Investigating the Use of Imagery by Elite Ballet Dancers

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By using an applied model of imagery use developed for sport (Martin, Mortitz, & Hall, 1999), the purpose of the present study was to examine the use of imagery by professional ballet dancers. In addition, the relationship between imagery use and the levels of self-confidence and anxiety that dancers may experience just prior to performing were also investigated. Forty-two full time professional ballet dancers were administered the Competitive State Anxiety Inventory-2 and the Sport Imagery Questionnaire. Results indicated that professional dancers use imagery for both cognitive and motivational functions. Hierarchical multiple regression analyses revealed motivational general-mastery imagery to be a significant predictor of self-confidence, and cognitive specific imagery to be a significant predictor of the direction of both somatic and cognitive anxiety symptoms.

Utilisant un modèle appliqué de recours à l’imagerie mis au point pour le sport (Martin et al., 1999), cette étude examinait le recours à l’imagerie chez les danseuses et danseurs de ballet professionnels. Les chercheurs s’intéressaient aussi aux liens entre l’imagerie, la confiance en soi et le taux d’anxiété chez les danseuses et danseurs juste avant l’entrée en scène. Dans le cadre de l’étude, on a demandé à quarante-deux danseuses et danseurs de ballet professionnels de remplir le questionnaire Competitive State Anxiety Inventory-2 et un questionnaire sur l’imagerie sportive. Les résultats révèlent que les danseuses et danseurs professionnels appliquent l’imagerie aux fonctions cognitives et

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Many thanks to all members of the Birmingham Royal Ballet for participating in and supporting this study.
aux fonctions motivationnelles. Les analyses de régressions hiérarchiques multiples indiquent que l’imagerie de maîtrise générale de la motivation constitue une variable explicative pertinente du taux de confiance en soi, alors que l’imagerie propre aux fonctions cognitives s’avère efficace pour prédir les symptômes d’anxiété somatiques et cognitifs.

Various reasons have been suggested for why dancers use mental imagery. The primary reason advanced by both researchers and practitioners is for the acquisition and improvement of dance skills (Hanrahan & Samela, 1990; Poon & Rodgers, 2000; Taylor & Taylor, 1995; Vaccaro, 1997) and choreographies (Hanrahan & Vergeer, 2000). Hanrahan, Têtreau, and Sarrazin’s (1995) study with 65 intermediate level dancers evaluated the effects of mental imagery when used while performing dance movements. Whole body images were used as facilitators during the performance of three dance movements, selected for their variation in dynamics and large amplitude allowing for easy measurement. Through the examination of the dancers in three groups (movement imagery, relaxation placebo, and no treatment control), a significant facilitatory effect of imagery on two of the movements was found. These results verified the efficacy of images during movement and suggested that imagery is a useful psychological tool for performance enhancement in dancers. Other reasons why dancers use imagery have also been suggested, and these include increasing self-confidence, regulating arousal and anxiety, and increasing concentration (Hanrahan & Vergeer, 2000; Taylor & Taylor, 1995). Despite imagery being a popular teaching tool in dance and a number of books published on the subject, limited research has systematically investigated the use of imagery by dancers.

Sport Imagery

Although research on imagery use in dance has been limited, research in sport has provided substantial evidence that imagery can effectively serve such functions. Martin, Moritz, and Hall (1999) recently reviewed the various functions that imagery serves in sport. They proposed that within the sport domain, five types (i.e., functions) of imagery can be identified encompassing Paivio’s (1985) theory that the images used by the athlete will affect cognitive or motivational response systems. Although the following five types of imagery are seen to be orthogonal, it is feasible that athletes may often use two or more in combination:

5. Motivational Specific (MS): Imagery of specific goals and goal orientated behaviours.

These five types of imagery form the central part of an applied model of imagery use in sport proposed by Martin et al. (1999). The model suggests that for a given sport situation, the function of imagery used by the athlete will determine whether specific cognitive, affective, and behavioural outcomes will be achieved. Possible outcomes fall into three broad categories: (a) skill and strategy learning and performance, (b) cognitive modification, and (c) arousal and anxiety regulation. Research supports the proposal that the function of imagery used should match the intended outcome (for reviews see Hall, 2001; Martin et al., 1999; Murphy & Martin, 2002). With respect to the cognitive functions of imagery, case studies and anecdotal evidence suggests that CG imagery can be beneficial when used for the learning and performance of strategies, game plans, and entire routines ( Munroe, Giacobbi, Hall, & Weinberg, 2000). For example, the performance benefits of using CG imagery have been reported for: rehearsing football plays (Fenker & Lambiottte, 1987), wrestling strategies (Rushall, 1988), pommel horse
routines in gymnastics (Mace, Eastman, & Carroll, 1987), artistic gymnastic routines (White & Hardy, 1998), and entire canoe slalom races (MacIntyre & Moran, 1996). Many studies, conducted in a wide variety of contexts, have shown that the use of CS imagery is conducive to enhancing the learning and performance of motor skills (see Driskell, Cooper, & Moran, 1994 for a review).

