

Gender Differences in Beliefs About the Influence of Ability and Effort in Sport and Physical Activity

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The purpose of this study was to explore gender differences in reasoning about the relationships between natural ability, effort/practice, and final skill level/performance across 16 physical activities at both elite and recreational levels. The participants were 153 college students enrolled in 6 physical activity classes. They completed 2 questionnaires. The results indicated that in physical activity domains, male students tended to rate natural ability as more influential for successful skill level or performance than did female students, but the beliefs seemed to vary for activities that are gender-linked. For all the participants, natural ability was viewed as more important at the elite level than at the recreational level. A strategy for practitioners and coaches to use foster beliefs in the efficacy of effort must be developed by challenging the conception of sports as gender-typed and promoting the concept of sports for all.

KEY WORDS: conceptions of ability; attributions; gender-appropriateness.

For years, researchers in sport and physical activity have explored ways to develop strategies to motivate participants, and they have provided explanations for why some individuals are more motivated than others. Included in this line of research is the study of individuals' belief systems about ability and about the relationships among ability, effort, and performance (Dweck, 1999). Some confusion is evident when conceptions of ability in physical activity are considered. One factor that contributes to this confusion is the manner in which ability is defined in a physical context (Dweck, 2002). Some scholars have conceptualized ability as an individual difference variable that is genetic or innate and cannot be changed (e.g., Magill, 2001) whereas others, though acknowledging the influence of innate characteristics, have tended to define ability more in terms of performance, or as a quality that can be influenced by

experience and training (e.g., Safrit & Wood, 1995). When conceptions of ability are studied in physical activity settings, it may be more important to investigate individuals' beliefs about the differential influence of innate ability and effort on successful performance than to consider whether or not ability can be changed through effort. This distinction is needed in order to clarify conceptions of ability in physical activity settings, and it should be requisite to the study of ability as changeable or unchangeable.

Beliefs about causes of success are rooted in attribution theory and cut across other major theories such as achievement goal theory (Nicholls, 1984, 1989), self-efficacy (Bandura, 1997), and conceptions of ability (Dweck, 1999). In achievement contexts, ability, effort, task difficulty, luck, mood, and help or hindrance from others are typically identified as the causes of success and failure (Graham & Weiner, 1996; Weiner, 1985, 1986, 1992). Among these inferred causal ascriptions, the most dominant variables are ability and effort. These two causal ascriptions exert a substantial effect on cognition, motivational behavior, and achievement strivings in physical activity and academic contexts (Graham, 1991). Weiner (1985, 1986, 1992) maintained that it is not

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the attributions given for failure or success per se, but the dimensions of these attributions, that have the ultimate impact on behavior. Thus, when success is attributed to a stable cause such as ability, future success can be anticipated. Attributions of success to effort, when it is seen as controllable and unstable, facilitate adaptive behavioral and motivational patterns. On the other hand, attributions of failure to a stable cause such as ability leads to inferences that future success is improbable and increases the likelihood of maladaptive behavioral and motivational responses.

According to theorists (Hong, Chiu, Dweck, Lin, & Wan, 1999), however, attributions can be made only when an outcome such as success or failure is encountered. Attribution theory does not address individuals' dispositional beliefs about the influence of ability and effort on successful performance. An individual predominantly endorses a belief about the influence of ability and effort in an achievement context. These dispositional beliefs about the influence of ability and effort guide individuals' strivings prior to an outcome. It seems clear from the available literature that individuals' dispositional belief systems play a vital role in mediating their motivational and behavioral responses in achievement contexts, including ability conceptions and goal orientation (e.g., Hong et al., 1999).

