

Perceived physical competence, enjoyment, and effort in same-sex and coeducational physical education classes.

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Abstract:

Perceived competence is a key motivational determinant of physical activity behaviours in adolescents, and motivational determinants are influenced by the class environment. The purpose of this study was to investigate levels of perceived physical competence, enjoyment and effort in class, focusing on gender and class-type differences. Participants were 546 adolescents (289 males, 257 females) who were in same-sex or coeducational physical education classes. The Hierarchical Physical Competence Scale (HPCS) and questionnaire measures of enjoyment and effort in classes were used to investigate students' perceptions. Results of 2×2 multivariate analysis of variance (MANOVA) indicated that students' perceptions of physical competence, enjoyment and effort in classes differed according to gender and class type, but these differences must be viewed in light of strong interaction effects. That is, female students reported more positive and adaptive perceptions in same-sex classes and were more affected by class type than were male students.

Keywords: gender differences | adolescents | middle school | interaction | physical education | coeducational physical education | same-sex physical education | perceived physical competence

Article:

Physical education has been advanced as a vehicle to promote physical activity levels for youth (Ryan & Deci, 2007). For some students, physical education is the only place where they engage in physical activity (Gallahue & Donnelly, 2003; Graham, Holt/Hale, & Parker, 2004). However, many students do not enjoy physical education, and there is no sign that this trend is slowing down (Carlson, 1995; Cothran & Ennis, 1999). In particular, during adolescence, female students often show lower interest and enjoyment in performing in physical education classes or physical activity situations than male students (Carroll & Loumidis 2001; Luke & Sinclair 1991; Lyu & Pyo 2006a; Tannehill & Zakrajsek, 1993). At this point, helping students become more intrinsically motivated and involved in physical education classes and physical activities is critical for their future health and well-being.

Self-determination theory and cognitive evaluation theory (Deci & Ryan, 1980) propose that competence and autonomy experiences are necessary conditions for the maintenance and enhancement of intrinsic motivation, which is a strong predictor of an individual's physical activity engagement (Biddle & Mutrie, 2001). Considerable research supports the relationships between perceived competence and intrinsic motivation. Ryan and Deci (2007) concluded that environments supporting feelings of competence facilitate intrinsic motivation, whereas environments and factors that diminish feelings of competence undermine intrinsic motivation. Moreover, contexts fostering perceived competence enhance sustained motivation, enjoyment and effort in the activities (Goudas, Biddle, & Fox, 1994; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003; Lyu & Pyo, 2006a).

In addition, perceived competence was positively related to interest/enjoyment and feeling satisfied with the activities that individuals engaged in (Frederick & Ryan, 1993). Interest/enjoyment of sport/exercise is clearly a major indicator of student attitudes towards physical education regardless of gender (Subramaniam & Silverman, 2007). Berger and McInman (1993) also found that enjoyment plays an important role in increasing physical activity adherence and positive attitudes. Based on the theories and empirical findings, it can be assumed that students who have higher perceived physical competence and intrinsic motivation are more likely to have higher interest/enjoyment and effort in physical education classes and physical activities. Therefore, understanding how to enhance students' perceived competence and enjoyment is an important problem for physical educators.

The learning environment is one of the most important variables that can positively and negatively influence students' perceptions, including perceived competence, interest/enjoyment and behaviour. One aspect of class environment that influences students' attitude to the physical education is class type, specifically same-sex or coeducational classes. Considerable research has shown that the class type (same-sex or coeducational class) influences students' perceived competence, intrinsic motivation and performance/achievement (Derry & Phillips, 2005; Fraser, 1994; Lee & Marks, 1990; Lirgg, 1993; McKenzie, Prochaska, Sallis, & LaMaster, 2004; McRobbie & Fraser, 1993). For example, Rowe (1988) found that students in same-sex classes exhibited greater gains in confidence than those in coeducational classes. However, research studies highlight issues in coeducational physical education, particularly for girls, and several authors have raised concerns about girls' participation in these settings (Brophy, 1985; O'Sullivan, Bush, & Gehring, 2002; Penney, 2002; Treanor, Graber, Housner, & Wiegand, 1998).

