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Pre-Performance Routines, Accuracy in Athletic Performance and Self-Control

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The aim of this study is to define the relationship between Pre-Performance Routine (PPR), accuracy of athletic performance and self-control. The research sample consisted of 240 high school students randomly assigned one of three groups: a motor-cognitive preparedness group (MMPPR); a motor preparedness group (MPPR); and a control group who participated in six instructional sessions. The first and the second experimental groups were shown videos of how elite athletes prepare themselves for a golf putt, a tennis serve, a volleyball serve and a basketball free throw. Members of the control group were told to concentrate on the technique used in golf putts, tennis serves, volleyball serves and basketball free throws. Thereafter the participants performed golf putts, tennis serves, volleyball serves and basketball free throws and the accuracy of these actions were measured. In addition, the participants were required to respond to a self-control questionnaire before and after the intervention. Overall research findings concluded that members of the MMPPR group were more accurate in their athletic performance than members of the MPPR group who in turn attained a higher level of accuracy in their athletic performance than members of the control group.

Keywords: *accuracy of performance, motor-cognitive preparedness, motor preparedness, pre-performance routine, self-control*

Introduction

Many studies in sport psychology assess athletes' use of Pre-Performance Routines (PPR) to mentally and physically prepare themselves immediately prior to the execution of an athletic skill (Bell et al. 2010, Kessel 2010, Lidor and Mayan 2005, Velentzas et al. 2011).

In particular, PPR can be used before performing motor skills undertaken in a relatively stable environment and for which the athlete may choose when to begin (within a time sequence determined by the rules of the game). Golf putts, serves in tennis and volleyball, and penalty free throws in basketball are examples of closed self-paced motor skills. Researchers have investigated how various techniques of mental and motor PPR affect athletes' attitudes about the performance and their accuracy in implementing the skill.

Singer (1986) was one of the first researchers to propose that systematic integration of routine movement with appropriate mental preparation is

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essential in helping athletes concentrate and reach automaticity in the task (Lidor 2009, Singer 2002). The literature presents two main theories that explain the importance of Pre-Performance Routine on the closed self-paced motor skill: (a) the theory of the body's condition of preparedness - according to this theory, a decrease in the impact of warming up prior to performance of the motor skills causes an undermining of the body's condition of preparedness. Sometimes a long period of time passes between warm-up and the actual performance of the skill itself. For instance, in the golf game, the players have long periods of rest between shots, which makes it harder for them to preserve physiological and cognitive alertness. Therefore, performing the Pre-Performance Routine prior to the shot can help the player to achieve the required physiological and cognitive alertness, despite the enforced breaks during the game (Cohn 1990); (b) the mental rehearsal theory - according to this theory the Pre-Performance Routine can serve as a suitable framework for implementing cognitive procedures such as imagery, attention and self-feedback. Mental rehearsal is a process that takes place with the help of imagining performance of the skill (Cohn 1990). Subsequent studies evaluated techniques of psychological preparation, clarified guidelines for their use, and developed theoretical models regarding preparation for performance of athletic skills (Taylor 1995, Wrisberg and Anshel 1989). Such assessments of PPR are usually based on self-reports, interviews, observations or case studies (Schack et al. 2005).

Subsequent studies have verified that PPRs help the athlete plan more effectively and implement planned activities, to feel better prepared to perform, to deal more effectively with stress and anxiety before and during the performance, and to focus attention before, during and after execution of the task (Coelho et al. 2014, Gencer 2010, Kanthack et al. 2014, Lidor 1999). PPRs allow the athlete to effectively plan performance through preparation, focusing of attention, and assessment (Lidor and Singer 2003).

The amount of time dedicated to PPR has been found to be important. A number of descriptive and interventional studies that examined the effectiveness of motor and mental PPR before putting in golf (Bell et al. 2010, Lidor and Mayan 2005) found that athletes who dedicate a consistent amount of time to PPR are more likely to succeed than those who deviate from their preparation routine. Combining motor PPR with mental PPR techniques such as imagery has been found to be particularly effective. When consistently used in a structured way, imagery can have positive practical implications for learning motor skills and enhance athletes' performance (Clowes and Knowles 2013, Saimpont et al. 2013). Further, imagery may reduce stress and anxiety, which in turn may increase accuracy (Coelho et al. 2014). Studies conducted among novice athletes in several sports indicated that athletes who learned both motor and mental PPR performed more accurately during the skill-acquisition phase and had better concentration than those using only motor PPR or control groups that used neither routines (Ohayon 2009, Kessel 2010, Velentzas et al. 2011, Coelho et al. 2014). This holds true even for young children (aged 8); those who studied and practiced mental imagery during training attained

increased control capability and improved kinesthetic ability (Taktek et al. 2008, Gabbard et al. 2008).

