Applications of the Individual Zones of Optimal Functioning Model for the Multimodal Treatment of Precompetitive Anxiety

James J. Annesi
Rutgers University
Enhanced Performance Technologies, Inc.

Effects of a precompetitive anxiety regulation system, based upon tenets of the individual zones of optimal functioning (IZOF) model, multidimensional anxiety theory, and the specific-effects hypothesis, were tested. In Phase I, case studies (3 elite adolescent tennis players) were used to analyze the IZOF model within a multidimensional state anxiety framework. In Phase II, the effectiveness of a precompetitive anxiety regulation system, based upon IZOF and the specific-effects hypothesis, was tested for enhancing match performance. Essential elements of IZOF theory were supported. In Phase II, in-zone/out-of-zone A-state assessment was used to guide athletes’ treatment selections. After training athletes in prematch psychological skills designed to regulate specific cognitive state anxiety, somatic state anxiety, and state self-confidence dimensions, posttreatment performances yielded higher values ($p < .05$) than pretreatment. The need to replicate findings through different sample types, sports, and expertise levels was emphasized. Concerns with intrusion into athletes’ precompetitive routines were discussed.

Applied sport psychologists are frequently required to design and apply treatments intended to regulate athletes’ precompetitive anxiety levels in order to maximize performance. While numerous models of the anxiety-performance relationship exist (see Weinberg, 1990; Zaichkowsky & Takenaka, 1993), little research has focused on testing and developing treatment protocols based upon models that are considered valid. Clearly, research evaluating the various paradigms, such as drive theory (e.g., Martens, 1971), inverted-U hypothesis (e.g., Krane, 1992; Sonstroem & Bernardo, 1982), catastrophe theory (e.g., Hardy & Parfitt, 1991), reversal theory (e.g., Kerr, 1989, 1993), and multidimensional anxiety theory (e.g., Martens, Burton, Vealey, Bump, & Smith, 1990; Parfitt, Jones, & Hardy, 1990), has taken one path, whereas work focusing on anxiety treatment has taken another, usually emphasizing treatment effect over a rationale for treatment selection (e.g.,

James J. Annesi is with the Department of Exercise Science and Sport Studies at Rutgers University, 70 Lipman Dr., New Brunswick, NJ 08901-8525.
Anshel, 1990; Mace & Carroll, 1985). While various investigations have been well grounded in sound anxiety management conceptualizations (e.g., Kerr & Leith, 1993; Maynard, Smith, & Warwick-Evans, 1995), most have not been guided by the broader anxiety-performance theories.

Published studies commonly claim success at enhancing performance through regulating competitive anxiety without suggesting any (anxiety-performance) theoretical basis for why they were effective. Surprisingly, few criticism of such shortcomings have been given (Gould & Udry, 1994). For example, Noel (1980) used visuomotor behavior rehearsal (VMBR) to regulate male tennis players’ arousal levels. Noel reported that performance increased for some athletes and declined for others, but made no attempt to link the findings with a theory. Similarly, Lanning and Hisanga (1983) applied abbreviated progressive relaxation to adolescent volleyball players. The researchers reported that performance improved but, as a rationale, only offered a brief suggestion that some social-psychological factors may have contributed.

While researchers concerned with accurately describing the anxiety-performance relationship have often eluded to how treatment selection may logically flow from the model of interest (e.g., Hanin, 1986, 1989; Kerr, 1993; Martens, Vealey, & Burton, 1990), others have questioned the sport psychologists’ readiness or abilities to adequately implement directed treatments based upon theory (Raglin & Turner, 1992; Raglin & Morgan, 1988; Wrisberg, 1994). Clearly, a gap exists in the applied research literature concerning theory-driven anxiety treatment selection and application.