Researchers have noted the effectiveness of imagery use for modifying an athlete’s thoughts and beliefs (Murphy, 1994; Suinn, 1996). Self-confidence is a sport related cognition that clearly can be affected by imagery use. For example, Callow, Hardy, and Hall (2001) investigated the effects of a MG-M intervention on the sport confidence of three elite badminton players using a single subject multiple baseline design. Sport confidence was assessed using the State Sport Confidence Inventory (Vealey, 1986) once a week for 20 weeks prior to a match. Imagery interventions were put into practice for all players at two week intervals (weeks 5, 7, and 9). The 2-week, 6-session intervention was made up of mastery imagery, consisting of images associated with control, confidence, and mental toughness in difficult situations. A significant increase in sport confidence was demonstrated for two of the players and a stabilized confidence level for the third (i.e., self-confidence levels remained stable compared to baseline), thus indicating that a MG-M imagery intervention improves sport confidence.

With respect to MG-A imagery, it has been argued that certain images may elicit particular physiological responses (Lang, 1977, 1979). When individuals engage in imagery, they activate information about stimulus propositions that describe the content of the imagined situation, and response propositions that describe what the physiological, emotional, and behavioural responses are to the stimuli in that imaged situation. It is these response propositions that elicit physiological responses during imagery that are similar to what is seen during the actual behaviour (Lang, 1977, 1979). Because response propositions are modifiable and represent a prototype for overt behaviour, these propositions must be activated so that the behaviour can be altered in some way. For athletes who associate their anxiety symptoms with competing poorly, therefore, imagery can be used to learn how to perform well under such conditions (Martin et al., 1999). In support of this proposal, evidence exists that MG-A imagery can be used for increasing arousal (Caudill, Weinberg, & Jackson, 1983; Hecker & Kaczor, 1988; White & Hardy, 1998). Additionally, MG-A imagery may also be used by the athlete to regulate competitive anxiety (Vadoez, Hall, & Moritz, 1997).

Finally, MS imagery has also been shown to be beneficial in a sport context. Munroe et al. (2000) reported that athletes use MS imagery to image two types of goals, performance and outcome. Performance goals involve imaging what it takes to achieve a goal, while outcome goals, which are further divided into team and individual goals, involve imaging winning and other accomplishments (e.g., completing the competition). Callow and Hardy (2001) recently argued that a benefit to using MS imagery would be an increase in athletes’ motivation to attain their goals. Consistent with these arguments, Martin and Hall (1995) found that beginner golfers who were assigned to a six session imagery condition spent more time practicing a golf putting task, set higher goals for themselves, and were more adherent to their training regime than participants in a control condition.

Possible Application to Dance

There are many similarities between dance and sport, especially at the elite level. For example, both demand peak performance, include stringent selection processes, require extensive practice and motivation, and are very mentally challenging (Hanrahan & Vergeer, 2000; Taylor & Taylor, 1995). With this in mind, it might be possible to apply the imagery model proposed by Martin and colleagues (1999) to the professional dance context. Dancers might be engaging in cognitive imagery to aid in the learning and performing of skills (i.e., CS imagery) and dance routines (i.e., CG imagery). In addition to the cognitive functions, dancers may be engaging in motivational imagery to build or maintain their self-confidence (i.e., MG-M imagery), regulate anxiety and arousal levels
(i.e., MG-A imagery), and image the achievement of goals (i.e., MS imagery). A model outlining these possible functions of imagery is shown in Figure 1.

