

Player Ability, Coach Feedback, and Female Adolescent Athletes' Perceived Competence and Satisfaction

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The purpose of this study was to examine the relationship between athlete ability and coach feedback with perceived competence and satisfaction among female adolescent athletes. Athletes ($N = 123$) reported their perceptions of coaches' use of feedback, their own field hockey competence, and satisfaction with the coach and team involvement. In addition, coaches' ratings of athletes' ability were obtained. Analyses revealed that both ability and coach feedback were significantly related to perceived competence and satisfaction. Specifically, a hierarchical regression analysis revealed that higher ability, more frequent praise and information, and less frequent encouragement and corrective information were related to higher perceived competence. Further, a canonical correlation analysis revealed that higher ability, frequent praise and information after a good performance, and frequent encouragement and corrective information after an error were associated with greater satisfaction with the coach and team involvement. The results are discussed in relation to Harter's (1978) competence motivation theory.

Key words: perceived competence, coach behavior, female athlete, adolescents

A voyage of discovery and development from uncut child to finished, polished, glittering jewel (Coe, Teasdale, & Wickham, 1992, p. 14).

Coe et al. clearly identify with the potential positive impact sport can have on all participants, particularly children and adolescents. Further, the number of children involved in youth sport and physical activity is a testament to this favorable view of sport. For example, of New Zealanders aged 5 to 15 years, 81% of boys and 79% of girls participate in sporting activities (Russell, Allen, & Wilson, 1996). In the United States it is estimated that 20 to 35 million children and adolescents (5 to 18 years) participate in nonschool sports (Ewing & Seefeldt, 1996). Wankel and Mummery (1996) reported that 42% of boys and 37% of girls 10 to 14 years, and 44% of males and 28% of females 15 to 19 years of age, participate in sports in Canada. Despite these impressive rates, a decline in participation becomes apparent around 11 years

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of age and continues through adolescence and into adulthood (Hodge & Zaharopoulos, 1991; Sallis & Patrick 1996; Wankel & Mummery, 1996).

Initiating participation in a sport for the first time, deciding to stay involved, electing to change to another activity, and withdrawing from sport altogether are all considered examples of motivated behavior. Of interest to youth sport researchers is what drives children and adolescents to behave in these ways. A number of theories have been proposed to explain motivated behavior (e.g., Harter, 1978; Nicholls, 1984; Deci & Ryan, 1985). Harter's (1978, 1981) competence motivation theory is well-suited for the explanation of behavior in youth sport. This theory proposes that children are motivated to engage in mastery attempts (e.g., sport performances) to demonstrate competence in specific achievement domains (e.g., academic, physical, social). Success at a mastery attempt (e.g., a competent performance) results in feelings of efficacy and pleasure. This, in turn, maintains or increases motivation to demonstrate competence.

Central to Harter's (1978) perspective on motivation are the individual's perceptions of competence and affect in a particular achievement domain. If a child believes she or he is good at an activity (e.g., sports, music, math), then she/he is more likely to enjoy involvement and engage in the activity, or a similar activity, in the future. Harter hypothesized that perceptions of competence could be enhanced by positive reinforcement from significant others for mastery attempts. Rather than suggesting an actual amount of reinforcement adults should give, Harter proposed that more positive and less negative responses from socializing agents for *independent* mastery attempts would reinforce an intrinsic motivational orientation. This orientation would lead to feelings of increased perceived competence and control, positive affect, and motivated behavior. In contrast, perceptions of failure and negative responses from significant others should decrease perceived competence and perception of control, increase anxiety, and decrease the likelihood of the individual engaging in further mastery attempts in that domain.

Applied to the sport domain, Harter's (1978) competence motivation theory suggests that praise and encouragement from coaches, parents, and peers for sport performance attempts, and successful performance outcomes should result in enhanced perceptions of physical competence, positive affect, and a desire to continue to participate in sports and improve physical skills. Negative experiences in sport, such as failure, or criticism from coaches, parents, and peers, should decrease perceptions of physical competence, and result in a lack of enjoyment and a decreased likelihood of continued participation in sport and the desire to improve skills.

Research in the sport domain has demonstrated support for the proposed relationships among many components of Harter's (1978) model, such as the relationship between perceived competence and participation motives in sport (Feltz & Petlichkoff, 1983; Klint & Weiss, 1987; Roberts, Kleiber, & Duda, 1981; Ryckman & Hamel, 1993). However, only two studies have directly examined the relationship between coach behavior and components of Harter's model (Black & Weiss, 1992; Horn, 1985). Both studies found significant relationships among coach behavior, perceived competence, enjoyment, and motivation. Horn (1985), in a study of junior high school female athletes (12 to 15 years), found that certain coaching behaviors (i.e., praise and criticism) contributed significantly to changes in self-perceptions above and beyond change attributed to skill improvement over the season. Specifically, children who received higher frequencies of praise from the coach following successful performances in practice reported lower perceived

competence than players who received less frequent praise. Further, those who received higher frequencies of criticism following errors in practice reported higher perceived competence than those receiving less frequent criticism. Therefore, as predicted by Harter's theory, coach behaviors were related to perceptions of competence. However, the direction of the relationships between feedback and self-perceptions was counterintuitive. In explaining these findings Horn suggested that the contingency and appropriateness rather than just the frequency of coaches' responses were the critical factors in how behaviors were interpreted by athletes and, subsequently, how these behaviors influenced perceptions of ability.