In recent years, there has been a substantial movement away from nomothetic analysis of the anxiety-performance relationship in favor of ideographic analysis (Auweele, DeCuyper, VanMele, & Rzewnicki, 1993; Gould & Udry, 1994; Wrisberg, 1994). The zone of optimal functioning paradigm (Hanin, 1980, 1986, 1989), more recently referred to as individual zones of optimal functioning (IZOF; Hanin & Syrja, 1995), has been successful in predicting the effects of state anxiety on performance using ideographic analysis. The IZOF model notes an individual’s precompetition state anxiety (A-state) associated with a personal best performance. This has usually been done by recalling a previous personal best performance and self-reporting (retrospectively) corresponding feelings immediately prior to that competition (Hanin, 1986, 1989; Turner & Raglin, 1996). After the A-state measurement, an optimal functioning zone is developed by adding and subtracting a 0.5 SD unit around the score (Hanin, 1989). Findings have supported these A-state zones to be associated with performances higher than out-of-zone anxiety scores (see Raglin, 1992). No predictions were made regarding performance levels above optimal zones versus those below. Also, Turner & Raglin (1996) reported that increased distance from IZOFs does not seem to be associated with greater performance reduction. Unlike other anxiety-performance models, IZOF is exclusively intraindividual (Hackfort & Schwenkmezger, 1993).

Most IZOF research has employed the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), a clinically based, self-report A-state test that yields a single, unified, A-state score. Adaptations of this research have used the Competitive State Anxiety Inventory-2 (CSAI-2; Martens et al., 1990), a sport-specific self-report instrument that provides separate cognitive A-state, somatic A-state, and state self-confidence values (Krane, 1993; Prapavessis & Grove, 1991; Woodman, Albinson, & Hardy, 1997). Separating A-state into subcomponents is considered advantageous for anxiety treatment prescription based upon the matching
(Marten et al., 1990) or specific-effects (Lehrer & Woolfolk, 1984) hypotheses (Annesi, 1997). These treatment selection systems have indicated that cognitive-based treatments best affect cognitive anxiety, whereas somatic-based treatments best affect somatic anxiety.

Although built into the original IZOF model, the accuracy of reported prospective/retrorpectve correlations with actual A-state measurements for estimating optimal anxiety zones has been questioned, especially when the CSAI-2 is the measurement instrument (Annesi, 1997). In the present research, empirically grounded tenets of the IZOF model were used to develop a multimodal precompetitive anxiety treatment application system. The effectiveness of this system in increasing performance was evaluated through detailed case studies. Specifically, in Phase I, optimal precompetitive A-state zones were assessed (individually for cognitive A-state, somatic A-state, and state self-confidence dimensions), based upon IZOF and multidimensional anxiety theory. Individualized analyses of the association of these zones with more successful performances were made. In Phase II, athletes were trained in various anxiety self-regulation skills that matched specific needs (based upon the specific-effects hypothesis) for use before competition beginnings. For example, if precompetitive A-state assessment indicated a need for somatic anxiety reduction, a somatic-based treatment (e.g., progressive relaxation) was suggested. Then, a formal protocol for the identified strategies was provided. Finally, the effectiveness of this system for increasing performance levels was analyzed.

Hypotheses, based on IZOF theory, were that in-zone performance values would be higher than those for out-of-zone, precompetitive A-state values would be highly variable both within and between athletes, and optimal functioning zones would be highly individual. It was further hypothesized that, given the logical and research bases of the anxiety treatment system used, posttreatment performance values would be higher than pretreatment. Ultimately, it was hoped that the different analyses would give preliminary shape to a system for precompetitive anxiety treatment design based upon adaptations of the IZOF model, multidimensional anxiety theory, and the specific-effects hypothesis.

Phase I
Method
Participants

Participants were three national level junior tennis players. Athlete A was a 17-year-old male who began competing at age 12. Of his 6 years in competition, 5 were at the sectional level, 1 at national. Athlete A practiced approximately 11 hr/week and competed in approximately 10 tournaments/year. Athlete B was a 15-year-old female who began competing at age 10. Of her 6 years of tennis, 3 were at the sectional level, 3 at national. Athlete B practiced approximately 15 hr/week and competed in approximately 12 tournaments/year. Athlete C was a 16-year-old male who began competing at age 11. Of his 6 years of competitive tennis, 4.5 were at the sectional level, 1.5 at national. Athlete C practiced approximately 10 hr/week and competed in approximately 10 tournaments/year.