One study also suggests that athletes who enhance their self-control through exercise and preparation perform more accurately in athletic tasks (Woodman et al. 2010). Self-control is the process by which an individual deliberately understands and voluntarily modulates behavior so as to achieve goals (Goldfried and Merbaum 1973). Raviv and Rothstein (1995) argue that an individual with a high level of self-control can regulate internal processes and manage emotions such as anxiety, fear, and pain, as well as disturbing thoughts and concerns. Through self-control an individual assumes responsibility for tasks and is better able to tolerate discomfort, psychological and physical stress and delayed gratification in order to achieve results. Wulf et al. (2001) assert that self-control encourages learners to be actively involved in an in-depth learning process. Furthermore, disciplined learners are more likely to experiment with different strategies as compared to peers without self-control, and this experimentation may ultimately lead to improved learning and performance.

Accordingly, the present research set two aims. The first was to examine the relationship between pre-performance routines which use only motor techniques (MPPR) and those which combine mental and motor techniques (MMPPR) on the one hand and accuracy in performance of athletic tasks on the other. The second aim was to describe the relationship between PPRs and the personality trait of self-control.

Thus the current study examined the impact of physical and psychological components of PPR on the accuracy of novice athletes in performing athletic tasks. It was hypothesized that novice athletes who learn how to combine motor and mental pre-performance routines will perform athletic tasks more accurately and will maintain enhanced self-control when compared with their counterparts instructed in the use of motor PPRs or with those not instructed in the use of any PPRs whatsoever.

Method

Participants

Two hundred and forty high school students (120 male and 120 female with mean age of 16 years and 1 month) who participated as novice athletes in physical education classes at public high schools in central Israel were randomly selected to participate in this study. After the initial training session students were divided into three research groups, namely MMPPR, MPPR and Control groups. Each group consisted of 20 participants of whom 10 were male and 10 female (see section on Procedure). Participants were not provided with any information regarding the goals of the study. Information provided by their physical education teachers ensured that participants had adequate athletic ability to learn the mental and motor pre-performance routines and to apply

them before performing athletic tasks. Table 1 shows the distribution of participants into the different research groups.

Table 1. *Description of the Distribution of Participants in the Study*

Research Group	N - Participants	N - Males	N - Females	Age
Golf - MMPPR	20	10	10	16.3
Golf - MPPR	20	10	10	16.1
Golf - Control	20	10	10	15.9
Tennis - MMPPR	20	10	10	16.0
Tennis - MPPR	20	10	10	15.9
Tennis - Control	20	10	10	16.0
Volleyball - MMPPR	20	10	10	16.1
Volleyball - MPPR	20	10	10	16.5
Volleyball - Control	20	10	10	16.0
Basketball - MMPPR	20	10	10	16.2
Basketball - MPPR	20	10	10	15.9
Basketball - Control	20	10	10	16.0

Source: Authors' estimations.

Questionnaire

An adapted version of Rosenbaum's (1980) Self-Control Scale (SCS) was the research questionnaire administered to the participants in the present study.

The original questionnaire is Likert type six point scale and included 36 items with Cronbach α reliability coefficients, derived from use in different research studies, that ranged between α=0.78 – α=0.84. The questionnaire was adapted for use in the present study and loaded on a general factor of self-control with a Cronbach alpha coefficient of α=0.79. Following are three examples of questionnaire items: "Before undertaking an action I convince myself that I am in full control of what I am about to perform"; "I always think about previous success in the performance of a particular action before repeating performance of the same action"; "I dismiss from my mind any thought that may interfere with the action I am about to perform".

Dependent Variables

Two dependent variables were measured: (1) accuracy of athletic performance in one of four sports, namely one of golf, tennis, volleyball or basketball; and (2) level of self-control as perceived by novice athletes while performing the particular athletic tasks required in the study.

Procedure

The research study was conducted in six sessions over the course of five weeks. During the first session participants completed the Self-Control Scale. Thereafter, in the second session, participants were then randomly assigned to one of four sports and were instructed to demonstrate two skills as a pre-test.

For golf the skills were a "hockey stick" swing and a putt; for tennis and volleyball the skills were throwing the ball shoulder-height at a wall and serving the ball; for basketball the skills were shooting the ball at the basket and taking a penalty free-throw. Based on their performances in the pre-test, three research groups with similar mean levels of athletic skills were created with similar numbers of male and female students assigned to the groups as follows: (a) the first research group whose members were instructed in the techniques and skills related to the athletic performances they were to undertake as well as in both mental and motor preparation routines (MMPPR); (b) the second research group whose members were instructed in the techniques and skills related to the athletic performances to be undertaken as well as in motor preparation routines (MPPR); and (c) a control group whose members were instructed only in athletic techniques and skills related to the athletic performances that they were to undertake with no reference made to preparation routines.

