**Appendix:** raw data from the analyzed manuscripts.

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| # | **Journal** | **Study** | **Aim(s)** | **Methods** | | | **Main findings** |
| Participant information | Type of study | Instrumentation |
| 1 | The Sport Psychologist | Mahoney, Gabriel & Perkins (1987) | To identificate the skills or clusters of skills that reliably differentiate elite athletes from their less exceptional peers.  To compare the psychological skills profiles reported by elite athletes and predicted by sport psychologists in their depiction of the ideal athlete. | 126 elite athletes (M = 24.1 yrs), from 17 sports. 141 preelite athletes (M = 18.6 yrs) from 11 sports.  446 nonelite athletes (college athletes, M = 19.8 yrs) from 21 sports.  TOTAL: 713 athletes (445 males; 268 females).  18 sport psychologists. | Cross-sectional; Quantitative. | PSIS (Psychological skills inventory for sports). | Elite athletes experienced fewer problems with anxiety; were more successful at deploying their concentration; were more self-confident; relied more internally referenced and kinesthetic mental preparations; were more focused on their own performance; were more highly motivated to do well in their sport. Elite athletes reported dreaming less frequently about competition than did their preelite counterparts. Preelite athletes tended to more frequently report that their anxiety interfered with their performance that the negative impact of that anxiety increased with its intensity, that their concentration was less consistently focused on their performance, that their coaches were a more important factor in their success, and that they tended to more extensively coach themselves with self-instructions while performing. The expert sport psychologists tended to view the ideal athlete as having fewer problems or concerns than the elite athletes themselves actually reported. Experts' views of ideal psychological patterns in athletes differ considerably from currently realized levels of psychological skill development. Female athletes tended to report significantly lower self-confidence than their male counterparts. They also appeared to coach themselves more via self-talk during their performances, and reported more frequent problems with anxiety and tension levels. Athletes in individual sports reported more frequent problems with anxiety and confidence, as well as different patterns of experience with mental practice. There was also some indication that individual sport athletes experienced more frequent problems with concentration. Team sports athletes reported a greater involvement with the success/failure of their team. Athletes in closed sports tended to report more frequent concerns or problems related to their confidence, anxiety management, and concentration. These athletes also tended to report being more motivated and to use mental preparation strategies more extensively than their peers in open sports. |
| 2 | Journal of Sport Behavior | Grouios (1992) | To investigate the effect of mental practice on reaction time. | 100 male top level sports participants from 8 sports (volleyball = 14). (18-25 yrs), randomly assigned in 5 groups: i) physical practice, ii) a mental practice, iii) a combined physical practice and mental practice group, iv) a combined mental practice and physical practice group, and v) a no practice control group. | Experimental; Quantitative. | Test for Normal Vision;  Test for Normal Hearing;  Test for Age, Skill Level and Sport Experience;  Test for Choice Reaction Time;  Test for Intelligence;  Test for Imagery Ability;  Test for Visual and Kinesthetic Imagery (MIQ). | MP can affect significantly reaction time (RT). The reasons for physical improvement in RT as a result of MP can be explained in terms of a cognitive activity which considerably influences memory comparison and/or response selection processes. (…) it is believed that MP facilitates RT by constructing a superordinate context which coheres associations and establishes meaningful connections, or effective relationships between stimuli and responses (Grouios, 1988), and thereby creates an additional degree of memory organization, which in turn through direct influence on encoding, storage, and retrieval operations, makes memory comparison and/or response selection processes more efficient. (...) MP is a powerful cognitive activity which can significantly influence memory comparison and/or response selection processes and effectively facilitate RT performance. |
| 3 | European Journal of Applied Physiology | Roure, Collet, Deschaumes-Molinaro, Dittmar, Rada, Delhomme & Vernet-Maury (1998) | To assess objectively mental rehearsal processes, at least in part, by measuring variations in autonomic responses in an open-ended complex motor skill, during two actual experiments (volleyball) separated by periods of mental rehearsals.  To evaluate the autonomic nervous system responses between the first and second experiments after mental rehearsals between the two. | 24 students not skilled volleyball players (9 females, 15 males, M = 23 yrs). | Experimental; Quantitative. | MIQ (pre-test) (Movement Imagery Questionnaire); Volleyball serve and pass practical test; Imagery program for 2 months (3 times/week, 30'/session). | There was a strong correlation between the responses in actual tasks (pre and post-test volleyball) and during MI. (…) The same autonomic channels seemed to be used during the actual activity and during the MI of this activity (...) the main finding was a differing development of a skill between imagining and non-imagining volleyball players. Mental rehearsing induced a specific pattern of autonomic response: decreased amplitude, shorter duration and negative skin potentials compared to the control group. (...) it can be suggested that in the case of open-ended motor activity, mental rehearsing may help in the construction of *schema* which can be reproduced, without thinking, in actual practice. |
| 4 | Physiology & Behavior | Roure, Collet, Deschaumes-Molinaro, Delhomme, Dittmar & Vernet-Maury (1999) | To evaluate performance improvement with imagery quality estimated during autonomic nervous system recording. | 24 intermediate-level volleyball players (9 females, 15 males). | Experimental; Quantitative. | MIQ (pre-test); Volleyball serve and pass practical test; Imagery program for 2 months (3 times/week, 30'/session). | There was evolution of performance between pre and post-tests in the imager group. Imager subjects showed markedly different abilities in their production of characteristic ANS responses at each signal. Highly aroused subjects undergo a decrease in skin resistance level during mental sessions and an increase in skin potential level. Performance was strongly correlated to ANS response. |
| 5 | The Sport Psychologist | Cumming & Hall (2002) | To examine the functions of imagery used by athletes during the off-season.  To examine how gender and competitive level influence imagery use during the off-season.  To examine whether athletes' use of imagery use was related to the amount of physical and technical preparation athletes were engaged in during the off-season. | 324 athletes (186 males, 138 females, M = 21.38 yrs), from 10 sports (volleyball = 26; 8%). 3 competitive levels (regional, provincial and national). | Cross-sectional; Quantitative. | SIQ off-season (Sport Imagery Questionnaire). | Athletes reported using MG-M imagery the most, followed by CS imagery, MG-A imagery, CG imagery and MS imagery. The males used significantly more motivational specific imagery than the females. The provincial and national level athletes used significantly more imagery in the off-season, regardless of the function, than the athletes at the regional level did. Provincial and national level athletes engaged in significantly more physical and technical preparation than the regional level athletes did. Positive, significant relationship existed between physical and technical preparation, and positive and significant relationships were found between physical preparation and the 5 functions of imagery, with the smallest relationship occurring with MG-A imagery, and the largest relationship occurring with CG imagery. Significant and positive relationships were also found between technical preparation and the 5 functions of imagery, with the smallest relationship occurring with MG-A imagery and the largest relationship occurring with CG imagery. The more physical and technical preparation athletes engage in during the off-season, the more imagery they use. |