Participants and their parents gave informed consent for results to be used for this research. Each also gave advance consent to obtaining, practicing, and
using selected mental skills under the direction of a provided sport psychology consultant. None of these athletes had any prior formal psychological skills training. Personal coaches were also contacted and gave approval for the present project.

**Instrumentation**

*Performance.* Participants’ tournament matches were tracked using The Tennis Analyst computer assessment system, which recorded relevant match data on a shot-by-shot basis, such as forehand errors, points won through forcing backhand approach shots, and outright winners hit. Summaries were available for factors such as forcing shots and unforced errors. Also, athletes and their personal coaches were asked to evaluate performances after each match on a 1–10 scale (including half points), where 1 = *worst possible performance* and 10 = *best possible performance.* They were asked to try not to be affected by a win or loss, only by how performance related to the athlete’s ability. The score was to represent an overall impression of the match performance. Because performance scores varied by more than one point (between coach and athlete) in only two cases, mean values were used.

Using a formula suggested by Daw and Burton (1994) to objectively rate a tennis match performance (aggressive margin = percentage of points won from forcing shots – percentage of unforced errors), a moderately high correlation ($r = .70, p < .001$) was found between the computer-generated assessment data derived through this formula, and athletes’ and coaches’ subjective scoring. In a pilot study for this investigation, interrater reliability was high ($rs = .90–.93, ps < .001$) between tennis professionals ($N = 3$) using computer scoring to obtain objective measurement.

Although evaluating individual performances can be problematic in open-skilled sports with opponents, Raglin (1992) and Raglin and Morgan (1988) strongly suggested that subjective performance evaluations, taken from individuals very familiar with a performer’s abilities (as was the case here), is a superior measurement method. This has not gone without opposition in favor of more objective measurement (Weinberg, 1990). Within this research, the objective aggressive margin assessment was moderately (but not perfectly) correlated with coaches’ and athletes’ subjective evaluations. Based upon the proponents of subjective evaluation, important global performance factors (e.g., coming back from an injury, a long match in hot weather earlier in the day) were probably not accounted for within the objective measure. However, some relationship was demonstrated between the subjective and objective performance assessments. Considering the extant literature, current findings, and the fact that computer-generated assessments were not available for all matches, coach and athlete evaluations (1–10 for each match) were chosen as the performance measure for the present research.

*State Anxiety.* The Competitive State Anxiety Inventory-2 (CSAI-2; Martens et al., 1990) was used to measure precompetition A-state. The CSAI-2 is a sport-specific, self-report inventory that takes < 5 min to complete. It assesses the cognitive, somatic, and self-confidence dimensions separately, yielding corresponding subscale scores. It is comprised of 27 items, with 9 items in each of the 3 subscales. Respondents answer using a Likert scale ranging from 1 = *not at all* to 4 = *very much so.* Subscale scores range from 9 to 36. Reliability coefficients for the CSAI-2 fall in the following ranges: .79–.81 on the cognitive subscale,
.82–.83 on the somatic subscale, and .88–.90 on the self-confidence subscale (Martens et al., 1990). Anti-social desirability instructions were presented before administration.

**Procedure**

All three athletes repeatedly self-administered the CSAI-2 approximately 45 min before sanctioned United States Tennis Association tournament matches over a 3- to 4-month period. Because CSAI-2 scores are substantially influenced by time-to-event administration (see Gould, Petlichkoff, & Weinberg, 1984; Jones & Cale, 1989; Krane & Williams, 1989), test completion timing was kept as consistent as possible. Only singles matches were used in this investigation. Coaches and players were asked to make their performance assessments immediately after matches. This score was written on the bottom of the corresponding CSAI-2 forms. When available, the computer-based evaluation printouts were also included. For Phase I, Athlete A provided 24 completed CSAI-2 forms with corresponding performance scores (8 from first rounds, 7 from second, 6 from third, 2 from fourth, and 1 from a fifth). Athlete B provided 14 (5 from first rounds, 5 from second, 3 from third, and 1 from a fourth). Athlete C provided 16 completed forms and performance scores (5 from first rounds, 5 from second, 4 from third, and 2 from fourth). Coaches confirmed that CSAI-2 self-administrations were done privately and at the appropriate times.

