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Do the Physical and Environment PETTLEP Elements Predict Sport Imagery Ability?

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Abstract

The present study aimed to examine whether physical and environment elements of PETTLEP imagery relate to the ability to image five types of sport imagery (i.e., skill, strategy, goal, affect, and mastery). Two hundred and ninety participants (152 males, 148 females; *M*age = 20.24 years, SD = 4.36) from various sports completed the Sport Imagery Ability Questionnaire (SIAQ), and a set of items designed specifically for the study to assess how frequently participants incorporate physical (e.g., "I make small movements or gestures during the imagery") and environment (e.g., "I image in the real training/competition environment") elements of PETTLEP imagery. Structural equation modelling tested a hypothesised model in which imagery priming (i.e., the best fitting physical and environment elements) significantly and positively predicted imagery ability of the different imagery types (skill, $\beta = 0.38$; strategy, $\beta = 0.23$; goal, $\beta = 0.21$; affect, $\beta = 0.25$; mastery, $\beta = 0.22$). The model was a good fit to the data, χ^2 (174) = 263.87, $p < .001$, CFI = .96, TLI = .95, SRMR =.09, RMSEA = 0.05 (90% CI = 0.03 – 0.05). Findings displayed that priming imagery with physical and environment elements is associated with better skill, strategy, goal, affect, and mastery imagery ability. The findings extend models of imagery use (e.g., Cumming & Williams, 2012) by indicating that how athletes images may influence their imagery ability.

Keywords: imagery ability, physical elements, environment elements, PETTLEP imagery, imagery types

Do the Physical and Environment PETTLEP Elements Predict Sport Imagery Ability?

Imagery is a popular mental technique used by athletes and coaches to improve learning and performance (for a review, see Cumming & Williams, 2012). As the benefits of imagery become more established, there is a growing body of literature recognising its role in achieving cognitive and motivational functions (Paivio, 1985). Hall, Mack, Paivio, and Hausenblas (1998) defined five major functions served by imagery in sport: cognitive specific (CS; skills), cognitive general (CG; strategies), motivational specific (MS; goal), motivational general-arousal (MG-A; affect), and motivational general-mastery (MG-M; mastery). These functions form the main reasons why athletes image, and influence both what and how the imagery is carried out to achieve desired affective, behavioural, and cognitive outcomes (Cumming & Williams, 2012).

Why athletes image, what they image, and how they image to achieve different outcomes forms the basic premise of the revised applied model of deliberate imagery use (RAMDIU; Cumming & Williams, 2012, 2013), which builds on its predecessor, the applied model of imagery use developed by Martin, Maritz, and Hall (1999). The RAMDIU encourages researchers and practitioners to consider the individual characteristics of the imager (“Who”), the imagery situation (“Where and When”), the intended imagery function(s) (“Why”), and the imagery content (“What”) and characteristics (“How”). This model also outlines the role played by imagery ability in determining whether an imagery intervention will be effective for facilitating desired outcomes by impacting both “What” and “How” individuals image. Considering the different RAMDIU model components can improve the effectiveness of imagery interventions for achieving outcomes such as skill learning, confidence, and motivation (Callow, Hardy, & Hall, 2001; Cumming & Ramsey, 2008; Mellalieu, Hanton, & Thomas, 2009). As the RAMDIU is a recent addition to the imagery literature, few studies have yet to directly examine its propositions (for an exception,

see Anuar, 2016; Anuar, Cumming, & Williams, 2016b). Of interest to the present study was to further explore the proposed relationship between an individual's imagery ability and how they image.

