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Competitive Performance Effects of Psychological Skills Training for Youth Swimmers

Abstract

This study assessed the effect of two different psychological methods of skills training – self-talk and goal setting - on the swimming performance of youth swimmers. We allocated a convenience sample of club and county level youth swimmers (N=49; M_{age}= 10.8, SD = 1.25) to one of three groups: self-talk, goal setting or a control group engaged in no systematic psychological method of skills training. The groups were balanced in terms of competitive performance ability, age and gender. Participants in the experimental conditions (self-talk and goal setting) completed a five-week psychological skills intervention program and were measured on pre- and post-200meter swimming time in competition. After controlling for level of engagement in the program, ANCOVA revealed a significant omnibus effect ($p = 0.006$, $\eta^2 = 0.20$) with post hoc pairwise comparisons using magnitude based statistics demonstrating that goal setting had a small positive effect compared to self-talk ($\eta^2 = 0.40$; +/- 0.45). Both self-talk ($\eta^2 = 0.50$ +/- 0.48) and goal setting ($\eta^2 = 0.71$ +/- 0.4), showed a small and moderate positive effect, respectively, relative to the control group. A social validation check confirmed that the swimmers found the intervention to be relevant, beneficial and meaningful for improving performance. Psychological skills training may be effective in improving youth swimming performance; specific mechanisms underlying these benefits need further exploration.

Key Words:

Introduction

Over the past decade, there has been rapid growth of interest in applying sport psychology techniques to improve real-world competitive performance. This research involves attempts to integrate psychological skills training (PST) with traditional physiological and sport skills training of skilled athletes (Foster, Maynard, Butt & Hays, 2016; Rothlin, Birrer, Horvath & Holtforth, 2016;). PST is the systematic learning and practice of psychological skills via self-regulatory strategies to help athletes consistently achieve peak performance states (Weinberg & Gould, 2007). Specifically, techniques such as goal setting, use of imagery, self-talk and arousal regulation are thought to enhance performance (Anderson, 2000; Van Raalte & Brewer, 2002). A current empirical concern within the PST literature, however, is the extent to which these methods are efficacious for athletes in real-world competitions (Moore, 2003).

Two of the most commonly implemented PST methods are self-talk (Johnson, et al, 2004; Maynard et al, 1995; Park, 2000) and goal setting (Boyce, 1994; Lerner et al, 1996; Ward & Carnes, 2002). Self-talk is defined by the athlete engaging in self-instruction to carry out a particular task or regulate emotional arousal (Hardy & Alexander, 2001). Thus, Zinsler, Bunker and Williams (2001) emphasised that the two main functions of self-talk within sport are instructional and motivational. Emotive motivational utterances aid the athlete in maintaining focus and building confidence (Chroni, Theodorakis & Trikala, 2007) and in enhancing the positive

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effects of a competitive level of physiological arousal. Theodorakis, et al. (2014) proposed that motivational self-talk should be more beneficial for gross motor skill tasks, as motivational self-talk tends to build arousal (i.e., “psych up” the athlete) and help maintain effort. By contrast, instructional self-talk is thought to enhance concentration that is critical to the execution of fine motor movements (Chroni, Theodorakis & Trikala, 2007). Zetou, Vernadakis, Derri, Bebetos and Filippou (2014) also demonstrated the relevance of instructional self-talk for young swimmers’ gross motor skill learning of the backstroke; these researchers found improved performance and attentional focus scores for a self-talk group relative to a control group.

In a review of the self-talk literature, Theodorakis (2012) identified a lack of research that has investigated the effectiveness of self-talk on athletes’ competitive performance. Theodorakis (2012) stressed a particular need for more field based research in this area, since most prior research measured self-talk intervention outcomes in the laboratory or assessed sport performance tasks in non-competitive settings (e.g., 100 meter sprint times: Mallet & Hanarahan, 1997). Moreover, earlier self-talk research examined specific skill components of a sport (e.g., dart throwing: Van Raalte et al, 1995; Cumming et al, 2006). Although the results of these studies provide guidance for self-talk strategies, it cannot be assumed that such findings transfer to holistic performance in the competitive environment (Martin, Vause & Schwartzman, 2005). An exception to these weaknesses in prior research is a study by Schuler and Langens (2007) in a real marathon competition in which researchers found that runners who used self-talk during the race, coped better with on-going crises in the race than did participants in the control group. However, this

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study was observational, and the self-talk participant group received no self-talk training.