Black and Weiss (1992) extended Horn's (1985) study by investigating the relationship between contingent coaching behaviors and age-group swimmers' (ages 10 to 18 years) perceived competence, enjoyment, and motivation. Perceptions of coach behavior were assessed using a questionnaire in which the statements were phrased in such a way that all behaviors were given in response to a specific performance attempt (i.e., contingent behaviors). They found that swimmers 15 to 18 years old (the age group of interest in the present study) who perceived a greater frequency of contingent praise, information, and encouragement plus information, and a lower frequency of criticism, reported higher self-perceptions of ability, greater enjoyment, and a preference for optimally challenging tasks. These findings supported Horn's (1985) suggestion that the contingency of coach behavior is important in determining children's and adolescents' perceived competence. In addition, these results also supported Harter's (1978) theory in that the feedback and reinforcement from significant others influenced self-perceptions, affect, and motivation.

Research and theory has also suggested that self-perceptions, affect, and motivation are influenced by one's actual ability or objective ability level (Harter, 1981; Horn, 1985). Horn found that ability as well as coach feedback was significantly related to changes in perceived competence over the season for 12- to 15-year-old girls. In addition, Smoll, Smith, Barnett, and Everett (1993) attributed increases in boys' self-esteem over a season to the preseason coach education workshop their coaches had attended. However, they recognized that without an assessment of boys' ability it was not clear whether changes in self-esteem were a direct result of coaches' behavior or mediated by changes in the boys' actual ability produced by more effective instruction given by the trained coaches. Therefore, the influence of athlete ability should be considered in any examination of the relationship between coach feedback and self-perceptions. The only study to investigate coach behavior in older adolescents did not include an estimate of actual ability (Black & Weiss, 1992). Therefore, the present study not only assessed coach behaviors, perceptions of competence, and affect but also included a rating of player ability.

Two other lines of research on coach behaviors have been conducted. One is based on the model of sport leadership by Chelladurai and associates with male university and elite athletes (see Chelladurai, 1993, for a review). This work has demonstrated significant relationships between perceptions of and preferences for coach behaviors and affective outcomes such as satisfaction. The second line of research is that by Smith and Smoll and colleagues with male youth sport athletes, which is grounded within a social reinforcement paradigm (e.g., Barnett, Smoll, & Smith, 1992; Smith, Smoll, & Barnett, 1995; Smith, Smoll, & Curtis, 1979; Smoll et al., 1993). Their work has demonstrated a significant relationship between coach behaviors and psychological outcomes of children's sport participation, such as self-esteem, enjoyment, and continued motivation. Both the Chelladurai and the

Smith and Smoll lines of research have most commonly examined male coaches and their male athletes. Moreover, these researchers have focused their efforts toward younger participants or college-age athletes. The adolescent age group has been neglected for the most part in sport-related literature. A recent consensus statement developed by a panel of experts identified adolescents as a group "at risk" due to declining physical activity and subsequent health-related behaviors and outcomes (Sallis & Patrick, 1996). If the desire is to increase the physical activity level of the teenage population, more research is needed with regard to factors related to physical activity participation motivation for teenagers.

Many questions pertaining to the sport participation of adolescents, particularly females, still remain unanswered. Fewer females than males participate in physical activities throughout childhood and adolescence, and the decline in participation of both boys and girls seen toward the end of childhood and through adolescence is greater for young women compared with young men (Russell et al., 1996; Wankel & Mummery, 1996). Females generally report lower perceptions of physical competence compared with males (Horn & Harris, 1996). In addition, while there is a tendency toward the use of internal information (e.g., good feeling after practices) and self-comparison (e.g., skill improvement over time) as sources of information to judge competency with increasing age, teenage girls report using evaluative feedback from coaches, parents, and peers more than males (Horn & Hasbrook, 1986; Horn, Glenn, & Wentzell, 1993). Thus, to fully understand the experiences of adolescent females in sport, research on their competence perceptions, affective responses, and motivation is needed.

Although demonstrated and perceived verbal coaching behaviors and psychological outcomes have been assessed, the influence of nonverbal forms of communication such as body language, facial expressions, and gestures have not been examined to the same degree. Authors of several coaching and applied sport psychology books have identified the importance of both verbal and nonverbal communication for conveying clear, consistent messages to athletes (e.g., Martens, 1987; Yukelson, 1998). Further, it has been estimated that over 70% of communication is nonverbal (Martens, 1997), yet nonverbal communication and its relationship to psychological responses have received little empirical attention (Howe, 1990; Smoll & Smith, 1989).

Despite the lack of attention given to the nature of relationships between nonverbal communication and psychological variables in sport and exercise contexts, there is a body of knowledge from areas such as the workplace and classroom. For example, Heintzman, Leathers, Parrott, and Cairns (1993) investigated the effect of rapport-building nonverbal behaviors of supervisors on perceptions of employees. After viewing a video of an interaction between an employee and his or her supervisor, study participants were asked to rate perceived employee satisfaction with the supervisor. Participants viewing the video of a supervisor displaying a high frequency of positive nonverbal behaviors such as smiling, touching, and eye contact rated satisfaction with the supervisor significantly higher than participants who viewed a video of a supervisor displaying a lower frequency of these behaviors. Extending these results to the present investigation, one might expect that a higher perceived frequency of positive nonverbal behaviors from a coach should be related to greater satisfaction with the coach.

Crocker (1990) examined the effect of the congruence between verbal feedback and facial expressions on individuals' reported frequency of positive or negative messages in an athletic context. Results indicated that facial expression altered

the perception of the content of a verbal message. Specifically, a negative facial expression (e.g., anger, disgust) when coupled with a positive verbal statement distorted, in a negative direction, the reported frequency of verbal feedback. Crocker's findings indicated that negative nonverbal behaviors have an adverse effect on the perceptions and interpretations of individuals. Therefore, a higher perceived frequency of negative nonverbal behaviors from a coach may be related to negative psychological outcomes. Although this study investigated only one form of nonverbal communication (i.e., facial expression) it does extend previous coach behavior literature by considering both verbal and nonverbal forms of communication.