It is now well established that athletes differ in their ability to image, and higher imagery ability will lead to more effective imagery outcomes (e.g., Gregg, Hall, & Butler, 2010; Robin et al., 2007). A technique for increasing individual imagery ability is PETTLEP imagery (Holmes & Collins, 2001), which involves incorporating seven different elements (i.e., physical, environment, task, timing, learning, emotions, and perspective) into imagery. For example, a tennis player may hold a tennis racquet (physical element) in a tennis court (environment) and imagine the backhand shot (task) in first person view (perspective) during imagery to improve execution of a backhand shot. In addition to performance benefits, there is growing interest in altering how an individual images based on these elements (Callow, Roberts, & Fawkes, 2006; Wright, Allsopp, & Westhead, 2007) to help athletes' imaging (e.g., improve imagery ability). Identifying which of the seven elements (i.e., physical, environment, task, timing, learning, emotions, and perspective) are beneficial for improving imagery ability, may in turn offer ways of further extending the propositions made by the RAMDIU. To date, robust evidence indicates that behaviourally matching the imagery conditions as closely as possibly to the real life situation by incorporating the PETTLEP elements leads to more effective imagery (for a review, see Wakefield, Smith, Moran, & Holmes, 2013). Two elements in particular, either when used individually or in combination, have been consistently found to produce better performance compared to more traditional imagery: physical and environment (Callow et al., 2006; Smith, Wright, & Cantwell, 2008; Smith et al., 2007).

The "physical" element refers to the importance of making the imagery experience as physical as possible (Wakefield & Smith, 2012). Wakefield and Smith (2012) further

described how this approach to imagery interventions could include not only the obvious step of imagining the kinesthetic sensations felt when performing the skill, but also adopting the starting position of the movement, and wearing the same clothes as when performing and holding any associated implements. Incorporating the physical element is proposed to exert its beneficial effects by increasing the shared brain regions and strengthening the memory function as explained by functional equivalence theory (Holmes & Collins, 2001). As also suggested by Gould and Damarjian (1996), dynamic kinesthetic imagery (e.g., holding the relevant sport equipment and making movements related to the images) will result in more vivid imagery because athletes would be able to more clearly recall the associated sensations. According to Lang`s bioinformational theory (1977, 1979), drawing on the relevant response and meaning propositions (i.e., verbal responses, somatomotor events, visceral events, processor characteristics) will help to create more vivid imagery as well as physiological responses similar to the real life situation.

The “environment” element is also based on Lang`s bioinformational theory and relates to the place the imagery is performed. Response and meaning propositions are more easily activated when stimulus information closely matches the real life situation. These stimulus propositions include multisensory environmental cues to help make the imagery more relevant and personally meaningful to the imager. These cues can be provided by imaging within the environment where the real life performance takes place and/or supporting image generation with pictures, video clips, and/or sounds relevant to this environment. In turn, the individual can better access response and meaning propositions from long-term memory and generate more effective images. Guillot, Collet and Ditmar (2005) and Wakefield and Smith (2012) have similarly suggested that being in the environment while imaging helps the athlete to feel closer to the actual performance.

A number of studies have demonstrated that altering how individuals' image based on elements from Holmes and Collins' (2001) PETTLEP model can lead to greater ease and/or vividness of the image. Compared to a static imagery group, Callow et al. (2006) reported higher vividness of a ski-slalom task for a dynamic imagery group who performed their imagery on the ski slope whilst wearing their ski equipment, adopting a race position, and making small side to side movements as if they were actually skiing. In two recent studies, Anuar and her colleagues (Anuar, Cumming, & Williams, 2016a; Anuar, Williams, & Cumming, 2016) demonstrated that incorporating elements of the PETTLEP model increased the ease and vividness of imaged movements. Furthermore, in both studies participants consistently perceived the physical and environment elements to be the most helpful in generating easier and more vivid images of movement. Collectively, these findings indicate a need to understand the association of these two particular PETTLEP elements with imagery ability.