**Study Purposes**

The first purpose of the present study was to examine whether professional ballet dancers' use the five different functions of imagery identified by Hall, Mack, Paivio, and Hausenblas (1998). We predicted that dancers would report using all five functions of imagery for the reasons outlined above, but made no additional predictions as to which functions of imagery the dancers would use the most frequently. In addition, given that self-confidence and performance anxiety are two critical concerns of dancers, a second purpose of the present study was to examine the motivational functions of dance imagery, and whether the use of these functions are related to levels of self-confidence and anxiety that dancers may experience just prior to performing. Self-confidence is the belief that an individual can successfully perform a desired behaviour, and this is considered to be an important characteristic of successful dancers. For example, Taylor and Taylor (1995) suggest that self-confidence will have a positive influence on all other psychological factors related to dance performance as well as on performance directly. Accordingly, there is a need to identify psychological strategies, such as mental imagery, that may be used to enhance self-confidence in dancers. The use of MG-M imagery has already been shown to increase sport confidence (Callow et al., 2001), and Moritz, Hall, Martin, and Vadocz (1996) argue that "if one wishes to develop, maintain, or regain sport confidence, then one should image being confident" (i.e., use MG-M imagery, p. 178). Given that dancers may also be using MG-M imagery to increase their self-confidence, it was hypothesized that dancers who generally use more MG-M imagery would be more self-confident.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Imagery Function</th>
<th>Desired Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dance</td>
<td>Cognitive</td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>Sequences</td>
</tr>
<tr>
<td></td>
<td>Cognitive</td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td>Specific</td>
<td>Skills</td>
</tr>
<tr>
<td></td>
<td>Motivational</td>
<td>Increasing</td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>Self-</td>
</tr>
<tr>
<td></td>
<td>Mastery</td>
<td>Confidence</td>
</tr>
<tr>
<td></td>
<td>Motivational</td>
<td>Regulating</td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>Anxiety</td>
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<td></td>
<td>Arousall</td>
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</tr>
<tr>
<td></td>
<td>Motivational</td>
<td>Goal-setting</td>
</tr>
<tr>
<td></td>
<td>Specific</td>
<td>and related</td>
</tr>
<tr>
<td></td>
<td></td>
<td>behaviours</td>
</tr>
</tbody>
</table>

*Figure 1. Applied dance imagery model (adapted from Martin, Moritz, & Hall, 1999)*
Performance anxiety, often referred to as *stage fright* in performing circles, is a common problem for dancers (Hamilton, 1998). A widely researched area in the field of sport psychology, anxiety is seen to be a multidimensional concept that is comprised of both cognitive and somatic components (Martens, Burton, Vealey, Bump, & Smith, 1990). Cognitive anxiety is associated with negative expectations and worries about oneself, the situation at hand, and potential consequences (Morris, Davis, & Hutchings, 1981). Somatic anxiety, on the other hand, pertains to the individual’s perception of physiological changes in the body that indicate autonomic arousal and unpleasant feeling states, and include such responses as a rapid heart rate, shortness of breath, clammy hands, butterflies in the stomach, and tense muscles (Morris et al., 1981). Traditionally, anxiety has been assumed to be always negative and detrimental to performance, and investigators have strived to identify psychological strategies that could be used to reduce or regulate levels of anxiety (e.g., Vadocz et al., 1997).

More recently, however, research has demonstrated that simply measuring the level or intensity of anxiety experienced by the athlete can be misleading (Jones, 1995). To gain a more accurate understanding of an athlete’s psychological state, it is has become important to examine how individuals interpret the extent to which the intensity of anxiety symptoms experienced are either facilitative or debilitating to their performance (Jones & Hanton, 2001). By doing so, research has shown that higher level athletes respond more effectively to their anxiety symptoms by interpreting these as being more facilitative or beneficial to upcoming performance. This is despite no differences being found in the actual intensity of the anxiety being experienced when these athletes are compared to lower level counterparts (Jones, Hanton, & Swain, 1994; Jones & Swain, 1995; Jones, Swain, & Hardy, 1993).

Rather than focusing on regulating anxiety levels, a shift has been made towards identifying psychological strategies that could be used to restructure interpretations of anxiety symptoms as being more facilitative of performance. In sport, the use of MG-A imagery has already been identified as a strategy used by athletes to increase, regulate, or reduce the arousal and anxiety they experience (Munroe et al., 2000; Vadocz et al., 1997). It is also possible that this function may be used to develop facilitative interpretations of anxiety in dance. According to prediction made by Lang’s bioinformational theory (1977, 1979), athletes debilitated by symptoms of anxiety would improve their competitive performance by imaging themselves performing perfectly while experiencing the symptoms of anxiety (i.e., MG-A imagery) that usually accompany their performance (Martin et al., 1999). Given that Jones (1995) has convincingly argued that the key to understanding the relationship between anxiety and performance is by understanding the directional interpretation of anxiety symptoms, this will be the focus of the present study. Since dancers can also use MG-A imagery for the same purpose as athletes (Taylor & Taylor, 1995), it was hypothesized that dancers who use more MG-A imagery would report symptoms as being facilitative towards their performance.