| 6 | Journal of Sports Sciences | Cumming & Hall (2002) | To examine MI within the context of the deliberate practice framework by investigating the relationships among the different dimensions of practice (relevance, concentration and enjoyment).  To determine whether athletes of various competitive standards have differing perceptions of how relevant imagery is to improving their sport performance or to competing effectively, how much concentration it requires and how enjoyable it is to perform.  To establish whether athletes of various competitive standards accumulate different amounts of imagery practice over the course of their athletic career. | 150 athletes (78 males, 72 females), from a board range of sports (volleyball = 32; 21.3%). 3 competitive levels: recreational, provincial and national. | Cross-sectional; Quantitative. | Deliberate imagery practice questionnaire. | The data were first examined for possible differences in imagery use by sex and type of sport. Athletes' perceptions of the relevance of imagery to improving their performance was significantly and positively related to their perceptions of the relevance of imagery to competing effectively, to the mental concentration required to perform imagery, and the enjoyment of performing MI, regardless of the result. National athletes perceived imagery to be more relevant to improving their performance and competing effectively than recreational athletes. Also, provincial athletes perceived imagery to be more relevant to competing effectively than recreational athletes. The athletes reported spending most time imaging skills (CS) and strategies (CG), followed by their goals (MS), staying confident and mentally tough (MG-M) and the stress and excitement of preforming (MG-A). (...) athletes spent more time imaging skills, strategies and goals and staying confident and mentally tough than the stress and excitement of performing. National and provincial athletes spent more time imaging goals than recreational athletes. National athletes also spent more time imaging skills, strategies, staying confident and mentally tough, and the stress and excitement of performing than recreational athletes. Recreational athletes had participated in their sport for 8.75+/-4.85 years and had accumulated 501+/-528 hours of imagery practice. Provincial athletes had participated in their sport for 8.50+/-4.05 years and had accumulated 639+/-648 hours of imagery practice. Finally, the national athletes had participated in their sport for 10.19+/-4.19 years and had accumulated 884+/-872 hours of imagery practice. |
| 7 | Journal of Sport Behavior | Leslie-Toogood & Martin (2003) | To provide information about the question "do coaches know the mental skills of their athletes?” through the within-sport checklists for volleyball and track. | 20 university varsity-level athletes (volleyball = 10; 50%). 20 high school varsity athletes (volleyball = 10; 50%).  7 coaches. | Cross-sectional; Quantitative. | Sport specific questionnaire for volleyball players and runners. | There was little agreement between athletes and coaches in the areas of mental preparation in which an athlete needed help. For volleyball players and their coaches, only two items were significantly positively correlated: one competition item (blocking out what other people might say if you lose or don't perform well) and one practice item (working more on skill deficiencies). For track athletes and their coaches, only one item was significantly positively correlated, and that was a practice item (keeping a written record of progress and meeting your goals). The coaches were very confident in their ability to rate the mental skill strengths and weaknesses of their athletes. |
| 8 | Journal of Applied Sport Psychology | Weinberg, Butt, Knight, Burke & Jackson (2003) | To enhance the Sport Imagery Questionnaire by adding an effectiveness component to the already existing frequency component.  To assess when, and under what conditions, imagery is being employed by athletes.  To conduct an exploratory analysis of the impact of gender and type of sport on imagery use. | 523 athletes (241 males and 282 females) from both individual (N = 285) and team (N = 238) sports at two NCAA Division I universities in the Midwest and southeast part of the United States. | Longitudinal; Mixed | SIQ;  IUQ (Imagery Use Questionnaire). Open-ended questions, describing the specific type of imagery athletes employed and when they used their imagery. | Results revealed that the effectiveness scale added some new information. Thus, athletes generally use different types of imagery that they find effective. It was also found that athletes use imagery most often in relation to competition (especially in tough situations). Finally, a number of gender and sport differences were found in relation to imagery use and effectiveness. Male athletes were employing imagery more frequently and viewing it as more effective, than female athletes. Individual sport athletes tended to find imagery more effective (although not used more frequently) than team sport athletes. |
| 9 | Journal of Applied Sport Psychology | Harwood, Cumming & Fletcher (2004) | To develop an initial understanding of the relationships between the varying motivational profiles of elite youth sports performers and their reported use of basic psychological skills/strategies. | 573 athletes (174 males; 395 females; 4 unreported elite young athletes, with an average age of 17.6 years. | Cross-sectional; Quantitative | POSQ (Perceptions of Success Questionnaire); TOPS (Test of Performance Strategies). | A Higher-task/Moderate-ego profile emerged as the most adaptive pattern with respect to psychological skill usage, given that athletes with this profile reported greater use of Imagery in practice and competition as compared to athletes with Moderate-task/Lower-ego and Lower-task/Higher-ego profile. No differences were found for the imagery when compared by gender and type of sports. |
| 10 | Journal of Sports Sciences | Hardy, Hall & Hardy (2005) | Study1: to generate quantitative data regarding the content-related dimensions of athletes’ self-talk.  To examine differences in the use of self-talk in general as well as the functions of self-talk in practice and competition settings.  To examine the effects of sex, skill and sport on the content of athletes' self-talk.  Study2: to employ a more stringent sample to examine more closely the effect of sex suggested by the findings of Study 1.  To cross-validate at least some of the findings of Study 1 in a different sample. | Study1: 295 athletes (21.9±4.2 yrs); 52% male and 48% female, from 13 individual and team sports (volleyball: 10%). 6 skill levels of participation: recreational, district, county, collegiate, national and international. Study2: 164 undergraduates (40% male; 60% female; 21.5±1.8 yrs), from recreational level in volleyball. | Cross-sectional; Quantitative. | STUQ (Self-Talk Use Questionnaire). | Athletes’ use of self-talk differs from their use of imagery. **Study 1**: single-factor between-group multivariate analyses of variance revealed significant differences across sex and sport type for the content of self-talk. Mixed-model multivariate analyses of variance revealed overall greater use of self-talk, as well as increased use of the functions of self-talk, in competition compared with practice. Moreover, individual sport athletes reported greater use of self-talk, as well as the functions of self-talk, than their team sport counterparts. In **Study 2**, the content of athlete self-talk was generally positive, covert and abbreviated lends support to the application of Vygotsky’s (1986) verbal self-regulation theory to the study of self-talk in sport. |