The empirical evidence has helped to establish the "physical" and "environment" elements as ways to prime imagery of movements and skills. However, it is also possible that these elements may be helpful in generating other types of images experienced by athletes, such as those measured by the Sport Imagery Ability Questionnaire (SIAQ; Williams & Cumming, 2011). From an applied perspective, it is important to identify potential intervention strategies that will enable athletes to also improve their ability to image different imagery content (i.e., different types of imagery) so that this can be used to serve the specific function(s) of imagery (i.e., why the athlete is imaging). Athletes tend to image content they find easier to generate (Williams & Cumming, 2011). Therefore, improving the ability to image the five types of imagery reflective of the main functions of imagery use (i.e., skill, strategy, goal, affect, and mastery imagery content) will help to maximise the use of this imagery as a performance-enhancing technique. Furthermore, investigating whether a direct

relationship exists between using the physical and environment elements and the different types of sport imagery ability may lead to further developments of the RAMDIU by demonstrating that how one image relates to how well they image.

Therefore, the aim of the present study was to examine the relationship between athletes' use of physical and environment imagery primes and their sport imagery ability using a cross-sectional design. Drawing from previous research by Anuar and colleagues (Anuar, Cumming, & Williams, 2016a; Anuar, Williams & Cumming, 2016), it was hypothesised that incorporating physical and environment elements into imagery more frequently would be associated with greater ease of imaging of skill, strategy, goal, affect, and mastery imagery ability as explained in the functional equivalence theory (Moran & Holmes, 2013). As this is the first study to assess athletes' use of physical and environment primes, items were developed specifically for the present study.

Method

Participants

Two hundred and ninety participants (151 males, 139 females; M_{age} = 19.94 years, *SD* = 2.33) took part in the study. Most of the participants represented team sports (*n* =167), mainly representing football (*n* = 74), whereas 123 participants identified themselves as individual sport athletes, mainly representing athletics (*n* = 26), and road running (*n* = 23). All participants had been involved in their sport for an average of 9.46 years (*SD* = 4.32), with 93 participating recreationally or at club level, and 197 representing competitive level athletes from regional to national/international athlete.

Measures

Demographic information. Each participant was asked to provide background information on their age, gender, competitive level, years of experience, and sport played.

Sport imagery ability questionnaire. The SIAQ (Williams & Cumming, 2011) was used to measure ease of imaging. It consists of 15 items, with three items tapping each of the five subscales athletes use in relation to their sport (skill, strategy, goal, affect, and mastery imagery). Participants image each item and then rate their ease of imaging each item on a 7-point Likert-type scale whereby 1 represents *"very hard to image"* and 7 represents *"very easy to image"*. The SIAQ has previously derived valid and reliable scores with internal reliability being above .76 for the different subscales (Williams & Cumming, 2011) and for this study, all subscales appeared valid and reliable with internal consistency values reported in Table 2.

"Physical" and "environment" imagery priming items. Participants completed 10 items designed specifically for the purposes of the present study to assess how frequently the physical and environment elements were used when imaging. Items were based on descriptions of the physical (e.g., I wear training/competition clothes) and environment (e.g., I image in the real training/competition environment) elements given by Wakefield and Smith (2012), and those items used previously by Anuar and colleagues (2016). Participants were asked to consider the extent to which they incorporate each item into their imagery. Responses were rated on a 7-point Likert-type scale, with 1 representing "*never"*, 4 representing "*sometimes*", and 7 representing "*very often*".

Procedures

The protocols were submitted and approved by the ethical committee of the University where the authors were based. Participants were recruited either from contact with local sport teams or from an undergraduate sport science class. Potential participants were informed about the voluntary nature of the study. Those agreeing to take part provided written informed consent. They then completed either online (n = 67) or hardcopy (n = 223)

versions of a multi-section questionnaire consisting of demographic information, the SIAQ, and the imagery priming items. The questionnaire pack took 10 to 15 minutes to complete.