Dweck and her colleagues (Dweck & Elliot, 1983; Dweck & Leggett, 1988; Elliot & Dweck, 1988) have proposed that students' ability belief systems can be described by two major constructs: entity versus incremental ability. An entity conception of ability is the view that ability is stable and cannot be changed through effort. In contrast, within an incremental conception of ability, ability is malleable, and this view is consistent with a belief that ability can be improved through effort. Research in educational and physical activity settings has demonstrated that an incremental conception of ability is positively associated with many adaptive motivational patterns such as positive self-inference, self-regulation, and greater effort and persistence, which should produce positive achievement outcomes (e.g., Dweck & Leggett, 1988; Wang & Biddle, 2001).

The particular view of ability that individuals adopt determines the achievement-related goal perspective that they pursue. Two major goals that operate in achievement contexts are performance and learning goals (Dweck, 1999). Students who pursue performance goals focus on norm-referenced criteria for success, where success is judged by comparisons

with the performance of others. Those who pursue learning goals focus on learning new skills and mastering new tasks to increase their competence. When compared to learners who adopt learning goals, those who adopt performance goals are more likely to withdraw effort and persistence, avoid challenging tasks, attribute success or failure to ability, and display performance deterioration, especially when perceived ability is low (for a review, see Dweck, 1999). An incremental view of ability is positively associated with a learning goal because students who hold incremental conceptions are concerned with increasing personal competency. On the other hand, an entity view of ability is positively associated with a performance goal because students who hold entity conceptions are focused on being smart and outperforming others (for a review, see Dweck, 1999).

Nicholls and his colleagues (Jagacinski & Nicholls, 1984; Nicholls, 1984, 1989) have also proposed that individuals hold a particular goal perspective when they enter an achievement setting, and their goal is associated with the conception of ability they endorse (for a review, see Li & Lee, 2004). Some students focus mainly on information about their abilities compared to those of others. These ego-oriented learners are likely to endorse differentiated conceptions of ability because they believe high effort means low ability. Others tend to focus on personal improvement and learning or mastery of the task. Those with task goal orientations are likely to hold undifferentiated conceptions of ability because they believe that effort can increase their abilities.

Duda and her colleagues (Duda, 1992; Duda, Chi, Newton, Walling, & Catley, 1995; Duda, Fox, Biddle, & Armstrong, 1992; Duda & Nicholls, 1992; Newton & Duda, 1993; Walling & Duda, 1995) have employed Nicholls' goal theory to explore the relation between goal orientations and beliefs about success in sport. Their findings provide strong evidence that individuals who are task-oriented are more likely to attribute success and failure to effort, whereas those who are ego-oriented are more likely to attribute success and failure to ability.

In conclusion, individuals' dispositional competence beliefs play a vital role in mediating their motivational and behavioral responses in achievement contexts. The study of individuals' attributions from a dispositional perspective may provide us with a new approach to understand their motivation and behavior in achievement contexts.

Attributions differ as a function of gender. Specifically, men are more likely than women to

attribute success to stable factors such as ability, whereas women are more likely than men to attribute success to unstable factors such as effort (Cramer & Oshima, 1992; Deaux, 1984). Deaux (1984) has argued that different attributions made by men and women are due to the different expectations held by men and women for any given task. For example, Deaux and Farris (1977) found that significant differences in attributions between men and women occurred when the activity was labeled as male-dominant. In this case, men had a higher level of expectation for success, and they identified ability as the more influential factor on their successful performance. On the basis of Lenny's (1977) argument that women display low confidence only when required to perform gender atypical tasks, several researchers have documented that students' beliefs about their own competence in various movements and sport activities are mediated by gender-linked tasks (Clifton & Gill, 1994; Lee, Nelson, & Nelson, 1988; Lirgg, 1992; Sanguinetti, Lee, & Nelson, 1985). For example, Lee et al. (1988) found that beliefs about the gender-atypicality of the task influenced participants' expectancies for success. Children were told that a gender-neutral novel reaction time task measured their ability in either football or dance. Girls who were told it was a football task had lower expectancies for success than did girls who were told it was a dance task. Boys' expectancies were less affected by the information they were given, which may have reflected their belief that if it was a dance task, or something that girls could do well, it must be easy enough that they too could be successful.

