

Quantifying athlete self-talk

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Abstract

Two studies were conducted. The aims of Study 1 were (a) to generate quantitative data on the *content* of athletes' self-talk and (b) to examine differences in the *use* of self-talk in general as well as the functions of self-talk in practice and competition settings. Differences in self-talk between the sexes, sport types and skill levels were also assessed. Athletes ($n = 295$, mean age = 21.9 years) from a variety of sports and competitive levels completed the Self-Talk Use Questionnaire (STUQ), which was developed specifically for the study. In Study 1, single-factor between-group multivariate analyses of variance revealed significant differences across sex and sport type for the content of self-talk. Mixed-model multivariate analyses of variance revealed overall greater use of self-talk, as well as increased use of the functions of self-talk, in competition compared with practice. Moreover, individual sport athletes reported greater use of self-talk, as well as the functions of self-talk, than their team sport counterparts. In Study 2, recreational volleyball players ($n = 164$, mean age = 21.5 years) completed a situationally modified STUQ. The results were very similar to those of Study 1. That the content of athlete self-talk was generally positive, covert and abbreviated lends support to the application of Vygotsky's (1986) verbal self-regulation theory to the study of self-talk in sport. Researchers are encouraged to examine the effectiveness of self-talk in future studies.

Keywords: *Self-talk, motivational, instructional, sex, skill level, sport type*

Introduction

Self-talk has been defined as “what people say to themselves either out loud or as a small voice inside their head” (Theodorakis, Weinberg, Natsis, Douma, & Kazakas, 2000, p. 254). This definition is, however, a little simplistic. Based on recent sport-specific self-talk findings (e.g. Hardy, Gammage, & Hall, 2001a; Theodorakis *et al.*, 2000), self-talk can be better thought of as a *multidimensional* phenomenon concerned with athletes' *verbalizations* that are *addressed to themselves*, which can serve both instructional and motivational *functions*. Although the promotion of appropriate self-talk is a commonly employed cognitive intervention in applied sport psychology that is frequently included in mental skills intervention packages (e.g. Rogerson & Hrycaiko, 2002), relatively little is known about the nature of self-talk or of its correlates.

A descriptive study by Hardy *et al.* (2001a) examined the “4 W's” (where, when, what and why) of athlete self-talk via a qualitative methodology. Hardy *et al.* (2001a) suggested through their

framework that the content (i.e. *what* athletes say to themselves) of self-talk could be further categorized into four more specific aspects: its nature, perspective or “overt/ness”, structure and person. The nature dimension refers to positive and negative self-talk (for example, “I can do this” and “There's no way I can do this”, respectively). The perspective or “overt/ness” dimension is related to internal and external self-talk – that is, self-talk said either inside one's head or out loud. The structure dimension is comprised of cue words (“Head!”), phrases (“Keep head still”) and complete sentences (“Keep your head down until you've hit the ball”) categories. Finally, the person dimension refers to self-talk said in the first (“I can do it”) or second (“You can do it”) person.

Previous research has primarily investigated the nature of self-talk, with the other three aspects receiving virtually no consideration (for an exception, see Van Raalte, Brewer, Rivera, and Petitpas, 1994). Although the examination of the nature of self-talk is not in itself a limitation, the lack of research on the remaining aspects of the content of

self-talk has led to a somewhat limited understanding of athlete self-talk. The sport literature that has examined the effects of positive and negative self-talk has generally supported the use of positive self-talk. To overcome problems associated with the use of self-report surveys and laboratory-based methodological approaches, Van Raalte *et al.* (1994) developed the Self-Talk and Gestures Rating Scale (STAGRS) to assess tennis players' use of observable self-talk. It would appear that observable self-talk is similar to external self-talk (one component of the perspective/overtness dimension of the content of self-talk). Using the STAGRS, Van Raalte *et al.* (1994) demonstrated that tennis players make use of observable self-talk approximately once every three points. Moreover, although match winners did not differ from match losers on their use of positive self-talk, match winners used significantly less (observable) negative self-talk during matches than their match-losing counterparts. In a subsequent study, match winners did not differ from match losers on the observable self-talk they generated, but did differ on how they responded to their self-talk. It was found that match losers were more likely to lose a point after the use of negative self-talk than match winners (Van Raalte, Cornelius, Brewer, & Hatton, 2000).

The reasons *why* athletes use self-talk represented a second "W" in Hardy and colleagues' (2001a) qualitative investigation. Hardy *et al.* (2001a) found that self-talk serves two main functions for the athlete, cognitive (instructional) and motivational. The cognitive function is subdivided into cognitive specific and cognitive general functions. These relate to assisting the athlete to learn and execute individual skills and strategies, respectively. The motivational function is divided into three specific functions. The motivational arousal function helps athletes "psych" themselves up, relax and control their arousal. The motivational mastery function is related to mental toughness, focus, confidence and mental preparation, all of which are required if athletes are to successfully master their circumstances. The motivational drive function is somewhat more global in nature than the other two motivational functions. It is concerned with helping athletes keep on track to achieve their goals. As a result, this function is associated with maintaining or increasing drive and effort. [For a more thorough description of the functions of self-talk, the interested reader is directed to the work of Hardy *et al.* (2001a).]

Another "W" examined by Hardy *et al.* (2001a) was concerned with *when* athletes employed self-talk. Athletes reported the use of self-talk before, during and after practice and competition. Inferences about when self-talk was used the most were not made, however. In addition, Hardy, Hall and Alexander (2001b) found that high school athletes reported

using a more positive and motivating form of self-talk before competing than before practising. Although Thomas, Murphy and Hardy (1999) found the use of self-talk as a competition and practice strategy to be strongly and positively correlated, it still remains to be seen if the frequency of the use of self-talk changes from practice to competition. The generation of data concerning the use of self-talk across settings should offer guidance to practitioners as to the most appropriate timing of their self-talk interventions (Mellalieu, Hanton, & Jones, 2003).