Lee and Marks (1990) found that girls in same-sex physical education classes responded more positively than girls in coeducational physical education classes, and more recently Derry and Phillips (2005) reported that girls in same-sex classes spent more time in practice and performing tasks than girls in coeducational classes. Also, McKenzie et al. (2004) found that although girls spent fewer minutes and a smaller proportion of lesson time in physical activity compared to

boys, girls in same-sex classes obtained more time on motor skill drills than boy/girls in coeducational classes and boys in same-sex classes.

For enjoyment and preference, results are mixed. Lirgg (1993, 1994) and Treanor et al. (1998) found that male and female students in middle and high school preferred same-sex physical education formats. In contrast, in Hong, Yoon, and Yeo's (2003) study, students in coeducational physical education classes had more positive attitudes and higher interest than students in same-sex classes. Furthermore, the class context, including same-sex or coeducational classes, has been implicated in much of the educational literature as important variable influencing students' motivation and achievement (Lirgg, 1993).

In the current study, we examined students' perceived physical competence, enjoyment and effort in same-sex or coeducational physical education classes. Fox and Corbin (1989) have proposed a hierarchical model of perceived physical competence with several distinct levels of specificity of self-perceptions within the physical domain. In this hierarchical structure, more specific, lower-level factors influence and predict the next level factor. Lyu (2008) examined Fox's hierarchical model and developed a measure of hierarchical perceived physical competence, including physical self-worth (highest level), physical competence, sport competence and performance competence (lowest, most specific level), for Korean adolescents in middle school. The purpose of this study is to investigate students' perceived physical competence, enjoyment and effort in physical education classes, as a function of gender and physical education class type (same-sex or coeducational class) in Korean adolescents.

Based on prior studies, the following hypotheses were proposed: (1) Male students will report higher perceptions at all levels of hierarchical physical competence model, as well as greater enjoyment and effort in physical education classes than female students; (2) Students in same-sex classes will report higher perceived physical competence, enjoyment and effort than those in coeducational classes; and (3) students who have higher perceptions of physical competence will have higher enjoyment and effort in physical education classes. Finally, the more specific levels of perceived competence will be more strongly related to enjoyment and effort than will the more general level.

Method

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Method

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Participants

In South Korea, both single-sex schools and mixed-sex schools have existed for some time. In this study, the participants were 546 adolescents (289 males and 257 females) aged 11–14 years from six Korean middle schools (three same-sex schools and three coeducational schools), taking coeducational or single-sex physical education classes. In coeducational schools, male and female students were taught in the same physical education class. The 319 coeducational school students included 173 males and 146 females. The 227 single-sex-school students comprised 116 males and 111 females. Parental and student consents were obtained for all participants to comply with university human subject protocol.

Instruments

Hierarchical physical competence

In line with Fox's (1998, 2002) hierarchical physical competence model, Lyu (2007, 2008) developed the Hierarchical Physical Competence Scale (HPCS). The HPCS measures four levels of perceived physical competence with Performance competence (handball shooting) at the lowest, most specific level, followed by Sports competence (handball), Physical competence and Physical self-worth. Each of the four HPCS sub-scales include four items with responses on a six-point scale that ranges from 1 – definitely disagree to 6 – definitely agree. The Korean Educational Development Institute (KEDI) provides a national educational curriculum, which schools should follow in classes. According to the KEDI national curriculum, handball is a requirement for grade 1 students in middle-school physical education classes. The specific performance and sport items on the HPCS focus on handball because all students in this study have taken handball pass and shoot lessons as the national curriculum in South Korea.