| 11 | Journal of Sports Sciences | Gregg & Hall (2006) | To develop a valid and useful instrument for assessing motivational general imagery abilities in sport.  To determine if it was feasible to develop MG-M imagery scenarios and identify suitable rating scales to measure MG-M imagery ability.  To assess the factor structure of the revised version of the MIAMS using confirmatory techniques.  To examine the influence of several demographic variables, including gender, competitive level and sport type, on motivational imagery abilities. | Phase 1: 607 students of sport psychology (412 females, 195 males); 11% were volleyball players. Phase 2: 72 undergraduate kinesiology students. Phase 3: 315 participants from 52 sports at various competitive levels. | Sequential; Quantitative. | MIAMS (Motivational imagery ability measure for sport). | The MIAMS can be employed to assess MG-M and MG-A imagery ability for sport.  Phase 3: participants gave higher ratings for ease than for emotion. (…) athletes participating at a competitive level scored higher than athletes participating at a recreational level on both the ease and emotion scales for MG-M ability. (....) Athletes participating in their sport at a competitive level had higher mean scores on emotion than athletes participating at a recreational level. |
| 12 | Arquivos de Neuro-Psiquiatria | Stecklow, Infantosi & Cagy (2007) | To assess the differences in alpha band power, particularly in the vicinity of the alpha peak (BPA), during motor imagery (MI) (kinesthetic and visual), in participants with different experiences in the volleyball drill of spiking. | 33 men (18-34 yrs), divided in 2 groups: 15 volleyball athletes, and 18 participants with no volleyball experience. | Experimental; Quantitative. | MIQ-R (Movement Imagery Questionnaire - revised); video observation of the spike volleyball movement; EEG. | Athletes imagine themselves more clearly than non-athletes during MI, both in kinesthetic and visual imagery. MI reduces alpha activity according to individual knowledge of real execution of motor task and MI modalities. It was verified an association between MI and the planning and memorizing process. The cortical activation was similar in both hemispheres of nonathletes but more pronounced in left hemisphere of athletes, mainly in MI kinesthetic. |
| 13 | Revista Brasileira de Cineantropometria & Desempenho Humano | Stefanello (2007) | To analyze the psychological skills used by athletes to regulate their activation/arousal levels, according to the different sport situations. | 2 beach volleyball athletes. | Case-study; Qualitative. | Feedback execution instrument (a specific segment). | The Olympic Beach Volleyball Champions maintained an optimal activation level in the majority of the games, irrespective of the situations experienced during the games. The psychological techniques most employed to regulate activation level were cognitive techniques, which aim to change or adjust the main determinants (thoughts, perception, memory, language) and were based on self-report, attention focusing and imagery. |
| 14 | Perceptual and Motor Skills | Shoenfelt & Griffith (2008) | To evaluate a preseason mental skills program for serving (including relaxation, imagery, attentional focus, behavioral modelling and goal setting) in an intercollegiate volleyball team. | 11 women intercollegiate volleyball players (18-22 yrs), with 2.6 years of experience. | Longitudinal; Quantitative. | Core Self-evaluations scale;  Mental skills questionnaire; Good serve percentage. Training program: in the preseason; 8 sessions (1h/session) over 2 weeks. | End-of-season reported use of imagery was significantly correlated with good serve percentage. Serve-specific self-efficacy significantly increased from the pretraining program to the end of the season. Results indicated that implementing the mental skills training program was associated with enhanced service performance. Athletes who reported greater use of imagery had better serving performance than athletes who report less use of imagery. (...) at the end-of-season, the mental skills questionnaire item of reported use of imagery in competition was significantly correlated with good serve percentage. |
| 15 | High Ability Studies | Taylor, Gould & Rolo (2008) | To investigate differences in performance strategies of US Olympians in both practice and competition. | 176 US Olympic athletes. 52 (29.5%) were medalists and 124 (70.5%) were nonmedalists. (28.90±5.8 yrs). 82 males (46.6%) and 94 females (53.4%). Athletes were from 28 sports (volleyball = 12, 6.8%). | Cross-sectional; Quantitative. | TOPS. | Regarding to practice strategies and skills, the athletes scored lowest on relaxation and imagery. Among the competition subscales, several patterns of relationships were identified, the most notable of which occurred between (...) imagery and goal setting. Among the practice subscales, the most prominent correlations emerged between (...) relaxation and imagery. Considerable overlap was demonstrated in the use of several psychological strategies across the competition and practice domains. (...) Specifically, the use of self-talk in practice closely related to the same skill in competition and notable links across the performance contexts were also evidenced in the use of imagery. In competition, higher imagery scores prevailed for nonmedalists than medalists. Automaticity and imagery contributed most to the differences between groups. In particular, while the younger athletes indicated greater automaticity than older athletes, higher imagery scores prevailed for the older athletes than younger athletes. |
| 16 | Journal of imagery research in sport and physical activity | Watt, Spittle, Jaakola & Morris (2008) | To explore the use of imagery in relation to task characteristics according to Paivio’s (1985) general analytic framework, investigating differences in imagery use by competitive level and exploring the influence on the use of imagery of skills involving a perceptual target and tasks without a perceptual target. | 66 Australian participants (34 males and 32 females; 19.42±4.07 yrs); 202 English participants (135 males and 67 females; 20.79±3.15 yrs), and 216 Finnish participants (111 males and 105 females; 20.31±4.80 yrs). TOTAL: 484 participants (280 males and 204 females; 20.38±4.10 yrs), from 54 sports (national, state, district and recreational levels). | Cross-sectional; Quantitative. | SIQ. | Participants used MG-M imagery the most, followed by CS imagery, CG imagery and MG-A imagery, and MS imagery. Significant differences were found among the four competitive levels on the dependent variables (...) The district level participants reported significantly higher use of MGA imagery than state and national level participants. The national level participants reported higher use of CS imagery than recreational level participants. There was a significant difference between tasks with a perceptual target and tasks with no target for MS imagery, with higher scores for tasks with a perceptual target. There were no significant differences between tasks with a perceptual target and tasks with no target for CS, CG, MG-A, and MG-M imagery. |