Member of the research groups then participated in the third, fourth and fifth sessions in which they continued to be instructed in the techniques and skills necessary for them to perform the particular athletic tasks required in the study with members of the MMPPR research group additionally viewing PPR videos of how elite athletes prepare themselves both from the mental and motor points of view for a golf putt, a tennis serve, a volleyball serve and a basketball free throw. Members of the MPPR research group were trained in techniques and skills necessary to perform the athletic tasks required from them. In addition they viewed PPR videos of the way elite athletes concentrate on motor preparation for a golf putt, a tennis serve, a volleyball serve and a basketball free throw. Members of the control group were instructed in skills and techniques related to the athletic tasks that lay ahead of them but were in no way exposed to videos of any PPRs whatsoever. In these sessions the members of the three groups then performed the different athletic tasks they were required to undertake in light of the different preparations and training they experienced.

In the sixth session members of the three groups were instructed to carry out the particular athletic tasks that they were assigned to perform with the highest level of accuracy they could attain. Standardized accuracy of performance was measured according to the regimen set out in Table 2. In addition, at the end of the sixth session the Self-Control Scale was administered once again to all participants in the research study.

Table 2. *Activities Performed in Six Research Sessions*

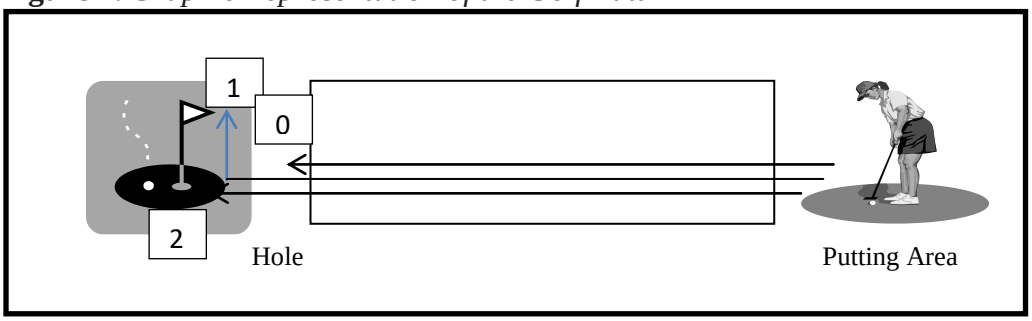
	Control group	MPPR	MMPPR
Session 1	Administration of Self-Control Scale	Administration of Self-Control Scale	Administration of Self-Control Scale
Session 2	Athletic skills pre-test and assignment to groups	Athletic skills pre-test and assignment to groups	Athletic skills pre-test and assignment to groups
Session 3	Instruction in technical principles of athletic task	Instruction in technical principles of athletic task and motor PPR techniques	Instruction in technical principles of athletic task and motor and mental PPR techniques
Session 4	Performance of athletic task after additional instruction	Performance of athletic task using motor preparation routine, without additional instruction	Performance of athletic task using mental and motor preparation routine, without additional instruction
Session 5	Performance of athletic task after additional instruction	Performance of athletic task after additional instruction, using motor preparation routine	Performance of athletic task after additional instruction, using motor and mental preparation routine
Session 6	Performance of measured athletic task Administration of Self-Control Scale	Performance of measured athletic task Administration of Self-Control Scale	Performance of measured athletic task Administration of Self-Control Scale

Source: Authors' estimations.