In order to verify reliability and validity of the HPCS in this study, the data were analysed through confirmatory factor analysis with the Amos 5.0 program. The results for the four-factor model are presented in Figure 1. To assess overall model fit, χ^2 , goodness-of-fit index (GFI), non-normed fit index (NNFI), comparative fit index (CFI) and root mean square error of approximation (RMSEA), which are the most widely used criterion measures, were investigated. Chi-square is a measure of the fit of the model to the data, with smaller values indicating better models. The GFI is a measure of the relative amount of variance and covariance that the proposed model is able to explain. The NNFI and CFI are frequently used for evaluating the fit of a structural model. The root mean square residual (RMSR) indicates the discrepancy between the elements of the sample and hypothesised matrices with values ranging from 0 and 1.

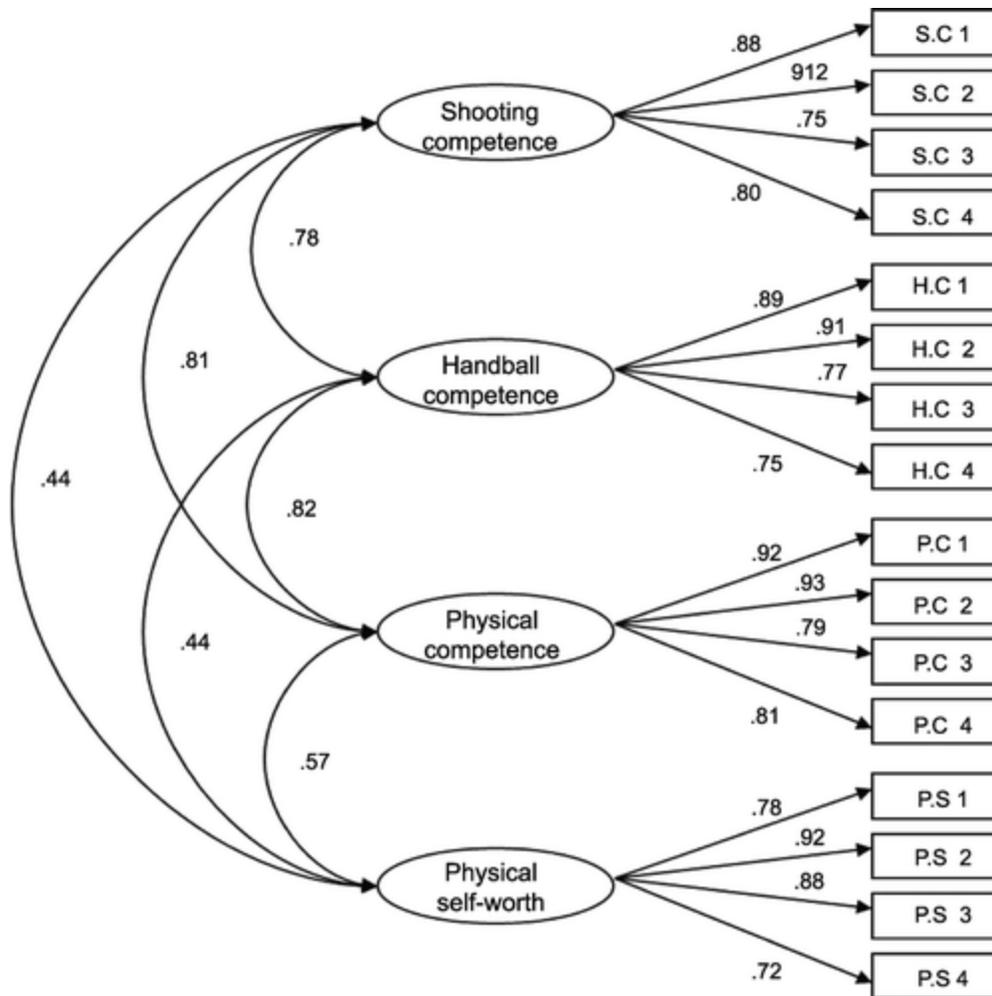


Figure 1 Confirmatory factor analysis.