To date, coaching behavior research has included several different perspectives (i.e., Chelladurai, 1990; Harter, 1978; Smoll & Smith, 1989) but has failed to adequately address a number of issues. Specifically, the relationships among verbal and nonverbal coach feedback, athlete ability and sport-related self-perceptions, and affect for the adolescent age group and, in particular, for female athletes, has received little empirical attention. Therefore, the purpose of the present study was to extend previous research by examining the influence of ability and coaches' verbal and nonverbal behaviors on adolescent female athletes' perceptions of competence and affective responses to their sport participation.

Based on Harter's (1978, 1981) competence motivation theory and previous research, it was hypothesized that adolescents with greater ability levels who perceived their coaches gave more praise (verbal or nonverbal), information, and praise combined with information in response to a good performance or effort would report more positive affect and physical competence than adolescents with lower ability levels who perceived less positive responses to good performances or efforts. Second, it was hypothesized that adolescents with greater ability who perceived more encouragement, corrective information, and encouragement combined with corrective information and less criticism (verbal or nonverbal) would report greater positive affect and physical competence compared with adolescents of lower ability who perceived less encouraging and informative and more critical feedback in response to mistakes.

Method

Participants

Female adolescent field hockey players ($N = 143$) from 10 British Columbia Women's Field Hockey Federation regional teams volunteered to participate in the study. The teams were select teams consisting of competitive age-group field hockey players under 18 years of age from each region. The athletes ranged in age from 14 to 18 years ($M = 17.09$, $SD = .83$) and had played field hockey for 1 to 12 years ($M = 5.08$, $SD = 2.06$).

Seven of the 10 coaches who volunteered to have their team participate in the study were females. Coaches ranged in age from 22 to 46 years ($M = 28.4$, $SD = 7.11$), had coached field hockey for 1 to 25 years ($M = 8.2$, $SD = 6.51$), and had coached this age group for 1 to 19 years ($M = 5.3$, $SD = 5.83$). All the coaches, except one, had received some formal coach education, physical education, or teacher education. For example, nine of the coaches held at least Level 1 sport-specific or general coaching certification from the national coaching certification

program, and four had Level 2 or 3 certification. Further, six of the coaches held degrees in education, physical education, or sport science. Thus, this group of coaches was well-trained and educated for coaching youth field hockey.

Design

A multivariate correlational design was employed to assess the relationships among ability, coach feedback variables, and self-perception and satisfaction variables. The predictor variables were the coaches' rating of athletes' ability and coaches' responses to players' performances. The criterion variables were perceived field hockey competence, satisfaction with the coach, and satisfaction with overall team involvement. This type of design allowed determination of the relationship between coach behaviors and athletes' psychological responses, the strength of this relationship, and the variables that contribute most to the relationship.

Measures

Background Information. Players were asked to respond to two questions concerning age and field hockey playing experience.

Perceived Coach Feedback. A questionnaire version of the Coaching Behavior Assessment System (CBAS) (Smith, Smoll, & Curtis, 1978) similar to that used by Black and Weiss (1992) with swimmers, was used to assess athletes' perceptions of their coach's feedback in response to desirable and undesirable performances. The scale was modified in this study to be specific to field hockey.

The Black and Weiss (1992) version of the CBAS included 10 categories of coach feedback. Four categories represent behavioral responses to athletes' good performances or efforts (praise only, no response, information only, and praise combined with information) and six categories represent behavioral responses to poor performances or errors (encouragement only, no response, criticism, corrective information, encouragement combined with corrective information, and criticism combined with corrective information). In addition, items were phrased to assess contingent feedback. That is, feedback was assessed in relation to its direct response to specific performance attempts.

One limitation of the CBAS is that it does not assess nonverbal communication (Smoll & Smith, 1989). Thus, two exploratory categories were added to the scale that related to nonverbal communication: nonverbal praise in response to a good performance or effort, and nonverbal criticism in response to a poor performance or error. The items for these new categories were generated by the authors and a university field hockey coach recalling nonverbal coach behaviors observed in sport. Then the items were pilot-tested with 15 female field hockey players to determine face validity and initial reliability of the categories (alpha coefficients: nonverbal praise = .80, and nonverbal criticism = .69). Examples of items from the 10 verbal feedback categories and all 6 items from the two nonverbal feedback categories can be found in Table 1. Each of the 12 categories were represented by three items, generating a 36-item questionnaire. The responses to the items were rated on a 7-point Likert scale from (1) never to (7) always, reflecting the frequency of coach feedback. The original CBAS scale was developed and validated based on interviews with coaches and youth sport participants (Smith et al., 1978). Black and Weiss (1992) demonstrated reliability for their modified scale.

Table 1 Items of the Coaching Behavior Assessment Questionnaire Modified for Field Hockey

Categories	Item
Response to good performance/effort	
Praise	"Nice move."
Information	"Your pushes are getting stronger."
Praise + information	"Well done! You put the ball into good space for her to move onto."
Nonverbal praise	Coach smiles. Coach claps enthusiastically. Coach pats you on the back.
No response	Coach doesn't say anything about your good practice or effort.
Response to poor performance/mistake	
Encouragement	"Hang in there! Better luck next time."
Corrective information	"Stay goal-side of your check."
Encouragement + corrective information	"It'll come. Next time dodge a little sooner."
Criticism	"That was a bad pass!"
Criticism + corrective information	"I told you to stay with your check! Next time go with her when she gets into the circle."
Nonverbal criticism	Coach rolls her/his eyes or looks to the sky. Coach shakes his/her head or looks away. Coach looks angry.
No response	Coach ignores your mistakes.