**Data Analyses**

Data were first used to develop optimal functioning zones for each athlete on all three A-state subscales. Based upon IZOF theory (Hanin, 1986, 1989), after noting the CSAI-2 subscale scores that corresponded to a best performance for each participant, a 0.5 SD unit was added and subtracted to these scores to form the IZOF zones. Standard deviations were calculated based upon individuals’ collective CSAI-2 subscale scores (see Krane, 1993). This procedure yielded optimal functioning zones (IZOFs) for each athlete on each of the cognitive A-state, somatic A-state, and state self-confidence dimensions. The next analysis assessed whether performance values differed within and outside of the zones.

**Results**

Intraindividual CSAI-2 subscale alpha values were similar to reported norms (Athlete A cog = .68, som = .68, sc = .76; Athlete B cog = .73, som = .87, sc = .78; Athlete C cog = .63, som = .69, sc = .81). One way ANOVAs indicated no significant (ps > .05) subscale score differences based upon the tournament round.

IZOFs were derived for each athlete on each CSAI-2 subscale (see Table 1). Consistent with IZOF theory, in two of the three cases (Athletes A and C), A-state subscale score ranges were quite wide (11–19 points). Athlete B demonstrated less variability (5–7 points). Also consistent with IZOF theory, IZOFs showed considerable difference between athletes on each subscale, supporting the individual nature of each.

An analysis was conducted to test whether performance values within subscale-based IZOFs were higher than performance values outside (i.e., above or below) of the zones. In every case (each subscale with each athlete), performance values were higher within (rather than outside of) IZOF zones. Significant differences (ps < .05) were found for Athlete A on the self-confidence dimension.
<table>
<thead>
<tr>
<th>Athlete</th>
<th>Cognitive A-state</th>
<th>Somatic A-state</th>
<th>State self-confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>Range</td>
</tr>
<tr>
<td>Athlete A</td>
<td>22.71</td>
<td>5.79</td>
<td>13–32</td>
</tr>
<tr>
<td>Athlete B</td>
<td>17.50</td>
<td>2.03</td>
<td>14–19</td>
</tr>
<tr>
<td>Athlete C</td>
<td>15.00</td>
<td>3.41</td>
<td>10–22</td>
</tr>
<tr>
<td>Normative data</td>
<td>19.29</td>
<td>4.80</td>
<td>—</td>
</tr>
</tbody>
</table>

Note. IZOF ranges were derived by adding and subtracting .5 SD to the CSAI-2 subscale score corresponding to each athlete’s best recorded competitive performance. Score ranges were 9–36 for each subscale.

*Normative data (elite sample) were adapted from Martens et al. (1990).*
and Athlete C on all (cognitive, somatic, and self-confidence) dimensions (see Table 2). Effect sizes reflecting in-zone/out-of-zone performance differences were generally moderate to high (see Table 2). Figures 1–3 present these results graphically, by athlete. Further analysis was conducted to examine the percentage of prematch CSAI-2 scores (by subscale) that fell below, within, and above each athlete’s IZOF (see Table 3). Only Athlete B had more in-zone scores than out-of-zone (on the cognitive and self-confidence subscales). Athlete A and C had no more than 31% in-zone scores on any of the three CSAI-2 subscales. No above-zone self-confidence scores were found for Athlete A, or below-IZOF somatic scores for Athlete B. Generally, values were varied in regard to being below, within, and above optimal zones.

Point biserial correlation was used to determine the relationship between the continuous variable of performance and the dichotomous variable of in-zone/out-of-zone A-state subscale value. For all three athletes, approximately 14% of the performance variance was explained on the cognitive dimension, 8% on the somatic, and 19% on the self-confidence. Using Fisher Z transformation ($Z_r = .36$), approximately 13% of the performance variance was explained through A-state values being either in or out of optimal functioning zones, overall.

**Phase II**

**Method**

**Participants**

Two of the three athletes who participated in Phase I continued into Phase II—the intervention phase. Athlete C unexpectedly relocated at the start of mental skills training and therefore provided no usable data for Phase II.