Data Analysis

Prior to analysis, the data were examined using SPSS 22.0 for missing values, mistakes, outliers, and univariate and multivariate normality. Prior to the main analyses, the psychometric properties of both the SIAQ and the priming items was checked using AMOS 22.0 software (Arbuckle, 2013) with maximum likelihood (ML) estimation. Exploratory confirmatory factor analysis (CFA) is the suggested strategy for utilising characteristics of a given data set to generate hints and hypothesis that help to structure subsequent investigation and test whether the items meet assumptions about the relations among variables of the study (Laursen, Little, & Card, 2012). Thus, for the physical and environment imagery priming items, an exploratory CFA was used to determine the structure of the observed variables (i.e., physical and environment) for the investigation. The best fitting model as determined by the exploratory CFA was then used in the main analyses. For the more established SIAQ (Williams & Cumming, 2011), a traditional CFA was used. The full measurement model (imagery priming and SIAQ) was then tested using AMOS before structural equation modelling examined the fit of the hypothesised model.

For both types of CFAs, the subsequent measurement model, and main analyses, the models' goodness of fit were tested by the chi-squared likelihood statistic ratio (χ^2; Jöreskog, & Sörbom, 1993). As a non-significant value is rarely found, additional fit indices were employed following the recommendations of Hu and Bentler (1999). The standardized root mean square residual (SRMR; Bentler 1995) and Root Mean Square Error of Approximation (RMSEA) were employed as indicators of the absolute fit, with desired values of < .08 and < .06. The Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) were also reported to reflect incremental fit with values for both of > .95 and > .90 considered to be excellent and good fit respectively (Hu & Bentler, 1999). Although there is still a debate surrounding the appropriate values for demonstrating an appropriate model fit (see Markland, 2007; Marsh,

Hau, & Wen, 2004), these values are the most commonly reported and accepted in the literature as indicative of the model fit. Models re-specification in the case of poor model fit was done by following the step-by-step techniques proposed by Byrne (2009), which includes inspection of estimates and modification indices.

Results

Preliminary Analyses

Data screening and item characteristics. The data were free from any missing values mistakes, and univariate and multivariate outliers. The Mardia`s coefficient was 95.47 and the critical ratio was over 1.96, indicating significant multivariate non-normality. Bootstrapping was therefore employed for all subsequent CFA/SEM analysis (Byrne, 2009).

SIAQ CFA and measurement model. A CFA on the SIAQ revealed a good fit to the data, χ^2 (80) = 127.83, $p < .001$, CFI = .97, TLI = .96, SRMR = .04, RMSEA = .05 (90% CI = 0.03 – 0.06). The internal reliability was adequate for all subscales with the Cronbach alpha coefficients being above .71 for all subscales (see Table 2). The inter-factor correlations between SIAQ subscales were significant and revealed moderate relationship ranging from 0.4 to 0.5 in magnitude.

Exploratory CFA of "imagery priming" items. A two-factor model consisting of five physical and environment items was tested using an exploratory CFA. This initial model had a poor fit to the data, $\chi^2(34) = 86.13$, $p < .001$, CFI = .91, TLI = .88, SRMR = .5, RMSEA = .07 (90% CI = 0.05 – 0.09). Due to high modification indices (Byrne, 2009), item 2 from the physical subscale and item 7 from the environment subscale were considered problematic and therefore removed from further analysis.

A second CFA with the two items removed revealed an improved fit to the data, $\chi^2(19) = 26.78$, $p = .11$, CFI = .98, TLI = .97, SRMR = .03, RMSEA = .04 (90% CI = 0.00 – 0.07). However, the high interfactor correlation (.60; $p < 0.001$) between the physical and

environment suggested that both variables are not purely independent and are instead highly inter-related (Bowen & Guo, 2011). Therefore, a one-factor model was examined to see whether this more appropriately represented the data (Byrne, 2009). The physical and environment variables were subsequently merged and a unidimensional variable named "imagery priming" was tested with the remaining 8 items (4 from the original physical scale and 4 from the original environment scale). The fit of this revised model was adequate, $\chi^2(20) = 29.82$, $p = .073$, CFI = .98, TLI = .97, SRMR = .04, RMSEA = .04 (90% CI = 0.00 – 0.07). However, item 3 and 8 were considered to be problematic due to high modification indices and therefore deleted in the final model.