There is also clear evidence that expectations for success are influenced by task-specific beliefs about competence and self-efficacy (Eccles, Wigfield, & Schieffle, 1998), and gender differences in these beliefs about sports and physical activity have also been reported consistently over the years (Belcher, Lee, Solmon, & Harrison, 2003; Clifton & Gill, 1994; Daley & Buchanan, 1999; Gill, Gross, Huddleston, & Shifflet, 1984; Lirgg, 1992). Taken together, the available research provides strong evidence that women and girls have higher self-perceptions of ability when they are involved in a gender-typical activity (Clifton & Gill, 1994; Lirgg, George, Chase, & Ferguson, 1996).

The gender differences reported in physical activity and sport domains are not based on how men and women actually differ, but on whether individuals expect differences and if they perceive

them (Deaux, 1984; Eccles & Harold, 1991). Eccles and Harold (1991) used Eccles et al. (1983) expectancy-value model to argue that gender differences in competence beliefs were more the consequences of gender role socialization and gender intensification at puberty than biological differences. Men and women have been pressured to behave in certain ways in order to satisfy cultural expectations. Women have traditionally been defined as physically inferior and dependent on men. Their primary roles were to be childbearer, childrearer, and homemaker (Eiten & Sage, 1978). These cultural expectations excluded women from participating in competitive sports. Even though the number of girls and women participating in sports has increased over the past 20 years, there is clear evidence that certain physical activities are still often perceived to be more typical for men or women (Lee, Fredenburg, Belcher, & Cleveland, 1999; Lirgg et al., 1996; Solmon, Lee, Belcher, Harrison, & Wells, 2003). Activities associated with strength and power such as football, baseball, basketball, and weight lifting are usually perceived as masculine activities, whereas activities such as gymnastics, dance, and aerobics are considered feminine activities (Eder & Parker, 1987; Weinberg, 1997). These views have limited women's involvement in physical activity and sports, especially in vigorous activities that are traditionally male-dominant (Harrison, Lee, & Belcher, 1999). As a consequence, men and women have particular expectations about their capabilities in various sports, and their subsequent attributions are likely to be affected by those expectations (Biddle, 1993; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002).

Hong et al. (1999) proposed that individuals' adoption of different implicit theories of ability could assign unequal weights to ability and effort, although both entity and incremental theorists may attribute their success or failure to lack of ability or effort. In one of a series of studies, Hong et al. (1999) gave participants a test that allegedly assessed their level of intelligence. After the test, negative feedback was provided to the participants, and they were asked to explain how much their poor performance was due to ability versus effort. The findings indicated that individuals with an incremental view of ability made stronger effort attributions than did those with an entity view. Inconsistent with the results of previous research, however, their results also showed that both entity and incremental theorists made strong ability attributions. Further explorations in this area are needed.

Individuals' ability conceptions differ as a function of gender (Dweck, 2002). Dweck reported that girls, especially intelligent girls, may embrace a more entity ability conception than do boys in an academic setting. To date, few researchers have investigated gender and conceptions of ability in physical activity settings. Li, Harrison, and Solmon (2004) examined ability conceptions in sport among college students. There was no difference in entity ability conceptions between men and women, but men expressed stronger beliefs in an incremental conception of ability than women did. Li et al. interpreted their findings in terms of a learned helpless pattern, where women tend to have weaker beliefs in the efficacy of effort.

Factors that influence beliefs about the relationships among natural ability, effort/practice, and successful final skill level or performance are a complex construct. A better understanding of the ways that men and women view the relationship between effort and ability and how that impacts performance could provide valuable information to coaches and physical education teachers as they strive to design motivational climates that will encourage all participants to exert effort and to be engaged in physical activity. Men and women may attribute successful final skill level or performance to natural ability in different ways according to different physical activities and skills in different settings.