Athletic Tasks in Golf, Tennis, Volleyball and Basketball

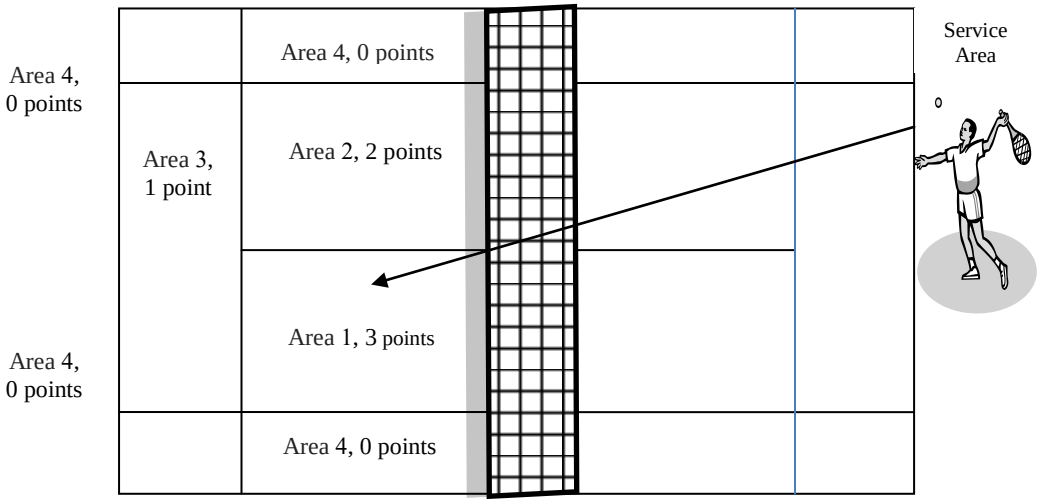
In golf participants' performance was measured by allocating 3 points to a putt that was sunk in the hole of a putting green, 2 point to a putt that hit the hole but was not sunk, 1 point was allocated to a putt that neither hit the hole nor was it sunk in the hole but remained near the green and 0 points were allocated to a put that neither hit the hole or was sunk and also rolled away from the hole (Figure 1).

Figure 1. *Graphic Representation of the Golf Putt*



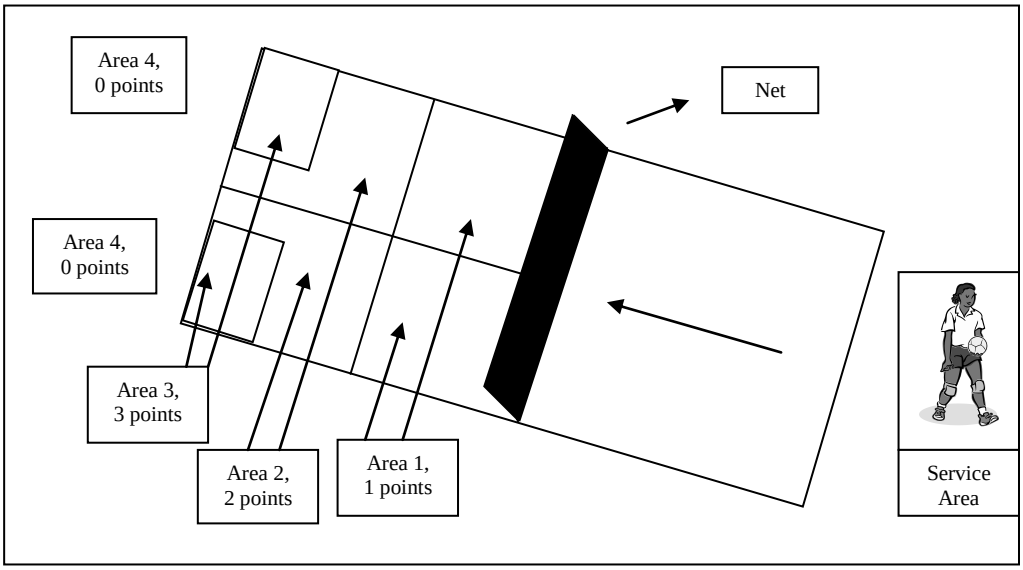
In tennis participants' accuracy of performance was measured by the allocation of 3 points to a service ball that landed in area 1, 2 points were allocated a service ball that landed in area 2, 1 point was allocated to a service ball that landed in area 3 and 0 points were allocated to a service ball that landed in area 4 or if the ball hit the net (Figure 2).

Figure 2. *Graphic Representation of the Tennis Serve*



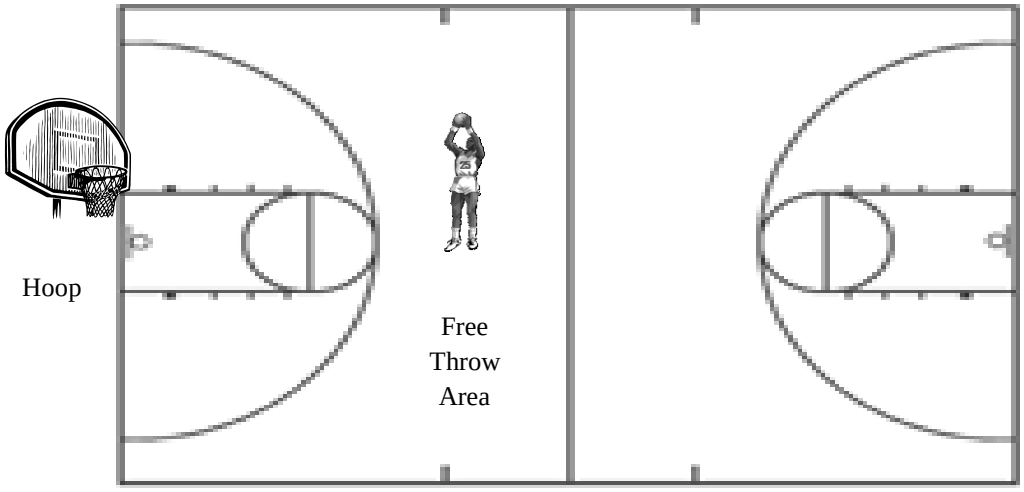
In volleyball participants' accuracy of performance was measured by the allocation of 3 points to a serve that landed in Area 1, 2 points were allocated to a serve that landed in Area 2, 1 point was allocated to a serve that landed in Area 3 and 0 points were awarded to a shot that landed in Area 4 or that hit the net (Figure 3).