Note. Items were scored on a 7-point Likert scale; (7) *always*, (6) *often*, (5) *a lot of the time*, (4) *about 50% of the time*, (3) *sometimes*, (2) *occasionally*, (1) *never*.

Estimate of Player Ability. Coaches were asked to rate the ability of each of their players relative to all other players at a season-end tournament. The rating was made according to a 4-point scale ranging from the "top 25% of players" (4) to the "bottom 25% of players" (1). Coaches' rating of players' ability was used rather than field hockey skills testing for several reasons. First, teacher ratings of actual competence have been used with demonstrated reliability in youth sport-related research (e.g., Horn & Weiss, 1991; Weiss & Duncan, 1992). Second, teacher ratings are often used as one measure of student's actual competence in developmental psychology research (Connell & Ilardi, 1987). Third, teacher ratings were used to help validate Harter's (1988) perceived competence scale for adolescents. Fourth, the coaches' ratings were based on their involvement with the athletes over many practices and games. Finally, a validated measure of overall field hockey ability has not been developed that adequately captures all dimensions of this interactive sport (Reilly & Borrie, 1992).

Self-Perceptions of Ability. Perceived field hockey competence was measured using the athletic competence subscale from Harter's (1988) Self-Perception Profile for Adolescents. The subscale was modified to be specific to field hockey.

The measure included 5 items in a structured-alternative format, where participants first chose which of two statements was more like them and then indicated whether the chosen statement was "sort of" or "really" like them. Scores ranged from high perceived competence (4) to low perceived competence (1). Several studies have employed the athletic subscale or a sport-specific form to assess perceived competence in the sport domain and have demonstrated acceptable validity and reliability (e.g., Black & Weiss, 1992; Klint & Weiss, 1987).

Satisfaction With Coach and Team Involvement. Affect was measured in terms of satisfaction with the coach and satisfaction with involvement with the team. Research examining Chelladurai's (1990) multidimensional model of leadership has operationalized satisfaction in a number of ways to tap different aspects of athletes' satisfaction with the sporting experience. For example, Chelladurai (1984) found that certain coach behaviors were related to satisfaction with team performance, satisfaction with leadership, and satisfaction with overall team involvement. Two categories of satisfaction were measured in this study: satisfaction with the coach and satisfaction with team involvement. Typically, these satisfaction variables have been assessed using a single question, which does not allow assessment of the reliability of the measure (Chelladurai, 1984). In this study two additional items for each satisfaction category were generated by the authors so that both satisfaction categories were represented by three items, thus allowing assessment of measurement reliability (see Table 2). Initial alpha coefficient estimates for satisfaction with coach and satisfaction with team involvement obtained from a pilot study indicated acceptable reliability (.74 and .90, respectively). The responses to the 6 items were rated on 7-point Likert scales from (1) very dissatisfied to (7) very satisfied.

Procedure

The questionnaire, including the perceived coaching behaviors, perceived competence, and satisfaction measures, was reviewed by an independent researcher and a university field hockey head coach for content appropriateness, face validity, and grammatical structure. These questionnaires were then pilot-tested with 8 adolescent female field hockey players. Based on the feedback from the reviewers and comments of players, minor changes were made to some items and to the wording

Table 2 Items Assessing Satisfaction With Coach and Satisfaction With Team Involvement

	Item
Satisfaction with coach	How satisfied are you with your coach so far this season?
	How much have you enjoyed being coached by your coach this season?
	What kind of job has your coach done with this team this season?
Satisfaction with team involvement	How satisfied are you with your team involvement so far this season?
	How much have you enjoyed being on this team this season?
	What kind of experience have you had with this team so far this season?

of some instructions. For example, the wording of one item was changed from "coach looks angrily at you" to "coach looks angry." Further, the instructions for completing the perceived competence scale were changed from one sentence describing the two decisions the athlete should make, to two separate and numbered sentences describing each decision one at a time.

Permission to conduct this study at the season-end tournament was obtained from the British Columbia Women's Field Hockey Federation, the governing body for women's field hockey in the province. Coaches of the 10 regional teams were contacted by telephone and sent a letter explaining the study. The letter explained the purpose of the study, what participation would involve, and requested permission to have their team participate in the study at the regional tournament. The coaches were contacted again by phone approximately two weeks later, giving them an opportunity to discuss the study and have any questions answered. All coaches agreed to have their teams participate. Coaches were then sent parental informed consent forms to have their athletes' parents read, sign, and return to the coach prior to the tournament.

At the tournament, each coach was contacted by the main investigator to finalize questionnaire administration times to fit with their schedule and to collect parental consent forms. At the time of questionnaire administration, those athletes whose parents had consented to their involvement in the study had the purpose of the study explained to them, and were told that their participation was voluntary and their responses would be confidential. Further, the investigator made it clear that if they decided not to participate, it would not affect their status on this or any other team. The athletes who chose to participate were instructed to sign the consent form and proceed with the questionnaire. Those athletes who did not have parental consent or chose not to participate were engaged in other activities with their coach. The coaches were not present during questionnaire administration.