**Table 2  In- and Out-of-IZOF Performance Differences for CSAI-2 Subscales, by Athlete**

<table>
<thead>
<tr>
<th>Athlete</th>
<th>Cognitive A-state</th>
<th>Somatic A-state</th>
<th>State self-confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athlete A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>6.86</td>
<td>6.71</td>
<td>7.67</td>
</tr>
<tr>
<td>SD</td>
<td>2.11</td>
<td>2.05</td>
<td>1.51</td>
</tr>
<tr>
<td>Athlete B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>6.50</td>
<td>6.50</td>
<td>6.39</td>
</tr>
<tr>
<td>SD</td>
<td>.60</td>
<td>.84</td>
<td>.89</td>
</tr>
<tr>
<td>Athlete C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>7.60</td>
<td>7.50</td>
<td>7.80</td>
</tr>
<tr>
<td>SD</td>
<td>1.39</td>
<td>1.80</td>
<td>1.04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In-IZOF performance M</th>
<th>Out-of-IZOF performance M</th>
<th>df</th>
<th>t</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive A-state</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somatic A-state</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State self-confidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05. **p < .01, one-tailed test.
Figure 1 – In-zone/out-of-zone CSAI-2 subscale scores and corresponding performance values for Athlete A.
Figure 2 – In-zone/out-of-zone CSAI-2 subscale scores and corresponding performance values for Athlete B.
Figure 3—In-zone/out-of-zone CSAI-2 subscale scores and corresponding performance values for Athlete C.
Table 3 Above-, Below-, and Within-IZOF Ranges for CSAI-2 Subscales, by Athlete

<table>
<thead>
<tr>
<th>Athlete A</th>
<th>Athlete B</th>
<th>Athlete C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cog</td>
<td>Som</td>
<td>SC</td>
</tr>
<tr>
<td>Above IZOF</td>
<td>45.83</td>
<td>50.00</td>
</tr>
<tr>
<td>Within IZOF</td>
<td>29.17</td>
<td>29.17</td>
</tr>
<tr>
<td>Below IZOF</td>
<td>25.00</td>
<td>20.83</td>
</tr>
</tbody>
</table>

Note. All values represent percentages. Cog = cognitive state anxiety CSAI-2 subscale, Som = somatic state anxiety CSAI-2 subscale, SC = state self-confidence CSAI-2 subscale.

Instrumentation

Performance was evaluated through athletes’ and personal coaches’ subjective rating averages. This procedure of rating each match performance on a 1–10 scale (using half points) was preliminarily validated in Phase I. A-state was measured by the CSAI-2 45 min before each tournament singles match, as in Phase I. Intraindividual subscale alpha values were similar to Phase I (Athlete A cog = .74, som = .79, sc = .33; Athlete B cog = .79, som = .23, sc = .75).

Procedure

Psychological skills training was provided on an individual basis for both athletes. Each met with a sport psychologist on a regular basis for 1 hr/week. Participants were informed that their developing mental skills would be used to self-regulate for performance enhancement in the near future. In addition to in-person training, each athlete agreed to follow recommendations for homework practice. Personal log books were used to confirm psychological skills rehearsal time. Skills were introduced into prematch routines after about 2 months of training. Follow-up was provided. Table 4 presents the psychological skills developed with each athlete as well as their approximate training time in-session and (logged) practice time.

Coaches and athletes were trained to self-score their CSAI-2 forms. This was done prematch on an ongoing basis. Based on each athlete’s IZOF zones on each CSAI-2 subscale, a one-page grid, directing athletes toward which skill(s) to use when outside their zone(s), was provided. Treatment selections were based on the specific-effects hypothesis. For example, if Athlete A’s prematch cognitive A-state score was above the 23.90 (rounded = 24) boundary for his cognitive zone, treatment selections would include cognitive restructuring and focus control. If Athlete B’s prematch somatic A-state score was above the 18.22 (rounded = 18) boundary for her somatic zone, treatment selections, such as breath control and deep muscle relaxation, would be suggested. A similar method was used to raise cognitive A-state, somatic A-state, and state self-confidence levels when indicated. Athletes referred to this brief treatment selection grid after assessing their prematch A-state levels before each match began. Athletes were repeatedly assessed on their abilities to complete this procedure while not feeling burdened by doing so. At
Table 4  Psychological Skills Trained and Their Intended Anxiety Regulation Direction