Figure 3. *Graphic Representation of the Volleyball Serve*



In basketball participants' accuracy of performance was measured by the allocation of 3 points to a free throw that landed in the basket without touching the hoop, 2 points were awarded to a free throw that entered the basket after touching the hoop, 1 point was awarded to a free throw that touched the hoop but did not enter the basket and 0 points were awarded to a free throw that neither touched the hoop or entered the basket (Figure 4).

Figure 4. *Graphic Representation of the Basketball Free Throw*



Statistical Analysis

Statistical tests performed on data included ANOVA procedures as well as post-hoc Bonferroni and t-tests performed to ascertain possible significant differences between the participants in the MMPPR, MPPR and Control groups on accuracy of athletic task performance and on the Self-Control factor.

Results

Integrated Examination of Golf, Tennis, Volleyball, Basketball

To investigate whether differences exist between the MMPPR, MPPR and control groups on the accuracy of performance factor in all four branches of sport (golf, tennis, volleyball and basketball) integrated into one standardized mean score, two-way ANOVA tests with repeated measures were conducted. Significant main effects were found between the groups [$F(2,237)=1.33$, $p<0.05$, $\eta^2=0.1$]. A follow-up post-hoc Bonferroni test found that accuracy of performance was highest for the MMPPR group, followed by the MPPR group in turn followed by the control group (Table 3).

Table 3. *Means and Standard Deviations of MMPPR, MPPR and Control Groups' Accuracy of Performance Scores attained in the 4 Branches of Sport together in the Final (6th Session) of the Study*

Group	Measure	Scores Attained in 6th Session
MMPPR	M	1.80
	S.D.	0.46
MPPR	M	1.54
	S.D.	0.52
Control	M	1.11
	S.D.	0.40

Source: Authors' estimations.

Examination of Golf Alone

To investigate whether differences exist between the MMPPR, MPPR and control groups on the accuracy of performance factor in golf alone, two-way ANOVA tests with repeated measures were conducted. Significant main effects were found between the groups [$F(2,57) = 18.86$, $p<0.001$, $\eta^2=0.39$]. A follow-up post-hoc Bonferroni test found that accuracy of performance was highest for the MMPPR group, followed by the MPPR group in turn followed by the control group (Table 4).

Table 4. *Means and Standard Deviations of MMPPR, MPPR and Control Groups' Accuracy of Performance Scores attained in Golf in the Final (6th Session) of the Study*

Group	Measure	Scores Attained in 6th Session
MMPPR	M	1.75
	S.D.	0.32
MPPR	M	1.10
	S.D.	0.38
Control	M	0.77
	S.D.	0.36

Source: Authors' estimations.

Examination of Tennis Alone

To investigate whether differences exist between the MMPPR, MPPR and control groups on the accuracy of performance factor in tennis alone, two-way ANOVA tests with repeated measures were conducted. Significant main effects were found between the groups [$F(2,57) = 16.67$, $p<0.001$, $\eta^2=0.36$]. A follow-up post-hoc Bonferroni test found that accuracy of performance was higher for the MMPPR and the MPPR groups than for the control group (Table 5).

Table 5. *Means and Standard Deviations of MMPPR, MPPR and Control Groups' Accuracy of Performance Scores attained in Tennis in the Final (6th Session) of the Study*

Group	Measure	Scores Attained in 6th Session
MMPPR	M	1.98
	S.D.	0.62
MPPR	M	2.02
	S.D.	0.63
Control	M	1.67
	S.D.	0.57

Source: Authors' estimations.

Examination of Volleyball Alone

To investigate whether differences exist between the MMPPR, MPPR and control groups on the accuracy of performance factor in volleyball alone, two-way ANOVA tests with repeated measures were conducted. Significant main effects were found between the groups [$F(2,57)=3.94$, $p<0.05$, $\eta^2=0.12$]. A follow-up post-hoc Bonferroni test found that accuracy of performance was higher for the MMPPR and MPPR groups than for the control group (Table 6).