Considering another popular PST technique, goal setting is thought to provide athletes with direction and a focus for their efforts, and it has also been seen to be effective in motivating individuals in occupational settings (Locke & Latham 1990). Research has found that goal orientations are associated with the personality attribute locus of control (Rotter, 1990) which reflects the degree to which one perceives events to be under their control (internal) or under the control of others (external). It has been found that goal orientations facilitate high level of internal locus of control which helps promote self efficacy (Philips & Gully, 1997). However, the efficacy of goal setting in sport is still contested, with some authors claiming that current evidence is insufficient (Strein & Roberts, 1992; Meyers et al, 1996) while other authors remain highly enthusiastic about its use (Burton et al, 2001). Moore (2003) reviewed goal setting PST programs and suggested that the empirical literature lacks adequate rigorous evidence to suggest that goal setting is an evidenced based practice for sport performance enhancement, further suggesting that this "... procedure has been advocated (by sport psychologists) well beyond the level of empirical validation necessary to ethically and responsibly incorporate it into standard practice" (Moore, 2006, pp. 80). These conclusions remain pertinent, even when considering variations in how goal setting is defined. For example, three different types of goals that may be utilized by athletes have been outlined (Hardy & Jones, 1994): outcome goals (the outcome of a particular event, involving comparison with peers or competitors), performance goals, (relying solely on the individual) and process (task) goals (specifying the actual behavior or group of movements that the

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individual will carry out within a performance). Here, as in the area of self-talk, there remains a need for well-controlled, field based studies that provide empirical tests of the value of goal setting in competition. To date, most field-based goal setting studies have been either case studies (Lerner, et.al., 1996; Ward & Carnes, 2002) or single group pre- post designs (Burton, 2001) that do not provide a strong basis for evidenced based practice (Moore, 2006). Hardy and Gammage (2001) highlighted the need for studies to use both an intervention and a comparison group in this research. The weak evidence to date for the efficacy of both self-talk and goal setting methods (Gardner & Moore, 2006) highlights the need for better controlled field based research with specifically targeted population groups.

A sport population for which there is growing interest in applying PST techniques is that of young people engaged in athletic competition (Foster, Maynard, Butt & Hays 2016). Hyraiko, Mactavish and Martin (2004) suggested that introducing cognitive techniques to young athletes is particularly beneficial, as the skills training then helps them develop into more psychologically aware competitors. Indeed, although it has been recognized that adolescent athletes have similar cognitive needs as adults in the areas of motivation, anxiety management and concentration (Chroni, Theodorakis, & Trikala 2007) there has been little research assessing applied cognitive techniques to enhance swimming performance in this population (Weinberg & Gould, 2003). A study by Sheard and Golby (2006) demonstrated, among adolescent swimmers, a significant post-PST improvement in three separate swimming strokes, each over 200 meters, and a significant overall improvement on participants' post-intervention positive psychological profiles. Simoes, Vasconcelos-Raposo, Silva and Fernandes (2012) implemented a goal setting program for nine swimmers using a

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multiple baseline design over one season and showed an improvement in swim times, compared to a reduction in performance during the second season when the intervention was withdrawn. More recently, Hatzigeorgiadis, Galanis, Zourbanos and Theodorakis (2014) randomly allocated swimmers aged 13-16 to either a 10-week self-talk program or a no-intervention control group and found greater improved competitive swimming performance in the self-talk group. Improving on earlier studies that failed to provide intervention checks and following recommendations from Hatzigeorgiadis, Galanis, Zourbanos and Theodorakis (2014) for manipulation checks, the present study included two measures of engagement in learning the PST methods, namely attendance at PST workshops and completion of individual workbook tasks.