| 17 | Journal of Applied Sport Psychology | O & Hall (2009) | To quantitatively examine athletes' reported intentional use of slow motion, real time, and fast motion images.  To determine whether gender and competitive level influenced reported voluntary image speed use. | 604 athletes (298 males, 306 females; 21.73 yrs), from 52 sports (including volleyball). | Cross-sectional; Quantitative. | Image speed questionnaire. | Females reported employing significantly more slow motion images than males, while males reported employing significantly more real time and fast motion images than females. When imaging brand new skills or strategies (CS-COG and CG-COG), or when imaging developing skills [cognitive specific imagery during the associative stage of learning (CS-ASSO)], athletes reported employing real-time and slow-motion images with the same frequency, but both real-time and slow-motion images significantly more than fast-motion images. When athletes reported imaging being confident or mentally tough (MGM) or to regulate arousal or anxiety levels (MGA), or when imaging a mastered skill or developing strategy (CS-AUTO and CG-ASSO), athletes employed real-time images most frequently and significantly more than slow-motion images, which in turn, were employed significantly more than fast-motion images. When imaging a mastered skill (CS-AUTO) or when imaging the achievement or specific goals (MS), athletes employed slow-motion and fast-motion images with the same frequency, but reported using real-time images significantly more often than slow-motion and fast-motion images. When reporting their image speed use for mastered strategies (CG-AUTO), athletes employed real-time images most and significantly more than fast-motion images, which interestingly, were reported as being employed significantly more than slow-motion images. Post-hoc findings indicated that athletes reported using slow-motion images significantly more for CS and CG imagery while in the cognitive and associative stages of learning than when employing CS and CG imagery while in the autonomous stage of learning. (...) athletes generally reported using slow motion imagery for CS and CG imagery while in the cognitive and associative stages of learning significantly more than when employing imagery for motivational function of imagery (i.e. MS, MGM and MGA). (...) athletes reported using real-time images significantly more for CS and CG imagery while in the autonomous stage of learning and when imaging for motivational functions than for CS and CG imagery while in the cognitive and associative stages of learning. (...) reported real-time image speed use increased, and slow motion image speed decreased, as the stages of learning progressed (from cognitive, to associative, to autonomous). Fast-motion images were reported as being used significantly more for CS and CG imagery in the autonomous stage of learning than for most all other imagery functions and stages of learning. |
| 18 | Journal of Sports Sciences | Hall, Munroe-Chandler, Cumming, Law, Ramsey & Murphy (2009) | To examine athletes' use of two mental skills, observational learning and imagery, in both practice and competition and how the use of these two skills are related to sport confidence. | 345 athletes (152 males and 193 females), from 32 team and individual sports, including volleyball. Mean age: 19.25 yrs. | Cross-sectional; Quantitative. | SIQ;  Functions of observational learning questionnaire;  Trait Sport confidence inventory. | The athletes reported significantly greater use of CG, MS, MG-A and MG\_M imagery in competition than in practice. However, no differences were observed in the use of cognitive specific imagery between practice and competition. Post hoc tests revealed that competitive athletes used more CG and MG-A imagery than both club and recreational athletes, and more MG-M imagery than recreational athletes. Team sport athletes used more the strategy function of observational learning than the individual sport athletes. (...) team sport athletes were found to use more this function in competition than individual sport athletes. Stronger relationships were observed between imagery use and self-confidence during both practice and competition. (...) The relationship between imagery and observational learning use was also significant and positive, both in practice and in competition. Both CS and MG-M imagery emerged as significant and positive predictors of practice self-confidence. |
| 19 | Journal of Applied Sport Psychology | Ross-Stewart & Short (2009) | To investigate the content of the images athletes use to build, maintain, and regain confidence, at both the SIQ subscale and individual item levels of analyses.  To examine the perceived effectiveness of the imagery subscales and each individual image for each of the confidence sub-functions. | 142 student athletes (60% female), from 10 sports (8.5% from volleyball). Mean age: 20.52 yrs. | Cross-sectional; Quantitative. | SIQ. | For building confidence MG-M imagery was used significantly more than CG and MS imagery. For maintaining confidence MG-M imagery was used significantly more than all the other subscales (MS was used significantly less than all other subscales). For regaining confidence MG-M imagery was used significantly more than all the other subscales (MS was use significantly less than all other subscales). (...) imagery was perceived to be more effective for building confidence compared to regaining confidence. Athletes used different images depending on whether they were building, maintaining, or regaining confidence, and that the images that were the most used were not always perceived to be more effective. |
| 20 | Arquivos de Neuro-Psiquiatria | Stecklow, Infantosi & Cagy (2010) | To investigate the existence of habituation in alpha band power, focusing the frequencies around the alpha peak during sequences of motor imagery of the spike volleyball movement. | 15 elite athletes of indoor volleyball and 18 subjects without experience in volleyball. 3 groups: control, visual imagery, kinesthetic imagery. | Experimental; Quantitative. | MIQ-R;  Video observation of the spike volleyball movement; EEG. | The motor imagery of volleyball attack is much clearer in athletes imagining themselves than non-athletes. Sequential motor imagery of complex tasks promotes cortical changes, mainly in the power vicinity of the alpha peak. This finding is more pronounced along the initial trials and also for the athletes during the modality of kinesthetic motor imagery. |
| 21 | South African Journal for Research in Sport, Physical Education and Recreation | Adegbesan (2010) | To examine the relationship of the team sport players' perception of cohesion and imagery in sport.  To examine whether the five imagery subscales significantly predict cohesion of team players. | 45 male elite players in volleyball, football and basketball (15 for each sport). Mean age: 22.50 yrs. | Cross-sectional; Quantitative. | GEQ (Group Environment Questionnaire); SIQ. | The regression analysis revealed no significant composite effect of imagery use on cohesion. Motivational specific and cognitive general imagery use were significant predictors of cohesion as perceived by the team players. Cognitive and affective elements of perceived imagery and cohesion are reciprocally related on the basis of theories concerning the relationship between cognition and affect. Team cohesion and imagery relationship could be used for team building and a team intervention tool with other cognitive variables. |
| 22 | Journal of Applied Sport Psychology | Velentzas, Heinen, Tenenbaum & Schack (2010) | To introduce a new method for measuring mental strategies when performing overhand service in youth high-level volleyball players. | 29 female volleyball players (German youth female National Volleyball team), 17 years old. | Experimental; Quantitative. | Routines questionnaire;  Structure-dimensional-analysis-motoric. | Higher-ranked players exhibited an increased similarity of serve mental representation to the reference mental structure. The selected players have an almost-perfect memory structure of the overhand service. The mental representation of routines are organized in a hierarchical, tree-like structure. The movement mental representations of players not selected to the national team were organized in a less hierarchical manner. The coach's performance ranking was significantly correlated to the athlete's mental representation invariance values (structure quality), indicating a close relationship between mental representation and performance. |