Data Analysis

Preliminary Analyses. The coach feedback items were subjected to an exploratory principal-axis factor analysis to determine whether the 36 items could be represented by a smaller number of more general latent constructs. A minimum eigenvalue of 1.0 was used to extract the initial factors, which were then rotated to give orthogonal (varimax) and oblique (promax) factor structures. The results of the rotations were compared and found to be very similar. Consequently, the orthogonal structure was used to guide subscale development. Subscale scores were calculated for each participant using the mean score of the items comprising each factor (i.e., factor loading $> .40$) and these scores were used in subsequent analyses. Means and standard deviations were calculated for all variables. Reliability estimates were calculated for all variables using Cronbach's (1951) alpha coefficient. Multicollinearity was also assessed among the criterion variables (i.e., perceived competence, satisfaction with coach, satisfaction with team).

Main Analyses. A multivariate multiple regression analysis with canonical correlation follow-up was employed to assesses the relationship between the set of predictor variables (ability, coach feedback) and criterion variables (satisfaction with the coach and satisfaction with overall involvement). A separate hierarchical regression analysis was conducted to assess the relationship between ability, coach feedback, and perceived competence because of the low correlations between perceived competence and the two satisfaction variables. This is in accord with

Marasculio and Levin's (1983) suggestion that when correlations between the set of dependent variables is low ($< .30$), using separate regression analyses rather than a canonical correlation analysis is more appropriate.

Results

Factor Analysis of Coach Feedback

Principal-axis factor analysis with varimax rotation resulted in a 9-factor solution indicating that the 36 items could be reduced to a more parsimonious number of feedback categories. Examination of the resulting factors revealed that the items representing coach feedback could be separated into 7 interpretable factors accounting for 50.6% of the common variance in the original data. A minimal loading of .40 was used as the criterion value in the interpretation of individual factors (the 8th and 9th factors had no items with loadings above the criterion). Each item loaded on only one factor, and 4 items did not load on any of the factors. Therefore the final solution was a 7-factor structure including 32 of the original items (see Table 3).

Factor 1 was labeled Encouragement/Information and was composed of 7 items representing coach's feedback after a poor performance that provided encouragement or information on how to improve one's performance. Factor 2 was composed of 8 items representing coach's feedback after a good performance that provided praise (verbal or nonverbal) or information about what the individual had done well. This factor was labeled Praise/Information.

Factor 3 represented criticism in response to a poor performance or error that was mostly nonverbal and was thus labeled Nonverbal Criticism. This factor contained 3 items, 2 of which were nonverbal criticism while the third was verbal criticism. Factor 4 also represented criticism following an error; however, this factor was composed of 5 items representing criticism and corrective information. Thus, Factor 4 was labeled Critical Information. Factor 5 included 3 items, each representing the provision of information in response to either a good or poor performance. This factor was labeled Information Only.

Factors 6 and 7 were composed of 3 items each and represented the coach's failure to respond to a performance. Factor 6 represented no response to a good performance, while factor 7 represented no response to a poor performance or mistake, and they were labeled No Response and Mistake-Contingent Nonresponse, respectively.

Scale Reliabilities

Acceptable internal consistency reliability was set a priori at .70 (Nunnally, 1978). Only four factors reached acceptable reliability: Praise/Information (.86), Encouragement/Information (.85), Nonverbal Criticism (.80), and Information Only (.78). Unfortunately, three factors were unreliable and were excluded from subsequent analyses. These were Critical Information (.67), No Response (.63), and Mistake-Contingent Nonresponse (.59). Both satisfaction with the coach (.87) and satisfaction with overall team involvement (.83) reached acceptable reliability. For the perceived competence scale, one item was found to have low relationships with the other 4 items and was removed from the scale, producing an acceptable alpha level (.70).

Table 3 Factor Analyses Results of Coach Feedback Scale

Coach feedback item	Factor loadings						
	1	2	3	4	5	6	7
Encouragement	.54	.30	-.04	-.01	.06	-.11	-.04
Encouragement + corrective information	.58	.29	-.05	-.06	.28	-.15	-.03
Encouragement	.72	.30	-.09	-.03	.00	-.12	-.05
Encouragement + corrective information	.71	.18	-.13	-.08	.11	-.10	-.05
Encouragement	.49	.04	-.46	.16	.24	-.10	-.07
Corrective information	.60	.25	.13	.00	.16	-.03	.07
Encouragement + corrective information	.70	.24	.15	-.02	.19	-.16	-.03
Praise	.19	.60	-.05	-.05	.21	.06	-.10
Praise + information	.07	.73	-.06	-.01	.20	-.22	-.01
Nonverbal praise	.39	.53	.21	.06	-.05	.00	-.15
Information	.27	.53	.03	.02	.42	-.10	.08
Praise	.20	.57	.08	.03	.03	-.20	-.01
Nonverbal praise	.30	.51	.11	-.01	.14	.05	.03
Praise + information	.34	.66	.03	.06	.15	-.10	-.08
Information	.34	.59	.05	-.24	.16	-.20	.11
Nonverbal criticism	-.01	.00	.49	.10	.09	.10	.04
Criticism	.01	.02	.91	.09	-.02	-.02	-.07
Nonverbal criticism	.02	.06	.83	.11	-.06	.10	.01
Criticism	-.02	-.04	.07	.59	.03	.07	-.00
Criticism + corrective information	-.03	.00	.02	.58	.18	.01	.10
Criticism	-.06	-.15	-.05	.49	-.09	.06	-.09
Criticism + corrective information	-.03	.12	.14	.49	.08	-.05	-.05
Criticism + corrective information	.05	.12	.03	.70	.01	.04	.08
Praise + information	.22	.39	-.02	.14	.75	.08	-.02
Information	.29	.33	-.07	.09	.65	-.03	-.06
Corrective information	.36	.17	-.10	.07	.49	-.12	.25
No response to good performance	-.13	-.05	.08	-.02	.04	.60	.07
No response to good performance	-.11	-.19	.08	.28	-.06	.54	.25
No response to good performance	-.08	-.13	.02	.27	.02	.45	.32
No response to poor performance	-.21	.09	.39	-.11	.06	.25	.42
No response to poor performance	-.03	-.15	.18	-.02	-.04	.22	.73
No response to poor performance	.01	.03	-.16	.07	.04	.05	.59
Eigenvalue	8.1	3.4	2.2	1.6	1.2	.98	.71
Percent variance explained	22.5	9.5	6.1	4.4	3.4	2.7	2.0

Note. A minimum loading of .40 was used as the criterion value for interpretation of individual factors.