Despite the popularity of both self-talk and goal setting, no randomized control study has yet compared these two interventions in applied sport settings for youth athletes. Although there have been some case studies that combined the two interventions (e.g., Thewell & Greenless, 2001) no studies have sought to isolate the effects of one versus another in a competitive setting. Therefore, to build on the research of Golby and Sheard (2006) and Hatzigeorgiadis, Galanis, Zourbanos and Theodorakis (2014), the present study aimed to test and compare two isolated psychological skills with youth swimmers (goal setting and self-talk) and a comparative no-intervention control group with regard to their effects on competitive swim performance. We predicted that both the self-talk and goal setting groups would achieve greater improvements in swim performance relative to the control group. Given the recent evidence of Hatzigeorgiadis, Galanis, Zourbanos and Theodorakis (2014) of self-talk improving competitive performance in

swimmers and the lack of similar findings for goal setting, we predicted that the self-talk group would show higher improved performance compared to the goal setting group.

Method

Research Design and Consideration of Extraneous Variables

This research design utilized a quasi-experimental matched groups intervention. The between-participants independent variables were three psychological skill training conditions (self-talk, goal setting, or no intervention control). Participants assigned to the control group condition received nutritional advice (also provided to experimental groups) in order to elicit a perception of expected improvement. The dependent variable was the participants' 200-meter swim time; pre- and post-intervention. We also considered and recorded data regarding the number of training sessions attended and the number of independent worksheet exercises completed. A final engagement score was calculated as a product of attendance and number of worksheets completed. Finally, participants responded to three social validation questions post-intervention (i.e., "Was the intervention meaningful for you? Was the intervention helpful in improving your swimming performance? Did you find the intervention to be relevant to your swimming?"). Responses were rendered on a Likert scale from 1 (definitely not) to 5 (definitely).

We balanced gender across the experimental groups, since a difference in participant propensity to engage with particular cognitive psychological skills has been noted between males and females (Rainey, 2006). We also controlled for

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participant age differences by matching the average age of participants in the three experimental conditions, since younger athletes are likely to show a larger performance improvement quickly. We also matched participants for ability, since the participant's current swim performance time may affect their scope for improvement across the psychological skill training period (i.e. swimmers who were initially slower might improve most, relative to those who were initially faster. Finally, to control for the effect of variations in the importance participants placed on the competitive event (Johnson et al., 2004), we asked participants to identify their most important event, or stroke over a 200meterdistance and measured their progress in the current event as our dependent variable.

Participants

We recruited 49 participants from among potentially national swimmers atMiddlesbrough SwimmingClub(Mean (M)_{age} = 10.8 years, Standard Deviation (SD)= 1.25: Female = 17, Male = 14). All participants were competitive swimmers from this successfulnorth eastern English swimming club, with skills ranging from club level athletes to Northumberland and Durham area medallists. The participants' coach attested to the swimmers having had no previous experience or involvement in psychological skills training. This may have been important, as the speed of learning may differ for athletes who have been exposed to such PST previously. (See below for information regarding participants' and their parents' consent to participate and institutional approval for this research protocol.)

[INSET TABLE 1 ABOUT HERE]

Table 1

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Participants' gender, age, 200m swim pre-intervention performance time across the three psychological skills training conditions.

Experimental group	Gender	Mean(SD) Age	Mean (SD) 200m swim time (seconds)
Self talk	7 female	10.9 (1.18)	170 (11.36)
	8 male		
Goal setting	8 female	10.8 (1.15)	178 (22.65)
	9 male		
Control	9 female	10.8 (1.08)	178 (22.12)
	8 male		

Experimental Interventions.

We applied a psychological skills training intervention model with three conceptual levels (psychological demands, skills and techniques) in each of two experimental conditions, following guidelines from Aoyagi and Poczwadowski (2012). The integrated psychological skills training model (Taylor, 1995) highlights the need to identify the psychological demands of a given sport, which then enables a focus on what psychological skills are required. Next, the psychologist and coach choose psychological techniques to improve the athlete's psychological skills. Currently, research literature highlights psychological skills associated with self-regulation, motivation, and coping with pain as important to enhanced performance for high intensity training sports such as competitive swimming (Birrer, 2010). Therefore, these techniques were the primary focus of our two psychological interventions - self-talk and goal setting. Weekly activities were designed to increase motivation and ability to tolerate painful sensations and difficult emotions. Trembath (2002) noted that, when designing interventions for youth athletes, it is important to focus upon the factors that motivate them to train. As the main performance factors found to motivate children have been the *skills they master and achievement* (Gould et al, 1996, Klinton & Weiss, 1986), we also targeted these factors within our self-talk and goal setting interventions.

