

# DEVELOPING PRE-PERFORMANCE ROUTINES FOR ACROBATIC GYMNASTICS: A CASE STUDY WITH A YOUTH TUMBLING GYMNAST

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## **Abstract**

*A mixed-method approach was used to examine the development and acquisition of a personalized pre-performance routine (PPR) by a male youth gymnast. The athlete completed the Test of Performance Strategies and participated in semi-structured interviews alongside video clips to examine PPR experience at pre and post intervention then at 6 months follow up. There was a perceived increase in the effective use of psychological skills post intervention. Moreover, the gymnast reported a consistent PPR prior to performance, demonstrating control and automaticity of his routine. The strategy used to develop the individual PPR and its potential use with young athletes more generally is discussed.*

**Keywords:** *pre-performance routines, mixed methodology, case study.*

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## **INTRODUCTION**

Pre-performance routines (PPR) are a sequence of motor and cognitive behaviors performed immediately before the execution of self-paced tasks (Cohn, 1990; Lidor & Mayan, 2005; Lidor & Singer, 2000). For an athlete, the general purpose of a PPR is to take them to an optimally aroused, confident and focused state which then enables control over cognitive activity and emotions before, during and immediately after performance (Lidor & Singer, 2000). The design of PPRs with athletes is influenced by the sport itself, the nature of the required task, the athlete's skill level and individual pre-performance preferences (Boutcher & Rotella, 1987; Cohn, 1990; Ravizza & Rotella, 1982; Singer, 1988, 2002; Taylor & Wilson, 2005).

Researchers have shown that to effectively use PPRs in sport, athletes

should acquire these techniques as early as possible during skill learning itself (LaRose, 1988; Lidor & Singer, 2000). Research has also shown that athletes need significant experience in their sport (i.e., indicative of a high training age) before using certain elements associated with PPRs as the acquisition of previous routines will enable them to incorporate further strategies, such as imagery techniques (Lidor & Mayan, 2005; Nevett & French, 1997). It has also been further suggested that novices are more likely to incorporate motor routines (e.g., physical rituals or mobilization of limbs) into their training before cognitive strategies (i.e., imagery and focus attention) because some experience is required to reduce the effect of information overload (Lidor & Mayan, 2005). However, Wrisberg and Anshel (1989) demonstrated a

significant result in performance efficacy with young basketball players (age: 10.2 – 12.4 years) by incorporating an arousal adjustment and imagery into a pre shot routine. Weiss (1991) also concluded cognitive strategies can be used with youth athletes and can have a positive impact when used with highly skilled young athletes. Relaxation techniques may also be used, but perhaps requires age appropriate adjustment for youth athletes in order to engage. For children and youth athletes imagery is a natural skill used in sport. According to Weiss (1991) imagery was reported by youth athletes in rehearsed skill sequences, competition strategies and in retention of newly acquired skills. Imagery exercises are therefore advocated for use with the assessment of intentional and motivational capabilities of youth athletes recommended as a stage to be conducted before imagery is developed (Callow & Roberts, 2010). In sports such as gymnastics athletes achieve expert performance when still young (i.e., have a low chronological age but high training age). Therefore, the athlete may have the experience but not the cognitive development required to implement PPR in their training program. In the present study, we examine the development and acquisition of a personalized PPR using a selection of cognitive strategies by a youth gymnast with a high training age but low chronological age.

Previous research examining the development and acquisition of a PPR by youth athletes is somewhat limited. An exception to this is Lidor and Mayan (2005; see also Lidor & Singer, 2000) who conducted a study with youth athletes. They examined the acquisition of motor and cognitive based PPRs in a group of sixty female novice volleyball players (mean aged 16.5 years). Participants were divided into three groups: motor preparatory routine, cognitive preparatory routine, and control (i.e., those who had no-motor or cognitive guidance) and followed three weeks of group based training focused on the serve. The motor routine was found to be more

effective for performing the serve more accurately compared to the cognitive routine. The researchers explained that “the (motor) routine provided them (athletes) with the feeling that they were in optimal control of the movement execution, thus increasing their self-confidence during the serving performances” (p. 359). The authors also suggested that in order to introduce cognitive routines with youth athletes, more experience was needed by the players in the skill (serve) to reduce information overload and implement the principles of cognitive strategies (Lidor & Mayan, 2001). Findings demonstrated that the developments of motor-based PPRs with youth athletes are possible, but the acquisition of cognitive-based PPRs is more difficult for these athletes.