| 23 | Asian Journal of Physical Education & Recreation | Adegbesan (2010) | To examine whether significant relationship exist between the team sport imagery use and the sport confidence. | 48 male elite players in volleyball, basketball and football. Mean age: 22.50 yrs. | Experimental; Quantitative. | SIQ;  Sources of Sport Confidence Questionnaire. | The sport imagery use significantly predicted the sources of sport confidence of the team players on mastery, demonstration of ability, physical self-presentation, social support vicarious experience and situational favorableness sub-scales. The result of the correlation matrix indicated a positive but moderate relationship of perceived imagery use and sport confidence. The results revealed an apparent significant composite effect of the imagery use on the team sport players' sport confidence |
| 24 | South African Journal for Research in Sport, Physical Education and Recreation | Potgieter & Kidd (2011) | To identify the psychological factors that affect sport performance.  To construct a practical, reliable and valid instrument to assess the psychological attributes of sportspersons. | 304 sport science students from several sports, divided into 2 achievement-level groups according to their type of sport participation (school, club or provincial/ national or senior).  7 psychologists. | Sequential; Quantitative. | 60-item Mental skills inventory. | Group 2 recorded significantly higher mean scores in all six mental skills than group 1. The largest differences were in the goal-setting and mental rehearsal skills. It was developed the Peak Performance Profile, with only 3 sub-scales: concentration, confidence and stress control. |
| 25 | Studies in Physical Culture and Tourism | Varzaneh, Saemi, Shafina, Zarghami & Ghamari (2011) | To examine the relationship between mental skills and anxiety interpretation in female volleyball athletes. | 120 female volleyball players from Iran. Mean age: 23.18 yrs. | Cross-sectional; Quantitative | CSAI-2 (Competitive state anxiety inventory-2);  OMSAT-3 (Ottawa Mental skills assessment tool-3). | The results revealed that the majority of volleyball players chose the subscale of goal setting, whereas the fear control subscale was the least selected one. The obtained results showed that the subscale of stress reaction was positively and significantly correlated with all three anxiety direction scales, as well as the subscale of imagery. The subscales of goal-setting, self-confidence, activation and imagery were positively and significantly correlated with self-confidence intensity. |
| 26 | Journal of Applied Sport Psychology | Velentzas, Heinen & Schack (2011) | To determine which routine integration strategy (routine imagery vs. Introduction of routines) is more beneficial with regard to its effects on the levels of the structural reorganization of the underlying movement mental representations, as well as on the movement characteristics and on the movement outcome of the overhand volleyball float-serve. | 30 female volleyball players. Mean age: 23.63 yrs. Players were divided in 3 groups (routines imagery integration - imagery group; routine introduction group; control group). | Experimental; Quantitative. | VMIQ (Vividness Movement Questionnaire);  SDA-M; Serve accuracy. | Participants' imagery ability did not differ between groups prior to the intervention phase. Imagery intervention led to a more evident integration of the routines on the level of the mental representation. Regarding players' serve accuracy, only the imagery intervention led to significant performance enhancement and a higher degree of performance persistence. The imagery group served significantly more accurate with significantly increased ball velocity, and players' movement mental representation covered more clearly these of the experts. |
| 27 | Journal of Imagery Research in Sport and Physical Activity | Parker & Lovell (2011) | To investigate the association between positive affect, negative affect and imagery functions used by sport performers outside a competitive event. | 117 university athletes (Mean age: 19.11 yrs), representing 19 different sports. | Cross-sectional; Quantitative. | SIQ;  PANAS (Positive and negative affect schedule). | Participants used MG-M imagery the most, with MS imagery used the least. Participants recorded higher levels of positive affect than negative affect, this difference was significant (athletes in this sample recorded higher levels of PA than NA). PA proved to be a significant predictor of MS imagery. Beta values demonstrated positive relationships between PA, NA and MG-A imagery. The strongest predictor for MG-M imagery was PA. Neither PA nor NA acted as a significant predictors for the cognitive subscales of SIQ (CS, CG). |
| 28 | Procedia - Social and Behavioral Sciences | Soflu & Esfahani (2011) | To investigate the relationship between the type of conceptual imagery to team efficiency and the performance of amateur and professional volleyball players. | 95 volleyball players participating in volleyball super league. Athletes were divided in 2 groups: amateurs and professionals. | Experimental; Quantitative. | SIQ;  CEI (Collective Efficacy Inventory Questionnaire);  Lane's athletes' performance evaluation questionnaire. | Both athletes groups use skillful imagery (MG-M) more than other types of imagery. Cognitive specific in professional group and arousal imagery (MG-A) in amateur group had the lowest mean values. |
| 29 | Journal of Applied Sport Psychology | Gregg, C. Hall, McGowan & N. Hall (2011). | To replicate the findings of Gregg et al. (2005) (i.e. higher visual and kinesthetic movement imagery scores are related to increased CS imagery use), and to extend their work by examining the relationships between the two motivational imagery abilities and the use of the motivational functions of imagery. | 432 athletes from 45 sports (29 from volleyball; 6.7%). Mean age: 19.88 yrs. | Cross-sectional; Quantitative. | MIQ-RS (Movement Imagery Questionnaire-revised 2nd version);  MIAMS;  SIQ. | Visual movement imagery is a significant predictor of cognitive imagery use in sport, with kinesthetic movement imagery adding to that prediction. Sport type, cognitive imagery ability (i.e. Visual and kinesthetic), and MG-A ease predicted 41% of the variance in CS imagery use in the final step of regression. For CG imagery use, the imagery ability measures predicted 32% of variance (...) CG imagery use was predicted by gender, MG-M emotion and MG-A ease. Overall 35% of the variance in the use of MG-A imagery was predicted by the imagery ability measures. Level of competition, gender, MG-A emotion, and MG-M emotion contributed to the prediction of MG-A imagery use. The imagery ability measures explained 33% of the variance in MG-M imagery ability use. MG-M emotion and MG-A ease were the only significant contributors to the variance in MG-M imagery use. MG-M emotion, MG-A ease and visual movement imagery predicted 20% of the variance in MS imagery use. |
| 30 | Asian Journal of Physical Education & Recreation | Adegbesan & Oladipo (2011) | To examine differences in exercise imagery use between genders, and to determine whether high and low frequency exercisers differ significantly on the use of each imagery functions.  To examine the differences in frequency of imagery used based on three different categories of activity such as ball games, racquet games, and jogging, swimming, and gymnasium activities. | 482 male (N = 256; 24.0±-4.7 yrs) and female (N = 226; 23.0±5.2 yrs) university students, involved in exercise activities and recreational sports. | Cross-sectional; Quantitative. | Demographic questionnaire;  EIQ (Exercise Imagery Questionnaire - revised version). | The female exercise participants were found to use the technique imagery function most frequently and the energy imagery function least frequently. While the male exercise participants were found to use the technique imagery function most frequently and the appearance imagery function least frequently. The exercise participants in the ball games exercise activity group used the three imagery functions most frequently than the racquet and stick games and the jogging, gymnastics and swimming exercise activity group when the mean values are considered. Results indicated that no significant difference was found on the three imagery functions by sex. But significant difference was located on the appearance imagery function based on the criterion independent variables of three exercise activity groups of the exercise participants. |