The statistically acceptable standard is that χ^2/df should be less than 5, and GFI, NNFI and CFI should be more than .90. Also, RMSEA should be between .05 and .08 (Byrne, 1989; Kim, 2002; Kline, 2005). This model exhibited a good fit to the data, $\chi^2(98) = 266.18, p < .01$, GFI = .87, NNFI = .92, CFI = .95, RMSEA = .08. Based on the results, all indices except GFI were acceptable, and both the four-factor model and the HPCS were considered appropriate for this study.

Factor 1, named shooting competence (specific perceived performance competence level), includes four items that represent handball shooting. The second factor, handball competence, has four items (e.g., I am good at handball). Factor 3, labelled perceived physical competence, consists of four items (e.g., I am good at sports). The last factor, physical self-worth, has four items. Internal consistency was analysed, and all Cronbach's alpha coefficients exceeded the recommended value of .70 (Pedhazur, 1982): shooting competence (.90), handball competence (.89), physical competence (.92) and physical self-worth (.89).

Enjoyment and effort in physical education class

In order to investigate how much students enjoy physical education lessons and how hard students try in the physical education class, a six-item questionnaire consisting of the effort-importance and enjoyment subscales of the Intrinsic Motivation Inventory (IMI: McAuley, Duncan, & Tammen, 1989) was adapted for use in the school setting. The three items for enjoyment (e.g., 'I enjoy physical education lessons') and the three items for effort in classes (e.g., 'I try to exert effort to do very well in classes') are rated on a seven-point scale. Internal consistency estimates from the present study showed these two subscales had good reliability (enjoyment: $\alpha = .93$, effort: $\alpha = .86$).

Procedure

Participants were informed that the purpose of the study was to better understanding their thoughts and feelings about physical ability and physical education. All participants were assured that participation had no bearing on their physical education grade, and no names were included on the surveys in order to ensure anonymity. In addition, they were told that the questionnaires did not have right or wrong answers. Administration time was approximately 15 minutes for the questionnaire. Approval for this study was granted from University's Institutional Review Board and the school administration. The protocols and procedures followed the school's guidelines about use of student data for approved research projects.

Analysis plan

All the data were analysed with SPSS version 14.0. To examine gender and class-type differences in students' perceptions, 2×2 (gender = male/female, class type = same-sex/coeducational class) MANOVA (multivariate analysis of variance) was used. Eta-squared (η^2) effect sizes were also computed. In line with the recommendations of Clark-Carter (1997), effect sizes between .001 and .058 were classified as small, effect sizes of between .059 and .137 classified as medium and effect sizes over .138 were classified large. Also, we compared four groups (male and female in same-sex class, male and female in coeducational class) using the Duncan's test to follow up MANOVA results. Correlation analysis was used in order to investigate the relationships among perceived physical competence, enjoyment and effort in physical education classes.

Results

Students' perceptions according to gender and class type

The MANOVA results revealed significant differences in students' perceived physical competence, enjoyment and effort according to gender [Wilks' Lambda = .89, $F(6, 536) = 10.98$, $p < .001$, $\eta^2 = .11$] and class type [Wilks' Lambda = .89, $F(6, 536) = 5.89$, $p < .001$, $\eta^2 = .06$]. MANOVA also revealed a significant interaction between gender and class type [Wilks'

Lambda = .94, $F(6, 536) = 5.47$, $p < .001$, $\eta^2 = .06$]. Table 1 includes means, standard deviations, univariate F values and effect sizes (η^2) for each variable.

Table 1. Mean differences in students' perception by gender and class type (N = 546).