Goal setting group. We used a model proposed by Vasconcelos-Raposo (2001) for sport-specific goal setting related to competition. The model takes into account the current practices of the athlete and coach when planning training and preparing for competition. Thus, in our use of this model for goal setting we emphasized two factors: (a) the coach's qualitative goals (technical development in training) and (b) the

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quantitative competition goals that sustain and direct attention and effort from both the coach and athlete. An example of one of the qualitative goals of the coach was to develop tumble-turn ability and speed as defined by the time taken to swim 10 meters out from the wall, complete a tumble turn and return to the 10 meter point. We measured and recorded this time in week one and used it to establish a quantitative goal of speed to complete the distance. We utilized goal attainment scaling as a more sophisticated measure of goal attainment (Bovend'Eerd, Botell & Wade, 2009). A further example related to the competitive dive-start was the time taken to respond to the start sound and reach the 10 meter mark. Thus, we also recorded and used this time as a training goal. These goals were evaluated by the researcher, coach and athlete weekly.

Self-talk group: The first stage of the self-talk intervention was for swimmers to develop self-awareness of negative thought patterns. We sought to help participants in this condition become aware of self-talk statements before, during or after a swimming meet. Subsequently, swimmers were introduced to thought stopping using cue words (e.g., “stop”, “enough”) and to replace negative thoughts with positive ones by using motivational cues (e.g., “I can do this,” “Let’s go,” “I’m prepared”). The final step for them was to apply the techniques they learned during practice. Moreover, we utilized instructional self-talk in training to aid technical performance during training by developing specific instructions for each phase of the swimming stroke (e.g., reach, feel, push, pull for freestyle). We also developed cue words for dive starts and tumble turns to increase the swimmer’s focus. Lastly, we encouraged motivational self-talk in race-pace trials and at intense periods of the swim sets to aid in pain management.

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Table 2

Weekly break-down of the psychological skills associated with Goal Setting (GS) and Self-talk (ST) intervention groups

	Self talk group	Goal setting group	Control group
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<p>Week 1</p>	<p>Self-talk was introduced to participants and the technique was contextualised by giving examples of how this relates to their everyday living as well as in the swimming arena. An activity involving translating a negative self-talk experience to a positive appraisal was discussed; this was aided using a work sheet produced by Theodorakis (2001) intended for female footballers, which was adapted to swimming for the purpose of this study.</p>	<p>The concept and importance of goal setting was introduced using a road trip analogy. The three types of goals, long term (Martin et al, 1984), short term (Hardy et al, 1997) and daily goals (process) were explained. The SMART goal setting technique produced by Fielding (2001) was explained to participants.</p> <p>The swimmers were then encouraged and helped to produce three of their own long-term performance goals, using</p>	<p>The importance of fluid intake and appropriate drinks to be consumed in training. This worksheet was adapted from the Middlesbrough ASC nutrition advice.</p>
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		<p>SMART rules. To further their understanding a small activity produced by the researcher, requiring participants to arrange different goals into their correct groups, was given.</p>	
<p>Week 2</p>	<p>Swimmers were introduced to differences between positive and negative self talk, examples were given and the effect this may have on their performance was explained. Cognitive restructuring was introduced – altering negative perceptions to positive</p>	<p>The second session focussed on developing training process goals that would lead to achieving their performance outcome goals. Perceived control was explained and the mechanisms through which goal-setting</p>	<p>This focus was on eating to compete (again adapted from Middlesbrough ASC nutrition advice). The importance of consuming carbohydrates to replace energy and guidelines</p>