Table 6. *Means and Standard Deviations of MMPPR, MPPR and Control Groups' Accuracy of Performance Scores attained in Volleyball in the Final (6th Session) of the Study*

Group	Measure	Scores Attained in 6th Session
MMPPR	M	1.88
	S.D.	0.63
MPPR	M	1.64
	S.D.	0.79
Control	M	1.14
	S.D.	0.38

Source: Authors' estimations.

Examination of Basketball Alone

To investigate whether differences exist between the MMPPR, MPPR and control groups on the accuracy of performance factor, two-way ANOVA tests with repeated measures were conducted. Significant main effects were found between the groups [$F(2,57)=16.72$, $p<0.001$, $\eta^2=0.37$]. A follow-up post-hoc Bonferroni test found that accuracy of performance was higher for the MMPPR and the MPPR groups than for the control group (Table 7).

Table 7. *Means and Standard Deviations of MMPPR, MPPR and Control Groups' Accuracy of Performance Scores attained in Basketball in the Final (6th Session) of the Study*

Group	Measure	Scores Attained in 6th Session
MMPPR	M	1.60
	S.D.	0.25
MPPR	M	1.42
	S.D.	0.28
Control	M	0.84
	S.D.	0.29

Source: Authors' estimations.

Examination of Self-Control

To investigate potential differences in the level of self-control between members of the MMPPR, MPPR and control groups as measured before and after the intervention, a two-way MANOVA procedure with repeated measurements was conducted. In this statistical procedure, research group affiliation served as the independent variable and level of self-control served as the dependent variable. A main effect for time [$F(1,237)=8.22$, $p<0.01$, $\eta^2=0.03$] was indicated. The level of self-control of participants after the intervention ($M=3.56$, $SD=0.51$) was significantly higher than the degree of self-control indicated by the participants before the intervention was initiated ($M=3.47$, $SD=0.44$) (Table 8).

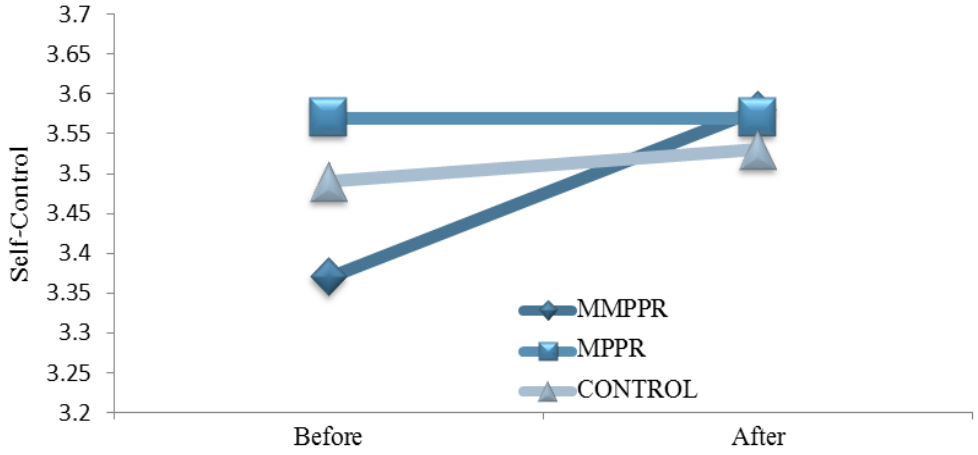
Table 8. *Means and Standard Deviations MMPPR, MPPR and Control Groups for Level of Self-Control in "Before and After" Intervention Measurements*

Groups	Before		After	
	M	***S.D.***	***M***	***S.D.***
MMPPR	3.37	0.30	3.58	0.50
MPPR	3.57	0.54	3.57	0.59
Control	3.49	0.49	3.53	0.43

Source: Authors' estimations.

Results of follow-up post-hoc t-tests for dependent samples conducted to ascertain possible significant differences on self-control in a "before and after" intervention configuration for the three research groups, participants who received instruction in MMPPR (motor-mental routine), attained a significantly higher level of self-control after the intervention [$t(79)=-3.89$, $p<0.001$], whereas participants who received instruction in MPPR (motor routine) and those in the control group did not register significant increases in measurements of the level of self-control in the "before and after" comparison (Figure 5).