**Method**

**Participants**

All participants (*N = 42*) involved in this study were full time professional ballet dancers and members of the Birmingham Royal Ballet (United Kingdom). Of the group, 24 were male and 18 female and ages ranged from 17 to 42 with a mean age of 25.43 years. The group included a cross section from all 4 ranks of the company; artist (*n = 15*), first artist (*n = 6*), soloist (*n = 13*), and principal (*n = 8*), with the artist rank being the most inexperienced dancers and the principal rank being the most experienced dancers. All of the dancers were considered to be of an elite status because they had entered intensive training at a young age and had been training for at least six years before being selected to join the professional ranks. Before joining a company and receiving payment
for their work, the dancers underwent a stringent selection process to ensure that they were able to meet the high physical and technical standards set by the profession. The dancers were currently training and rehearsing 6 to 7 hours daily, 5 to 6 days a week for an average of 35 hours per week. Performing on stage in front of an audience occurred regularly for all members of the company.

**Instruments**

The participants supplied relevant demographic data including age, gender, and rank within the company.

*Modified Version of Competitive State Anxiety Inventory-2 (CSAI-2)* (Martens et al., 1990) was employed to measure the dancers’ state anxiety and state self-confidence levels prior to their performance. Although the CSAI-2 is designed to assess state anxiety responses prior to performing in a competition, it was still considered to be suitable for capturing the multidimensional nature of anxiety in a ballet setting. Even though competition does not exist in ballet in the same traditional sense found in sport, the CSAI-2 was developed based on the theoretical conception that competition is a situation that leads to the adequacy of an individual’s performance being evaluated (Smith, Smoll, & Wiechman, 1998). It can certainly be argued that dancers face evaluative pressures of their performance. In a professional company, such as the one involved with the present study, poor performances may result in a loss of status or rank with the company while good performances are rewarded with better roles in future productions. Indeed, Smith et al. (1998) point out that competitive anxiety in sport and stage fright experienced by dancers are part of the same family of performance related fear-of-failure constructs. Although there is no empirical data to support their point, we will also make the same assumption.

The CSAI-2 consists of 27 items with 9 items in each of 3 subscales: (a) cognitive state anxiety, (b) somatic state anxiety, and (c) self-confidence. Responses are recorded on a 4-point Likert-type scale ranging from 1 (*not at all*) to 4 (*very much so*), with possible intensity scores on each subscale ranging from 9 to 36. Consistent with previous research examining the directional perceptions of anxiety symptoms, the direction scale developed by Jones and Swain (1992) was also included. Each participant was asked to rate the degree to which the experienced intensity of each symptom was either facilitative or debilitative to the subsequent performance on a scale from -3 (*very debilitative*) to +3 (*very facilitative*), with the midpoint of 0 (*unimportant*). Possible direction scores on each subscale ranged from -27 to +27. To better contextualize the questionnaire to a dance setting, minor changes were made to the wording of two items. To be more precise, the word “competition” was replaced with the word “performance”. Reliability of the CSAI-2 is examined through the internal consistency of its three subscales given it is a state measure. Alpha coefficients are typically reported to range from .79 and .90 for each of the three subscales.

*Sport Imagery Questionnaire.* The Sport Imagery Questionnaire (SIQ: Hall et al., 1998) was given to the dancers to assess to what extent they use imagery. Although the SIQ was developed specifically for assessing a sport population, dancers were included in the original samples used to validate the questionnaire (Hall et al., 1998). Since dance imagery research is in its infancy, there is a lack of valid and reliable dance imagery measurement instruments. Consequently, the SIQ was deemed to be the most appropriate measure for use in the present study. The questionnaire contains 30 items that asks participants to rate on a 7-point Likert scale ranging from 1 (*rarely*) to 7 (*often*) how often they employ the five different functions of imagery: cognitive general (CG; e.g., imagining routines and strategies), cognitive specific (CS; e.g., imagining perfectly executed skills), motivational general-mastery (MG-M; e.g., imagining staying focused and working through problems), motivational general-arousal (MG-A; e.g., imagining the arousal, stress, and anxiety that may accompany performance), and motivational specific (MS; e.g., imagining specific goals and outcomes). The SIQ has been shown to be a valid
and reliable instrument with an acceptable internal consistency estimates for the five subscales, with alpha coefficients ranging from .70 to .88 (Hall et al., 1998).