However, according to Lidor and Mayan (2005) recommend sport psychologists should search for the “best” components of a preparatory routine that most fit the individual’s learning capabilities and skill level, which requires understanding of the individual characteristics to compose an efficient PPR. In order to decrease the instructional load placed on learners, they further suggested teaching a routine through which the emphasis is on motor elements and only then to add preparatory components that emerge from a cognitive-oriented routine. The authors themselves were unable to test these suggestions regarding individualized PPRs in their study as a group (as opposed to individual) instruction format was used. Tam and Losdale (2007) also made reference to consistency in PPR concluding that athletes should be encouraged to develop a consistent pattern of pre-performance behavior which their study found was associated with greater accuracy. Cotterill’s studies with golfers (2008, 2010) also suggests that future research should seek to explore the effectiveness of developing individually focused routines and their perceived impact upon preparation and performance. Although there are guidelines on how to conduct a PPR with beginners (Cohn, 1990) and young athletes (Lidor &

Singer, 2000), there is no practical research showing how effective the use of athlete capacities and sport nature together with cognitive strategies can be combined into a PPR.

A case study is an important preliminary step towards gathering such information and the present study's aim is to provide an in-depth understanding of the acquisition and use of PPRs in a youth athlete within real life context (Patton, 2002a) using quantitative and qualitative techniques. Subsequent findings could then be used to examine the training and development of PPRs in larger samples of youth athletes.

For the purposes of this study it was therefore proposed that the high training age of the study participant combined with the individualized program would result in an effective use of PPR linked with improvement in performance.

## METHODS

### *Participant*

The participant was a UK based 15 years old national grade male competitor from the discipline of acrobatic gymnastics (tumbling) selected by convenience (Bryan, 2008). The gymnast had a training age of five years and had been working with his current personal coach at the onset of the study for one year. He currently trained approx 12-15 hours per week with three hours each day. Informed consent was provided prior to participation and ethical approval was gained through the lead institution's Ethics Committee.

### *Design*

The study was divided into five phases (see Table 1). The first phase (needs analysis) incorporated the Test of Performance Strategies (TOPS) (Thomas et al., 1999) to examine the participant's use of specific psychological skills; video recording of one training session (2.5 hours) to capture the participant's experiences and help the recall during interview and a semi-structured interview. The aim of the

interview was to explore further and highlight examples of the psychological skills that the gymnast currently used in training and competition and explore how effective they were in these environments. The second phase (intervention development) was the development of a personalized PPR program. The third phase (intervention phase) was the implementation of the PPR program. The fourth phase (post intervention/ evaluation) was an evaluation of the PPR program effects by applying the instruments used in the first phase. Finally, the fifth phase (6 month follow-up/retention phase) involved re-administering the questionnaire and a follow up interview. The research used a mixed methodology that sought to incorporate both quantitative and qualitative approaches with quantitative methods (Gratton & Jones, 2004) used to inform the qualitative data collection.

### *Procedures and Measures*

Prior to contact with the gymnast the participant was informed in writing of the purpose of the study, the study protocol and ethical issues relating to the use of data and anonymity. On receipt of participant, parental and personal coach consent a convenient time and day was set to video record a training session. A full and typical training session was video recorded with digital video cameras (Canon 3CCD Digital Video Camcorder XM2 PAL, Tokyo, Japan). Video recording clips were created using editing software (Sportscode Gamebreaker, Sportstec, UK Limited). The video clips were edited into a short sequence of events that would be used during the interviews with the gymnast. Here, six video clips were shown to the gymnast depicting three accurately executed skill 'runs' and three that fell short of this criteria with major judging associated errors. The gymnast's personal coach advised on the selection of these video clips and the aim was to assist comparison between the PPRs and recall these experiences.