Study 1

Hardy and colleagues' (2001a) qualitative findings regarding the "4 W's" of self-talk in sport provide only a very basic description of self-talk – limited to describing what the various aspects of self-talk are and not how each of the aspects are employed. Moreover, as noted by Hardy *et al.* (2001a), the qualitative nature of their study does not allow for generalizations to be made across the athletic population. Consequently, the overall aim of the present study was to generate quantitative descriptive data on athletes' use of self-talk that would supplement Hardy and colleagues' (2001a) qualitative findings. The first specific purpose was to generate quantitative data regarding the content-related dimensions of athletes' self-talk. Previous self-talk research has primarily compared positive and negative self-talk and there remains a lack of thorough descriptive data. Furthermore, a limitation of the self-talk literature is the use of general meta-cognitive questionnaires to assess athletes' self-talk, such as those employed by Mahoney and Avenier (1977) and Thomas *et al.* (1999). These questionnaires assess an assortment of cognitive variables including imagery, anxiety and dreams, as well as self-talk. They fail, therefore, to provide detailed information about any one particular variable (e.g. self-talk). To date, there has not been a questionnaire study that focuses solely on an in-depth examination of athlete self-talk.

As researchers have not systematically investigated how variables such as sex, sport and skill influence the content of self-talk, knowledge from both an applied and theoretical standpoint is lacking. Thus, the effects of sex, skill and type of sport on the content-related dimensions of self-talk were also considered in the present study. As female athletes tend to have higher cognitive anxiety (e.g. Jones & Cale, 1989; Jones, Swain, & Cale, 1991; Martens, Burton, Vealey, Bump, & Smith, 1990), lower self-confidence (Lirgg, 1991) and less facilitative interpretations of their anxiety symptoms (Perry & Williams, 1998) than male athletes, it was expected that female athletes would report greater use of negative and lesser use of positive self-talk compared

with male athletes. This hypothesis was based on the overlap between negative self-talk and cognitive anxiety (e.g. concerns over the fear of failure) as well as Bandura's (1997) conceptualization of verbal persuasion as a source of self-efficacy perceptions. In addition, because Van Raalte *et al.* (1994) found tennis match winners employed less negative self-talk than losers, it was hypothesized that skilled athletes would use less negative self-talk than their less skilled counterparts. The self-talk literature has not examined differences between sports. However, it seemed reasonable to expect that what athletes from different sports say to themselves (i.e. the content of their self-talk) would not be the same. For example, given the mainstream psychology literature focusing on children's increased use of overt self-talk in the presence of supportive significant others (see Diaz, 1992), such as a mother, it was predicted that athletes competing in team sports would use more overt self-talk. This was because an athlete competing in a team sport would be in the presence of more supportive significant others (e.g. coaches and team-mates) than an athlete competing in an individual sport. More specific *a priori* or interaction hypotheses for the variables examined (i.e. sex, sport and skill) were not proposed because strong theoretical rationales were lacking.

The second specific purpose of Study 1 was to investigate further possible differences in the use of self-talk between practice and competition settings. In particular, we examined the effect of setting with respect to the use of self-talk in general and at a more focused level with respect to the use of the specific functions of self-talk (i.e. why athletes use self-talk). It was predicted that athletes would use more self-talk in conjunction with competition than practice. The rationale for this hypothesis centred around competition-related anxiety and its disrupting effects on athletes' information-processing capacity (e.g. Hardy, Jones, & Gould, 1996). Due to a disrupted and/or reduced processing capacity, successful performance becomes more challenging. Thus, it was predicted that athletes would employ self-talk in competition as a strategy to obtain the necessary guidance and motivation to be able to achieve their goals. As with the first purpose, the effects of sex, sport and skill on the use of self-talk in general and on the use of the specific functions of self-talk were also examined. Similar to the content of athletes' self-talk, it was hypothesized that males and females, and more skilled and less skilled athletes, would differ in how they used the various functions of self-talk. Although the self-talk literature has not previously examined differences between sports, differences were expected due to individual sport athletes having a reduced presence of supportive significant others than team sport athletes. As a result

of less supportive others and a corresponding reduction in support and guidance available to them, it was predicted that individual sport athletes would employ self-talk more frequently to assist them in pursuit of their goals. More focused *a priori* or interaction hypotheses were not proposed, as again theoretical rationales were lacking.

Finally, a sub-component to the examination of the effect of setting was to assess whether athletes used self-talk differently across the temporal phases of practice and competition. More specifically, changes in the use of self-talk before, during and after practice/competition was assessed. As noted previously, Hardy *et al.* (2001a) reported athletes' use of self-talk in each of the phases, although the temporal usage patterning of this mental skill remains unclear. The generation of data pertaining to the temporal patterning of the use of self-talk should assist practitioners' timing of self-talk interventions to be most beneficial for their athletes (Mellalieu *et al.*, 2003). Although differences in the use of self-talk were expected across the three time periods, focused *a priori* hypotheses were not proposed for this aspect of the use of self-talk due to a lack of previous research or sound theoretical rationale.

In summary, Study 1 examined the effects of sex, skill and sport on the *content* of athletes' self-talk. In addition to the aforementioned independent variables, the effects of setting and temporal phase were assessed with regard to athletes' *use* of self-talk.

Methods

Participants. The participants were 295 athletes aged 21.9 ± 4.2 years (mean $\pm$ s); 52% were male and 48% were female. Athletes competed in individual and team, contact and non-contact, as well as objectively and subjectively scored sports, the most frequently cited of which were: basketball (3%), figure skating (7%), Canadian football (3%), golf (3%), ice hockey (17%), long-distance running (3%), rowing (7%), rugby (3%), Canadian soccer (3%), swimming (6%), track and field (9%), volleyball (10%) and water polo (7%). Athletes represented a range of skill levels: recreational (36%), district (10%), county (7%), collegiate (39%), national (5%) and international (3%).

