The Relationship Between Mental Skills, Experience, and Stock Car Racing Performance

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ABSTRACT

Ebben WP, Gagnon J. The Relationship Between Mental Skills, Experience, and Stock Car Racing Performance. JEPonline 2012;15(3):10-18. Stock car racing is one of the largest spectator sports in the United States. However, the experience of the driver participant has been largely unresearched. The purpose of this study was to examine the relationship between stock car driver performance, mental skills, and experience. Twenty male stock car drivers from throughout the United States participated. The Psychological Skills Inventory for Sports-R5 (PSIS-R5) was used to assess participants’ use of mental skills. Success was evidenced by the drivers’ track points ranking, regional, and national ranking. A Pearson’s correlation coefficient was used to examine the relationships between these variables. Track points ranking (percentile) was negatively correlated with mental preparation ($R = -0.46, P = 0.004$) and anxiety coping ($R = -0.53, P = 0.028$). The participants’ age was negatively correlated with motivation ($R = -0.56, P = 0.023$). The participants’ motivation was correlated with self-confidence ($R = 0.48, P = 0.047$), mental preparation ($R = 0.48; P = 0.03$), and team emphasis ($R = 0.46, P = 0.04$). Concentration was correlated with self-confidence ($R = 0.64, P = 0.002$) and anxiety coping ($R = 0.65, P = 0.002$). Self-confidence was correlated with anxiety coping ($R = 0.64, P = 0.003$). Mental preparation was correlated with team emphasis ($R = 0.50, P = 0.024$). Stock car drivers, as well as sport psychologists who work with them, should emphasize strategies designed to reduce anxiety and should employ mental skills training to increase racing success.

Key Words: Psychological Skills, Cars, Automobile Racing, PSIS-R5
INTRODUCTION

Stock car racing is a popular sport with a large fan base in the United States. Since its establishment in 1948, the National Association for Stock Car Auto Racing (NASCAR) has become one of the most commercially successful professional sports organizations in the United States (19). In terms of television ratings, NASCAR has become the second most popular sport, just behind the National Football League (NFL) (19). In addition to NASCAR, there are also many other sanctioning bodies and drivers at the regional and state level. While the exact number of stock car drivers is not known, there are 1,389 stock car tracks throughout the United States (9). Research has begun to quantify the physical demands of stock car drivers, though little is known about the psychological demands of the sport.

Studies show that stock car drivers, compared to physically active controls, have faster reaction times (2). Stock car drivers also have heart rate, VO\textsubscript{2} max, and ventilatory responses similar to athletes in basketball, boxing, soccer, bicycling, handball, and running (14,15). When interviewed, stock car drivers state that the most important attributes during racing are psychological, not physiological, including courage, patience, and self-confidence (1). However, there are no studies specifically focusing on the psychology of stock car racing, even though mental skills are believed to be important in this sport (26).

While there are no studies that focus on the psychology in stock car racing, the use and effectiveness of mental skills of athletes in a variety of other sports has been frequently studied. For example, research has shown that soccer players use imagery, goal setting, self-talk, and relaxation in preparing for, during, and after competition (31). Researchers have also found the mental skills (e.g., self-talk and imagery) are associated with emotional intelligence in collegiate soccer, rugby, and hockey athletes (18). The mental skills used by athletes may depend on the position they play in some sports, such as football (7). Studies have also indicated that the use of various mental skills is correlated with the ability to positively manage anxiety, which arises during both individual and team competition in swimming and basketball (11,35).

Studies that assess mental skills in sports other than stock car racing use a variety of questionnaires, including the Competitive State Anxiety Inventory-2 (CSAI-2) (35), Sport Imagery Questionnaire (12), and the Psychological Skills Inventory for Sports-R5 (PSIS-R5). The PSIS-R5 assesses mental skill characteristics relevant to exceptional athletic performance (6). Many studies use the PSIS-R5 to differentiate between the mental skills in various levels of sport, from the recreational to elite level athletes (5,6,24,25,33). The PSIS-R5 has been used to assess the mental skills practiced by athletes in high speed and individual sports, such as equestrian, rodeo, and telemark skiing (24,25,33). The PSIS-R5 measures a variety of mental skills, which have yet to be measured and studied in stock car drivers. Therefore, the purpose of this study is to examine the relationship between stock car driver performance, experience, and the use of mental skills using the PSIS-R5.

METHODS

Subjects
Twenty male stock car drivers (age = 39.5 ± 13.8 yrs; racing experience = 15.15 ± 12.2 yrs) from throughout the United States participated in this study. The classes of racing represented by the drivers were street stock, late model, modified, sportsman mid-American, and one driver raced open wheel modified. Drivers were informed that participation was voluntary, and they could withdraw from the study at any time. The institutional review board approved the study.
Procedures
Driver information was found in online databases published by the stock car governing bodies or racing tracks. The subjects were then recruited through electronic mail (e-mail) communication. The initial e-mail message introduced and explained the study and provided a consent form. Two weeks later, a follow up e-mail was sent containing a brief demographic and driver information questionnaire and the PSIS-R5 survey. The questionnaire requested information about: (a) the driver’s track points standing; (b) regional and national rankings; and (c) years of racing experience. It also included two open-ended questions. These questions asked drivers to identify three personality characteristics that limited driving ability and three characteristics of an effective racer.