<table>
<thead>
<tr>
<th>Treatment</th>
<th>In-session time</th>
<th>Practice time Athlete A</th>
<th>Practice time Athlete B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower cognitive state anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thought stopping/cognitive restructuring</td>
<td>40*</td>
<td>100</td>
<td>160</td>
</tr>
<tr>
<td>(Bunker, Williams, &amp; Zinsser, 1993)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus control - Open focus training</td>
<td>40</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>(Fehmi &amp; Fritz, 1980)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxing imagery (Vealey &amp; Walter, 1993)</td>
<td>40</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Raise cognitive state anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energizing imagery (Zaichkowski &amp; Takenaka, 1993)</td>
<td>40</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>Energizing verbal cues (Harris &amp; Williams, 1993)</td>
<td>30</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Lower somatic state anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep breathing (Benson, 1975)</td>
<td>20</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Progressive muscle relaxation (Jacobson, 1938; Suinn, 1980)</td>
<td>120</td>
<td>160</td>
<td>220</td>
</tr>
<tr>
<td>Autogenic training (Norris &amp; Fahrion, 1984)</td>
<td>40</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Raise somatic state anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energizing physical activity (Zaichkowski &amp; Takenaka, 1993)</td>
<td>20</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Accelerated breathing (Norris &amp; Fahrion, 1984)</td>
<td>20</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Lower state self-confidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal setting (match-specific, challenging)</td>
<td>20</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>(Gould, 1993)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal-directed verbal cues (Harris &amp; Williams, 1993)</td>
<td>20</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Raise state self-confidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive imagery (Suinn, 1980)</td>
<td>40</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>Positive self-talk (Bunker, Williams, &amp; Zinsser, 1993)</td>
<td>40</td>
<td>100</td>
<td>30</td>
</tr>
</tbody>
</table>

Note. References are treatment descriptions similar to those used in this research.

*All times are estimates (min). Practice times were derived from athletes’ practice log books. Some psychological skills were, at times, trained in combination (e.g., progressive relaxation with autogenic training).

four checkpoints during Phase II, both athletes indicated that they viewed this system as productive and nonintrusive. For research purposes, Phase II lasted 3–4.5 months, including 13 matches for Athlete A and 25 for Athlete B.

Results

Athlete A’s posttreatment performance values, taken over 13 matches ($M = 7.39$, $SD = 1.39$), were significantly higher, $t (35) = 2.44$, $p < .01$, than pretreatment
performance values ($M = 6.16, SD = 1.61$) taken over 24 matches. Athlete B’s posttreatment performance values, taken over 25 matches ($M = 6.92, SD = 1.40$), were also significantly higher, $t (37) = 1.69, p < .05$, than pretreatment performance values ($M = 6.32, SD = .82$) taken over 14 matches. Effect sizes reflecting how much treatment improved performance were large for Athlete A ($d = .80$) and moderate for Athlete B ($d = .50$). Time series data for each athlete are presented in Figure 4.

In a single item inquiry into participants’ prematch usage of appropriate psychological skills, Athletes A and B both answered every time. In a single item inquiry into the effect of the newly learned psychological skills on performance, Athlete A answered very large effect, Athlete B large effect.

Pre- to post-IZOF treatment data demonstrated 20 and 10% improvements in Athletes A and B’s performances, respectively.

![Figure 4 – Pre- and posttreatment time series match performance values for Athletes A and B.](image-url)
Discussion

Findings provide preliminary support for the positive effect of the present precompetitive anxiety treatment system on performance. Derivation of multidimensional A-state optimal functioning zones and the treatment selection system were both successful. Phase I was designed to develop and then evaluate the actual presence of optimal functioning zones, using multidimensional A-state theory. All three participants had optimal functioning zones, derived using IZOF theory. CSAI-2 being the A-state measurement instrument. In each of the nine possibilities (three athletes × three subscales), performance was higher within IZOFs than outside, some demonstrating significant differences. These findings are consistent with IZOF research using the STA1 (e.g., Raglin, Morgan, & Wise, 1990; Turner & Raglin, 1996) and CSAI-2 (Krane, 1993). In agreement with IZOF theory, the derived zones were highly individual. Also, A-state values varied among individual athletes. The aspect of multidimensional A-state theory that predicts high cognitive anxiety to be associated with declined performance was refuted. Based upon normative values, no evidence was present to support this. Additionally, catastrophe theory was not supported within this research because there was no indication that heightened cognitive anxiety caused declined performance.