The main purpose of this study, therefore, was to explore gender differences in reasoning about the relationships between natural ability, effort/practice, and final skill level/performance across 16 physical activities at both elite and recreational levels. It was hypothesized that men would be more likely than women to believe that successful skill performance is dependent on natural ability, but the beliefs would vary for activities that are gender-linked. The Hong et al. (1999) study demonstrated that relationships exist between students' implicit theories of ability and their attributions about success and failure. Therefore, another focus of the present study was to examine the relationships between general ability conceptions in sports and beliefs about the influence of ability and effort on successful performance. On the basis of the study of Hong et al. (1999), it was hypothesized that an incremental view of ability would be positively related to an effort attribution, whereas an entity ability conception would be positively associated with an ability attribution.

METHOD

Participants

The participants were 153 college students (78 men and 75 women; 26 African Americans, 126 European Americans, and 1 whose ethnicity was not known) from a broad range of academic majors enrolled in physical activity classes at a university in the southeastern United States. About 6% of participants were kinesiology/physical education majors. The students' ages ranged from 18 to 30 years ($M = 21.66$, $SD = 2.21$). Informed consent was obtained from all participants.

Instrumentation

Dweck's (2002) questionnaire was adapted to assess participants' beliefs about the influence of natural ability versus effort/practice on successful performance. Specifically, individuals were asked to complete the equation " $\text{—\% natural ability} + \text{—\% effort/practice} = 100\%$ final skill level or performance" for 16 different physical activities. The 16 physical activities were basketball (BAKT), gymnastics (GYM), football (FT), swimming (SWM), volleyball (VOL), baseball (BAS), soccer (SOC), golf (GOLF), tennis (TNN), jogging (JOG), bowling (BOW), dance (DAN), badminton (BAD), weight lifting (WGT), martial arts (MAR), and aerobics (AERO). Participants were asked to complete the equation (Dweck, 1999) for two levels of physical activity involvement: elite and recreational. Examples provided for successful performance at an elite level were running marathons or competing in sports or activities at national, collegiate, or professional levels. Successful performance at a recreational level was defined as participating in physical activity for the purpose of promoting health and fitness or competing in a sport at a recreational level.

The Conceptions of Natural Athletic Ability Questionnaire (CNAAQ-2), used in several studies by Biddle and his colleagues (Wang & Biddle, 2001; Wang, Chatzisarantis, Spray, & Biddle, 2002), was employed to assess conceptions of ability in sports. This measure has been established as a valid and reliable instrument. For the present study, all questions were phrased in terms of the individual. The 12-item measure consists of four first-order factors (learning, improvement, stable, and gift) and two higher order factors (incremental and entity). Two subscales that

reflect learning and improvement were used to assess the incremental scale. For example, the item “to reach a high level of performance in sports, I must go through periods of learning and training” represents the learning scale, and the item “in sports, if I work hard at it, I will always get better” reflects the improvement scale. The entity scale was assessed through two subscales that reflect stable (e.g., “I have a certain level of ability in sports, and I cannot really do much to change that level”) and gift (e.g., “I need to have a certain ‘gift’ to be good at sports”). The responses were made on 5-point Likert-type scales that ranged from *strongly disagree* to *strongly agree*. Participants were asked to choose a point that represents their opinions for each item. A score of 5 represents that participants strongly agree with the statements.

Internal consistency reliability for the two subscales from the CNAAQ-2 was assessed using Cronbach’s (Cronbach, 1951) coefficient alpha. The coefficient alphas for the entity and incremental subscales were .72 and .81, respectively. The aggregate scores were calculated by summing all responses for each subscale and dividing by the relevant number of items per subscale.

Procedures

The instruments were administered to the participants in their classes. The researcher read the instructions, provided examples for the participants, and encouraged them to ask questions about anything they did not understand. Participants first completed the questionnaire assessing beliefs about the influence of natural ability versus effort/practice on successful performance, and then completed the CNAAQ-2 to assess their entity and incremental conceptions of ability. It took participants about 20 min to complete the questionnaires.