The PSIS-R5 is a 45-item 5-point Likert scale inventory that evaluates concentration, motivation, self-confidence, anxiety, mental preparation, and team emphasis. Each item is composed as a statement such as, “I sometimes lack motivation to train” or “I worry a lot about making mistakes in an important race.” The drivers were instructed to indicate whether they strongly disagreed or agreed with each item. A score of 1 indicated strong disagreement with the statement, while a score of 5 indicated strong agreement with the statement.

Statistical Analyses
A Pearson’s correlation coefficient with a significance level of P = 0.05 was used to examine the relationships between each mental skill from the PSIS-R5 and the driver’s age and track points standing. From the latter, a high point standing was represented by a low number (i.e., finishing first in the points standing versus tenth) and as such is an indication of success. Answers to the open ended questions were content analyzed according to methods described by Patton (29). The actual driver responses were defined as raw data, while the main ideas represented from the raw data were the higher-order themes. Researchers independently evaluated the raw data and generated higher-order themes using inductive content analysis for each question. These higher order themes were then compared until consensus was reached on the higher order themes that best represented the raw data.

RESULTS
The driver’s track points standing was negatively correlated with mental preparation (R = -0.46, P = 0.004) and anxiety coping (R = -0.53, P = 0.028) scores. Subject’s motivation was correlated with self-confidence (R = 0.48, P = 0.047), mental preparation (R = 0.48; P = 0.03), and team emphasis (R = 0.46, P = 0.04) scores. Concentration was correlated with self-confidence (R = 0.64, P = 0.002) and anxiety coping (R = 0.65, P = 0.002) scores. Self-confidence was correlated with anxiety coping (R = 0.64, P = 0.003), mental preparation was correlated with team emphasis (R = 0.50, P = 0.024), and the subject’s age was negatively correlated with motivation score (R = -0.56, P = 0.023). The higher-ordered themes based on the driver’s raw data are presented in Tables 1 and 2.

DISCUSSION
This study is the first to measure specific mental skills used by stock car drivers in addition to examining the relationship between the use of mental skills, driver performance, and years of experience. The statistical findings indicate that the driver’s “track points standing” was negatively correlated with mental preparation and anxiety scores. This means that the smaller the number representing the drivers ranking (i.e., 1st in the point standings), the higher the mental preparation
and anxiety coping scores. Thus, the ability to cope with anxiety and mentally prepare prior to competition may improve driver performance.

Table 1. Personality Characteristics Limiting Driving Ability

<table>
<thead>
<tr>
<th>Higher-Order Theme</th>
<th>Number of Occurrences</th>
<th>Raw Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cautious</td>
<td>7</td>
<td>Cautious, being car owner and not taking chances</td>
</tr>
<tr>
<td>Financial Risk</td>
<td>6</td>
<td>Fear of financial cost of wrecking</td>
</tr>
<tr>
<td>Considerate</td>
<td>5</td>
<td>Considerate, friendly/outgoing, too friendly</td>
</tr>
<tr>
<td>Fear of Injury</td>
<td>3</td>
<td>Fear of getting injured and not being able to perform my job or support family</td>
</tr>
<tr>
<td>Impatience</td>
<td>3</td>
<td>Impatience</td>
</tr>
<tr>
<td>Aggressiveness</td>
<td>2</td>
<td>Aggressiveness</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>11</td>
<td>Emotion, a mind dirtied up by drugs, temper, multi-tasker</td>
</tr>
<tr>
<td>Non-personality characteristics</td>
<td>7</td>
<td>Weather, time constraints, race for fun</td>
</tr>
</tbody>
</table>

Previous research shows mental preparation (17,21) and anxiety coping are correlated with success (6,13,24,25,36). When compared to sub-elite athletes, elite athletes have better mental preparation and anxiety management skills (24,25). Elite athletes also report fewer problems with anxiety and rely on internally referenced (controllable) mental preparation prior to competition more than sub-elite athletes (21). Sub-elite athletes indicate that anxiety negatively interferes with their performance (21). The drivers in the current study appear to be more similar to elite than the non-elite athletes in the use of the coping skills. Additionally, athletes with lower anxiety levels are able to remain calm and have better mental preparation before competition, thus resulting in more successful performances (4). This correlation between mental preparation and anxiety coping is likely to benefit stock car racers, since racing is a high stress sport.