Descriptive Statistics

The Pearson's product-moment correlations among all variables, as well as the means and standard deviations, were calculated and are presented in Table 4. These athletes perceived their coaches as frequently praising and providing information in response to a good performance or effort. Perceived frequent responses to a poor performance or mistake were encouragement and corrective information, while feedback that contained criticism was perceived to occur relatively infrequently. In general, these athletes were very satisfied with their coach ($M = 6.21$, $SD = 0.91$) and with their overall involvement with their team this season ($M = 6.01$, $SD = 0.88$). Further, these athletes had a moderate to high perception of their field hockey competence ($M = 2.72$, $SD = 0.57$).

Relationships Among Ability, Coach Feedback, and Psychological Responses

A moderate correlation of .50 was found between satisfaction with the coach and satisfaction with team involvement; however, correlations between perceived competence and either satisfaction measures were low ($r = -.05$, $r = .29$). Marascuio and Levin (1983) suggest that, when correlations between dependent variables are above .30, canonical correlations analysis is appropriate to assess the relationship between the set of dependent variables and the set of independent variables. However, when the correlations between dependent variables are lower than .30, separate regression analyses are more suitable. Consequently, it was decided to assess the relationships between the set of predictor variables (i.e., ability and perceived coach feedback) and the two satisfaction measures (satisfaction with coach, sat-

Table 4 Descriptive Statistics for Ability, Perceived Coach Feedback, Perceived Competence, and Satisfaction Variables

	1.	2.	3.	4.	5.	6.	7.	8.
1. Praise/information	1.00							
2. Information only	.59	1.00						
3. Encouragement/information	.62	.56	1.00					
4. Nonverbal criticism	.10	-.04	-.11	1.00				
5. Perceived competence	.02	-.18	-.23	-.01	1.00			
6. Satisfaction with coach	.34	.15	.35	-.04	-.05	1.00		
7. Satisfaction with team	.22	.06	.20	-.07	.29	.50	1.00	
8. Ability	.21	.03	.03	.16	.19	.16	.23	1.00
Mean	4.79	3.83	4.66	1.70	2.72	6.21	6.01	2.90
Standard deviation	1.16	1.55	1.25	1.11	.57	.91	.88	1.01

Note. Feedback and satisfaction means are on a 7-point scale. Perceived competence and ability means are on a 4-point scale.

isfaction with overall team involvement) through multivariate multiple regression, whereas the relationship between ability and perceived coach feedback with perceived competence was assessed separately through multiple regression analysis.

Horn (1985) suggested that coach behavior may differ in accordance with their expectations of athletes' capabilities and this would affect the athletes' perceptions of competence. To address this issue, ability was entered first, then coach feedback categories second in a hierarchical multiple regression analysis with perceived competence as the dependent variable. The independent variables were Ability, Praise/Information, Encouragement/Information, Nonverbal Criticism, and Information Only. This design allowed us to determine the amount of variance explained by ability alone, and then coach feedback, while controlling for ability. The change in the amount of variance explained was calculated and then tested for significance. The results of the analysis are presented in Table 5.

Ability alone was predictive of athletes' perceived competence— $F = 4.33$ (1, 121), $p < .05$ —accounting for a small amount of the variance in perceived competence ($R^2 = .035$). The addition of the coach feedback variables resulted in a significant relationship with perceived competence— $F = 3.24$ (5, 117), $p < .01$ —accounting for a greater amount of variance in perceived competence ($R^2 = .15$). The increase in explained variance was significant: $F_{\text{change}} = 3.91$, $p < .01$. These results indicate that coach feedback was related to perceptions of field hockey ability over and above that attributable to actual ability. Examination of the beta weights indicated that three variables contributed significantly to the relationship with perceived competence: Ability ($\beta = .19$), Encouragement/Information ($\beta = -.35$), and Praise/Information ($\beta = .32$) (see Table 5). Specifically, higher ability, more frequent praise/information following a good performance, and less frequent encouragement and corrective information in response to a mistake or poor performance were related to higher perceptions of physical competence.

A multivariate multiple regression analysis was conducted with ability and perceived coach feedback as predictor variables and the set of two satisfaction variables as criterion variables. The predictor variables were Ability, Praise/Information, Encouragement/Information, Nonverbal Criticism, and Information Only.

Table 5 Hierarchical Regression Analysis for Perceived Competence, Ability, and Perceived Coach Feedback

Variable	Multiple R	R ²	Beta	F	df
Step 1					
Ability	.19	.035	.19	4.33*	(1, 121)
Step 2					
Encouragement/information			-.35**		
Praise/information			.32*		
Nonverbal criticism			-.11		
Information only			-.18		
	.39	.15		3.24**	(5, 117)

* $p < .05$. ** $p < .01$.