For the purposes of the present study, several of the items reflecting sports terminology were modified to better reflect a dance context. For example, the CS item “I can consistently control the image of a physical skill” was changed to “I can consistently control the image of a dance move”, and the MG-M statement “I image myself working successfully through tough situations (e.g., a player short, sore ankle)” was changed to, “I imagine myself working successfully through tough situations (e.g., injury, problem with costume).” Prior to the start of the study, this slightly revised version of the SIQ was then distributed to several elite ballet dancers who had over 20 years of professional experience to ascertain the face validity of the questionnaire. In addition, several of the participants were consulted about the wording and relevance of the items following completion of the questionnaire.

Procedure
Following ethical approval from the Review Board for Non-Medical Research Involving Human Subjects at the University of Western Ontario, this study was conducted around the opening performances of two different three act ballets. Of the two works, one was newly choreographed and the other returning to the company’s repertoire following an absence of approximately 5 years. These occasions seemed to present an ideal opportunity for the collection of anxiety related data as a performer’s level of anxiety will likely increase when performing a debut role. The participants were contacted to request their participation and informed that the project aimed to examine the relationship between anxiety, self-confidence, and imagery use in elite ballet dancers. Confidentiality was assured and the permission of the directors of the company was received. Because the participants were in certain cases performing multiple roles, the individual chose to complete the questionnaires prior to performing the role that was personally deemed to be the most challenging. Participants were asked to answer the questions as honestly as possible, were instructed that the time when the CSAI-2 should be completed was crucial, and that their responses to the CSAI-2 should be recorded within 1 hour before the start of the performance. The dancers were asked to complete the SIQ within the hour following the end of the performance. Both questionnaires took between 5 and 10 minutes to complete. After completing both questionnaires, the dancers returned them to the experimenter in a sealed envelope.

Results

Preliminary Analysis
Reliability analysis. The internal consistency of the items representing each of the different constructs measured in the study was determined by calculating coefficient alphas (Cronbach, 1951). Adopting a criterion of .70 (Nunnally, 1978), the internal consistency was determined to be acceptable for each subscale of the CSAI-2 (i.e., somatic anxiety, cognitive anxiety, self-confidence), with values ranging from .75 to .90, and the SIQ (i.e., CS, CG, MS, MG-A, and MG-M), with values ranging from .72 to .88. It must be noted, however, that one item had to be dropped from the CG subscale “I imagine alternative steps in case I need them” and two items from the MG-A subscale “I imagine the stress and anxiety associated with performing”, and “When I imagine myself performing in front of an audience, I feel anxious” in order to obtain the minimum criteria of .70. The coefficient alphas are reported in Table 1.

Descriptive statistics. Means and standard deviations were calculated for each subscale of the SIQ (i.e., CS, CG, MS, MG-A, and MG-M) and CSAI-2 (i.e., somatic anxiety, cognitive anxiety, and self-confidence) and are presented in Table 1. A repeated measures ANOVA revealed significant differences in the dancers use of the different functions of imagery, $F(4,160) = 26.93$, $p < .001$, $\eta^2 = .40$. A Tukey HSD post hoc test revealed that the dancers used CG imagery ($M = 5.26$, $SD = 1.22$), MG-A imagery ($M = 4.71$, $SD =$
1.40), MG-M imagery ($M = 4.68, SD = 1.30$), and CS ($M = 4.51, SD = 1.42$) significantly more than they used MS imagery ($M = 3.34, SD = 1.50$).

Table 1

Means and standard deviations for the CSAI-2 and SIQ subscales.

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>$SD$</th>
<th>$\bar{a}$</th>
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</thead>
<tbody>
<tr>
<td>Cognitive Anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity</td>
<td>19.74</td>
<td>5.37</td>
<td>.83</td>
</tr>
<tr>
<td>Direction</td>
<td>2.41</td>
<td>11.77</td>
<td>.90</td>
</tr>
<tr>
<td>Somatic Anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity</td>
<td>17.23</td>
<td>5.46</td>
<td>.87</td>
</tr>
<tr>
<td>Direction</td>
<td>3.72</td>
<td>11.21</td>
<td>.76</td>
</tr>
<tr>
<td>Self-confidence</td>
<td>23.70</td>
<td>6.11</td>
<td>.90</td>
</tr>
<tr>
<td>Imagery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Specific</td>
<td>4.54</td>
<td>1.42</td>
<td>.86</td>
</tr>
<tr>
<td>Cognitive General</td>
<td>5.26</td>
<td>1.22</td>
<td>.72</td>
</tr>
<tr>
<td>Motivational Specific</td>
<td>3.38</td>
<td>1.51</td>
<td>.88</td>
</tr>
<tr>
<td>Motivational General-Arousal</td>
<td>4.76</td>
<td>1.41</td>
<td>.73</td>
</tr>
<tr>
<td>Motivational General-Mastery</td>
<td>4.70</td>
<td>1.30</td>
<td>.78</td>
</tr>
</tbody>
</table>