The final model tested consisted of three physical items and three environment items loading onto the single factor named "imagery priming". Results for this CFA revealed a non-significant chi square, which is desirable but rarely obtained in SEM, and demonstrated good fit across the different indices (Tabanick & Fidell, 2013), χ^2 (9) = 9.75, p = .37, CFI = .99, TLI = .99, SRMR = .03, RMSEA = .05 (90% CI = 0.00 – 0.07). The standardised factor loadings were significant for all items ($p < .001$) and above .40, with item 1 ($\beta = .61$); item 4, ($\beta = .55$); item 5 ($\beta = .79$); item 6 ($\beta = .46$), item 9 ($\beta = .56$), and item 10 ($\beta = .45$). The internal reliability for imagery priming was also adequate ($\alpha = 0.75$) (Nunnally, 1978). The priming items are listed in Table 1. The items in the final model (highlighted in bold in Table 1) were therefore used in all subsequent analyses.

After the model modification and a goodness of fit values attained at the item level, the results of the overall measurement model containing both the SIAQ and priming items revealed a acceptable fit to the data: χ^2 (174) = 264.69, $p < .001$, CFI = .96, TLI = .95, SRMR = .05, RMSEA = .04 (90% CI = .03 – .05).

Descriptive statistics and imagery content ease of imaging differences. Means and standard deviations for each factor were calculated for the total sample as well as separately

for males and females and the different competitive levels as displayed in Table 2. In general, participants' rated their use of physical and environment imagery priming in relation their sport as between "not very often" to "sometimes" (M = 3.49, SD = 1.15). They also found it mostly "somewhat easy to image" the five types of ability measured by the SIAQ. A repeated measures ANOVA, $F(4, 1103) = 62.02$, $p < .001$, $\eta_p^2 = .18$, indicated that significant differences existed between SIAQ subscales. Pairwise contrasts using a Bonferroni ($p = .01$) adjustment to correct for multiple comparisons indicated that participants had significantly better affect imagery ability, compared to the other subscales (i.e., strategy, goal, affect, and mastery imagery ability, all *ps* < .001). Additionally, strategy imagery ability was significantly poorer than skill and goal imagery ability (*ps* < .001), and mastery imagery ability was significantly poorer than skill ($p < .001$) and goal ($p = .001$) imagery ability.

Main Analysis

The final SEM model as shown in Figure 1 revealed a good fit to the data, $\chi^2(155) = 231.16$, $p < .001$, CFI = .96, TLI = .95, SRMR =.05, RMSEA = 0.04 (93% CI = 0.03 – 0.05). The standardized regression weights revealed that "imagery priming" was positively associated with all five SIAQ subscales as shown in the Figure 1.

Discussion

The aim of this study was to examine the relationship between athletes' use of physical and environment imagery primes and their sport imagery ability. Based on previous research (Anuar, Cumming, & Williams, 2016a; Anuar, Williams, & Cumming, 2016), the physical and environment imagery priming items were hypothesised to predict greater ease of imaging skill, strategy, goal, affect, and mastery imagery ability.

A measure was developed to assess athletes' use of physical and environment imagery primes. Items were written based on the descriptions of the elements of the PETTLEP model

(Holmes & Collins, 2001) and included things such as wearing training/competition clothes and imaging in the real training/competition environment. Although physical and environment are distinct elements of the PETTLEP model, the high interfactor correlation found in the two-factor model suggested that participant responses to the items reflecting each variable are representing the same underlying construct (Tabachnick & Fidell, 2013). Consequently, data from the present study provided valid and reliable scores for a unidimensional scale consisting of items representing both physical and environment elements. Future research may wish to provide further validity evidence to support using this measure to capture athletes' use of physical and environment primes within natural settings. Another potential use of the measure is to serve as manipulation checks for interventions testing the effectiveness of PETTLEP imagery.