Figure 5. *"Before and After" Measurement of Self-Control Indicated by MMPPR, MPPR and Control Group Members*



Discussion

The results indicate that when all four sports are simultaneously taken into account, those trained in using MMPPR and MPPR consistently performed more accurately than those who did not perform a preparatory routine. When the different sports are examined individually, similar results are indicated. The above findings confirm results reported in previous studies (Clowes and Knowles 2013, Kessel 2010, Marlow 1998, McCann et al. 2001) that indicated that MMPPR contributes to accuracy of athletic performance. The combination of motor and mental preparation performed by the MMPPR group seemingly decreased cognitive stress and anxiety and enabled members of this group to achieve more precise and accurate execution of athletic performance.

The findings that MMPPR and MPPR group members were more accurate in their performance than members of the control group are consistent with the findings recorded in the research projects undertaken by Clowes and Knowles (2013), Kessel (2010), Marlow (1998) and McCann et al. (2001) that indicate that concentration on technique is not an adequate substitute for specific PPR preparation and training. It clearly appears that a combination of mental and motor preparation as well as motor preparation contribute more significantly to the enhancement of accuracy of performance than when using technique training routines alone (Weinberg 2008).

It should be noted that as the participants in the study were novice athletes, they were very methodical about performing the different pre-performance routines that they learnt during the intervention. Thus members of the MMPPR group were meticulous in performing the MMPPR so as to optimize athletic accuracy; participants in the MPPR group did their best to perform the MPPR in order to achieve athletic accuracy and members of the control group diligently followed the techniques they learnt in the intervention so as to maximize athletic accuracy. Thus, while all participants did their utmost with their respective inputs, it is clear that the different PPRs contributed to the

overall enhanced accuracy of the MMPPR and MPPR groups when compared with the control group.

Regarding the level of self-control exhibited by the members of the three research groups, "before and after" measurements of participants in the three research groups who participated in the four branches of sport (golf, tennis, volleyball and basketball) indicated that although a significant main effect indicated higher level of self-control in the "after" measurement when compared to the level of self-control in the "before" measurement, this significant increment is due to the change in level of self-control in the MMPPR group alone. Follow-up post-hoc t-tests indicated that the members of the MMPPR group were the only participants who exhibited enhanced self-control after undergoing MMPPR training. The level of self-control of MPPR group members was identical in both "before" and "after" measurements and control group members indicated a statistically non-significant higher level of self-control in the "after" measurement when compared to their group score on this factor in the "before" measurement. These results, which indicate that the level of self-control of members of the MMPPR group increased after they used the mental and motor pre-performance routine in advance of athletic performance in the four different sports, confirm previous findings indicated by Ohayon (2009), Kessel (2010), Velentzas et al. (2011) and Coelho et al. (2014).

Limitations of the Study

The second study was conducted in a high school environment during school hours, bearing in mind the constraints of school routine. It was difficult to isolate the participants from routine school activities which on occasion interfered with the smooth running of the intervention. It is suggested that in a future replicative study, the examination of accuracy of athletic performance and level of self-control be tested in a conducive sport orientated environment without external distractions that could well mitigate the reliability of performance.

Conclusions

The current research has implications for the implementation of PPR in advance of athletic performance. The assumption is that by using motor and mental training novice athletes can increase accuracy of performance as well as enhance a feeling of self-control when performing an athletic action.

Sports instructors can make use of the findings of this study to integrate both mental and motor preparation routines into their training programs, in addition to their teaching athletic techniques alone. Students' attention should be focused on the importance of the impact of pre-performance routines and their impact on accuracy of performance as well as feeling of self-control of

novice athletes. Moreover, instructors should impress upon their students the importance of focusing their attention on the PPR environment in order to maximize athletic performance and results. Future studies are needed to test the long-term effectiveness of motor-mental rituals as well as to examine the effectiveness of additional creative personal PPRs designed to enhance athletic performance.

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References

Bell RJ, Cox KE, Finch WH (2010) Pre-putt routines and putt outcomes of collegiate golfers. *Journal of Sport Behavior* 33: 239-257.

Clowes H, Knowles Z (2013) Exploring the effectiveness of PPR in elite artistic gymnasts: A mixed method investigation. *Science of Gymnastics Journal* 5: 27-40.

Coelho RW, Kuczynski KM, Paes MJ, Greboggy DL, Bertoldo dos Santos P, Dalazuana AP, Rosa S, Joice Mara J, Stefanello F (2014) Effect of a mental training program on salivary cortisol in volleyball players. *Journal of Exercise Physiology Online* 17: 46-57.

Cohn PG (1990) Pre-performance routines in sport: Theoretical support and practical applications. *The Sport Psychologist* 4: 312-301.

Gabbard CP, Cacola P, Cordova A (2008) Does general motor imagery ability (via questionnaire) predict estimation of reachability in children? *Journal of Imagery Research in Sport and Physical Activity* 1: 12-1.