RESULTS

A 2 (gender) \times 2 (participation level) \times 16 (type of activity) ANOVA with a split-plot design was used to investigate whether participants’ beliefs about the influence of natural ability versus effort/practice on successful performance were a function of gender, participation level, and type of activity. Gender was an independent variable in the main plot. Participation level and type of activity were treatment effects in the subplot. The dependent variable used in the

analysis was the percentage that participants gave to natural ability in each sport at each level. The effort percentages were not analyzed, as they are the inverse of the ability percentages, and the results would mirror those of the ability analysis. When appropriate, the Tukey procedure was used in the post hoc analysis to follow-up the main effects. The simple effects across gender for all 16 physical activities were computed with the Bonferroni adjustment (Kuehl, 2000).

Means and standard deviations by participation levels, gender, and activity are presented in Table I. Main effects for gender, $F(1, 151) = 6.43$, $p < .0122$, $\eta^2 = .041$; participation level, $F(1, 4678) = 86.04$, $p < .0001$, $\eta^2 = .018$; and type of activity, $F(15, 4678) = 16.14$, $p < .0001$, $\eta^2 = .049$, were significant. In addition, the gender \times type of activity interaction was also significant, $F(15, 4678) = 4.82$, $p < .0001$, $\eta^2 = .015$. All of the effects accounted for less than 5% of the variance.

In general, participants tended to view effort/practice as having a stronger influence on final successful performance than natural ability. In only four instances did the average percentage of final skill levels attributed to ability exceed 50%: elite performance in basketball (50.69%); elite performance in baseball (51.93%); men’s overall football performance (51.96%); and men’s overall baseball (52.34%) performance. All participants believed that natural ability was more important at the elite level than at the recreational level.

Beliefs about the influence of natural ability on final successful skill level or performance also varied according to the type of activity. Participants believed that performance in male-dominant team sports such as baseball, basketball, and football was more dependent on innate ability than was the case for individual activities such as golf, bowling, badminton, and fitness activities such as aerobics (see Table I). With regard to the gender effects, overall, men tended to assign a higher percentage to natural ability than women, whereas women were more likely than men to assign a higher percentage to effort.

The gender \times type of activity interaction suggests that men and women varied in their assessment of the influence of natural ability and effort in relation to the type of activity. Tests on the simple effects across gender for all 16 physical activities indicate that men, more than women, tended to indicate that sports that are traditionally male-dominated such as football, $F(1, 4678) = 21.8$,

Table I. Means and Standard Deviations for Ability Percentages by Participation Levels, Gender, and Physical Activities ($N = 153$)

Physical activities	Participation levels				Gender				Total	
	Recreational		Elite		Men		Women			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M^a</i>	<i>SD</i>
Baseball	43.27	18.99	51.93	18.26	52.34	19.06	42.67	17.90	47.60 ^A	19.10
Basketball	42.42	19.37	50.69	18.34	49.52	19.88	43.47	18.20	46.55 ^{AB}	19.28
Football	43.53	20.49	48.24	19.92	51.96	20.10	39.57	18.59	45.88 ^{ABC}	20.31
Dance	40.44	22.37	46.88	22.73	42.69	23.82	44.67	21.59	43.66 ^{ABCD}	22.74
Volleyball	41.01	19.33	45.72	18.12	45.71	19.31	40.93	18.12	43.37 ^{ABCD}	18.86
Swimming	40.92	21.36	44.31	18.76	42.18	20.44	43.07	19.89	42.61 ^{ABCD}	20.14
Gymnastics	40.72	20.83	44.25	23.45	40.93	23.84	44.10	20.33	42.48 ^{BCD}	22.21
Soccer	38.82	18.56	45.73	19.51	45.96	18.58	38.45	19.39	42.28 ^{BCD}	19.32
Jogging	38.97	25.42	44.14	23.89	45.21	25.08	37.73	23.92	41.57 ^{CDE}	24.76
Tennis	38.43	18.97	44.25	19.21	42.63	19.06	40.00	19.48	41.34 ^{CDE}	19.28
Weight lift	38.37	23.29	40.46	22.14	44.05	23.19	34.59	21.22	39.42 ^{DEF}	22.71
Golf	33.89	20.30	40.29	22.21	39.36	20.94	34.73	21.87	37.09 ^{EF}	21.49
Bowling	35.13	22.45	38.23	19.81	39.14	22.19	34.18	19.86	36.68 ^{EF}	21.19
Badminton	35.75	21.11	36.93	19.58	39.34	20.81	33.27	19.42	36.34 ^F	20.33
Aerobics	33.89	23.04	36.80	21.11	35.13	20.47	35.57	23.76	35.34 ^F	22.11
Martial arts	33.69	20.05	35.42	20.57	36.28	21.38	32.77	19.01	34.56 ^F	20.29
Total	38.70	21.26	43.39	21.05	43.28	21.72	38.73	20.57		