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	<p>perceptions. Participants were encouraged to produce their own ideas and to be pro-active in the tutorials.</p>	<p>can be effective (direct attention and focus, maintain persistence and increase engagement with related activities). A worksheet to further understanding of effective goal setting was then given to participants.</p>	<p>suggesting when eating should occur before competition races were provided.</p>
<p>Week 3</p>	<p>Thought stopping was the focus of this tutorial; Van Raalte, et al (1995) produced this technique of eliminating negative self talk phrases, which is thought to be beneficial to performance. Each swimmer was required to select three negative self talk phrases they had experienced and recorded in their log book. The activity sheet using thought stopping was</p>	<p>An initial activity produced by the researcher to assess the swimmers' understanding of the goal setting knowledge learned in weeks 2 and 3. This session was used to encourage swimmers to reflect upon their progress with process goals, make adjustments and evaluate their progress towards the outcome goals</p>	<p>A summary of diet and nutrition, and tips to boost energy were provided and explained to swimmers. A list of appropriate snacks to eat prior to races was given.</p>

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	<p>applied to these phrases. This was repeated until participants were satisfied they understood the technique.</p>	<p>(Hardy and Gammage, 2001). A worksheet to help swimmers reflect upon their progress and draw the relationships between process goals and outcome goals was given. Finally, the swimmers decided upon their performance goal for the post-intervention meet swim.</p>	
<p>Week 4</p>	<p>The differences between instructional and motivational self-talk were explained to participants. As Chroni et al (2007) support, the use of instructional self-talk was encouraged, when executing fine motor skill movements. In swimming fine motor skills may be the dive start, technical skills such as the fine tuning of</p>	<p>A final worksheet was given to participants that outline their current progress in achieving goals (process goals in training) and to reflect upon how these improvements would help them achieve their performance goal for the post-</p>	<p>The concept of role models and why we have them was presented to participants. A worksheet produced by the researcher was used which required the swimmers to be aware of who their role model was and to</p>

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	<p>the freestyle arm pull and tumble turns. The use of motivational self talk was encouraged throughout training and races as endurance is a core necessity of swimming and Chroni et al (2007) argues that this is the appropriate use of this nature of self talk.</p>	<p>intervention meet.</p>	<p>provide reasons for this selection.</p>
<p>Week 5</p>	<p>A brief re-cap of the week's activities was provided to demonstrate how the participants have progressed; this was supported by the use of brief questions such as what is self talk? How can it affect my swimming? A final race self talk pre-performance routine was given</p>	<p>Participants were asked to revise their performance goal (if necessary) and discuss this with their coach (as a check for how realistic the goal was) and outline how confident/focussed they felt in achieving this goal (in order to deepen</p>	<p>A recap of the nutritional advice was provided to swimmers and they were given an opportunity to ask questions regarding only nutrition. The importance of eating the correct foods on race</p>

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	to the participants and explained by the researcher. This was to be used prior to the final competition race.	their understanding of goal setting and ensure they were focussed on their goal leading into the competition).	day and warming up correctly was the focus of the final tutorial.
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<p>Log books</p>	<p>At the first tutorial, all participants were given a log book in which they were instructed to record their self talk dialogues, as they remember them, before, during and after training sessions (refer to Hardy et al, 2001) and any additional thoughts or comments they had, every evening. The participants were also given stickers to aid them in marking in their books if they had positive, neutral or negative self talk patterns in each training session.</p>	<p>At the first tutorial, all participants were given a log book in which they were told to record three daily process training goals every evening, and to record if they achieved these goals. As Getz & Rainey (2001) suggest, a combination of types of goals should be introduced to athletes to provide a sound goal base. Swimmers were told to place their long-term performance goal on the opening page of their log books and to focus on this before training sessions. Participants were given stickers to aid them in showing if they had achieved goals and</p>	<p>Log books were given to participants at the first tutorial, they were told to record five healthy foods on a weekly basis i.e. pasta, and asked to record the occasions when they consumed this food in the tally chart. No specific feedback or advice was given regarding these foods; it was merely to eliminate differences between experimental groups. This prevented participants' from guessing their experimental group, which may</p>
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		how well they achieved them. The layout of the log book was tailored towards making this process simple for participants.	have influenced results.
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Procedure