Measures. Athletes completed the Self-Talk Use Questionnaire (STUQ), a self-report questionnaire assessing the frequency of athletes' use of sport-related self-talk specifically designed for the present study. The STUQ is a 59-item survey that contains items based on a similar broad-based measure of mental imagery, the Imagery Use Questionnaire (IUQ; Hall, Rodgers, & Barr, 1990), as well as

Hardy and colleagues' (2001a) qualitative self-talk findings. The IUQ is a valid and reliable measure of athletes' frequency of use of imagery, which focuses on the imagery-related habits of athletes (i.e. when athletes use imagery) as well as the content of their images. Hardy and colleagues' (2001a) qualitative findings facilitated the generation of items that were relevant to athletes' self-talk. The questionnaire is divided into three portions. The first portion pertains to demographic information. Athletes were asked for their sport, skill level, sex and age. The second portion contains the questionnaire's instructions and includes a self-statement oriented definition of self-talk. The third portion consists of the specific self-talk items, which are further subdivided into four sections. The six questions in Section 1 are concerned with when athletes generally use self-talk. Section 2 contains nine questions related to three dimensions of the content of athlete self-talk. Section 3 comprises 24 items associated with why athletes talk to themselves. The use of the functions of self-talk was assessed in both practice (12 items) and competition (12 items) settings. Finally, Section 4 contains questions about how athletes use self-talk (e.g. items assess athletes' use of self-talk in combination with imagery, physical (slow motion) practice, and alone). It should be noted that because of length constraints and to assist the reader's comprehension, responses to Section 4 are not included here but are presented by Hardy, Hall and Hardy (2004) (see the Appendix for the STUQ items relevant to the present study).

Athletes responded to the items included in the data analyses using a 9-point scale (1 = "never", 9 = "all the time"). Additionally, the nine items in Section 2 assessing the content of self-talk were scored as percentages. Based on Van Raalte and colleagues' (1994) finding that tennis players used overt self-talk approximately one-third of the time, it was felt that the use of percentages would generate information relating to the lack of overt self-statements. Three aspects of the content of athlete's self-talk were each represented by three items, which were required to sum to 100% (e.g. three sets of three items: positive self-talk, 25% + neutral self-talk, 50% + negative self-talk, 25% = 100%). The three aspects of self-talk's content were: (a) its nature, comprising items assessing the proportion of positive, neutral and negative self-talk; (b) its perspective or overtness, comprising items assessing the proportion of internal/covert, muttered and external/overt self-talk; and (c) its structure, comprising items assessing the proportion of self-talk utilizing single cue words, phrases and complete sentences. The STUQ was developed as an initial attempt to quantify athletes' use of self-talk as well as supplement Hardy and colleagues' (2001a) qualitative findings. As each of the items is a single-

item measure of a particular aspect of self-talk, there are no true subscales present within the STUQ. Thus, common indications of internal consistency (e.g. Cronbach's alpha) or factorial validity (e.g. confirmatory factor analysis) are not appropriate. The STUQ's items do, however, sample the full domain of self-talk; thus, the instrument does possess content validity. Using Bland and Altman's (1986) proportion of agreement method, a modified version of the STUQ (i.e. no competition-related items) demonstrated adequate test-retest reliability (Hardy & Hall, in press). The utilization of an item-total test approach to examine the general internal consistency of the STUQ has also indicated excellent reliability (Hardy & Hall, in press). During the development of the questionnaire, the STUQ's items were reviewed for ease of comprehension and terminology by an experienced sport psychology consultant and national level soccer coach, independently. "Athlete friendly" worded items was the end-product of minor (rephrasing) alterations made in accord with their comments. Taken together, it is argued that the STUQ is a valid and reliable survey tool to measure self-talk, albeit one in its infancy.

Procedure. The aims of the study were first explained to coaches, who in turn gave their permission for us to approach their athletes, whose voluntary participation was sought. Before completion of the questionnaire, all athletes read a letter of information. Informed consent was implied by agreement to complete the survey. Timing of the data collection was at the convenience of the coaches. Most data collection was performed after a practice session, late in the competitive season. Data were not collected after a competitive match, since successful or failure experiences have been found to lead to recall biases (Brewer, Van Raalte, Linder, & Van Raalte, 1991). As the study was cross-sectional in nature, the athletes independently completed the STUQ on a single occasion.

Results

The content of self-talk. Table I provides some descriptive statistics on what athletes tend to say to themselves. It would appear that most athlete self-talk is positive in nature, with approximately equal proportions of negative and neutral self-talk. In addition, it would appear that most self-talk is said internally, with slightly more self-talk said in a muttered fashion than said out loud. Finally, most of athletes' self-talk was said in an abbreviated (single words plus phrases) structure rather than as complete sentences.

To examine the content of the athletes' self-talk, three single-factor (sex, sport and skill) between-

Table I. Mean descriptive statistics for each of the content of self-talk variables and groups of interest (standard deviation in parentheses)

	Sex		Skill level		Sport type	
	Male (<i>n</i> = 153)	Female (<i>n</i> = 142)	Skilled (<i>n</i> = 139)	Less skilled (<i>n</i> = 156)	Individual sports (<i>n</i> = 126)	Team sports (<i>n</i> = 169)
Overtness						
Internal ^a	59.41 (28.90)	68.45 (25.54)	63.18 (28.27)	64.21 (27.22)	66.28 (26.97)	61.83 (28.11)
Muttered ^b	19.89 (16.74)	21.11 (18.63)	20.34 (17.84)	20.59 (17.54)	21.30 (20.09)	19.86 (15.62)
External ^a	21.00 (24.31)	10.25 (12.38)	16.85 (21.36)	15.01 (19.24)	12.60 (16.93)	18.30 (22.12)
Nature						
Positive	62.71 (21.26)	61.73 (22.32)	62.41 (22.14)	62.09 (21.46)	64.63 (21.96)	60.46 (21.47)
Neutral ^b	15.06 (13.07)	20.28 (17.01)	18.39 (16.00)	16.83 (14.64)	18.47 (16.85)	16.87 (14.01)
Negative ^a	22.30 (18.13)	17.41 (15.14)	18.47 (15.76)	21.26 (17.80)	16.26 (14.01)	22.73 (18.35)
Structure						
Single words	25.52 (21.07)	21.90 (19.69)	20.89 (18.90)	26.30 (21.48)	24.49 (21.99)	23.28 (19.30)
Phrases ^b	51.51 (23.20)	53.12 (25.15)	56.34 (23.34)	48.76 (24.21)	51.70 (24.60)	52.71 (23.82)
Complete sentences	22.93 (22.17)	24.85 (24.68)	22.65 (22.14)	24.89 (24.44)	23.71 (24.10)	23.95 (22.91)

Note: Values in this table are percentages. Due to rounding errors, means for the respective dimensions of content may not necessarily sum to 100%. ^a Contributed to the multivariate effect of sex. ^b Variable excluded from MANOVA due to problems of multicollinearity.