^aActivities with the same letter in superscript were not significantly different from one another.

$p < .0001$, $d = 0.61$; baseball, $F(1, 4678) = 13.29$, $p < .0003$, $d = 0.51$; and weight lifting, $F(1, 4678) = 12.71$, $p < .0004$, $d = 0.42$, were more dependent on natural ability, as reflected in Fig. 1. For the female-dominated activities, such as dance, aerobics, and gymnastics, and for the gender-neutral activities, the perceived influence of natural ability and effort was not significantly different between women and men, as reflected in Fig. 1. Interpretation of those simple effects of physical activities suggests that men might think about sports and physical activity in terms of their gender typicality, and tend to rate natural ability as more influential for activities with which they are more familiar, and possibly those with which they have more direct experience.

Relationships between entity and incremental conceptions of ability and beliefs about the influence of ability and effort were assessed across 16 physical activities at both elite and recreational levels using simple correlations. The correlational analyses indicated a negative relationship between the entity and incremental conceptions of ability, $r(153) = -.39$, $p < .0001$, as measured by the CNAAQ-2, which is consistent with the theoretical prediction. There were no significant correlations between ability conceptions and beliefs about the influence of ability and effort on performance across the 16 physical activities at both elite and recreational levels at the .01 significance level. The correlation coefficients ranged from $-.01$ to $.18$.

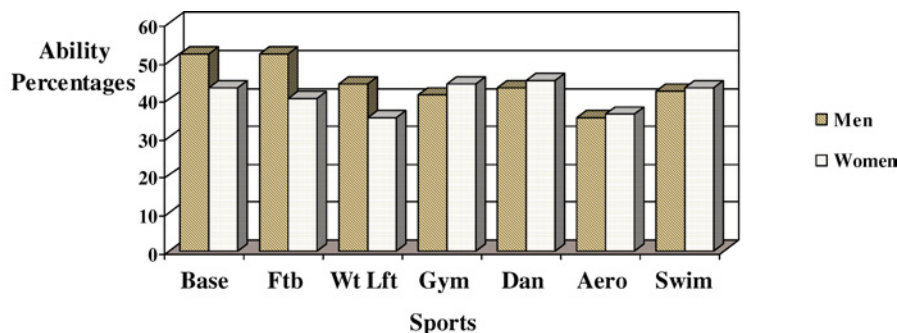


Fig. 1. Gender differences in ability percentages for male-typical, female-typical, and gender-neutral sports.