Table 1. *Project Phases*

Phase	1	2	3	4	5
Timescale	April	April	May – July	July	January
Procedure	<i>Needs analysis</i>	<i>Intervention development</i>	<i>Intervention phase</i>	<i>Post intervention/ evaluation</i>	<i>6 month follow-up/retention phase</i>
Rational	Exploration of psychological strategies employed by the gymnast.	Based on information revealed by TOPS (Thomas et al., 1999) and interview. Respect gymnast ways to learn. Use strategies that align with needs analysis and sport demands.	Implement a personalized PPR program over 7 weeks (4 sessions). PPR content: Imagery, Broad attention, narrow attention and cue word.	Evaluate use of personalized PPR program. Evaluate the effect of the procedure as a new methodology.	Evaluate retention and use of skills of the personalized PPR program after six months.
Design	Quantitative Qualitative			Quantitative Qualitative	Quantitative Qualitative
Measure	TOPS  Video recording  Semi-structured interviews (4) (+ clips)  Familiarization of protocol for gymnast Researcher observation of training and familiarization with equipment	Representative of PPR.  New PPR (Consult – efficiency, Refinement).	Gymnast's research dairy.  Weekly feedbacks and observation.	TOPS  Video recording  Semi- structured Interview (+ clips)  Gymnast's dairy	TOPS  Semi- structured Interview
Analysis	<b>TOPS:</b> Score representing the gymnasts use of psychological strategies in training and competition.  <b>Video recording</b> = clip editing  <b>Interview</b> = Verbatim transcription/ pen profiles	Physical rituals Gaze Mental strategies		<b>TOPS:</b> Score representing the gymnasts use of psychological skill and strategy training and competition. <b>Video recording</b> = clip editing <b>Interview</b> = Verbatim transcription/ pen profiles/ quotes to illustrate the research <b>Gymnast's research diary</b> = representative verbatim quotes to illustrate the research	<b>TOPS:</b> Score of the gymnast use of psychological skill and strategy training and competition.  <b>Interview</b> = Verbatim transcription/ pen profiles/ verbatim quotes to illustrate the research

The TOPS questionnaire was used to assess the participant's current use of specific psychological skills. Given the participants age, the questionnaire was administered co-operatively with author one to ensure clarity in understanding and completion. The instrument contains 64 items which describe the use of psychological strategies in a situation that athletes might encounter during training or competitions together with how frequently they actually use the skills. The mental skills constructs are those of goal setting, emotional control, automaticity, relaxation, activation, self-talk, imagery and attentional control. The competition section of the questionnaire includes the same mental skills with the exception of the item "attentional control" which is replaced by "negative thinking". The participant rated the frequency of his psychological skills usage on a five-point Likert scale anchored at one (never) and five (always). The maximum raw score on each subscale session of TOPS is twenty and a high score indicates a greater use of mental skills in the training or competition environment. Reliability coefficients for this test have been reported to range from 0.86 to 0.93 (Thomas et al., 1999). Reviewers have also agreed on the validity of the instrument's content (Goudas, Kontou, & Theodorakis, 2006; Harwood, Cumming, & Fletcher, 2004; Lane, Harwood, Terry, & Karageorghis, 2004).

Following completion of the TOPS, four semi-structured interviews were conducted to expand on responses within the questionnaire in order to gain in-depth information and understanding of the psychological strategies and other elements (i.e. physical rituals) used by the gymnast before his performance. Following procedures successfully adopted by other authors (Ravizza & Rotella, 1982) the type of questions incorporated into the guide and structure were developed through discussions with author three who was experienced in sport psychology consultancy with junior athletes and coach of elite artistic gymnasts.

The interviewer (author one), had previous experience in qualitative research and experience as a participant in artistic gymnastics, was trained to perform the interview. Prior to data collection, a familiarization session was conducted including the use of video and enable the interviewer to practice the interview/video combined technique. The interview structure emerged from the responses revealed by the TOPS scores and the video clips. During each interview the participant was asked to respond to the questions based on his current use of preparation strategies in training and competitions while watching the clips from the laptop to stimulate recall analysis (Gardin, 2010; Nicholls et al., 2006). The interviews lasted on average of 36 minutes each, were conducted over a period of three weeks, were taped recorded and transcribed verbatim for the purpose of data verification (Lincoln & Guba, 1985).

The second phase (intervention development) of the program focused on the development of a personalized PPR for the gymnast using information revealed by the TOPS and interviews. This was designed by drafting and re-drafting a representative PPR, identifying strategies for the gymnast taking into account personal characteristics and nature of the sport (i.e., self-paced, speed). The analyses of the first phase (needs analysis) revealed that the gymnast was already engaged in a highly consistent PPR characterized by physical ritually based movements however mentally was only using imagery as part of this routine. The gymnast was experiencing debilitating symptoms associated with negative thoughts while preparing to perform in both competition and training.