| 31 | Journal of Imagery Research in Sport and Physical Activity | Parker & Lovell (2012) | To determine VMIQ-2 utility within representative samples of athletes.  To analyze if age differences in movement imagery ability exist within samples of youth sport performers. | 169 youth sport performers, from 14 sports (1 from volleyball; 0.6%). Mean age: 16.62 yrs. Athletes were divided in 4 competitive levels: recreational, club, county and national. | Cross-sectional; Quantitative. | VMIQ-2. | The results demonstrated vividness of imagery was greatest when participants employed internal visual imagery and least vivid when using external imagery. Participants' vividness of imagery was clear and reasonably vivid to moderately clear and vivid. The results revealed significant differences in kinesthetic imagery between the 12-13 and 20-21 age groups, with the 20-21 age group recording greater imagery vividness for this imagery modality than their 12-13 year old counterparts. |
| 32 | Journal of Applied Sport Psychology | Mattie & Munroe-Chandler (2012). | To examine the relationship between mental toughness and the specific psychological skill of imagery. | 151 varsity athletes, from 6 sports (20 from volleyball; 14%). Mean age: 20.70 yrs. | Cross-sectional; Quantitative. | SIQ;  Mental toughness 48 inventory. | MS subscale was correlated only with confidence, while MG-A was not significantly correlated with any of the four subscales. Positive moderate correlations were observed between MG-M imagery and each of the mental toughness subscales. Both CS and CG imagery also showed small to moderate positive correlations with each mental toughness subscale. Hierarchical multiple regression analysis revealed that imagery use significantly predicted mental toughness. Specifically, MG-M imagery emerged as the strongest individual predictor for all dimensions of mental toughness. |
| 33 | Perceptual and Motor Skills | Kizidalg & Tiryaki (2012) | To examine the use of imagery by elite male and female athletes in team open-skill sports, individual open-skill sports, and individual closed-skill sports. | 151 elite Turkish athletes, from 5 sports (volleyball = 39; 26%). Mean age: 20.4 yrs. | Cross-sectional; Quantitative. | SIQ. | Male team open-skill athletes and individual closed-skill athletes had higher scores on MG-M imagery than individual open-skill athletes. Female team open-skill athletes and individual closed-skill athletes had higher scores on MG-M imagery than individual open-skill athletes. |
| 34 | Journal of Sports Sciences | Ruiter, Hutter, Icke, Groen, Gemmink, Smilde & De Haan (2012) | To investigate if imagery training improves the fast onset of neuromuscular activation and thereby fast knee extensor isometric torque development. | 40 young participants (18-24 yrs), from recreational sports. They were randomly divided for 4 groups: control; physical training; imagery; placebo. | Experimental; Quantitative. | SIAM (Sport Imagery Ability Measure);  Dinamometer, for isometric torque measurement | At 90º knee angle, maximal torque increased similarly in all three training groups. The torque-time integral (contractile impulse) over the first 40ms after torque onset increased after physical training, but only at 90º. The increases in TTI40 following physical training were related to significant increases of knee extensor rectified surface EMG at torque onset. Only physical training led to a knee angle specific increase of contractile impulse that was significantly different from placebo and controls and that was related to improved onset of neuromuscular activation. |
| 35 | Life Science Journal | Afrouzeh, Soharbi, Torbati, Gorgin & Mallett (2013) | To compare the effects of physical practice with PETTLEP-based imagery, and physical practice with traditional imagery interventions, on new skill learning in novice volleyball players. | 36 novice male volleyball players (Mean age: 13.2 yrs), randomly placed into 3 groups: physical practice with PETTLEP-based imagery training; physical practice with traditional imagery training; and physical practice. | Experimental; Quantitative. | MIQ-R;  Passing test. | The mean scores for all groups were greater in the posttest than in the pretest. Tukey HSD tests revealed that significant development of physical practice and PETTLEP, was better than physical practice and traditional imagery and physical practice, and physical practice and traditional imagery, was better than physical practice only. As hypothesized the PETTLEP group improved more than the traditional imagery and physical practice groups. |
| 36 | Brain Research | Tomasino, Maieron, Guatto, Fabbro & Rumiati (2013) | To determine if motor system activity and functional connectivity between the cognitive system and sensorimotor system is differentially modulated by an individual's level of expertise. | 10 expert volleyball players and 10 novice individuals. | Experimental; Quantitative. | fMRI;  Action-related sentences. | Mean correct responses were significantly higher for athletes than novices, for pseudo words than impossible sentences (which are semantically correct but could not be performed) and possible sport-specific action sentences. Mean response times were significantly higher for pseudo words than impossible and possible sentences, and for negative Vs, positive sentences. Compared with novices, experts' activity in the left primary motor cortex hand area (M1) and in the left premotor cortex (Pm) was decreased by impossible actions presented as positive commands. Sensorimotor activation in response to action-related stimuli is not that automatic as held since we found that these areas were deactivated during the task, and their functional connectivity to the primary visual cortex was strengthened for possible actions presented as positive commands, reflecting the neural processes underlying the interaction between motor and visual imagery. |
| 37 | Accounting Education | Ay, Halaweh, & Al-Taieb (2013) | To investigate the psychological mental training of movement imagery from a different and unusual perspective, the field of education.  To teach the students the forearm pass in volleyball and to educate them on psychological skills and teach them when and how to use them effectively during before and after practice.  To investigate the effect of MI training on learning the forearm pass in volleyball. | 24 students at physical education college (Mean age: 19 yrs), divided in 2 groups. | Experimental; Quantitative. | MIQ-R. | The results showed significant differences in posttest between the 2 groups in favor of the experimental group. Learning a new motor skill through mental movement imagery training and physical practice enhanced learning and improved performance more than physical practice of the skill alone. The combination of mental movement imagery and physical practice enhanced learning and improved motor skill performance. |
| 38 | International Journal of Academic Research | Al-Haliq, Khasawneh & Al-Akor (2013) | To recognize the effect of mental training program related to skills teaching on learning the volleyball basic skills such as serving, setting and reception.  To identify the effect of mental training program that parallels skill teaching on learning volleyball basic skill at the members of the experimental group.  To identify the effect of the proposed skills teaching program about using the video for learning volleyball basic skills at the member of the control group.  To identify the differences between the experimental group that used the mental training program that parallels skill teaching and control group which used the usual program. | 40 volleyball male students, randomly divided into 2 groups: mental training program; and usual training program. | Experimental; Quantitative. | Mental training program. | The results indicated that there were statistically significant differences in serving, setting and reception skill between the experimental and control groups in favor to the experimental group. There was a positive effect of the mental training program on learning the volleyball basic skills. |