After gaining the approval of the Teesside ethics committee, we contacted the Middlesbrough swimming club coach, and the researcher attended the training site for the club and explained the main goals of the research and the expectations of the swimmers to the coaches/support staff, swimmers' parents, and swimmers. Next, we obtained informed consent from the swimmers' parent(s)/guardian(s) and then allocated swimmers to the three psychological skills training groups (goal setting, self-talk, and control group), balancing groups for average age, gender and current swimming ability). Swimmers were randomly allocated to each group until we achieved this balance.

The first recorded meet was the Northumberland and Durham regional championships, and this meet was used to assess the participants' pre-intervention performance (Week 0). Participants then attended five weekly 30-minute tutorials (in groups of five participants each) with the sport psychologist. The researcher attended training sessions after weeks two, three and four in order to observe/encourage the use of logbooks and take specific time trials to aid this tutorial process. A detailed break-down of the activities covered in each weekly tutorial for the experimental groups is provided in Table 2. After week five of the intervention (i.e., during week six), participants engaged in the second competition meet, the Middlesbrough annual county gala, and the participants' post-intervention swimming performance was recorded. Afterwards, participants were thanked for their participation and provided with a full debriefing of the experiment.

Data Analysis

Prior to conducting inferential statistical analysis, we checked the data for assumptions of distribution normality and equal variance between groups; we found no violations of these

assumptions. Prior to examining differences between the groups in performance improvement, we performed Pearson's cross-correlations, including the four measured dependent variables (see Table 3). Results showed that performance improvement was significant and moderately positively correlated with both overall participant engagement ($r = 0.53$) and number of worksheets completed ($r = 0.52$). Therefore, to control for shared variance with the dependent variable, we utilized an ANCOVA to test for the significant effect of groups on performance improvement, using overall engagement as the covariate. We set the criterion for significance was set at $p < 0.05$ and analysed effect size with η^2_p , where $0.01 < \eta^2_p < 0.06$ constituted a small effect, $0.06 < \eta^2_p < 0.14$ constituted a medium effect and $\eta^2_p > 0.14$ constituted a large effect (Cohen, 1988). The ANCOVA was performed using IBM SPSS Statistics for Windows, Version 23. Subsequent post-hoc analysis used a magnitude based statistics approach with the adjusted means of each group. Magnitude based statistics allows quantification of the treatment effect size between groups with confidence intervals to express the uncertainty of the difference between two group means. We made probabilistic magnitude-based inferences about the true value of the outcomes, based on the likelihood that the true population difference was substantially positive (e.g 95/5/0) or substantially negative (e.g 0/5/95). We used spreadsheets to analyse the post-hoc comparisons between groups only after a significant omnibus ANCOVA (Batterham & Hopkins, 2006). The main outcome measure was log-transformed and then back-transformed with uncertainty of the estimates expressed as 90% confidence limits. Standardized thresholds for trivial, small, moderate, large and very large changes (0-0.2, 0.2-0.6, and 0.6-1.2, 1.2-2 and 2+ respectively) (Batterham & Hopkins, 2006) were used to assess the magnitudes of the effects sizes for the pairwise comparisons. Inferences were then based on the confidence interval for the difference score to these standardized thresholds and calculated as per the magnitude based inference approach using the following scale: 25% to 75%, possibly; 75% to 95%, likely;

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95% to 99.5%, very likely; >99.5%, most likely (Hopkins, Marshall, Batterham, & Hanin, 2009).

Results

Table 3:

Pearson's cross-correlations(95% CI) matrix for all measured dependent variables

	Overall engagement score	Attendance	Number of worksheets completed	Performance improvement
Overall engagement score		.527** (0.29, 0.70)	.908** (0.85, 0.95)	.533** (0.29, 0.71)
Attendance			.211 (-0.08, 0.46)	.245 (-0.03, 0.50)
Number of worksheets completed				.52** (0.28, 0.71)
Performance improvement				

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There were significant Pearson's correlations between performance improvement and two of the three other variables. This included number of worksheets completed ($r = .52$, $p < 0.01$) and overall engagement (attendance x number of worksheets completed); $r = .533$, $p < 0.01$ but not attendance ($r = .25$, $p > 0.05$).