Additional information revealed by the questionnaire, such as the consistent use of imagery and the presence of negative thoughts was taken into account to develop a personalized PPR for the gymnast (see Table 2).

The interviews suggested that the gymnast was having difficulties in focusing his attention (i.e. where to locate his gaze during his preparation to perform) and

eliminating negative elements and distractions to think on the tumbling sequence or 'run'. The psychological strategies utilized in the PPR program were thus a sequence of imagery (an internal image of his 'run' characterized by the sensations felt and the images seen), broad attentional focus (associated with end of the track) shifting to narrow (linked with initial hand placement on the track) and an energizing cue word (i.e., "Come on!"). The physical components of the routine remained the same (e.g., arms position extending in front of the body and dry his hands 3 times).

Table 2. Measures obtained by the application of the TOPS (Phase one).

<i>Psychological skills and strategies</i>	<b>Practice</b>	<b>Competition</b>
	Needs analysis phase 1	Needs analysis phase 1
Activation	9	9
Relaxation	4	4
Imagery	14	11
Goal Setting	18	11
Self Talk	6	7
Automaticity	8	10
Emotional Control	12	12
Negative Thinking/ Attentional Control	15	20

Note. Maximum score for each subscale session = 20.

Once the PPR training program was established, the third phase was implemented over a seven week period. The implementation of the program was conducted by author one. To introduce the PPR and assist the gymnast on its integration into training, meetings between author one and the gymnast were held each week for approximately 30 minutes each in the first four weeks. Each PPR strategy (imagery, attention and cue word) was trained separately in each of the first four weeks followed by the whole PPR training in the remaining weeks. The final three weeks were monitored by the author one via telephone and training observation in order

to both support the gymnast in his PPR training and gain feedback from both the gymnast and coach. A 'home task' (using clips from the previous video recorded training session and the PPR training) was also set for the gymnast to undertake at home in order to complement his PPR practice. A diary was completed by the gymnast to record his experiences and reflections during the investigation period. He was requested to date all entries and write in his own style (words) following a guided structure format: description of the activity; feelings; evaluation (what was positive and negative); conclusion (suggestions). The diary was used during the Intervention phase meetings and final interview in order to facilitate the gymnast to reflect and recall his PPR training experience.

The fourth phase (post intervention/evaluation) was conducted to record the training, complete the TOPS and conduct a final interview for evaluation immediately after intervention. This phase was conducted by the same researcher following the procedures described in the first phase. Finally, the retention phase was conducted after six months following a competitive phase and incorporated the completing again the questionnaire and an interview to evaluate the retention of skills and application of the routine following the removal of support/intervention by author one.

#### *Data Analysis*

Descriptive statistics were calculated for the TOPS to explore the use of psychological skills by the gymnast. Firstly, the raw score was calculated in order to demonstrate the psychological skills used by the gymnast. Secondly, the increased change of the score was calculated to present the comparison between post-intervention and retention phase of the questionnaire following the sequence present in the table one.

In the current study, several methods were used to enhance the trustworthiness of the data proposed by Lincoln and Guba

(1985). The interview guide, which was based on the findings from the TOPS and video clips, provided a deductive analytic framework. Thereafter, analysis of the interview data involved moving back and forth between deductive and inductive approaches. This movement allowed for both the verification of deductively driven research question and the exploration of inductive findings that emerged from the multiple interviews (Patton, 2002b).

Pen profiles were firstly constructed from the transcripts of phases fourth and fifth. These profiles provide a composite of key themes from the data at post intervention/evaluation and retention phases (Ridgers, Knowles, & Sayers, 2012; Mackintosh, Knowles, Ridgers & Fairclough, 2011). Verbatim quotations were used directly from the transcripts in order to expand the pen profiles. These extracted quotes, or a statement made by the subject, were self definable and self delimiting in the expression of a single recognizable aspect of the subjects' experience. The consultation process took the form of a presentation by first authors in which the pen profiles and verbatim quotations were demonstrated to the third author an experienced researcher familiar with qualitative research techniques. The researcher critically questioned the analysis then interrogated the data independently tracking the process in reverse from the pen profiles to the transcript. A further meeting allowed the researchers to offer alternative interpretations of the text or profile. This process continued until acceptable consensus had been reached.