Table II. Means and Standard Deviations for Entity and Incremental Ability Conceptions by Gender

	N	Entity theory of ability		Incremental theory of ability	
		M	SD	M	SD
Men	78	2.59	0.59	4.11	0.71
Women	75	2.28	0.61	4.18	0.50
Total	153	2.43	0.61	4.15	0.61

The gender differences between entity and incremental conceptions of ability were analyzed using a 2 (entity conception vs. incremental) \times 2 (gender) profile analysis with a repeated statement for ability conceptions (Johnson & Wichern, 1998). The profile analysis revealed significant main effects for ability conceptions, $F(1, 151) = 446.21, p < .0001, \eta^2 = .75$, and gender, $F(1, 151) = 4.13, p < .044, \eta^2 = .027$. The gender \times ability conceptions interaction was also significant, $F(1, 151) = 4.91, p < .028, \eta^2 = .031$. Means and standard deviations for entity and incremental conceptions by gender are reported in Table II. The significant interaction indicates that conceptions of ability varied as a function of gender. Inspection of the means for the entity and incremental ability conceptions indicates that participants expressed a stronger incremental conception than an entity conception. Univariate ANOVAs were used to follow-up the gender effects. Incremental conceptions did not differ significantly by gender, but men expressed stronger entity beliefs than women did, $F(1, 151) = 9.12, p < .003, d = 0.5$.

DISCUSSION

This study was designed to explore gender differences in reasoning about the relationships between natural ability, effort/practice, and final skill level/performance across 16 physical activities at both elite and recreational levels. It was hypothesized that men would be more likely than women to believe that successful skill performance is dependent on natural ability, but the beliefs would vary for activities that are gender-linked. The data did not provide strong evidence to support the hypothesis given that the effects of gender differences and the interaction between gender and type of activity accounted for less than 5% of the variance.

The findings, however, did provide some evidence that men and women have different beliefs about the role of natural ability in physical activity

domains. Men tended to rate natural ability as the more influential factor on the successful skill level or performance, but the beliefs seemed to vary for activities in relation to their gender typicality. As argued by Eccles and her colleagues (Eccles et al., 1998; Eccles & Harold, 1991; Wigfield, Eccles, & Rodriguez, 1998), gender role socialization and gender intensification at puberty may have influenced the development of men's and women's competence beliefs and expectations for success. As a result, men and women have higher levels of perceived competence and expectations for success when the activity is perceived as gender-typical (Harrison et al., 1999; Lee et al., 1999; Lirgg et al., 1996). Men in our study tended to rate natural ability as more influential for activities that were gender-typical for them, but the same was not true for women. A possible explanation might be that women have lower levels of perceived competence in feminine-typed physical activities than men do in masculine-typed activities. One important area worthy of future exploration would be how men's and women's participation or experience in sport may shape their perceptions of ability. Although that aspect was not investigated in the present study it may be that the men had had more opportunities than the women had had to participate in sport and physical activity, and consequently their experience or lack of it influenced their beliefs about the influence of ability and effort in successful performance.

A developmental perspective has been employed in the study of individuals' ability conceptions in achievement contexts (Nicholls, 1984). There is strong evidence that children's understanding of ability and effort changes as they age (e.g., Dweck, 2002). In physical education, several researchers (Fry & Duda, 1997; Lee, Carter, & Xiang, 1995; Xiang & Lee, 1998) have used Nicholls' developmental theory to examine changes in children's conceptions of ability using both qualitative and quantitative approaches. Consistent with predictions, their results showed that children's conceptions of ability changed with age; older children were more likely than younger children to hold a differentiated conception of ability. Researchers have recently reported that some older children who have a differentiated conception of ability still believe strongly in the efficacy of effort (Lee et al., 1995; Xiang, Lee, & Williamson, 2001). Xiang et al. (2001) further investigated the influence of age on conceptions of ability by comparing children and adolescents in physical education. Adolescents employed different criteria to

judge their own ability, and younger children were more likely to identify task mastery and class behavior (e.g., paying attention, listening, and following the rules) as evidence of ability. These findings are consistent with those of earlier research (Lee et al., 1995).

Given these developmental changes in individuals' understanding of the nature of ability and effort, it is suggested that beliefs adopted by individuals about the influence of natural ability and effort on successful performance differ with age. Attribution theory research in physical activity settings has not adopted a developmental approach (Biddle, 1993), even though age has been suggested as an important variable in achievement attribution (Banziger & Drevenstedt, 1984). In the current study, all participants were college students. Future researchers should not only investigate school-aged children's understanding of the influence of natural ability and effort on successful performance, but should also include older adults to investigate age differences in individuals' beliefs about natural ability and effort (Biddle, 1993).