Table 4:

Mean (SD) descriptive statistics for performance improvement(s), engagement and attendance by group

	Goal setting	Self talk	Control
Performance improvement (s)	13.1 (10.1)	8.6 (5.3)	5.6 (3.7)
Engagement	37.4 (12.4)	35.1 (9.5)	35.8 (11.0)
Attendance	4.4 (0.7)	5.1 (0.7)	4.5 (0.7)

To examine differences in swimming improvement, pre and post intervention, between experimental groups, while controlling for engagement, ANCOVA showed a significant main effect of intervention $F(2,45) = 5.726$, $p = 0.006$, $\eta^2 = 0.20$. The covariate of engagement score was significant ($p < 0.001$, $\eta^2_p = 0.31$). Post hoc analysis pairwise comparisons using magnitude based statistics, with engagement as the covariate, revealed the following effect size performance improvement comparisons between groups (i.e., Goal setting-Self talk; Control-Self talk; Control-Goal setting. Comparing self-talk to goal setting

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yielded a small effect size of 0.40 (-0.05, 0.85) showing a likely substantial positive performance improvement effect for goal setting compared to self-talk 77/21/2. Comparing the control group to self-talk yielded a small effect size of 0.5 (0.98, 0.02) showing a likely substantial positive performance improvement effect for self-talk compared to the control group 85/14/1. Finally, comparing the control group to goal setting showed a moderate effect size of 0.71 (1.14, 0.28), indicating a very likely substantial positive performance improvement effect for self-talk compared to the control group 97/03/0.

Discussion

The present study furthered research into the effect of psychological skill training on youth swimming performance by examining the effects of goal setting versus self-talk, compared to a control group (no intervention) condition on swim meet performance. Given findings from Hatzigeorgiadis, et al. (2014) that self-talk improved competitive performance in swimmers, and given a lack of similar findings for isolated goal setting psychological skill training methods, we had predicted that the self-talk group would show greater improved performance, compared to the goal setting group and that both psychological skill training methods would show greater performance improvement, compared to controls. As expected, both self-talk and goal setting showed a small and moderately beneficial effect on swimming performance improvement, relative to the control group. This finding is not surprising, since prior studies using a control group found that both self-talk (e.g., Schuler & Langens, 2007) and goal setting (e.g., Theodorakis, 1995; Swain & Jones, 1999; Getz & Rainey, 2001) were beneficial to sports performance, relative to the control groups.

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Interestingly, when comparing the psychological skill training treatments against each other, there was a likely substantial beneficial effect for goal setting compared to self-talk ($ES = 0.40$). Although this was only a small effect, it was not expected. A possible explanation for the greater improvement in performance of the goal setting group may be our participants' young ages. The goal setting condition included information and worksheets on Smart goal setting in three of five training sessions, and this training method was similar to these participants' prior experience. Thus, goal setting may have had a disproportionate influence on this group of participants, relative to participants in prior studies. Many schools include target setting and the use of smart targets in the curriculum (Fielding, 2000), giving these adolescents greater experience with some use of goal setting, even though it may be unrelated to sport. Drawing from research involving motivation in the goal setting literature, this prior experience with the smart goal setting, combined with the proximity of the forthcoming swimming competition may have altered the way the swimmers committed to their training, contributing to their persistence and effort at focusing with the goal setting intervention (Weinberg, 2009). Our findings are consistent with those of Simoes, Vasconcelos-Raposo, Silva & Fernandes (2012) who concluded that their goal setting intervention allowed swimmers to commit to their goals and develop higher levels of effort for swimming performance objectives. In terms of mechanisms that produce the goal setting effect, an increased internal locus of control in detecting errors and having a strategy for self-correction could be important attributes related to performance (Phillips & Gully, 1997). This interpretation of these data remains tentative, as we do not know what specific goals participants set for themselves. However, given the emphasis on smart goals, it is reasonable to assume that setting realistic and achievable goals increased motivation in the medium term.