Credibility and transferability (qualitative equivalent of internal and external validity respectively) were demonstrated through verbatim transcription of data and inter-researcher consensus procedures. Dependability (qualitative equivalent of reliability) was demonstrated through the comparison of pen profiles with verbatim citations and triangular consensus processes (Knowles, 2009). The qualitative themes and quantitative data subsequently formed the basis of the discussion.

Quotations from the interviews and athlete's diary were selected to illustrate the research phases (Faulkner & Biddle, 2004).

## RESULTS

The aim of the research was to provide an understanding of the acquisition and use of PPRs in a youth gymnast. Scores for post- intervention and retention phases of the TOPS are provided in table three and revealed that the gymnast maintained a consistent use of the psychological strategies during training. However, in competition he had a profound increase (100%) in using relaxation and a decrease (47%) in negative thoughts, corroborating with interview based data. It should also be noted that the gymnast did not have competitions during the implementation of the program due to unforeseen circumstances however data collected after six months (retention phase) was completed following a competitive phase within his annual program. The analysis of the interview responses yielded eight raw data themes in the post- intervention (Figure 1) and five key themes in the retention phase (Figure 2) that suggested perceived effectiveness of the PPR according to the gymnast. The current authors have reported the interview results based on a selection of direct quotations to illustrate the variety of responses obtained. This offers a considerable advantage by allowing the gymnasts "voice" to be heard and enabling the reader to gain understanding as to the experiences and issues involved via the participants' words.

### *PPR program development*

The PPR was developed in accordance with the current pre-performance routine of the gymnast which was characterized with imagery techniques and noted a persistent appearance of negative thought. With regard to the latter the gymnast described himself as despondent and perceived he was viewed negatively by others (i.e., coach, previous coach, judges, and competitors). The design of the routine considered sport

characteristics such as power and explosiveness. A sequence of specific cognitive strategies was incorporated into the PPR to assist the gymnast in coping with uncontrollable situations immediately prior to his performance. Even though relaxation appeared a critical issue for the gymnast, it was not appropriate to incorporate relaxation techniques into the routine per se as he perceived explosion and activation

were essential characteristics to complete the sequence of complex skills. The gymnast also requested to use anxiety to assist him during perceived pressure situations. As a result a cue word was incorporated in his PPR firstly to help the gymnast to avoid negative distractions and secondly, to permit him to achieve an optimal right arousal level.

Table 3. Measures obtained by the application of the TOPS at Post intervention/ evaluation (phase 4) and 6 month follow-up/retention phase (phase 5).

<i>Psychological skills and strategies</i>	Practice			Competition		
	Needs analysis	Post	Percentage Increased (%)	Needs analysis	Post	Percentage Increased or Difference (%)
Activation	12	12	0	12	14	16
Relaxation	6	7	17	7	14	100
Imagery	18	18	0	18	20	11
Goal Setting	18	20	11	18	18	0
Self Talk	13	13	0	14	11	-21
Automaticity	11	11	0	10	9	-10
Emotional Control	15	16	7	15	16	7
Negative Thoughts/ Attentional Control	16	17	6	17	9	-47

Note. Maximum score for each subscale session = 20.