The criterion variables were satisfaction with coach and satisfaction with overall team involvement. The overall multivariate analysis was significant: Wilks's lambda = .79, $F(10, 232) = 2.90$, $p < .01$. This indicated that the set of ability and perceived coaching feedback variables were predictive of satisfaction with coach and team involvement.

Only the first canonical function was significant. The correlation between the two sets of variables was $R_c = .43$, indicating a moderate relationship between predictor and criterion variables. The canonical loadings provided further detail regarding the relative contribution of each variable to the overall multivariate relationship. A loading of .30 or greater was considered a significant contribution to the overall relationship (Pedhazur, 1982). The loadings for all variables are presented in Table 6.

Ability, Praise/Information, Encouragement/Information, and Information Only made a significant contribution to the relationship with satisfaction variables, while Nonverbal Criticism did not contribute significantly. Both satisfaction variables contributed significantly to the relationship. Adolescent female field hockey players reported greater satisfaction with their field hockey experience if they were rated higher in ability by their coach, perceived their coaches as giving a greater frequency of praise and information after a good performance, and a greater frequency of encouragement and corrective information after a poor performance or mistake.

The strength of the association between the two sets of variables was assessed through calculation of the redundancy index. This index reflects the amount of variance in the criterion set of variables explained by the set of predictor variables. A redundancy index of 10% or greater is considered significant and meaningful (Pedhazur, 1982). The amount of shared variance between criterion and predictor variables was 13.61%, indicating that the set of coach feedback variables and ability accounted for a significant and meaningful amount of variance in athletes' satisfaction with the coach and team involvement.

Discussion

Adolescents, especially females, have been identified as a group at risk of poor health due to their declining level of physical activity (Sallis & Patrick, 1996).

Table 6 Canonical Loadings for Ability, Perceived Coach Feedback, and Satisfaction Variables

Variable	Canonical loadings
Predictor variables	
Ability	.485
Praise/Information	.777
Encouragement/Information	.777
Nonverbal criticism	-.115
Information only	.309
Criterion variables	
Satisfaction with coach	.950
Satisfaction with team involvement	.739

Furthermore, researchers examining the factors associated with adolescents' motivation in sport have identified the central role coaches play in participants' sport experience. Specifically, coaches' feedback has been related to individuals' self-perceptions, affect, and motivation; however, there is a paucity of research on these relationships for adolescent females. The purpose of this study was to examine the relationship between player ability and coach feedback with perceived competence and satisfaction of adolescent female athletes.

Results revealed that both ability and coach feedback contributed significantly to explaining athletes' perceived competence. Specifically, higher ability, more frequent praise and information in response to a good performance, and less frequent encouragement and corrective information following mistakes were related to higher perceptions of physical competence. The positive relationship between ability, praise, information, and perceived competence is easy to understand and congruent with hypotheses. That is, athletes who are better at field hockey are likely to perform well and be successful more frequently, and this success should lead athletes to view themselves as more competent. In addition, Harter suggested that positive responses from significant others lead to higher perceptions of competence. It is important to note that this positive relationship between praise and information following a good performance and perceived competence was significant after the effects of ability had been controlled for. The inverse relationship between Encouragement/Information and perceived competence was contrary to hypotheses and at first glance would appear counterintuitive. Black and Weiss (1992) found that greater contingent encouragement and corrective information and lower criticism following an undesirable performance were associated with higher perceived competence in 15- to 18-year-old athletes. Our results revealed that more frequent encouragement and corrective coaching behaviors for skill errors were related to lower perceptions of competence, which is opposite to the relationship found by Black and Weiss (1992).

There are several possible explanations for the findings of the present study with regard to the relationship between coach feedback and perceptions of ability. First, adolescent females may be more sensitive to corrective information from coaches than previously recognized. In Harter's competence motivation theory, she suggested that positive responses from significant others lead to higher perceptions of competence, which ultimately result in an increased likelihood of continued participation and future mastery attempts. Further, she proposed the opposite for negative responses from significant others. It is possible that, for adolescent female athletes, receiving a high frequency of corrective information from the coach following a mistake, even when it includes encouragement, may be perceived as indicating failure, which in turn results in feelings of lower perceived ability. In addition, Horn et al. (1993) found that adult feedback (e.g., coaches, parents) was a salient source of competence information for adolescent females (ages 14-18 years). Therefore, the potential to interpret corrective feedback as indicating failure, combined with the importance placed on coach feedback, may result in higher frequencies of corrective feedback being related to lower perceptions of competence for female adolescents.

Second, the quality of feedback children and adolescents receive in comparison to the feedback their peers receive may influence their perceptions of competence. The absolute frequency of feedback may not be as important as the frequency and content of feedback relative to their peers. In late childhood and through adoles-

cence, peer comparison is an important source of competence information (Horn et al., 1993; Horn & Harris, 1996). Considering the increased interest in how their peers are performing, it is likely that adolescents are aware of differences between the content as well as the frequency of feedback they receive and the feedback their peers receive for a similar performance. An example of such a discrepancy is when two youths perform similarly and one receives praise while the other athlete receives encouragement plus technical information. The athlete receiving praise may interpret this feedback to indicate she has performed well. However, knowing that another athlete received encouragement plus information on how to improve, she may interpret the feedback as indicating the coach thinks her level of performance was the best she could do (hence the praise), while the coach expects superior performances from her teammate. In the same example, the athlete who received the encouragement plus information may infer she made a mistake and failed, while the athlete receiving praise did not fail, leading her to think she is not as good as the first athlete. The interpretations of this example are speculative, however, and highlight the potential influence coach feedback can have on athletes and how it may be interpreted differently by children and adolescents.