| 39 | College Student Journal | Beauchemin (2014) | To examine the impact of an integrative outreach model that incorporated mental health education, sport psychology concepts, and mental skill techniques, on awareness and attitudes related to mental health and counselling. | 32 students-athletes on an intercollegiate athletic team. 10 student-athletes (18-21 yrs old). | Experimental; Mixed. | Questionnaires; Qualitative interviews. | Student-athlete interviews illustrated variability in preferences for mental skills. |
| 40 | International Journal of Sports Sciences and Fitness | Gurmeet, Kumar, Kuldeep & Jit (2013) | To assess the mental toughness between team game players. | 106 male athletes (volleyball = 26; 18.19±1.72) | Cross-sectional; Quantitative. | PPI (Psychological performance inventory). | For the visual and imagery control there were significant differences among Hockey, volleyball and Kabaddi. On Visual and Imagery Control, Kabaddi Players scored the highest followed by Volleyball players and Hockey players. On Visual and Imagery Control, Kabaddi players were significantly higher than Hockey players. |
| 41 | Journal of imagery research in sport and physical activity | O & Hall (2013) | To conduct a qualitative analysis of competitive athletes’ use of voluntary image speed manipulation, describing why athletes are employing specific image speeds during imagery. | 9 competitive level (University and national/international) athletes (4 males and 5 females; 23.33±4.27 yrs old), from 6 (individual and team) sports. | Cross-sectional; Qualitative. | Semi-structured interviews. | All nine athletes commented on the using slow motion imagery for CS purposes, None of the athletes described employing fast motion images for the CS function of imagery. Some of the athletes reported that slow motion images often helped them when learning a new skill. All of the athletes described using slow-motion imagery to review and “fine tune” learned skills outside of competition. (...) athletes emphasized the utility of slow motion in identifying and mentally practicing extremely small movement details that would help improve performance. Athletes often reported that real-time images enhanced the ability to get an accurate kinesthetic representation of what a skill would feel like if performed perfectly. (...) Athletes also suggested that real-time imagery allowed them to visually and immediately review flawed performances while in competition to identify corrections that needed to be made. Slow-motion imagery was reported to enhance the ability to plan effective strategies (CG). Athletes specifically commented on the usefulness of slow-motion imagery in analyzing as many environmental details as possible, to best-construct a plan of action. Some athletes also felt that slow-motion imagery allowed them to refine specific movements during the mental review of a planned strategy. (...) Athletes generally noted that real-time images helped them to ensure the movement tempo of a strategy (...) athletes specifically noted that real-time images immediately before, or during competition helped them understand the actual speed at which they needed to make decisions when executing strategies. (...) Athletes also noted that fast-motion imagery was employed to facilitate strategy planning, but only while in competition. Several athletes felt that the use of slow motion enhanced the confidence-building effects of MG-M imagery when preparing for an upcoming performance. (...) Athletes also noted that by slowing images down, they could improve their focus in preparation for a performance. Athletes felt that the slow-motion speed enhanced the calming effects of MG-A images. (...) A few athletes felt that fast-motion images enhanced the energizing effects of MG-A imagery (e.g. volleyball spike). |
| 42 | Journal of Exercise Physiology Online | Coelho, Kuczynski, Paes, Greboggy, Santos, Rosa & Stefanello (2014) | To investigate if a mental training program intervention, involving imagery, relaxation, and video modelling would have a beneficial impact on stress reduction through measuring cortisol concentrations in a real competitive setting. | 53 elite volleyball players (28 males and 25 females; 14-24 yrs old), divided into 2 groups: experimental and control. | Quasi-experimental; Quantitative. |  | Psychological skills training had a significant effect in the salivary cortisol concentration levels. |
| 43 | International Journal of Sports Sciences and Fitness | Subramanyam (2014) | To examine the correlation among self-confidence, negative energy control, attentional control, imagery/visualization, motivation, positive energy, and attitude control in elite Indian athletes of national level. | 133 elite Indian athletes from 8 sports (volleyball = 16; 12%). | Cross-sectional; Quantitative. | PPI. | Athletes with optimal self-confidence can handle emotions such as fear, anger and frustration, remain in focusing on the task, think positively in pictures or visualizing a successful moment, willingness to persevere through pain or fitness troubles, ability to become energized from such sources as fun, joy, determination, positiveness and team spirit and with right attitude towards their sport. Athletes who can handle emotions such as fear, anger and frustrations, enjoy the game and maintain right attitude. Athletes who remain focused on the task can handle pressure during critical situations, can flow positive emotions, and maintain right attitude. Athletes who think positively in pictures or visualizing a successful moment can experience willingness to persevere through pain or fitness troubles and maintain right attitude. Motivated athletes can enjoy the game, and maintain right attitude. Athletes who can flow positive emotions can maintain right attitude. Athletes with right attitude experience higher levels of confidence, can control their negative emotions, remain focused, think positively in pictures, or visualizing a successful moment, willingness to persevere through pain or fitness troubles, can enjoy the game, and maintain right attitude. |
| 44 | Journal of Sports Medicine and Physical Fitness | Afrouzeh, Sohrabi, Haghkan, Rowshani & Goharrokhi (2015) | To compare the effects of physical practice with PETTLEP-based imagery and physical practice with traditional imagery on the learning of new skills in novice volleyball players. | 36 novice male volleyball players (Mean age: 13.5 yrs), randomly divided into 3 groups: physical practice with PETTLEP-based imagery training; physical practice with traditional imagery training; and physical practice only. | Experimental; Quantitative. | MIQ-R;  AAHPERD's test for "passing" in indoor volleyball. | There was significant difference in improvement between pretest and posttest of each groups. Tukey HSD tests revealed that significant development of physical practice and PETTLEP, was better than physical practice and traditional imagery and physical practice, and physical practice and traditional imagery, was better than physical practice only. |
| 45 | Psicogente | Arias, Cardoso, Aguiire & Arenas (2016) | To identify the differences of psychological characteristics related to performance, in relation to team sports (soccer, basketball, volleyball and futsal) and gender. | 205 athletes: 87 females (Mean age: 21.9 yrs), and 118 males (Mean age: 19.2yrs), from 4 sports (volleyball = 44, 21.4%). | Cross-sectional; Quantitative. | CPRD (questionnaire for Psychological Characteristics related to the Sports Performance). | Male athletes had higher values in stress management, influenced by performance evaluation and mental skills. Female athletes had higher values of motivation and team cohesion. In volleyball the psychological skill with the highest mean was motivation, followed by mental skills. Here, female athletes presented highest mean values in mental skills. |
