	*27***	*08*	*00*	*-03*	*16**	***4.99*** *(0.9*

											0)
5. Sec. PE Experience	*-13**	*02*	*33***	*68***		*40***	*32***	*11*	*08*	*10*	***5.07*** *(0.77)*
6. Commitment to Sport	*-31**	*-05*	*20***	*51***	*54***		*29***	*09*	*09*	*15*	***4.82*** *(0.77)*
7. Attitude to PA	*-16**	*-03*	*22***	*47***	*48***	*58***		*40***	*33***	*24***	***5.34*** *(0.57)*
8. Belief in the Benefit of PE	*00*	*03*	*15***	*39***	*34***	*37***	*47***		*42***	*30***	***5.18*** *(0.61)*
9. Attitude to PE teaching	*-13**	*-06*	*25***	*51***	*53***	*54***	*57***	*53***		*31***	***5.51*** *(0.61)*
10. Confidence teaching PE	*-03*	*-11**	*17***	*36***	*39***	*46***	*44***	*37***	*51***		***5.00*** *(0.56)*
Mean (SD) Potential Range	***1.85*** *(0.36)*	***2.10*** *(1.23)* *1-8*	***4.45*** *(0.95)* *1-6*	***4.40*** *(1.14)* *1-6*	***3.97*** *(1.32)* *1-6*	***3.30*** *(1.18)* *0-6.5*	***4.62*** *(0.95)* *1-6*	***4.84*** *(0.72)* *1-6*	***4.94*** *(0.98)* *1-6*	***4.22*** *(0.79)* *1-6*	

	1-2										

a Pearson correlation x 100

*b * Correlation is significant at the 0.05 level; 2-tailed*

*** Correlation is significant at the 0.01 level; 2-tailed*

Table 5 Null and Fitted Standardised Model for Non-specialist Attitudinal Categories as Response Variables

Attitudinal Constructs n=439			Attitude to Physical Activity	Belief in the Benefits of PE	Attitude to Teaching PE	Confidence Teaching PE
Standardised Regression Coefficient (Standard Error)			b (SEb)	b (SEb)	b (SEb)	b (SEb)
Null Model [b_{0ij}]	Fixed Part	Constant **[b_0]**	0.024 (0.109)	0.043 (0.130)	-0.001 (0.107)	0.016 (0.121)
	Random Part	· [u_{0j}] ~ N(0,W_u) : W_u = [s^2_{u0}]**Level 2**	0.038 (0.034)	0.058 (0.048)	0.036 (0.032)	0.049 (0.042)
		· [e_{0ij}] ~ N(0,W_e) : W_e = [s^2_{e0}]**Level 1**	0.955 (0.065)	0.933 (0.063)	0.960 (0.065)	0.940 (0.064)
		Intra-cohort correlation coefficient (ρ)	0.038	0.059	0.036	0.050
Fitted Model	**Fixed Part**	Level 1				
		Constant [b_0]	0.000 (0.037)	0.000 (0.041)	0.000 (0.036)	0.000 (0.040)

		· Commitment to Sport and PA	0.393 (0.045)	0.218 (0.051)	0.292 (0.045)	0.292 (0.048)
		· Experience in Secondary PE	0.153 (0.052)	-	0.235 (0.052)	0.232 (0.048)
		· Outcome Attainment in Primary PE	0.166 (0.051)	0.295 (0.048)	0.197 (0.051)	-
		· Quality of Primary PE Program	-	-	-	-
		· Gender	-	0.110 (0.043)	-	-
		· Age	-	-	-	-0.165 (0.041)
		Level 2				
		· 2nd Year University	-0.153 (0.037)	-0.239 (0.042)	-	-0.248 (0.042)
		· 3rd Year University	-	-	0.104 (0.040)	-
		· 4th Year University	-	-	0.177 (0.040)	-
	Random Part	· $[u_{0j}] \sim N(0,W_u)$: $W_u = [s^2_{u0}]$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
		· $[e_{0ij}] \sim N(0,W_e)$: $W_e = [s^2_{e0}]$	0.586 (0.040)	0.739 (0.050)	0.581 (0.039)	0.694 (0.047)

		Intra-cohort correlation coefficient (ρ)	0.000	0.000	0.000	0.000
· Omitted category for dummy variable = Inservice teachers · *NI* = Not included in sub-model analysis			**R^2 =0.410**	**R^2 =0.254**	**R^2 =0.417**	**R^2 =0.298**

Table 6 Null and Fitted Standardised Model for Specialist Attitudinal Categories as Response Variables

Attitudinal Constructs n=175			Attitude to Physical Activity	Belief in the Benefits of PE	Attitude to Teaching PE	Confidence Teaching PE
Standardised Regression Coefficient (Standard Error)			b (SEb)	b (SEb)	b (SEb)	b (SEb)
Null Model [b_{0ij}]	Fixed Part	Constant **[b_0]**	0.000 (0.075)	0.019 (0.120)	0.036 (0.189)	0.035 (0.203)
	Random Part	· [u_{0j}] ~ N(0,W_u) : W_u = [s^2_{u0}]**Level 2**	0.000 (0.000)	0.035 (0.040)	0.122 (0.100)	0.145 (0.117)
		· [e_{0ij}] ~ N(0,W_e) : W_e = [s^2_{e0}]**Level 1**	0.994 (0.106)	0.958 (0.104)	0.861 (0.093)	0.854 (0.092)
		Intra-cohort correlation coefficient (ρ)	0.000	0.035	0.124	0.145
Fitted Model	**Fixed Part**	Level 1				
		Constant [b_0]	0.000 (0.070)	0.000 (0.069)	0.000 (0.070)	0.000 (0.067)

		· Commitment to Sport and PA	0.198 (0.077)	0.158 (0.071)	-	0.169 (0.069)
		· Experience in Secondary PE	0.240 (0.077)	-	-	-
		· Outcome Attainment in Primary PE	-	-	-	-
		· Quality of Primary PE Program	-	-	-	-
		· Gender	-	0.320 (0.071)	-	0.168 (0.070)
		· Age	-	-	-	-
		Level 2				
		· 2nd Year University	-	-	-	-0.419 (0.074)
		· 3rd Year University	-	-0.226 (0.069)	-0.384 (0.070)	-0.315 (0.073)
		· 4th Year University	-	-	-	-
	Random Part	· $[u_{0j}] \sim N(0,W_u)$: $W_u = [s^2_{u0}]$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
		· $[e_{0ij}] \sim N(0,W_e)$: $W_e = [s^2_{e0}]$	0.861 (0.092)	0.838 (0.090)	0.848 (0.091)	0.791 (0.085)
		Intra-cohort correlation coefficient (ρ)	0.000	0.000	0.000	0.000

· Omitted category for dummy variable = Inservice teachers · *NI* = Not included in sub-model analysis	**R^2 =0.134**	**R^2 =0.156**	**R^2 =0.137**	**R^2 =0.208**