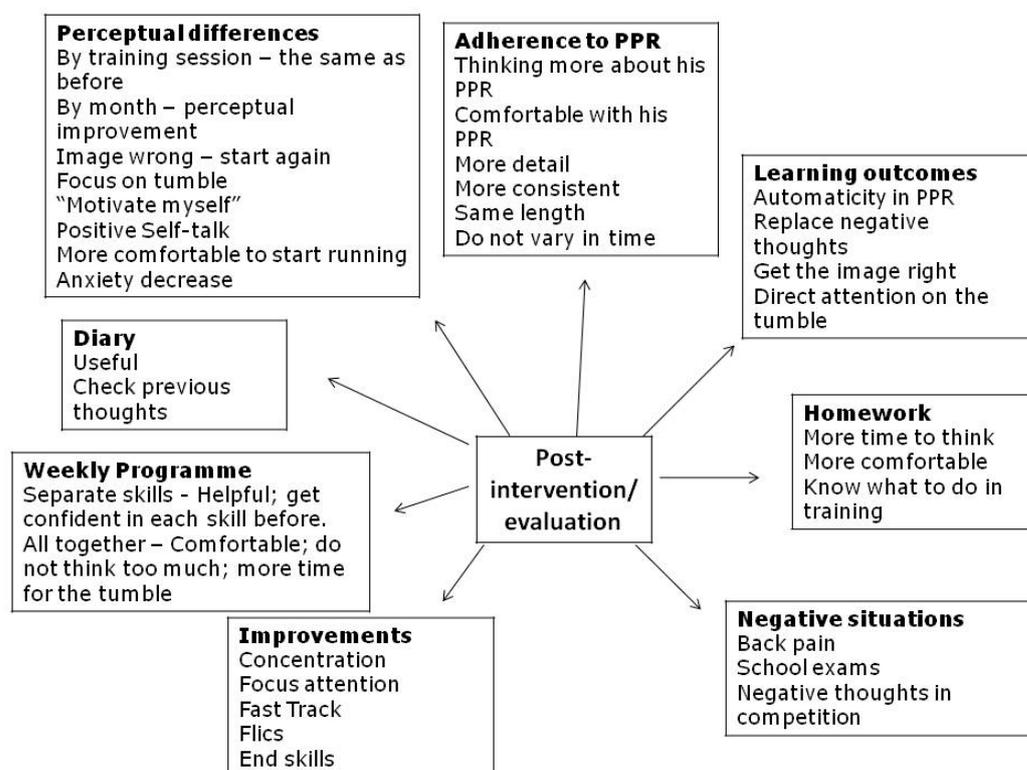


Figure 1. Pen profiles from post-intervention/evaluation.

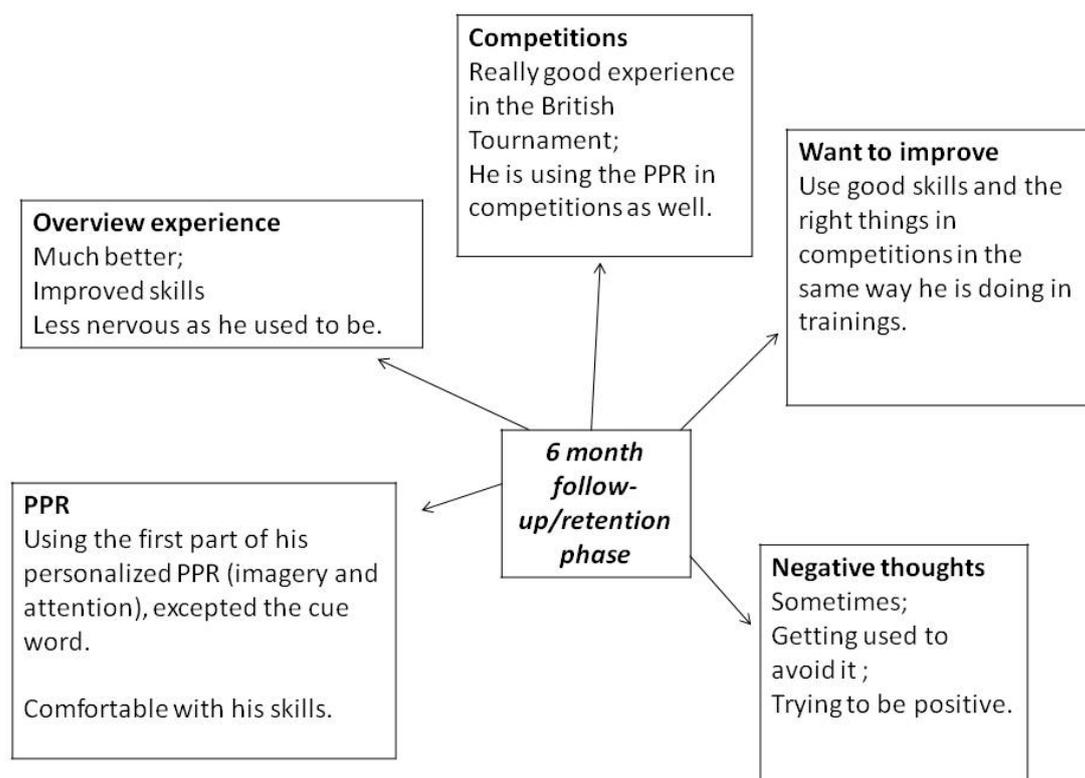


Figure 2. Pen profiles from 6 month follow-up/retention phase.