groups multivariate analyses of variance were computed, where each independent variable had two levels. Because of large discrepancies in sample size for the different sports and skill levels participants competed at, both variables were operationalized with two levels: sport type (team vs. individual sports) and skill level (those competing at collegiate level and above formed the skilled group, while those competing at a county level or below created the less skilled group). In addition, because of the nature of the items assessing the three different aspects of the content of self-talk (i.e. three proportions summing to 100%), only two of the respective three items were included in the analysis. This was to avoid problems with multicollinearity (Tabachnick & Fidell, 2001). As a result, there were six dependent variables in the analyses. The six self-talk dependent variables were the proportion of positive, negative, internal/covert and external/overt self-talk, as well as the proportion of self-talk said as single cue words and as complete sentences. To control the inflated type I error rate, due to the three multivariate analyses of variance conducted, a Bonferroni correction was computed; the criterion alpha level for the multivariate effects was $P = 0.05/3 = 0.0167$.

The effect of sex on the content of self-talk. The multivariate analysis of variance (MANOVA) pertinent to the effect of sex revealed a significant multivariate effect (Pillai's trace $F_{6,288} = 5.74$, $P < 0.001$, $\eta^2 = 0.11$, power = 0.998). Follow-up analyses of variance suggested that differences in the valence and "overt/perspective" dimensions contributed to the significant multivariate effect for sex. Male athletes were found to use significantly

more negative ($\eta^2 = 0.02$), less internal and more external ($\eta^2 = 0.03$) self-talk than female athletes.

The effect of skill level on the content of self-talk. Results from the relevant MANOVA revealed no multivariate main effect for skill level (Pillai's trace $F_{6,288} = 2.39$, $P = 0.028$, power = 0.814). Consequently, univariate follow-up tests were not conducted.

The effect of sport type on the content of self-talk. The sport type MANOVA revealed the presence of a significant multivariate effect (Pillai's trace $F_{6,288} = 2.83$, $P = 0.011$, $\eta^2 = 0.06$, power = 0.884). Similar to the effect of sex, univariate differences on the valence and "overt/perspective" dimensions contributed most to the multivariate effect of sport type. Team sport athletes were found to use more negative ($\eta^2 = 0.04$) and more external ($\eta^2 = 0.02$) self-talk than individual sport athletes.

The frequency of use of self-talk. To examine athletes' use of self-talk at the general level as well as at a more focused level (that is, use of the specific functions of self-talk), two sets of analyses were conducted. At the general level, 3 three-factor ($2 \times 3 \times 2$) mixed-model analyses of variance were performed. The general use of self-talk was the dependent variable for each analysis. The repeated-measure factors were setting (two levels: practice and competition) and temporal phase (three levels: before, during and after the event). The between-group factors for the three analyses of variance were sex, skill level and sport type, respectively. At the specific level, 3 two-factor (2×2) mixed-model multivariate analyses of var-

iance were conducted, with setting as the factor with repeated-measures. The between-group factors for the three multivariate analyses of variance were again sex, skill level and sport type, respectively. Each of the three multivariate analyses of variance had the same 12 dependent variables relating to the specific functions of self-talk: (1) execute individual skills; (2) execute strategies/plays/plans/routines; (3) “psych” themselves up; (4) relax themselves; (5) control their nerves; (6) regain or maintain focus; (7) boost self-confidence; (8) mentally prepare; (9) cope in tough situations; (10) increase or maintain their motivation; (11) control how much effort they exerted; and (12) remind themselves of their goals. For both sets of analyses, due to a dearth of previous research, as well as a lack of strong rationale for interaction hypotheses, only the tests of main effects are reported. For each set of analyses, a Bonferroni correction was applied to control the type I error rate. As a result, the criterion alpha level for the univariate effects concerned with the general use of self-talk, as well as for the multivariate effects associated with the use of specific functions of self-talk, was $P = 0.05/3 = 0.0167$. Table II displays the descriptive statistics for each of the items.

The effect of sport type on the use of self-talk. The relevant three-factor mixed-model analysis of variance (ANOVA) indicated a significant effect for sport type on athletes’ general use of self-talk ($F_{1,293} = 11.51$, $P = 0.001$, $\eta^2 = 0.04$, power = 0.922). More precisely, individual sport athletes (mean = 6.00, $s = 1.30$) were found to use significantly more self-

talk than team sport athletes (mean = 5.47, $s = 1.36$). Inspection of the results obtained from the setting $\times$ sport type mixed-model MANOVA also revealed the presence of a significant (multivariate) effect for sport type (Pillai’s trace $F_{12,282} = 2.14$, $P = 0.015$, $\eta^2 = 0.08$, power = 0.939). Univariate follow-up tests conducted to further understand the multivariate effect indicated that individual sport athletes reported greater use of self-talk than team sport athletes for each of the dependent variables except for the self-confidence function ($P > 0.05$). Effects sizes from the follow-up tests suggested that differences found for the use of the skills ($\eta^2 = 0.04$) and focusing ($\eta^2 = 0.05$) functions of self-talk contributed most to the significant multivariate effect found for sport type.

The effect of sex on the use of self-talk. The relevant three-factor mixed-model ANOVA did not reveal a significant effect for sex ($F_{1,293} = 4.01$, $P = 0.046$, power = 0.514). Similarly, the relevant two-factor mixed-model MANOVA revealed no significant effect of sex on the use of the self-talk functions (Pillai’s trace $F_{12,282} = 1.99$, $P = 0.025$, power = 0.918).

The effect of skill level on the use of self-talk. As was the case with the previous between-group factor, the three-factor mixed-model ANOVA pertinent to skill level revealed no significant effect ($F_{1,293} = 2.22$, $P > 0.05$, power = 0.318). Furthermore, results from the relevant two-factor mixed-model MANOVA indicated no significant effect of skill level on the use of the specific functions of self-talk (Pillai’s trace $F_{12,282} = 0.72$, $P > 0.05$, power = 0.417).