The current study found that the driver’s motivation was correlated with self-confidence and mental preparation scores. This result has been previously observed in elite male athletes, who have higher levels of motivation and self-confidence compared to female and sub-elite athletes (25,33). The drivers were all male, and all were ranked within the top 50th percentile at their home track, including seven regionally or nationally ranked drivers. To remain at a high or an elite level of athletic performance, athletes must have sufficient motivation to train and practice frequently (29,34). This also appears to be true in the present study. Driver success may increase motivation and may, therefore, lead to continued high performance.
Table 2. Personality Characteristics of Effective Racing

<table>
<thead>
<tr>
<th>Higher-Order Theme</th>
<th>Number of Occurrences</th>
<th>Raw Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determination</td>
<td>6</td>
<td>Determined, tenacious</td>
</tr>
<tr>
<td>Focus</td>
<td>6</td>
<td>Focused, clear mind, ability to focus on task at hand</td>
</tr>
<tr>
<td>Preparedness</td>
<td>4</td>
<td>Prepared, belief we prepared a good, fast, safe car</td>
</tr>
<tr>
<td>Passionate</td>
<td>4</td>
<td>Pride, devoted, love of racing</td>
</tr>
<tr>
<td>Work-ethic</td>
<td>4</td>
<td>Hard working, work ethic</td>
</tr>
<tr>
<td>Aggression</td>
<td>3</td>
<td>Aggressive</td>
</tr>
<tr>
<td>Confidence</td>
<td>3</td>
<td>Confidence in ability, knowing you can win the race</td>
</tr>
<tr>
<td>Intelligence</td>
<td>3</td>
<td>Intelligent, crafty</td>
</tr>
<tr>
<td>Knowledge-seeking</td>
<td>3</td>
<td>Good listener</td>
</tr>
<tr>
<td>Anticipation</td>
<td>2</td>
<td>Always thinking ahead, expect the unexpected</td>
</tr>
<tr>
<td>Competitive</td>
<td>2</td>
<td>Very competitive</td>
</tr>
<tr>
<td>Patience</td>
<td>2</td>
<td>Patience</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>11</td>
<td>Swift, fearless, outgoing, endurance</td>
</tr>
</tbody>
</table>

In addition to motivation, concentration was found to be correlated with self-confidence and anxiety coping scores. This finding indicates that as concentration and focus are increased, the drivers are likely to be better able to cope with different stressors and experience more successful performances. Studies conducted with athletes other than stock car drivers, such as collegiate and professional rugby players, show that concentration is the most commonly used and effective strategy in dealing with sport related stressors (27,28). Similar to rodeo, stock car racing is a fast paced high intensity sport that requires quick reactions (2). Concentration for quick decision-making is important.

Self-confidence and anxiety coping scores were also correlated with each other, which suggests that drivers with high levels of self-confidence might not experience as much anxiety. Self-confidence and anxiety coping scores are positively correlated in male and negatively correlated in female athletes (24,25,33), indicating a significant gender difference. All drivers in the present study were male and had both high self-confidence and anxiety coping scores. In addition to the gender differences, elite athletes report higher self-confidence levels compared to sub-elite athletes (20,21,24,25). Since the drivers were ranked, it supports previous research findings that a high level of self-confidence is an important contributing factor to success.

Team emphasis (i.e., the importance that a driver places on the teams' contributions and the driver's relationships with other team members) was correlated with mental preparation. This finding has not
been reported in previous research. Stock car racing is a unique individual sport in which the team has a strong influence on the car’s performance and the success of the driver. This may be a contributing factor to the high team emphasis scores among the drivers in this study, compared to low team emphasis scores seen in the individual sports such as rodeo (25). Different psychological orientations are required for individual compared to team sports (16), and the orientation of stock car drivers may be more similar to that of a team sport athlete rather than an individual sport athlete. In addition to the drivers’ psychophysiological stress, pit crew team members during competition exhibit significant psychological stress and physiological increases in heart rate and core body temperature (10). Thus, communication and cohesiveness between the drivers and their teams is critical for successful performances (3,8,23,32). This is supported by the driver’s high scores on team emphasis and preparation.

The drivers’ age was negatively correlated with motivation. Age is also negatively correlated with the motivation of other athletes, especially distance runners (22). While this decline in performance is related to physiological factors, social and environmental factors may also contribute to a poor performance. In the present study, older drivers were more likely to cite financial factors, including the cost of wrecking and repairing their car. The financial factor influenced their motivation as well as the number of races competed in.

It is noted that the positive and negative correlations found in the present study range from $R = 0.46$ to $R = 0.65$ indicating that these statistical results show a range of weak to moderately strong relationships between the use of mental skill and driver success and between the mental skills. Thus, the findings of this study should be interpreted in this context.

**CONCLUSIONS**

The current study represents the first time that mental skills have been assessed in stock car racing. The results demonstrate that anxiety coping and self-confidence are not only correlated with success, but with each other. The findings are consistent with the sports psychology literature that indicates mental skills are related to athletic performance. Stock car drivers (and sport psychologists who work with stock car drivers) should use mental skills to reduce anxiety to thereby increase racing success. In addition, team emphasis and age should be taken into consideration, since these factors influence driver performance as well.

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