**Gender differences in imagery use, anxiety, and self-confidence.** Given that previous research in sport has found that gender differences exist in anxiety levels (e.g., Perry & Williams, 1998), a multivariate analysis of variance (MANOVA) was used to examine whether any such differences would exist in the present study examining a dance population. The subscales of the CSAI-2 and SIQ served as the dependent variables and gender served as the independent variable. No significant differences were found for any of the dependent variables. Therefore, the data was collapsed across gender for further analyses.

**Correlational analyses.** Bivariate correlations were calculated for the CSAI-2 intensity and direction subscales, and are reported in Table 2. The relationship between cognitive anxiety intensity and somatic anxiety intensity ($r = .63, p < .001$) was similar to the relationship reported by Fletcher and Hanton (2000), but higher than most other previous studies (e.g., Gould, Petlichkof, & Weinberg, 1984; Jones & Hanton, 1996, 2001; Martens et al., 1990). In addition, the relationships between the cognitive intensity and direction dimensions ($r = .48, p < .05$) and the somatic intensity and direction dimensions ($r = .58, p < .001$) were again higher than previous studies (Fletcher & Hanton, 2000; Jones & Hanton, 2001), but still acceptable in terms of supporting the separate measurement of intensity and direction. Finally, self-confidence was negatively related to the intensity of both cognitive ($r = -.67, p < .001$) and somatic anxiety ($r = -.64, p < .001$) symptoms, but positively related to the direction of cognitive ($r = .62, p < .001$) and somatic anxiety ($r = .50, p < .01$).

**Hierarchical Multiple Regressions Analyses**

A series of hierarchical multiple regression analyses were conducted on each of the subscales of the CSAI-2 to determine the relationship between imagery use and multidimensional state anxiety, and the results are presented in Table 3. Upon examination of the correlation matrix, it appeared that high correlations existed between the imagery subscales (.34-.79). However, this is not necessarily an indication of multicollinearity because the correlation matrix is incapable of diagnosing specific collinear relationships (Belsley, Kuh, & Welsch, 1980). Instead, Belsley et al. (1980)
recommend using a combined method of examining both the variance decomposition index and the condition index. The variance decomposition index provides an indicator of how much an independent variable contributes to the total variance of that particular regression coefficient. Problems occur when the independent variable contributes more than 50% of the variance of two or more regression coefficients in a single regression equation (Callow & Hardy, 2001). The condition index provides a number to show the extent of near singularity of independent variables, and indices larger than 30 represent moderate to strong problems with collinearity (Callow & Hardy, 2001). Examination of the collinearity diagnostics for the data from the present study indicated that all imagery subscales were below the recommended threshold for both the variance decomposition index and the condition index and were therefore included in the data analysis.

Table 2
Bivariate correlations among the CSAI-2 subscales.

<table>
<thead>
<tr>
<th>Subscales</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Anxiety (Intensity)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cognitive Anxiety (Direction)</td>
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<td>-.48*</td>
<td>-.39*</td>
<td>.81***</td>
<td>.62***</td>
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<tr>
<td>Somatic Anxiety (Intensity)</td>
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<td></td>
<td></td>
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<tr>
<td>Somatic Anxiety (Direction)</td>
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<tr>
<td>Self-confidence</td>
<td></td>
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</tbody>
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Note: *p < .05, **p < .01, ***p < .001

Table 3
Summary of Hierarchical Regression Analyses for Imagery Variables Predicting Competitive State Anxiety and Self-confidence.