Variable	S-sM (SD)	CoedM (SD)	TotalM (SD)	GenderF (η^2)	Class typeF (η^2)	InteractionF (η^2)
Shooting competence						
Male	3.27 (.95)	3.20 (1.05)	3.23 (1.01)	.36	25.44***	17.56***
Female	3.59 (1.01)	2.77 (1.07)	3.12 (1.12)	(.001)	(.05)	(.03)
Total M (SD)	3.43 (.99)	3.00 (1.08)	3.18 (1.07)	Duncan: D < C, A < B		
Handball competence						
Male	3.16 (.86)	3.23 (1.09)	3.20 (1.01)	6.26*	19.11**	27.18***
Female	3.40 (1.01)	2.55 (1.04)	2.91 (1.11)	(.01)	(.03)	(.05)
Total M (SD)	3.27 (.94)	2.92 (1.12)	3.06 (1.06)	Duncan: D < A, C, B		
Physical competence						
Male	3.53 (1.02)	3.74 (1.13)	3.66 (1.09)	3.65*	2.33	13.44***
Female	3.71 (1.22)	3.20 (1.14)	3.42 (1.20)	(.01)	(.004)	(.02)
Total M (SD)	3.62 (1.12)	3.49 (1.65)	3.55 (1.15)	Duncan: D < A, B, C		
Physical self-worth						

Male	3.10 (.94)	3.28 (1.08)	3.21 (1.03)	2.00	26	5.99*
Female	3.20 (1.20)	2.92 (1.08)	3.04 (1.14)	(.004)	(.001)	(.01)
Total M (SD)	3.14 (1.07)	3.11 (1.20)	3.13 (1.08)	Duncan: D < A, B, C		
Enjoyment						
Male	5.37 (1.39)	5.54 (1.40)	5.47 (1.39)	48.80***	1.41	6.56*
Female	4.80 (1.54)	4.32 (1.60)	4.52 (1.59)	(.08)	(.003)	(.01)
Total M (SD)	5.09 (1.49)	4.98 (1.61)	5.02 (1.56)	Duncan: D < B < A, C		
Effort in class						
Male	4.80 (1.29)	5.13 (1.27)	5.00 (1.29)	7.12**	1.44	16.78***
Female	4.96 (1.24)	4.36 (1.39)	4.62 (1.36)	(.01)	(.003)	(.03)
Total M (SD)	4.88 (1.26)	4.78 (1.38)	4.82 (1.33)	Duncan: D < A, B, C		

Notes: S-s, same-sex class; Coed, coeducational class; Duncan (A, male in S-s; B, Female in S-s; C, male in Coed; D, female in Co). *p < .05, **p < .01, ***p < .001.

The univariate main effect for gender appeared for perceived handball competence, perceived physical competence, enjoyment and effort in class. Males had higher perceptions for handball performance, physical competence, enjoyment and effort in class than females, with enjoyment showing the strongest gender difference, $F(1, 544) = 48.80, p < .001, \eta^2 = .08$. For class type, the main effect appeared for perceived handball shooting competence and perceived handball competence. Students in same-sex classes evaluated their ability at handball shooting and handball settings higher than those in coeducational classes.

The univariate interaction between gender and class type appeared for all variables: perceived handball shooting competence, perceived handball competence, perceived physical competence, physical self-worth, enjoyment and effort in class. To explore the interactions, Duncan's test was used to compare the four groups. As Figure 2 shows, class type has a large effect on perceived shooting competence for females but no effect for males. Duncan's test revealed that females in same-sex classes had higher perceived shooting competence than all others, and females in coeducational classes had the lowest perceived shooting competence, $F(3, 542) = 13.73, p < .001, \eta^2 = .07$. Class type had a large influence on perceived handball competence, perceived physical competence and physical self-worth for females, with females in coeducational class reporting lower scores than other groups. In perceived handball competence, $F(3, 542) = 17.90, p < .001, \eta^2 = .09$, three groups had significantly higher scores than females in coeducational classes, and those three groups did not differ. Similarly, females and males in same-sex classes and males in coeducational classes evaluated their perceived physical competence, $F(3, 542) = 7.00, p < .001, \eta^2 = .04$, and self-worth, $F(3, 542) = 3.10, p < .05, \eta^2 = .02$, higher than females in coeducational class.