#### *Individual skill training*

The gymnast familiarized himself with each PPR element before progressing towards a comprehensive routine comprising of several elements in sequence demonstrating independent control and automaticity of these skills. He stated:

Well, because the way we did, like we did a bit and then we trained, so I got to be confident on that; and we did the second part and got more confident and then when we put all together, I did not have to think about it too much. I could think about my run. But if I had put all together straight away I would have thought about that and not about my run. (Post-intervention)

#### *Outcomes of the PPR program*

A PPR induced optimum state was achieved through a gradual process and the gymnast, with time, learned how to obtain this state prior to performance. It was assumed that the PPR provided him with the feeling that he was in control of movements increasing thus, his self-confidence and

performance at the time of post-intervention. As an illustration, the gymnast commented:

It was different, because I do not really like to say words before my runs, and at home I do not usually think about it before I go to sleep. So it was different, but was not wrong in doing it and all seems to be working, because I am getting better. (Post-intervention)

I think my PPR are more consistent. I think it is making my tumble more consistent. I think about PPR and it makes me a little more confident that I will do it, because if I think about my run in my head and I have done it in my head, so I just need to do it and relay. So it is kind of motivating me. (Post-intervention)

Of particular importance here are the statements that demonstrate how the strategy was developed through the 'home task' and application made within training:

I took my video; watched it; then turned it off and imagined different routines. I felt as if I was actually in the gym. (Diary)

Before, I never used to say things to myself. And now I do think about things to say to motivate me. (Post-intervention)

When exploring the impact of the PPR program six months after the initial evaluation including training and competitive situations, the routine had, at this point, changed in composition for example he had eliminated the cue word, but the routine was regularly used by the gymnast in a comfortable and automatic manner. The gymnast stated:

I do not think about it anymore. I use it (PPR), but I do not notice that I am using it. So, it is like I am using it, but I do not think about it. I think about the routine and everything, but I do not think that I am thinking about it, if you know what I mean. It is natural. (Retention phase)

Clearly the PPR may have had a greater influence on the gymnast's preparation in general during training and in the competitive environment and this was supported by comments about his difficulties related to negative thought:

I think sometimes, but I am getting used to avoid it and just forget it. I do not think too much. Not really. I am trying to be positive. (Retention phase)

Although young in chronological age, the participant was experienced in his sport (i.e., a possessed a high training age) and this may be necessary to facilitate acquisition of a PPR. According to the gymnast in this study PPR fostered improvement of psychological skills and a perceived decrease in the anxiety. Allowing for the uncontrollable environment, the psychological strategies learned by the gymnast proved to be effective as he stated:

It (performance) is much better; because in the last competitions I have not been nervous with anything. I have not been that nervous and it is very good. (Retention phase)

I am happy and not scared like I used to be. (Retention phase)

## DISCUSSION

The aim of this study was to develop and implement a personalized PPR training program for a youth gymnast and evaluate, via the gymnast's own perceptions, the impact of the routine on his training and performance. The present study is perhaps the first to explore and consider in detail each individual psychological skill independently before combining into a pre performance 'routine'. It was anticipated that the intervention would facilitate the experienced youth gymnast to develop and then incorporate a PPR in both training and competition. Indeed, the gymnast reported improvement on his preparation and performance in training and competition as a result of this program.

The needs analysis and intervention development phases of the research allowed assessment of the gymnast's personal and sport characteristics which in turn informed a more appropriate analysis of critical elements in his current routines and, hence, the option to maintain or replace it (Boutcher & Rotella, 1987). Results from previous research indicated that watching video recordings/clips of performances and reflecting back on positive experiences could be used as a mental preparation technique (Gould, Finch, & Jackson, 1993). However, the present study used video clips in combination with interview to aid recall, capture the attention of the young gymnast and facilitate conversation with the researcher to explore experiences.