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This research found self-talk to have a small positive performance improvement effect relative to controls. Mechanisms underlying this effect are also not clear, as the self-talk condition did not prescribe a particular type of self-talk but rather included information about different types of self-talk. Subsequently, due to the relatively open nature of the information given, specific strategies used would have been relatively individualised. However, we strongly emphasized motivational self-talk throughout the intervention as being relevant for pre-performance preparation (as opposed to instructional self-talk for improving technique during training). Motivational self-talk was incorporated into their pre-performance routine before the post-intervention swim race. Previously, Hatzigeorgiadis, Galanis, Zourbanos & Theodorakis (2014) argued that competing with a motivational self-talk strategy can increase motivation and effort while preventing the athlete from focusing on explicit task relevant information. The current study did not check for what type of self-talk was most used by the participants, but previous research has found that swimmers prefer motivational self-talk for competition (Hatzigeorgiadis, Galanis, Zourbanos & Theodorakis, 2014; Hardy, Hall & Hardy, 2005). It has further been proposed that individualized self-talk may have further positive motivational influences (Hardy, 2006) that enhances commitment and belief in its effectiveness. Similar explanations have been offered by Latinjak, Torregrosa and Renom (2010) who found that individualized self-talk had positive motivational effects for tennis players. Johnson, Hrycaiko, Johnson & Halas (2004) also looked at adolescent athletes, using self-talk and reported significant improvement in shooting performance for two of three participants, who received the intervention. However, this was a very small sample, and it is difficult to conclude from this study that cognitive restructuring techniques are effective for young athletes.

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Our results suggest that both goal setting and self-talk were effective, possibly by increasing effort and motivation toward training. As noted above, in explaining the stronger effect of goal setting, engagement may be an important consideration. The goal setting group had significantly higher engagement scores than the other two groups even though average goal setting attendance was less than in the other two groups. Goal setting participants completed more worksheets and therefore applied goal setting procedures more effectively in terms of swim meet performance than did participants in the self-talk group. Of note, it is unlikely that adolescents will have encountered the concepts of self-talk strategies outside of sport. Youth athletes are less likely to reflect on their inner speech, and this experience difference with this psychological skills training method may have reduced its relative effectiveness (Couture, 2002). As supported by Hatzigeorgiadis, Galanis, Zourbanos & Theodorakis (2014), self-talk interventions can show reduced effectiveness from a lack of prior self-talk training or understanding. By contrast, the goal setting strategies may not require prior training to be effective.

In the context of possible experience differences with aspects of these two methods, the relatively short intervention in our study of five weeks duration may have favored the goal setting group relative to the self-talk group. If young swimmers require frequent sessions to become fully familiar with new techniques, then introducing a new cognitive technique such as self-talk may be initially unsettling for them (Couture 2002). There are some further limitations to this study that should be noted. First, although the intervention allowed participants to self-select goals and personalize their self-talk statements, we did not monitor the content of the individual's strategies, making it difficult to know precisely what underlying mechanisms account for these findings. Second, there may be uncontrolled variability of the precise strategies used. Moreover, there was no post-evaluation of the

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participants' perceptions of the effectiveness of the psychological strategies used. Third, the attempt at matching the participants according to age and ability may not have reduced individual differences related to performance across the three conditions.

This study aimed to establish the impact of different motivational techniques on the performance of adolescent swimmers, in a competitive arena. Support was found for both self-talk and goal setting in improving swimming performance. Goal setting was shown to have the stronger effect on performance improvement which may be due to its usability and consistency with individuals previous experience on how to improve performance. Both goal setting and self talk may work by increasing motivation and commitment toward goals but the increased engagement with goal setting may facilitate further beneficial effects over self-talk. This effect may be attenuated by the relatively short duration of the psychological skills program (i.e., 5 weeks). Further research may wish to address the stability of the effect of these interventions across time in more longitudinal studies (e.g., Simeios, et. al, 2012). In particular it is unknown how lasting these effects would be after the psychological skills training is withdrawn. This is a question for future research using this population.

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