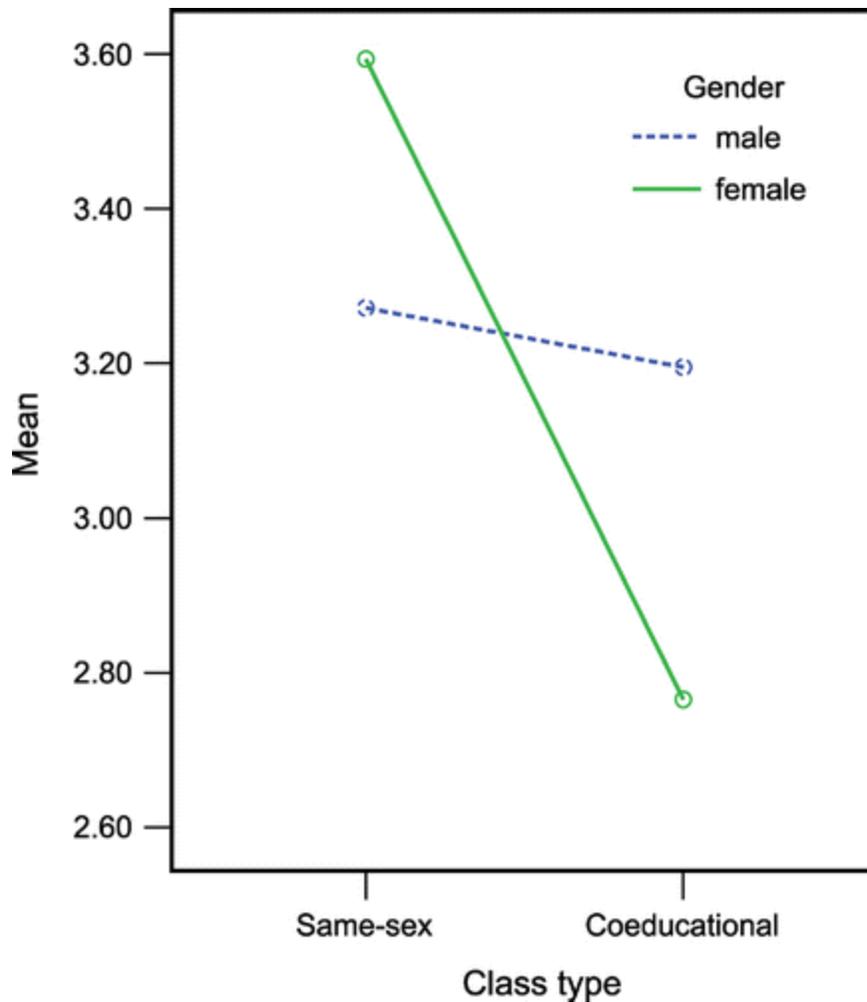


Figure 2 Interaction in shooting competence.

In enjoyment, $F(3, 542) = 21.40, p < .001, \eta^2 = .11$, males enjoy physical education lessons more than females regardless of class type. However, females in coeducation classes did not like physical education classes as much as other groups, and females in same-sex classes had higher scores on enjoyment than females in coeducational classes. Finally, for effort in class, $F(3, 542) = 9.75, p < .001, \eta^2 = .05$, males in coeducational classes and males and females in same-sex classes did not differ in their effort in the physical education class, but females in coeducational classes tried little in physical education class compared with other groups. These results show that females were more affected by class type than were males, and except for enjoyment, females in same-sex classes have perceptions similar to males in both same-sex and coeducational classes.

Relations among students' perceived competence, enjoyment and effort in class

The intercorrelation matrix is presented in Table 2. Pearson's product correlation analyses revealed modest positive relationships among the four sub-variables of hierarchical physical

competence (shooting competence, handball competence, physical competence, and physical self-worth), enjoyment and effort. Correlation results confirmed the hierarchical structure as each level had the strongest relationship to the next one above it. For example, the correlation between perceived handball shooting competence and perceived handball competence was the highest ($r = .809, p < .01$). The next strongest relationship was between perceived shooting competence and perceived physical competence ($r = .671, p < .01$), followed by shooting competence and physical self-worth ($r = .418, p < .01$). Enjoying physical education classes showed a higher relationship with perceived physical competence than with other levels of hierarchical physical competence ($r = .652, p < .01$), and effort in class had the highest correlations with enjoyment ($r = .518, p < .01$).