Table II. Mean descriptive statistics for the use of self-talk and its function across setting and sport type (standard deviation in parentheses)

	Effect of setting		Effect of sport type	
	Practice	Competition	Individual sport	Team sport
The use of self-talk in general				
Before a practice/competition?	4.19 (1.98)	6.87 (1.83)	5.92 (1.58)	5.25 (1.65)
During a practice/competition?	6.21 (1.90)	7.62 (1.40)	7.39 (1.29)	6.56 (1.48)
After a practice/competition?	4.01 (1.99)	5.25 (2.09)	4.69 (1.77)	4.59 (1.91)
Use of the functions of self-talk				
Individual skills function ^b	5.78 (2.01)	5.88 (2.22)	6.24 (1.73)	5.53 (1.82)
Strategies/plays/routines function ^{a, b}	5.83 (1.96)	6.11 (2.04)	6.30 (1.66)	5.72 (1.67)
Psyching-up function ^{a, b}	6.72 (2.02)	7.29 (1.78)	7.28 (1.59)	6.79 (1.67)
Relaxation function ^{a, b}	5.39 (2.36)	6.18 (2.28)	6.24 (2.12)	5.45 (2.07)
Nerve control function ^{a, b}	5.40 (2.25)	6.49 (2.04)	6.26 (1.92)	5.72 (1.88)
Focus function ^{a, b}	6.28 (1.85)	6.70 (1.97)	6.92 (1.65)	6.17 (1.72)
Self-confidence function ^a	6.06 (2.00)	6.58 (2.03)	6.52 (1.79)	6.18 (1.86)
Mental preparation function ^{a, b}	6.16 (2.02)	6.88 (2.04)	6.83 (1.71)	6.29 (1.77)
Coping function ^{a, b}	6.27 (1.99)	6.69 (1.99)	6.85 (1.66)	6.21 (1.83)
Motivation function ^{a, b}	6.29 (1.83)	6.76 (1.86)	6.86 (1.52)	6.28 (1.73)
Effort control function ^{a, b}	5.40 (2.31)	5.89 (2.28)	6.10 (2.11)	5.31 (2.14)
Goal function ^{a, b}	5.66 (2.17)	5.99 (2.22)	6.25 (1.86)	5.51 (2.13)

Note: Athletes responded to all items on a 9-point scale. ^a Contributed to the multivariate effect of setting. ^b Contributed to the multivariate effect of sport type.

The effect of setting on the use of self-talk. Results from each of the three-factor mixed-model analyses of variance revealed a highly significant main effect for setting. The smallest effect was obtained from the sport type $\times$ setting $\times$ temporal phase ANOVA ($F_{1,293} = 649.13$, $P < 0.001$, $\eta^2 = 0.69$, power = 1.00). Athletes reported greater use of self-talk, in general, in competition (mean = 6.58, $s = 1.38$) than practice (mean = 4.80, $s = 1.57$) settings.

To gain a better understanding of the effect of setting on athletes' utilization of self-talk, we examined the use of the specific functions of self-talk. Highly significant multivariate effects for setting were found for each MANOVA conducted, the smallest effect (obtained from the sport type $\times$ setting MANOVA) having a Pillai's trace of $F_{12,282} = 11.49$, $P < 0.001$, $\eta^2 = 0.33$, power = 1.00. In addition, univariate follow-up tests for each multivariate effect for setting revealed a greater use of self-talk by athletes in competition than in practice, for all the self-talk dependent variables except for the use of self-talk to help execute individual skills ($P > 0.05$). The univariate effect sizes suggested that difference in the use of the relaxation ($\eta^2 = 0.14$), mental preparation ($\eta^2 = 0.11$) and nerve control ($\eta^2 = 0.23$) functions contributed most towards the significant multivariate effect for setting.

Overall, it can be seen that athletes tend to make use of self-talk, in general and of nearly all the specific functions of self-talk, to a greater extent in conjunction with competition than practice. Furthermore, as can be seen in Table II, it would appear that athletes tend to use the "psyching" up self-talk function the most and the relaxation self-talk function the least in practice settings. In competition, the mental preparation self-talk function was used most frequently and the skills self-talk function least frequently.

The effect of temporal phase on the use of self-talk. Each of the three-factor mixed-model analyses of variance revealed a significant main effect for temporal phase. The smallest effect was obtained from the sex $\times$ setting $\times$ temporal phase ANOVA (Greenhouse-Geisser $F_{1,77,518.39} = 285.13$, $P < 0.001$, $\eta^2 = 0.49$, power = 1.00). *Post-hoc* Bonferroni tests revealed that athletes used significantly more self-talk during practice/competition (mean = 6.92, $s = 1.45$) than either before (mean = 5.53, $s = 1.65$) or after (mean = 4.63, $s = 1.85$) practice/competition. Athletes also reported significantly greater use of self-talk before than after practice/competition.

Discussion

The overall aim of Study 1 was to generate descriptive quantitative data on the use and content of athletes' self-talk. Sport type differences were

found for the use of self-talk in general, as well as the use of the specific functions of self-talk. Moreover, athletes were found to use self-talk more frequently in conjunction with competition than practice. Greater use of self-talk during as opposed to before or after practice and competition was also found. Finally, the content of self-talk employed by male and female athletes, as well as by individual and team sport athletes, was found to differ.

With regard to the use of self-talk, athletes' more frequent use of self-talk in connection with competition as opposed to practice settings was hypothesized. An interesting finding, that was contrary to the general pattern of increased usage, was that athletes' reported use of the skill function of self-talk did not increase across settings. A possible reason for this finding is linked to Masters' (1992) conscious processing hypothesis (CPH). According to this hypothesis, the use of explicit rules, which are similar to instructional self-talk, to help control motor performance will lead to decrements in performance under pressure situations. Thus, the lack of increases in the usage of self-talk from practice to competition to help execute individual skills may be in the athletes' best interests. The finding that the use of the relaxation, mental preparation and nerve control functions contributed the most to the multivariate effect found for setting should not be all that surprising given the nature of competition. Athletes are required to be mentally prepared and in control of their nerves if they are to be successful. Furthermore, according to the conscious processing hypothesis, if use of skill function-related self-talk is undesirable in competition, the present study offers some preliminary guidance regarding the optimal manner in which to employ self-talk (i.e. use of the relaxation, mental preparation and nerve control functions). Given that CPH research informs us that instructional self-talk can be detrimental to performance, future research should focus on motivational self-talk.