Phase II was designed to test the effectiveness of a treatment system, based on the specific-effects hypothesis, the multidimensional nature of A-state, and IZOF theory, for improving athletic performance. For both athletes, posttreatment performance improved significantly (ps < .05) over pretreatment performance, representing a 20% and 10% improvement, respectively (moderate to large effect sizes). Athletes accepted the treatment positively and viewed it as productive. This is one of the first intervention effectiveness studies guided primarily by IZOF theory. Based upon previous suggestions (e.g., Gould, Tuffey, Hardy, & Lochbaum, 1993; Weinberg, 1990), a multidimensional A-state perspective was included. Considering suggestions from the sport psychology (e.g., Harris & Williams, 1986; Zaichkowsky & Takenaka, 1993) and clinical psychology (e.g., Lehrer & Woolfolk, 1984) literature, treatment selection was designed to match dimensional (cognitive, somatic, self-confidence) and directional (raise, lower) indications. Although results are promising and may provoke much needed anxiety treatment prescription guidance, they must be considered as preliminary. Replication over different sample types, sports, and expertise levels are greatly needed.

Methodological considerations also need further attention. While manipulation checks, such as practice log books, treatment usage adherence questions, and acceptance of treatment inquiries, were included, this (like all field experimentation) had limited internal validity controls. For example, there was no way of knowing which anxiety regulation methods were developed spontaneously over time, or the actual effort or attention spent differentially learning one mental skill over another. Since athletes were in-zone up to 57% of the time, considerable self-development of self-regulation skills probably occurred during their competitive careers before treatment. Such concerns should be addressed directly. Also, treatment crossover effects (e.g., cognitive treatments affecting somatic anxiety) need to be analyzed, especially based on the potential in-zone/out-of-zone implications. Additionally, A-state changes during matches were not assessed and may have considerably affected performance.

Regarding A-state measurement, a current research trend is to ascertain direction of each CSAI-2 item (facilitative/debilitating; e.g., Jones & Swain, 1992;
Jones, Swain, & Hardy, 1993). We do not know how this would have affected zone formation. Possibly, intraindividual analyses and individuals perceiving the same item in the same way would control for directional content (Maynard, Smith, & Warwick-Evans, 1995). Again, further study is needed to resolve this important question. Within this project, perceived intrusion derived from repeated prematch testing (and scoring) did not appear to be a problem. However, in other sport contexts it may be problematic. Further development of shortened multidimensional A-state instruments (Krane, 1994; Murphy, Greenspan, Jowdy, & Tammen, 1989) may alleviate this potential concern. Possibly, even telemetric physiological indices (e.g., EEG, EMG) could play a part.

In conclusion, this treatment system was developed from the extensive anxiety-performance and treatment prescription literature. The criticisms of anxiety treatment selection were addressed based on normative scales or standardized, prepackaged protocols, supposedly equally effective for all individuals. A multidimensional anxiety measurement instrument (CSAI-2) was incorporated that was better suited to treatment selection than an earlier one (STAI), previously dominant in IZOF research. Systems utilizing IZOF-emotion theory for analyses of constructs, such as energy mobilization/demobilization and energy use/misuse in place of A-state, are currently developing (Hanin, 1997; Hanin & Syra, 1995). This work is being extended into treatment selection using cognitive, affective, motivational, somatic, motor-behavioral, performance-related, or communication foci. The comparative efficacy of this line of research for treatment selection effectiveness will be important. Future researchers must question and then test the various components of the present system. Additionally, determining why being in one’s optimal functioning zone is advantageous requires direct analysis (Gould & Tuffey, 1993). Such work will better link theoretical knowledge to applied research and ultimately benefit sport psychology consultants as professional service providers and athletes as performers.

References


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