| 46 | Psychology of Sport and Exercise | Gregg, O & Hall (2016) | To determine the relationship between goal orientations and imagery ability. | 272 athletes: 112 females and 160 males (Mean age: 20.04 yrs), from 4 individual sports, and 5 team sports (volleyball =34). University level (semi-elite), club, national and recreational. | Cross-sectional; Quantitative. | VMIQ-2;  MIAMS;  POSQ (Perceptions of Success Questionnaire). | For cognitive imagery ability, gender had a significant effect for athletes with low task/low ego orientation; female athletes rated their internal imagery perspective as clearer and more vivid. Regarding motivational imagery ability, when sport type was controlled for, cluster membership demonstrated a significant multivariate effect. Goal orientations have a relationship with motivational imagery ability but this same relationship was not evident with cognitive imagery ability. Athletes with high task/high ego goal orientations scored significantly higher on their ability to feel emotions and their ease of generating MG-M images compared to athletes with low task/high ego or low task/low ego orientations. No differences between goal orientation clusters were found for MG-A imagery ability. Athletes who have a high task orientation are very motivated and have an easy time forming mastery images and a high ability to experience the emotion of these images. |
| 47 | Psychology | Rothlin, Birrer, Horvath & Holtforth (2016) | To compare the effect of psychological skills training and mindfulness-based interventions on functional athletic behavior and to examine the underlying mechanisms of these interventions.  To show the suitability of FAB as a construct to evaluate sport psychological interventions and the utility of our FAB measure as an alternative outcome variable. | 108 athletes from 4 sports (curling, volleyball, floorball, ice hockey). 3 groups (control, PST, and MI). | Experimental; Quantitative. | Psychological skills training program. | No results: program in progress (5 weeks/, 2h/week). |
| 48 | Perceptual and Motor Skills | Secades, Molinero, Salguero, Barquín, Vega & Márquez (2016) | To use a Spanish version of the Coping inventory for competitive sport to investigate the relationship between coping strategies and the individual resilient qualities in a large group of athletes at two different points during the sports season in which coping strategies could change according to the pressure/relevance of the situation. | 235 athletes: 126 males and 109 females (Mean age = 20.7 yrs), from 8 sports (79.1% from 4 team sports: soccer, handball, volleyball, rugby; and 20.9% from 4 individual sports: gymnastics, athletics, cycling, triathlon). | Cross-sectional; Quantitative. | ISCCS (Coping Inventory for Competitive Sport);  Resilience scale (Spanish version). | There was no significant difference in resilience scores between evaluations performed during the last mesocycle or competition. A significant increase occurred in the scores for emotion-oriented and distraction-oriented coping during competition. Resilience scores correlated positively to task oriented coping and negatively to disengagement- and distraction-oriented coping during both periods. Analysis of variance indicated that athletes with high individual resilient qualities reached higher scores in task-oriented coping, using to a lower extent disengagement- and distraction-oriented coping. Results obtained suggest that resilient characteristics may associate in athletes to the use of more potentially adaptative coping strategies. Among task-oriented coping strategies, only relaxation and mental images showed significant correlations with resilience both in the mesocycle and after the competition (...). As for emotion-oriented coping strategies, both MI/thought control and resignation showed negative correlations with resilience in the two evaluations. |
| 49 | Wien Klin Wochenschr | Keilani, Hasenohrl, Gartner, Krall, Furnhammer, Cenik & Crevenna (2016) | To explore the use of mental techniques by professional athletes, and to assess the use of mental techniques depending on socio-demographic characteristics, sport experience and sport- associated injuries. | 191 athletes (142 males and 49 females), from 5 sports (basketball, football, hockey, ice hockey and volleyball = 45, 25%). | Cross-sectional; Quantitative. |  | Mental techniques seem to be well-accepted but rarely used among professional athletes. Imagery/visualization was reported to be used in 71 cases. |
| 50 | Revista Brasileira de Ciências do Esporte | Daronch, Petersen, Spindola, vaz, Oliveira & Geremia (2016) | To compare cortical processing in dancers and volleyball players, in the cerebral regions of planning and motor commands, kinesthetic perception and spatial positioning. | 7 female ballet dancers (22.9±1.8 yrs) and 7 female volleyball players (20.1±1.6 yrs). | Experimental; Quantitative. | EEG. | The differences found between the groups on electrodes C3 and C4, related to the preparation and initialization of voluntary movement and for the variable number of evoked neuronal elements allows us to state that there are differences in cortical processing between individuals with different motor skills. Results showed that ballet dancers and volleyball players present differences in the cortical processing in the cerebral regions of planning and motor commands. |
| 51 | European Journal of Neuroscience | Kraeutner, McWhinney, Solomon, Dithuribide & Boe (2018) | To examine how experience modulates brain activity driven via MI. | 38 athletes (volleyball = 10; 20.2±1.2 yrs; 7 females) from Atlantic University sport. Athletes were randomly assigned in 3 groups (basketball; volleyball; control). | Experimental; Quantitative. | Neuroimaging data (EMG);  MIQ-RS;  IUQ. | All groups were similarly able to perform MI, in both the visual and kinaesthetic domains. The control group presented a highest mean of visual MI score, and the volleyball group the lowest score. On the other hand, this group presented the highest mean of kineasthetic MI score, and the highest mean of IUC frequency score. Brain activity during MI is modulated by experience; speciﬁcally, that novice performance is associated with the additional recruitment of regions across both hemispheres. During MI, novice performance is associated with wide-spread and bilateral activity, primarily in frontal and parietal regions. |
| 52 | Journal of applied sport psychology | Perry, Chow, Tenenbaum & Katz (2018). | To investigate the effectiveness of teaching young learners PPR tailored to four closed-skills.  To examine the separate and combined performance effect of motor and mental components of PPR elicited in the first phase among novice adolescent learners performing closed self-paced skills. | Study1: 115 athletes (60 males and 55 females), from 4 sports (volleyball = 19; 11 males: 23.90±4.45 yrs; and 8 females: 15.8±1.22 yrs), from national and international elite levels. Study2: 240 students (120 males and 120 females: 16±1.46) with no experience in the sport task. | Experimental; Mixed. | Volleyball behaviors: walking toward the serving area, positioning, gazing toward the net/target, and bouncing the ball. Semi structured interviews. Study2: 3 groups (1 control+2 experimental). PPR implementation questionnaire + motor performance + MMPPR routine + MPPR routine. | The use of imagery was noted by 66% of the athletes. Interview data revealed that imagery was used extensively by athletes in all four sports as part of the PPR. Of interest, imagery was used at the end of the PPR, just prior to action initiation. (...) imagery is an integral part of the PPR process and thus must be integrated into the PPR once the learner has acquired some experience with the motor task. Findings revealed that PPR enhances motor performance and can be implemented at an early stage of learning. |