Support that athletes' use of self-talk varies across the temporal phases of practice/competition was also generated. Athletes reported using self-talk extensively during practice and competition, to a lesser extent before practising and competing as a preparatory tool, and less still as a tool for reviewing their performances. As such, it would appear that athletes' use of self-talk differs from their use of imagery. Hall *et al.* (1990) demonstrated that imagery is used most frequently before rather than during competition. One possible explanation for these differences is that for most athletes, self-talk probably requires less time and effort to utilize than does imagery. Consequently, self-talk is a mental skill that may inherently lend itself to use in time-restricted situations such as those found during practice and competition.

Although significant effects for sex or skill level were not found (perhaps due to the relatively crude operationalization of skill level), a significant effect for sport type on the use of self-talk was present. Individual sport athletes reported more frequent use of self-talk than team sport athletes. On the one hand, this finding may be due to differences in general task demands of individual and team sports. For example, it could be argued that in most individual sports athletes have more time to consider their options and have less external cues to attend to. On the other hand, the proposals of Martens, Vealey and Burton (1990) concerning state anxiety offer an alternative explanation for this effect. Martens *et al.* (1990) showed that individual sport athletes experience more intense cognitive state anxiety symptoms than team sport athletes. It was suggested that this is because individual sport athletes are more identifiable, with an increased threat of evaluation, than team sport athletes. Thus, it is argued that individual sport athletes may also utilize self-talk to a greater extent than team sport athletes so as to counter their sense of evaluative isolation. Support for this explanation comes from the univariate follow-up tests related to the use of the specific functions of self-talk. It was found that use of the focusing, individual skills, strategies/routines and relaxation functions contributed most to the multivariate effect found for sport type. As such, it could be expected that anxious individuals would naturally extensively employ these specific functions of self-talk either due to being anxious (i.e. the focusing and instructional functions) or in an attempt to reduce anxiety (i.e. the relaxation function). Some caution should be used when interpreting the latter explanation, as this sport type classification difference may not be due exclusively to the individual or team-based differences; sports can also be classified along the lines of their contact or non-contact and subjectively or objectively scored natures.

With regard to the *content* of self-talk, based on previous research (Van Raalte *et al.*, 1994) it was hypothesized that skilled athletes would use less negative self-talk than their less skilled counterparts. This was not the case, as no differences emerged between more skilled and less skilled athletes' content of self-talk. A possible reason for the lack of a significant effect for skill level may be related to the way it was measured – that is, only two levels. Alternatively, given that Van Raalte *et al.* (2000) found tennis match winners only differed on the way they responded to their self-talk, the present findings can be combined with this research to suggest that the content of self-talk may not be as important as the response to or (motivational–de-

motivational) interpretation of self-talk's content. It is suggested that future research examine the interpretational aspects of self-talk to better understand their role with dependent variables such as athletic performance.

Maintaining a focus on the content of self-talk, although significant effects for both sex and sport type were present, concern over the possibility of a confound was raised as the significant findings emerged on the same content dimensions. As a result, a *post-hoc* chi-squared test was conducted to check for the even distribution of male and female athletes across team and individual sport types. The results obtained from the chi-squared test ($\chi^2 = 197.142$) exceeded the criterion ($_{(0.05)}\chi^2_{(1)} = 3.84$) required for significance. More specifically, the result revealed that significantly more male than female athletes competed in team sports. Conversely, more females than male athletes competed in individual sports. Thus, the results of this analysis indicated that there was an imbalance between male and female athletes across individual and team sports. This is an obvious limitation to the present study, with the implication of this confound being that greater consideration needs to be given to the sampling of participants. To this end, a second study was conducted which controlled for sport type. Further discussion of this finding is deferred until the results of this study have been presented.

Study 2

The aims of Study 2 were two-fold. The first aim was to employ a more stringent sample to examine more closely the effect of sex suggested by the findings of Study 1. Second, because of the possibility that the findings of Study 1 were sample dependent, we wished to cross-validate at least some of the findings of Study 1 in a different sample. As noted previously, the difference between the sexes in Study 1 for the content of self-talk may have been due to the imbalance between male and female athletes across individual and team sports. Consequently, it was decided to replicate Study 1 using participants from a single sport (volleyball; a non-contact team sport that is objectively scored) with a single skill level (recreational). Thus, by controlling sport type classification (across three classes) and skill level, a more accurate examination of the effect of sex could be achieved. As the recreational sample employed did not involve competition, this precluded the replication of all of the findings of Study 1. It was, however, hypothesized that the relevant previous STUQ findings would be replicated. Because of the lack of a research-based rationale, tests of interactions were again not conducted.

Methods

Participants. One hundred and sixty-four male (40%) and female (60%) kinesiology undergraduates volunteered to participate in Study 2. The mean age of the sample was 21.5 years ($s = 1.8$). Participants were recruited from a 6 week (three classes per week) volleyball activity class and were relative novices, self-classifying themselves as taking part in volleyball at a recreational level.

Measures. As the participants were recruited from an activity class that did not contain a competitive setting, all items pertinent to that setting were deleted from the STUQ. Consequently, a 36-item situationally modified version of the STUQ was administered.

Procedure. Potential participants were approached after permission had been obtained from the class instructors. Before completing the questionnaire, all participants read a letter of information. Informed consent was implied by agreement to complete the survey. Participants completed the STUQ before the start of a class in the fourth week of the 6 week course. Participants were explicitly instructed to answer the questions in relation to the volleyball activity course.

Data analysis. To test for the effect of sex on the content of athletes' self-talk, an identical MANOVA approach to that employed in Study 1 was utilized. To examine the use of self-talk at the general level, a simplified ANOVA was conducted; one sex by temporal phase (2×3) mixed-model ANOVA. At the specific level, one single-factor between-groups MANOVA was conducted with the 12 functions of self-talk as the dependent variables.

Results

The effect of sex on the content of self-talk. The MANOVA relevant to this effect revealed no multivariate effect (Pillai's trace $F_{6,157} = 1.72$, $P > 0.10$, power = 0.64). This finding was contrary to that hypothesized. At a descriptive level, the means and standard deviations for the present sample's content items were comparable to those in Study 1. In summary, Study 2 provides supportive evidence that athletes' self-talk is primarily positive (54%) as opposed to neutral (24%) or negative (22%), abbreviated (single words 23% + phrases 59% = 82%) as opposed to said in full sentences (18%), and covert (65%) as opposed to muttered (22%) or overt (13%).