Third, coaches' encouragement and corrective information in response to errors is a form of helping behavior. Athletes receiving a high frequency of help may feel they have lower ability because of the extra help they receive. A review of research into children's assessment of intellectual competence in the educational domain indicated that teachers' helping behavior may be viewed as a negative cue of ability by children. Specifically, students perceived that high-ability students were helped less by teachers compared with low-ability students, therefore, if an individual received frequent help he or she must have low ability (Stipeck & Mac Iver, 1989).

The findings of the present study provide support for the continued inclusion of coach feedback in research examining self-perceptions, affect, and motivation during adolescence. However, the small amount of variance in perceived competence explained by ability and coach feedback suggests that other sources of competence information should also be examined. Researchers interested in children's and adolescents' sources of competence information have found that as a child matures, the use of self-referenced sources of information, such as achievement of goals, increases and becomes one of the most salient sources of competence information during adolescence (Horn & Hasbrook, 1986; Horn et al., 1993). This shift in competence information sources may help to explain the moderate relationship between ability and coach feedback with perceived competence found in the present study.

In the present study we also examined the relationship among ability and coaching behaviors with satisfaction with the coach and team involvement. We found that the set of ability and feedback variables significantly predicted satisfaction with the coach and satisfaction with team involvement. Closer examination revealed that higher ability and perceptions of more frequent positive coaching behaviors, such as those including praise, information, encouragement, and corrective information, were related to higher levels of satisfaction with the coach and satisfaction with team involvement. This finding supported our hypotheses and is consistent with other lines of research on coaching behaviors (e.g., Smith et al., 1979).

These athletes were satisfied with the leadership they received and their overall involvement. Both are desirable outcomes for sport participants and support the positive relationship proposed in Harter's (1978) competence motivation theory

between reinforcement from significant others and positive affect. According to this theory, positive affect such as enjoyment of team involvement should lead to an increased likelihood of continued participation and future mastery attempts. Furthermore, these athletes perceived their coaches to be positive in response to good performances and efforts, to provide encouragement and instruction following a mistake or poor performance, and to criticize relatively infrequently. These findings correspond closely to guidelines of coach education programs such as the Coach Effectiveness Training program (CET) (Smith, et al., 1979), the National Coaching Certification Program (NCCP) (Coaching Association of Canada, 1988), and the American Sport Education Program (ASEP) (Martens, 1997). Given the educational background and training of the coaches in this study, the parallels between coach guidelines and perceived behaviors may not be too surprising. However, it adds indirect support for the utility of coach education.

One area of coach communication that has received minimal attention is nonverbal communication. To address this issue, two measures of nonverbal coach feedback (Nonverbal Praise and Nonverbal Criticism) were included in the present study. Results of the factor analysis indicated that coaches' responses to good performances were best represented by two factors (i.e., Praise/Information and Nonresponse). The nonverbal praise items loaded on the Praise/Information factor suggesting that praise, whether it is verbal or nonverbal, was viewed similarly by these adolescents. In addition, the Praise/Information factor contributed significantly to the relationships with perceived competence and satisfaction. The factor analysis also revealed one factor that was composed of two nonverbal and one verbal criticism items. This factor was included in the analyses but did not contribute significantly to satisfaction or perceived competence. In this study, the assessment of nonverbal communication was limited to praise and criticism. Certainly there are other aspects of nonverbal behavior that warrant development and inclusion in further investigations of coach behavior. One example might be to investigate the relationship among the congruence between verbal and nonverbal messages and adolescents' self-perceptions, affect, and motivation in a youth sport setting.

This study was intended to extend the knowledge and understanding of adolescent females' sport experiences. The negative relationship found between contingent encouraging and informational responses to performance errors and perceived competence has not been previously documented for adolescent females. The finding that high frequencies of coach feedback that is generally considered positive, such as encouragement and instruction, was related to lower perceptions of competence for adolescent females requires further investigation. Past experience of coach feedback and reinforcement history from significant others have both been identified as variables likely to influence how feedback is perceived and the effect it has on self-perceptions and motivation (Weiss, 1986). In addition, Chelladurai (1990) has proposed that the congruence between perceived and preferred coaching behaviors is critical to athletes' affective responses to sport participation. Further, situational factors such as motivational climate may influence how athletes interpret coach feedback and determine its appropriateness. Investigations that include these variables may help to clarify the relationship between coach feedback and self-perceptions.

In conclusion, it is encouraging to note that this group of athletes, who are at an important stage in their development, were satisfied with their coach and field hockey experience, and this was significantly related to their coach's feedback.

Adolescent females are an "at risk" group with regard to their continued participation in sport and physical activity, and the coach plays a central role in the quality of their sport experience. This study attempted to shed light on the relationships among adolescent females' perceptions of coach feedback, field hockey ability, and the psychological variables of perceived competence and satisfaction. Coach feedback and ability both contributed to explaining athletes' perceptions of competence and satisfaction. It is suggested that adolescent females may be more sensitive to higher frequencies of encouragement and corrective information than has been previously recognized, and that higher frequencies of this type of feedback may lead them to infer lower perceptions of ability.

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Acknowledgments

This study was based on a master's thesis conducted by Justine B. Allen under the direction of Bruce L. Howe, School of Physical Education at the University of Victoria, Victoria, BC, Canada. Justine Allen is now a doctoral student at the University of Virginia.

We would like to thank the British Columbia Women's Field Hockey Federation, coaches, parents, and players for their cooperation and support of this study. We would also like to thank Maureen Weiss for her comments on drafts of this manuscript.

Manuscript submitted: June 26, 1997

Revision accepted: April 27, 1998