The PPR developed had the intention to buffer the negative thoughts and focus the gymnast on the task, i.e. tumble run (Cohn, 1990; Cohn, Rottela, & Lloyd, 1990; Mallett & Hanrahan, 1997; Mesagno, Marchant, & Morris, 2008). Unlike previous research (Foster et al., 2006; Lidor & Mayan, 2005; Wrisberg & Anshel, 1989), the PPR in this study was implemented by having each skill trained separately before incorporating into a routine. The results demonstrate that perhaps this strategy could be effective in enabling a young athlete to have control and automaticity of their

routines and thus focus on the current task (Lidor & Singer, 2000; Ravizza & Rotella, 1982).

The process of learning and applying new psychological skills requires time and persistence by the sport psychology consultant and the athlete. The present findings demonstrated a consistent effort by the gymnast to the elements learned in order. The findings also reinforced the contentions of Wrisberg & Anshel (1989) who stated that young athletes are particularly motivated by opportunities that promote skill development and young athletes are able to learn and use cognitive techniques to enhance their performances (LaRose, 1988; Lidor & Singer, 2000; Weiss, 1991). Nevett & French (1997) also stated that when children possess sufficient sport knowledge, they can produce planning strategies.

With regard to the efficacy of the PPR for a young athlete, the results are clearly satisfactory. The gymnast perceived improvement in both preparation and performance (in training and competition) and these were consistently supported by his comments on the interviews at the post-intervention and retention phases. This suggests that following conclusion of the project the gymnast continued to refine and develop his skills further though without specific guidance via contact with the researchers. Concentration, consistency in preparing to execute the task and security in following the complexity of his training were also reported as improvements by the gymnast (and supported by his coach). At an applied level, the findings presented here support and further enhance Cohn's (1990) suggestion that PPRs should be structured for each individual within his or her specific sport. A variety of individual preferences should be considered when formulating PPR (Lidor & Mayan, 2005). These preferences may include perceptual learning styles, general anxiety or arousal levels, and pacing of the routines all of which are important to facilitate adherence with the program and a more effective acquisition of the new routine. Researchers have previously

suggested that PPRs, especially cognitive PPRs, may be ineffective with youth athletes (Lidor & Mayan, 2005; Nevett & French, 1997). In the present study the participant aligns with chronological age against Lidor and Mayan (2005) participants (mean age: 16.5) and we concur with Lidor and Mayan (2005), that experience (i.e., a high training age and/or exposure to psychological skills training) may moderate the effect of a young chronological age and thus add weight to the argument that youth athletes can indeed benefit from the use of PPRs.

Unforeseen issues linked with injuries occurred during the PPR implementation phase, however, the PPR program also appeared to be effective in these circumstances too. It is known that gymnasts have a high incidence of injuries (Hoshi, Pastre, Vanderlei, Júnior, & Bastos, 2008; Nunomura, 2002) and persist in training even when suffering from pain and injuries. In this study, the gymnast had a moderate back pain but maintained his physical training in a more cautious manner. However, the gymnast was able to focus his PPR "home task" to execute during his spare time. This was welcomed and proved to have an important impact in the gymnast's PPR training as he stated:

I think it probably did help. Because I get to think about it more and it makes me more comfortable in the run, so when I come to the training I know what to do. (Post-intervention)

When interpreting the findings of the present study it is important to acknowledge that the case study based PPR design should be viewed with caution. Further research, though costly in time and resources, may indeed assess the viability of this strategy and refine its applicability. The aim to replicate with a larger number of young participants from different sports and skills will indicate the generalizability of such an approach. Further phases of retention/follow up would also be indicated if there is a temporal effect to pre performance routine associated with proximity to initial psychological skills training for PPR's.

Linked to this, further work may also explore the development and refinement of skills linked with learning and performance of more advanced skills and the PPR's effectiveness as competition demands change.

In conclusion, the case study provide a detailed insight into a youth gymnast experience with the implementation of independent psychological skill training before combining into a 'routine'. The intervention was successful in creating an effective PPR as perceived by the gymnast and thus, contributing to a consistent preparation to perform and, consequently, the enhancement of performance in both practice and competition. In this sense, PPR development requires an individual approach with regard to design and support and perhaps warrants such investment in order to be successful. The implementation of the routine was a strength of the program as the gymnast consistently developed and then combined skills and so achieved a more automatic and comfortable program integration which had positive reflections in the retention phase. Indeed, this study has perhaps stimulated a need for further exploration of PPR with young athletes. In doing so, it is postulated that coaches, sport psychologists and organizations will become better informed to design, implement and manage appropriate PPR interventions for elite youth athletes.

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