The effect of sex on the use of self-talk. At the general level, the (2×3) mixed-model ANOVA revealed no significant main effect for sex ($F_{1,162} = 0.91$, $P > 0.10$, power = 0.16). Moreover, at the specific level, results from the between-group MANOVA supported this finding (Pillai's trace $F_{12,151} = 0.52$, $P > 0.10$, power = 0.29). This finding replicates that in Study 1.

The effect of temporal phase on the use of self-talk. The general (2×3) mixed-model ANOVA revealed a significant main effect for temporal phase (Greenhouse-Geisser $F_{1.96,317.41} = 199.71$, $P > 0.001$, $\eta^2 = 0.55$, power = 1.00). Follow-up tests revealed a similar trend to Study 1. That is, athletes reported greater use of self-talk in general during practice (mean = 5.51, $s = 1.89$) than before (mean = 2.92, $s = 1.88$; $P < 0.001$) or after (mean = 2.87, $s = 1.81$; $P < 0.001$) practice. These findings replicate those of Study 1. Furthermore, the effect sizes for the effect of temporal phase are similar to those observed in Study 1.

Discussion

The aims of Study 2 were to clarify the sex by sport type confound and cross-validate pertinent findings from Study 1. Although differences between the sexes emerged in Study 1 for the content of self-talk, such differences were not repeated in Study 2. An explanation for the lack of sex differences in Study 2 with regard to the content of athletes' self-talk is most likely linked to the more stringent sampling employed in this study. Consequently, it is proposed that the significant results obtained in Study 1 for sex on the content of self-talk were due to differences in sport type. A recent study by Hardy *et al.* (2004), which focused on how athletes' use self-talk, may help to explain the content-related sport type differences found in this investigation (i.e. team sport athletes employed more negative and overt self-talk than their individual sport counterparts). Hardy *et al.* (2004) found that team sport athletes used a less deliberate form of self-talk and had a significantly reduced belief in their self-talk compared with individual sport athletes. It may follow that as team sport athletes have less belief that their self-talk impacts on their sporting performances, they are more prone to use self-talk that is negative and overt, perhaps as a way to "blow off steam".

A less likely explanation for the lack of sex differences found in Study 2 may be linked to the fact that although the participants used in Study 2 were not competitive volleyball players, it is possible that they were competitive athletes in other sports. Regardless of the likelihood of explanations, this issue highlights the complexity and importance of

appropriate sampling when dealing with sex, competitive level and sport classifications as independent variables (Hanton, Jones, & Mullen, 2000).

The generation of comparable cross-validation results (that is, all the effects examined, other than sex, replicated the findings of Study 1) offers some support for the external validity, as well as the replicability, of data generated by the STUQ. With regard to the repeated finding concerned with the use of self-talk across temporal phases, the apparent difference in the pattern of self-talk use compared to imagery use is interesting. Given that the mental skills of self-talk and imagery are frequently promoted for performance enhancement reasons, and that they seem to have overlapping functional uses, it is suggested that future research should examine how these two mental skills are used in tandem, especially across the temporal phases of competition and practice. It would be expected that such descriptive data would help further guide practitioners' practice.

General discussion

Together, the findings of these two studies extend Hardy and colleagues' (2001a) qualitative data in two ways. First, while the study by Hardy *et al.* suggested a relatively diverse content and set of functions that self-talk can serve athletes, inferences about the frequency of use of self-talk's functions or its content was not possible. The quantitative findings of the present studies go some way to remedy this situation. Second, the present two studies were also able to address how different athletes (male vs. female; team vs. individual; skilled vs. less skilled) employed the mental skill.

Content of self-talk

Regarding the *content* of self-talk, the repeated finding that athlete self-talk was generally positive, said covertly and in an abbreviated structure lends support to Vygotsky's (1986) verbal self-regulation theory. According to his theory, self-talk generated by cognitively mature athletes should primarily be internalized and abbreviated. As such, future research should more closely examine Vygotsky's theory in the sporting and motor learning domains. The replication that most of athletes' self-talk is positive in nature mirrors the mainstream psychological literature (Amsel & Fichten, 1998) but is contrary to the sport literature. That is, Van Raalte *et al.* (1994, 2000) found the observational self-talk of tennis players to be mostly negative. The contradiction in findings may be explained by the fact that Van Raalte *et al.* (1994, 2000) focused solely on observable self-talk, whereas the present study examined the content of both covert and overt self-

talk. Moreover, Van Raalte *et al.* (1994) suggested that positive self-talk might be more likely to be internalized by the individual than negative self-talk. Thus, the present finding that most of athletes' self-talk is positive and covert in nature lends some support to their proposal. The present findings related to the content of athlete self-talk also suggest that a greater understanding might be gleaned from the examination of the valence (positive–negative), perspective (internal/covert–external/overt) and structure (single cue words–complete sentences) aspects of self-talk rather than a continued exclusive focus on the valence self-talk dimension. With that said, if valence-related research questions are pursued, it is recommended that researchers borrow from the automatic thoughts literature and adopt states of minds ratios (e.g. positive/[positive + negative]), which have advantages over the use of raw frequency (see Amsel & Fichten, 1998, for a more detailed discussion on this matter).

Use of self-talk

Regarding the *use* of self-talk, the present investigation provides some initial data about how frequently athletes employ self-talk that may help guide future research. For example, given that the use of the functions of self-talk was found to increase from practice to competition settings (Study 1) and that the utilization of self-talk, at a general level, increases as time of season progresses (Hardy *et al.*, 2004), it follows that employment of the functions of self-talk should change accordingly. Drawing from the mainstream stress literature (Bolger & Zuckerman, 1995), an avenue of research that has yet to be examined revolves around the effectiveness of self-talk. It should be noted at this point that frequency and effectiveness are not necessarily connected. It may be possible to achieve an effective outcome with little use of self-talk and vice versa. The difference between frequency and effectiveness has also been highlighted in the sport imagery literature (Weinberg, Butt, Knight, Burke, & Jackson, 2003). Based on the premise that research and theory should always guide practice, the issue of effectiveness of self-talk should be addressed in the future.