<table>
<thead>
<tr>
<th>Variable</th>
<th>R</th>
<th>R² change</th>
<th>F</th>
<th>( \hat{\alpha} )</th>
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<tr>
<td>Self-confidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG-M</td>
<td>.34</td>
<td>.11</td>
<td>4.92*</td>
<td>.34</td>
</tr>
<tr>
<td>Cognitive Anxiety (Direction)</td>
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<td></td>
</tr>
<tr>
<td>MG-A</td>
<td>.12</td>
<td>.01</td>
<td>.54</td>
<td>-.12</td>
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<tr>
<td>CS</td>
<td>.40</td>
<td>.15</td>
<td>6.38*</td>
<td>.41</td>
</tr>
<tr>
<td>Somatic Anxiety (Direction)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG-A</td>
<td>.17</td>
<td>.03</td>
<td>1.03</td>
<td>-.17</td>
</tr>
<tr>
<td>CS</td>
<td>.22</td>
<td>.19</td>
<td>3.89**</td>
<td>.47</td>
</tr>
</tbody>
</table>

Note: *p < .05, **p < .01

Self-confidence. For self-confidence, MG-M was entered on the first step, followed by CS, CG, MS, and MG-A, which were all entered as a block on the second step. The rationale behind this order was that the applied model of imagery use predicted that MG-M imagery, but not the other functions of imagery, would be associated with self-confidence (Martin et al., 1999). A significant model for self-confidence was found, \( F(1,40) = 4.92, p < .05 \). MG-M imagery was the only significant predictor of self-confidence accounting for 11.2% of the variance (\( p < .05 \)). Inspection of the beta weight for this variable indicated that the use of MG-M was positively related to self-confidence (\( \hat{\alpha} = .34, p < .05 \)).

Anxiety. For anxiety, two separate hierarchical multiple regression were conducted with either cognitive anxiety direction scores or somatic anxiety direction scores serving as the criterion variables. MG-A imagery was then entered on the first step, followed by CS,
CG, MS, and MG-M, which were all entered as a block on the second step. Again the rationale for this order was developed based on the predictions of the applied model of imagery use that MG-A imagery, but not the other functions of imagery, would be associated with anxiety. A significant model was found for the direction of cognitive anxiety, but contrary to prediction, MG-A imagery was not found to account for a significant amount of variance. Instead, only CS imagery accounted for a significant amount of variance (14.5%). Interpretation of the beta weight for this variable ($\hat{\beta} = .41, p < .05$) showed that the use of CS imagery is positively related to direction scores of cognitive anxiety. Similar results were also found for the direction of somatic anxiety, $F(2,39) = 5.096, p < .05$, which again indicated that CS imagery was the only the variable that accounted for a significant proportion of the variance (18.8%). The beta weight ($\hat{\beta} = .47, p < .01$) for this variable also revealed that CS imagery was positively related to direction scores of somatic anxiety. In other words, dancers who used more CS imagery reported more facilitative interpretations of both their cognitive anxiety and somatic anxiety symptoms.

**Discussion**

The purpose of this study was two fold. The first purpose was to examine whether professional ballet dancers use the five functions of imagery identified by Hall et al. (1998). The second purpose was to investigate the relationship between imagery use, self-confidence, and the interpretation of anxiety symptoms experienced by dancers prior to performing a debut role in a three act ballet.

Various cognitive and motivational benefits to performance have been cited as reasons for dancers to use imagery (Taylor & Taylor, 1995), but no systematic examination of dancers’ use of imagery has been undertaken to date. Thus, the present research investigated this issue within a professional dance population through the administration of the SIQ. Similar to the use of imagery by individuals in other domains such as sport and exercise (see Hall, 2001 for a review), it was found that professional dancers use imagery for both cognitive and motivational functions. In particular, they report using imagery to rehearse dance sequences (CG imagery), to rehearse specific dance skills (CS imagery), to stay positive and confident in tough situations (MG-M imagery), to regulate arousal and anxiety (MG-A imagery), and to a lesser extent, for goal setting purposes (MS imagery). No differences were reported by male and female dancers in their use of imagery. Again, this corresponds to the findings for athletes that minimal differences exist in the use of imagery by male and female rowers (Barr & Hall, 1992) and soccer players (Salmon, Hall, & Haslam, 1994).

The present study also investigated whether imagery use by dancers is related to their level of self-confidence and the interpretation of the anxiety symptoms they experience just prior to performing. With respect to self-confidence, support was found for our hypothesis that dancers who use more MG-M imagery would be more self-confident. To be exact, MG-M imagery was the only function of imagery that significantly predicted the dancers’ level of self-confidence. The same recommendation put forward by Moritz et al. (1996) for building self-confidence in athletes would seem to be applicable to dancers. Simply put, dancers should imagine themselves being self-confident in order to develop, maintain, or regain self-confidence.