Gencer E (2010) The relationship between locus of control, self-esteem and goal orientation, motivational climate in badminton players. *Ovidius University Annals, Series Physical Education and Sport/Science, Movement and Health* 10: 157-162.

Goldfried MR, Merbaum M (1973) *Behavior change through self-control*. Austin, TX: Holt, Rinehart and Winston.

Kanthack TFD, Bigliassi M, Vieira LF, Altimari LR (2014) Acute effect of motor imagery on basketball players' free throw performance and self-efficacy. *Brazilian Journal of Kineanthropometry and Human Performance* 16: 47-58.

Kessel D (2010) Imagery training among youth sport novices: the effect of mental-imagery training on performance enhancement with 8-12-year-old novice children. Unpublished M.Sc. Dissertation in Sport Science, Brunel University.

Lidor R (1999) Learning strategies and the enhancement of self-paced motor tasks: theoretical and practical implications. In R Lidor and M Bar-Eli (Eds.), *Sport psychology: Linking theory and practice* (pp. 108-132). Morgantown, WV: Fitness Information Technology.

Lidor R (2009) Free throw shots in basketball: Physical and psychological routines. In E Tsung-Min Hung, R Lidor, D Hackfort (Eds.), *Psychology of sport excellence* (pp. 53-61). Morgantown, WV: Fitness Information Technology.

Lidor R, Mayan Z (2005) Can beginning learners benefit from pre-performance routines when serving in volleyball. *The Sport Psychologist* 19: 343-363.

Lidor R, Singer RN (2003) Pre-performance routines in self-paced tasks: Developmental and educational considerations. In R. Lidor , KP Hanschen (Eds.), *The psychology of team sports* (pp.69-98). Morgantown, WV: Fitness Information Technology.

Marlow C (1998) The use of single case design to investigate the effect of a preperformance routine on the water polo penalty shot. *Journal of Science and Medicine in Sport* 1: 143-155.

McCann P, Lavalle D, Lavalle R (2001) The effect of performance routines on early learners performing the golf wedge shot. *European Journal of Sport Science* 1: 123-129.

Ohayon A (2009) The effect of motor routine on accuracy in serve in tennis among beginning learners. M.A. dissertation, Haifa University.

Raviv S, Rothstein A (1995) Background variables and personality characteristics that characterize adolescent participants in the course of preparation for IDF. *Motion* C: 77-100.

Rosenbaum M (1980) A schedule for assessing self-control behaviors: preliminary finding. *Behavior Therapy* 11: 109-121.

Saimpont A, Lafleur MF, Malouin F, Richards CL, Doyon J, Jackson PL (2013) The comparison between motor imagery and verbal rehearsal on the learning of sequential movements. *Human Neuroscience* 7: 1-9.

Schack T, Whitmarsh B, Pike R, Redden C (2005) Routines. In J Taylor, G Wilson (Eds.), *Applying sport psychology. Four perspectives.* (pp. 137-15). Champaign, IL: Human Kinetics.

Singer RN (1986) Sports performance: a five-step mental approach. *Journal of Physical Education, Recreation and Dance* 57: 82-85.

Singer RN (2002) Pre-performance state, routines, and automaticity: What does take to realize expertise in self-paced events? *Journal of Sport and Exercise Psychology* 24: 359-375.

Taktek K, Zinsser N, St. John B (2008) Visual versus kinesthetic mental imagery: Efficacy for the retention and transfer of closed motor skill in young children. *Canadian Journal of Experimental Psychology* 62: 174-187.

Taylor J (1995) A conceptual model for integrating athletes' needs and sport demands in the development of competitive mental preparation strategies. *The Sport Psychologist* 9: 339-357.

Velentzas K, Heinen T, Schack T (2011) Routine integration strategies and their effects on volleyball serve performance and players' movement mental representation. *Journal of Applied Sport Psychology* 23: 209-222.

Weinberg R (2008) Does imagery work? Effects on performance and mental skills. *Journal of Imagery Research in Sport and Physical Activity* 3: 1-21.

Woodman T, Zourbanos N, Hardy L, Beattie S, McMullan A (2010) Do performance strategies moderate the relationship between personality and training behaviors? An exploratory study. *Journal of Applied Sport Psychology* 22: 183-197.

Wulf G, Clauss A, Shea CH, Whitacre CA (2001) Benefits of self-control in dyad practice. *Research Quarterly for Exercise and Sport* 72: 299-303.

Wrisberg CA, Anshel MH (1989) The effect of cognitive strategies on the free throw shooting performance of young athletes. *The Sport Psychologist* 3: 95-104.