Implications

Related to the issue of effectiveness, the findings from the present research have implications for both applied research and practice. For example, although the present research did shed some light on athletes' use of self-talk, the lack of the investigation of elite athletes' use of this mental skill is an obvious gap in the literature. Basic research questions posed by Hardy *et al.* (1996, p. 251) remain unanswered:

“What is the nature of the self-talk that successful elite athletes use? How does this self-talk exert its influence upon motivation, attention, emotion, and performance?” Recent research by Hatzigeorgiadis, Theodorakis and Zourbanos (2004) has attempted to address one underpinning mechanism of the self-talk–performance relationship, namely attention control; nevertheless, further systematic research is necessary. In addition, preliminary research by Hardy and colleagues (2001a, b) focusing on the functions and interpretation of self-talk has indicated links between self-talk and athlete motivation. Answers to the above research questions would undoubtedly assist consultants’ practice.

As the self-talk literature is still in its infancy, recommendations for best practice are somewhat limited; however, it is proposed that self-talk interventions should not focus entirely on the content of athletes’ self-talk (e.g. positive self-talk). Instead, the practitioner is advised to match the desired outcome (e.g. to increase a gymnast’s self-confidence for successfully landing a double back somersault dismount from the high bar) to the promotion of the most appropriate self-talk function (in this case, possibly the mastery function). Moreover, due to the absence of sex and skill level differences for the use of the self-talk functions, it is suggested that the principle of matching function to desired outcome should be applied consistently across the sexes and skill levels. Given the relative lack of self-talk use in conjunction with the practice setting, practitioners are reminded that self-talk can be used in a multitude of ways; for example, to help swimmers psych themselves up for an early morning training session, to fine-tune the execution of individual motor skills (e.g. swimming stroke), to facilitate focus towards the end of a tiring practice, and to rehearse race strategies. One caveat to this matching hypothesis revolves around athletes’ cognitive processing preference. More specifically, if a performer has a non-verbal cognitive preference, the practitioner’s time might be better spent constructing an intervention strategy other than one involving self-talk. Finally, the authors do not believe that effective self-talk interventions simply entail a “more is better” approach; differences between instructional and motivational functions and the importance of Masters’ (1992) conscious processing hypothesis must be remembered.

Concluding remarks

Although the present studies provide some novel information regarding athlete self-talk, there are issues of concern connected to the research. First, the utilization of Likert-type response scales rather than percentages would have allowed for the inclusion of all three aspects of each dimension of the

content of self-talk (e.g. positive, neutral and negative self-talk, rather than just positive and negative self-talk as employed in the present studies). Second, more information regarding the validity of the STUQ would be helpful. Nevertheless, previous and present research supports the contention that the STUQ is a trustworthy “broad brush” survey tool that can be used to obtain wide-ranging information on self-talk. The STUQ has adequate test–retest reliability (Hardy & Hall, in press) and findings generated by the instrument in the present research were replicable across (general and specific) levels as well as studies. Furthermore, both previous and present research employing the STUQ has provided support for the theory-based predictions of Annett’s ALI model (Hardy *et al.*, 2004) and Vygotsky’s (1986) verbal self-regulation theory (Studies 1 and 2). Thus, supportive evidence for the STUQ’s construct validity has been generated. It is recommended that future investigations switch from a broad to a more narrow focus. More specifically, there is a need to develop appropriate psychometric instruments that specifically assess the content and use of self-talk at a more detailed level. In short, the STUQ has provided some very useful information upon which to base initial discussion regarding athletes’ use of self-talk. Researchers interested in the area now need to develop psychometrically robust measures capable of providing in-depth examinations of the construct in order to more closely examine some of the interesting questions generated by the present research.

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Appendix

Presented below are the STUQ items relevant to the present study.

Definition and Instructions

“Self-talk, as the name suggests, is best thought of as what you **say** to yourself. You may talk to yourself out loud or you may talk to yourself in your mind, so that only you can hear what you are saying. For example, you may say things to get yourself psyched up or calmed down, to stay focused, to keep going, etc.”

The following questions/statements are concerned with what you say to yourself **in relation to your sport**. Your responses will be kept strictly confidential. Neither your coaches nor anyone other than the researcher will see your responses. There are no right or wrong answers but please give an honest reply.

Unless instructed otherwise, use the scale below to rate how frequently you **talk to yourself** for each of the following questions. Thank you!

Never	Rarely		Sometimes		Often		All the time	
1	2	3	4	5	6	7	8	9

Temporal aspects of self-talk (When)

How often do you use self-talk in relation to your sport. . .

before a practice?

before a competition?

during a practice?
 during a competition?
 after a practice?
 after a competition?

to cope in tough situations?
 to increase or maintain your motivation?
 to control how much effort you exert?
 to remind yourself of your goals?

Functions of self-talk (Why)

In **practice**, how often do you say things to yourself. . .

to refine an already learned skill?
 to refine a strategy/plays/plan/routine?
 to psych yourself up?
 to relax?
 to control your nerves?
 to regain or keep focus?
 to boost your self-confidence?
 to help mentally prepare yourself?
 to cope in tough situations?
 to increase or maintain your motivation?
 to control how much effort you exert?
 to remind yourself of your goals?

In **competition**, how often do you say things to yourself. . .

to execute a skill?
 to execute a strategy/plays/plan/routine?
 to psych yourself up?
 to relax?
 to control your nerves?
 to regain or keep focus?
 to boost your self-confidence?
 to help mentally prepare yourself?

Content of self-talk (What)

In your opinion, . . .

generally what percentage of your self-talk is positive in nature? _____% +
 generally what percentage of your self-talk is neutral in nature? _____% +
 generally what percentage of your self-talk is negative in nature? _____% = 100%

In your opinion, . . .

what percentage of what you say to yourself is said as single words? _____% +
 what percentage of what you say to yourself is said as short (3 or 4 words) phrases? _____% +
 what percentage of what you say to yourself is said as complete sentences? _____% = 100%

In your opinion, . . .

in general, what percentage of your self-talk is said out loud so that others can potentially hear what you are saying to yourself? _____% +
 in general, what percentage of your self-talk is said in a "muttered" fashion or under your breath so that only you can hear what you are saying to yourself? _____% +
 in general, what percentage of your self-talk is said in your head so that only you can hear what you are saying to yourself? _____% = 100%

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