In support to the hypothesis, results of the present study showed that the frequency in which athletes incorporated the physical and environment PETTLEP elements into their imagery was positively associated with greater ease of imaging. The finding suggests imagery priming through the incorporation of physical and environmental PETTLEP elements could be another way to make it easier for athletes to image different types of content that they use in relation to their sport. Anuar and colleagues (Anuar, Cumming, & Williams, 2016a; Anuar, Williams, & Cumming, 2016) previously found that imagery priming helped with movement images. The present results support these previous studies, but extend this finding beyond movement images by revealing an association with the ability to image cognitive and motivational sport specific imagery content measured by the SIAQ.

The possible explanation for the physical and environment elements positively predicting athletes' ease of imaging five different types of imagery content could be attributed to Lang's Bioinformational theory (1979). Bioinformational theory proposes that the incorporation of more relevant response and meaning propositions (e.g., verbal responses,

somatomotor events, visceral events, processor characteristics, and sense organ adjustment) results in more vivid imagery. The presence of props (physical) and cues from the real situation (environment) may help to trigger these responses leading to more vivid imagery that is generated more readily. Additionally, Wakefield et al. (2013) suggested that a closer match between the imaged and real life conditions contribute to an increment in imagery ability. Therefore, coaches and practitioners should encourage athletes to use physical and environment primes to help make their images easier to generate.

Interestingly, the relationship between how athletes' image (i.e., incorporating the physical and environment elements) and imagery ability has implications for the RAMDIU, which is a model for guiding effective imagery use (Cumming & Williams, 2013). Research has identified a positive relationship between imagery use and ease of imaging (Gregg, Hall, McGowan & Hall, 2011; Williams & Cumming, 2012). As such, the relationship between imagery use and imagery ability may **be** influenced by how the imagery is performed (i.e., the incorporation of the physical and environment PETTLEP elements). Consequently, the present study findings suggest that how particular content is imaged could possibly relate to the ability to image such content. As the RAMDIU proposes that the "Imagery Ability" component predicts the "What (type) & How" component of the model, the present findings suggest the relationship between the "What (type) & How" and "Imagery Ability" components could be bi-directional in nature.

The first strength of this study is the relatively large sample size and use of SEM to establish the relationship between physical and environment priming and sport imagery ability rather than separate regression analyses which would have inflated the likelihood of a Type I error. The second strength of this study was the use of previous research findings (Anuar, Cumming, & Williams, 2016) to focus on individuals have identified as their preferred elements (i.e., physical and environment) of the PETTLEP model to increase

imagery ability. Other strengths of this study were the implementation of the RAMDIU framework to underpin the research question, and that the assessment of physical and environment elements was conducted in a more natural setting as a compliment to previous research exploring the relationship between imagery ability and these PETTLEP elements through manipulating the usage of these elements (Anuar, Williams, & Cumming, 2016).

Despite the strengths of the present study, the work is limited by the imagery priming items having been developed for the present study and have not been extensively validated. Although evidence was found to support the validity and reliability of the scores, it is still recommended that researchers further investigate this measure. Additionally, the cross-sectional nature of the study means that causation cannot be inferred. A logical next step in continuing this line of research would be to conduct an intervention to encourage athletes to adopt the physical and environment elements in naturalistic settings to see whether this improves their sport imagery ability.

The present study was the first to examine the relationship between athletes' use of physical and environment imagery primes and their imagery ability. Consequently, it is unknown whether athletes would differ in their use of physical and environment primes according to key demographic variables such as gender, sport type, and competitive level. Therefore, future research could examine any differences in utilising physical and environment elements between males and females or across different competitive levels to see whether the effect the primes have on imagery ability is influenced by such individual characteristics.