Table 2. Correlation between variables (N = 546).

Variables	1	2	3	4	5
1. Shooting competence	1.00				
2. Handball competence	.809**	1.00			
3. Physical competence	.671**	.728**	1.00		
4. Physical self-worth	.418**	.444**	.518**	1.00	
5. Enjoyment	.399**	.529**	.652**	.338**	1.00
6. Effort in class	.366**	.422**	.430**	.312**	.518**

** $p < .01$.

Discussion

The purposes of this study were to investigate the relationships among components of hierarchical physical competence, enjoyment and effort and also to make comparisons by gender and class type (same-sex or coeducational physical education class). Main effects were found for both gender and class type. As expected, the number of males was higher than that of females, and the number of students in same-sex classes was higher than those in coeducational classes for females on most variables. However, these main effects must be viewed in light of strong interaction effects.

First, as expected, gender differences were broad and males scored higher than females on perceived handball competence, perceived physical competence, enjoyment and effort in classes. Enjoyment showed the strongest gender difference, as male students enjoyed physical education classes more than female students in both same-sex and coeducational classes, but the gender difference was greater in coeducational classes. These gender differences are in line with previous research showing that males enjoyed physical activity more and had higher specific

physical competence than females (Asci, Kosar, & Isler, 2001; Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2004; Lyu, 2008; Lyu & Pyo, 2005; McKiddie & Maynard, 1997). In Korea, Lyu and Pyo (2006a) found that male students had less stress and liked physical activities and physical education class more than female students.

Gendered expectations are instilled in children at a very early age. Parents, as a result of their own sex-role socialisation, transmit gendered values to their children, which reproduce gender stereotypes (Greendorfer, 1983). In particular, girls are encouraged to play quietly like 'good girls' and discouraged from taking part in activities that are rough or noisy. In contrast, parents may foster physically active play in boys and discourage more passive, 'girlish' behaviour (Kay, 2003). Also, many teenage girls simply do not associate sports activity with the femininity to which they aspire; in fact, sport and physical activity are more commonly seen as distinguishing trademarks of the 'unfeminine' girl. Kay (2003) suggests three rationales for females disliking and not participating in physical activity: the medical rationale that females are physiologically unsuited to sporting activity and the aesthetic rationale that females engaging in sport are an unattractive spectacle and the social rationale that the qualities and behaviours associated with sport are contrary to real femininity. Any of those rationales would support our findings that female students enjoyed physical activities less and reported less effort in physical education class than male students.

However, class environment also plays a role in students' perceptions in physical education classes. Only handball shooting competence and handball competence showed significant main effect differences for class type. Interestingly, students in same-sex classes had higher scores for both of these competence measures than those in coeducational classes.

Clearly, the strongest findings in this study are the interactions between gender and class type, which were significant for all variables. Class type had different effects on males' and females' perceptions in physical education: class type had little effect for male students but strong effects for female students. Female students in same-sex classes had notably higher scores in perceived physical competence, enjoyment and effort than females in coeducational classes, who had the lowest competence, enjoyment and effort perceptions. According to McKenzie and colleagues (2004), in coeducational physical education, males interrupted and limited female's performing and learning; as a result, females had less much time to perform and lower perceptions of ability.

Evans (2006) found that girls thought boys were the audience responsible for evaluating their gender performance in class, and this focus on evaluation of sporting performance may feed a fear of incompetence. Rose (1993) suggests that women's and girls' performances of gendered identities reflect the view that women expected to look right for a gaze that is masculine. This view was evident in girls' interview responses about coeducational physical class in Evans' study (2006, p. 552); 'Ashamed [embarrassed]... I am not good at the sports and I just don't like anyone watching it'. These results may reflect a fear of undermining the performance of boys, or

heterosexual femininity, which positions the feminine body as an object to be looked at, not used in sport (Hargreaves, 1994; Young, 1990).