A second hypothesis developed based upon Lang’s bioinformational theory (1977, 1979) and the applied model of imagery use (Martin et al., 1999) was that dancers who use more MG-A imagery would report their symptoms as being more facilitative towards performance. According to theory, dancers debilitated by anxiety symptoms would improve their performance by imaging themselves dancing in conditions when they normally experience these symptoms (i.e., MG-A). Contrary to this hypothesis, however, MG-A imagery failed to predict the direction of both cognitive and somatic anxiety symptoms. Instead, dancers who imaged their skills (i.e., CS imagery) tended to perceive
their anxiety symptoms as being facilitative towards their performance, and this is consistent with findings of a recent qualitative study that athletes image successful performance of a forthcoming skill as a strategy for helping them ignore negative anxieties or worries (Hanton, Mellalieu,

Together, these findings suggest that the function/outcome relationship predicted by the applied model of imagery use might not be as simple or as straightforward as initially thought, particularly in the case of regulating the interpretation of anxiety symptoms at least in a dance context. Although qualitative investigations have identified imagery as being a strategy that can influence the interpretation of anxiety symptoms (Hanton & Jones, 1999; Hanton et al., in press), perhaps MG-A imagery is not the most effective function for achieving this outcome. Rather, CS imagery has emerged in the present study as the function of imagery linked with increased facilitative interpretations of anxiety symptoms. As a result, dancers debilitated by high levels of anxiety intensity should be encouraged to use CS imagery just prior to performing.

Further evidence from athletic populations suggest that athletes use MG-M imagery to maintain their performance level in the presence of high levels of anxiety by increasing their self-confidence (Hanton et al., 2004). In this type of situation, self-confidence acts as a buffer by allowing athletes to tolerate higher levels of cognitive and somatic anxiety before experiencing problems with performance (Hardy, 1990). Given that MG-M imagery was the function of imagery related to higher levels of self-confidence in the present study, it possible that dancers debilitated by their anxiety symptoms might also use this type of imagery as an intervention strategy. Important to examine in future work, therefore, would be the functions of imagery that dancers use just prior to the performing. Recall that the measurement of imagery use (i.e., SIQ) that was employed in the present study measured the extent to which dancers use imagery on a general basis. Perhaps, the SIQ can be contextualized for a particular performance or competition in order to better understand the strategies that dancers/athletes use to control such things as self-confidence and anxiety.

The present study represents an initial attempt to better understand dancers’ use of imagery and its relationship to variables such as self-confidence and performance anxiety. There are a couple of limitations, however that are important to acknowledge. First, the sample size is relatively small. However, this is quite a unique sample of professional dancers and obtaining access to such dancers for research purposes immediately prior to a performance is very difficult. Nevertheless, this research should be replicated with a larger number of dancers performing at various levels. Second, the SIQ was slightly modified to better suit a dance setting. Upon examination of the psychometric properties of this adapted version, problems were revealed with the internal reliability of two of the subscales. We rectified this problem by eliminating some of the items. Upon closer inspection of the eliminated CG item “I imagine alternative steps in case I need them”, it appears that this may not be relevant to a dance context given that dancers are expected to perform the choreographed steps and it would not be appropriate for them to use alternative ones during a dance performance. Of greater concern is the elimination of two MG-A items that describe imaging levels of anxiety, with the remaining items being mostly focused on imaging arousal levels, and this may explain our finding that MG-A imagery was not predictive of anxiety. Based on these issues concerning the internal reliability of the CG and MG-A subscales of the SIQ, it appears that one of the next steps for research examining the use of imagery by dancers would be to develop a valid and reliable questionnaire.

Needless to say, more research on this topic is warranted. While the findings suggest that the predictions for self-confidence made by the model of imagery use seem to have application in a dance setting, it appears that some revision may be necessary to take into account the interpretations that athletes hold for their anxiety symptoms. There has been considerable research examining what has been termed the 4 W’s of imagery use in sport (e.g., Hall, Rodgers, & Barr, 1990; Munroe et al., 2000), and some research in exercise (Hausenblas, Hall, Rodgers, & Munroe, 1999). The 4 W’s refer to where performers use
imagery (i.e., location), when they use it (i.e., time frame), why they use it (i.e., function), and what they imagine (i.e., content). Similar research could be undertaken with dancers. If a goal of dance imagery research is to ultimately develop more effective interventions, then we need to first establish a foundation on which to build such interventions. Determining the 4 W’s of imagery use by dancers of various performance levels would provide that foundation.

References


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