The present study contributed to the literature by giving further insight into the relationship between the "What (type) & How", and "Imagery Ability" components of the RAMDIU. The important practical implication is that athletes of lower imagery ability should be educated and encouraged to use more physical and environment elements during

their imagery to help develop their imagery ability likely resulting in greater benefits from this technique. Although mean scores of the imagery priming frequency demonstrated moderate results which suggest athletes only use these elements sometimes, those who use the elements more frequently tend to display greater imagery ability. Therefore, it can be suggested that those who find it harder to image, should be encouraged to use physical and environmental primes as a potentially simple way to improve imagery ability when using this technique in an applied setting as results suggest that this should impact not only movement based imagery but other types of imagery (e.g., goal, mastery and affect) ability.

In conclusion, this study is the first to explore the relationship between athletes' general use of physical and environment PETTLEP elements and their sport imagery ability. Results revealed more frequent use of physical and environment elements positively predicted skill, strategy, goal, affect, and mastery imagery ability. These results suggest that the "What (type) & How" component of the RAMDIU is likely to influence the "Imagery Ability" component. Future research should be undertaken to investigate the differences in utilising physical and environment PETTLEP elements using different research design (e.g., qualitative research and intervention studies) to have a better understanding of how athletes use these elements and the effects this can have on their imagery ability.

4520 words

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Table 1. Original imagery priming items and the six retained items following the exploratory CFA analysis.

Item no	Physical and environment imagery priming items	Element	Means	SD
1	**I make small movements or gestures during the imagery**	**Phys.**	**4.26**	**1.67**
2	**I wear training/competition clothes	Phys.	4.01	1.74
3	** I image while holding or touching kit related to my sport (e.g., hockey stick)	Phys.	3.12	1.93
4	**I perform the movement for real just before I image it**	**Phys.**	**4.64**	**1.82**
5	**I image while standing or adopting a position similar to what I am imaging**	**Phys.**	**4.84**	**1.32**
6	**I watch myself or others perform the movement and/or in that situation, either live or recorded**	**Env.**	**3.36**	**1.79**
7	** I image in the real training/competition environment	Env.	3.73	1.70
8	** I image a situation that I have recently experienced	Env.	2.81	1.75
9	**I use pictures or other visual cues of the environment and/or equipment**	**Env.**	**3.10**	**1.50**
10	**I try to image the same senses (e.g., sight, sound, smell, taste, touch) that I would experience in the real life situation**	**Env.**	**4.39**	**1.78**

Notes. The items in bold font are the 6 retained items for final analysis.
** Items that were removed during Exploratory CFA analysis.
Phys. = Physical. Env. = Environment

Table 2. Mean and standard deviations of imagery priming and imagery ability according to gender and competitive level.

		Total sample		**Gender**				**Competitive Level**			
	α	*M*	*SD*	Female		Male		Recreational		Competitive	
				M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Imagery priming	.74	3.49	1.15	3.44	1.15	3.53	0.98	3.23	1.07	3.61	1.17
Skill	.81	5.12	1.02	5.11	1.00	5.13	1.04	5.14	0.94	5.11	1.06
Strategy	.83	4.51**	1.14	4.32	1.16	4.68	1.09	4.28	1.07	4.52	1.17
Goal	.76	5.02	1.20	4.77	1.16	5.02	1.18	4.82	1.24	5.11	1.18
Affect	.81	5.53*	1.08	5.47	1.05	5.59	1.10	5.51	1.04	5.54	1.10
Mastery	.71	4.71**	1.02	4.53	1.03	4.89	0.98	4.78	1.05	4.68	1.00

Note. * = significantly greater than the other SIAQ subscale at $p < .001$. ** = significantly lower than the other SIAQ subscales $p <$ or $= .001$.

Figure 1. The final SEM model, imagery priming predicting all SIAQ subscales. For visual simplicity, control variables (gender and competitive level) are not presented.