Lack of competence is often given as a reason for dissatisfaction with physical education. In particular, females tend to underestimate their ability in physical tasks such as sports; therefore, female students are inhibited in their movements and achieve less than their potential, thus fulfilling the prophecy that they are weak (Evans, 2006; Young, 1990).

In contrast, females in same-sex classes might help each other rather than interrupting and also consider other females as their competitors, leading them to evaluate their ability higher compared to females in coeducational classes. Boys and girls may view a coeducational physical education class differently; that is, boys may find that coeducation fosters efficacious beliefs, whereas girls do not, because the class climate reinforces gender differences in achievement attitudes, beliefs and performance (Lirgg, 1993). Eccles and Blumenfeld (1985) suggested that coeducation may facilitate achievement, which improves actual ability and perceived competence, in boys but may dampen or have little positive effect on girls' achievements due to these differing perceptions.

For enjoyment and effort in physical education class, females in same-sex classes had higher scores compared with in coeducational classes. Based on the relationships between competence and enjoyment of sport (Evans, 2006), it is easy to predict that females in same-sex classes, who have higher perceived competence, enjoy physical activity more than females in coeducational classes, who have lower perceived competence. As previously stated, males in coeducational classes limit females' activity in physical education classes, whereas students in same-sex classes help each other. According to previous research related to motor skill improvement, time of activity and task time in classes, same-sex classes are more efficient and effective for teachers and students. In Im's (2004) study, teachers perceived that same-sex physical educational class was more efficient and effective for teaching and managing students. According to Derry and Phillips' (2005) study, teachers and students had more interaction in same-sex classes. Also, teachers thought same-sex was the more effectively managed class, and teachers spent less time on administration than in the coeducational class.

Overall, these previous studies suggest that same-sex classes lead to higher competence, confidence, achievement, enjoyment and effort and that females are more affected by class type than males. In spite of good educational intentions of giving opportunity to understand each other and reduce inaccurate gender role perceptions, there are negative side effects in coeducational physical education.

According to Dale (1974), girls have better academic results in single-sex schools, and Zittleman (2006) found that girls talk more and perform better in all-girl classroom. Leonard (2006) argued that single-sex secondary schooling is good for girls, and Streitmatter (1999) contended that

single-sex schools are beneficial for girls because girls encountered fewer distractions, had all of the teacher's attention and did not need to make a space in different culture.

In terms of the educational benefits, same-sex classes may be the better teaching environment in adolescent physical education, particularly for girls. However, similar benefits may be achieved even in coeducational classes. For example, groups and teams composed of same-sex students could provide the benefits of same-sex classes, and students could have same-sex activities even in a class that includes both males and females. To accomplish this, teachers can first change the physical education class environment to encourage students to participate more actively and foster motivation to continue in sport and physical activity.

Limitations and future directions

It is unclear whether the results from this study generalise to other class activities and physical education classes. Class content may be an important additional variable that affects perceived physical competence, enjoyment and effort. For example, dance or gymnastics might lead to different perceptions. Lyu and Pyo (2006b) found that female students perceived higher competence than male students in a dance activity class and highlighted the importance of class content in coeducational classes. The effect of class type along with class content could be an interesting future study topic. In addition, teachers' teaching styles, including feedback, communication and interaction with students, were not considered in this study. What teachers do and how they teach is one of the most important variables in changing students' psychological factors, such as emotion, motivation, perceived competence and confidence. Therefore, teaching style is an important factor for future study. Also, it would be good to investigate achievement and psychological outcomes in a pre- and post-comparison after providing same-sex or coeducational classes as an intervention. In terms of research methods, interviews with teachers and students and observations in classes could be used to gain more insight into how students feel about physical education classes. More in-depth investigation might help us find way to encourage student participation in physical activities and in physical education.

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