This study represents an initial attempt to examine gender differences in the construct of conceptions of ability in physical activity and sport domains by investigating beliefs about the relative influence of effort and ability on performance in specific activities. The results suggest that male students tended to rate natural ability as more influential than female students did for successful skill level or performance in physical activity domains, but their beliefs seemed to vary for activities that are gender-linked. Natural ability was generally viewed as a more powerful influence in male-dominated team sports such as football, basketball, and baseball than in individual activities such as martial arts, badminton, bowling, and fitness activities. It is encouraging that effort was viewed as a powerful influence on successful performance in fitness activities. Although they recognize the role that natural ability plays in physical activities, these college students believed in the efficacy of effort. One interpretation of these findings could be that a certain amount of innate ability might be necessary to achieve a successful level of performance, but that ability alone is not sufficient to produce success in this domain. They recognized that natural ability would likely be more influential at elite levels than at recreational levels, but, overall, they tended to indicate that effort was more influential than ability in a wide range of activities. Another possible explanation is that the increased opportunities for

women to participate in physical activities and sports might have shaped their beliefs about competence and self-efficacy in these activities and sports. Beliefs about the efficacy of effort have been linked to many adaptive motivational responses such as persisting longer, choosing challenging tasks, and expending effort (Lirgg, 1992; Wigfield et al., 1998). It is suggested that practitioners in sports and physical activity settings could capitalize on those beliefs to foster effort in those activities by promoting the concept of sports for all. Otherwise, women may be put at risk of developing low self-efficacy and underestimating their own competence in sports and physical activities (Lirgg, 1992).

One important finding of our study is that beliefs about the proportional influence of effort and ability were unrelated to the assessment of conceptions of ability. Hong et al. (1999) found that incremental theorists assigned greater weight to effort than did entity theorists when given negative performance feedback. In the present study, no feedback was provided, and all questions were phrased in terms of the individual, but the results indicate that entity and incremental theories had little, if any, impact on beliefs about the efficacy of effort in physical activity and sport. This suggests that the classroom findings may not be directly applicable to physical activity domains, and this is an important first step.

Men expressed a stronger entity conception of ability than women did, but there were no differences in incremental conceptions of ability. This finding is inconsistent with that of the Li et al. (2004) study, where men and women did not differ with regard to entity conceptions, but women were less inclined to have an incremental conception. One possible explanation for this inconsistency could be that the administration of the instrumentation affected the women's responses. In the Li et al. study the conceptions of ability questionnaire was given as an independent measure. In the present study, participants completed the same questionnaire, but it was administered after they had completed the equations about the relative influence of ability and effort on performance. It seems plausible that asking individuals to consider the influence of effort and ability across a wide range of sports and physical activities could have influenced how they responded to the ability conceptions questionnaire. That is, after they had rated effort as more influential on performance than men did, women seemed to have been more likely to embrace an incremental conception of ability and reject an entity view. On the other hand,

men were more likely to endorse an entity view of ability because they had rated natural ability as the more influential factor on performance. It seems that the ability conceptions of men and women do vary, but further study is needed to clarify how and why they differ. It is also suggested that future researchers counterbalance the order of questionnaires to examine the relationship between ability conceptions and attributions.

An understanding of ability conceptions and beliefs about the efficacy of effort is critical to the design of optimal motivational climates. Research evidence has supported the suggestion that environments that emphasize effort/practice foster adaptive motivational behavior patterns. A strategy for practitioners and coaches to use that might foster beliefs in the efficacy of effort must be developed by challenging the conception of sports as gender-typed and promoting the concept of sports for all. The results of this study suggest that it is important for us to gain a clearer understanding of individuals' beliefs about the influence of effort in physical activity to structure an instructional environment that will foster active engagement.

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