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Performers choke under pressure due to an increase in anxiety under perceived pressure at a time when the outcome of a competition has not been decided. Research findings have led to the development of the distraction and self-focus models of choking. Researchers have suggested that instead of both models acting as alternative explanations of choking, they may both be applicable explanations in different domains, depending on the individual's skill level with the task. Findings have shown that novices experience decrements in performance that are best explained by distraction models, while experienced performers experience decrements in performance best explained by self-focus models. Further examination is needed on the role of experience in choking.

This study examined the differences between the dominant and non-dominant features of skill-execution within an experienced performer. Participants performed a soccer-dribbling task under three practice conditions: single-task (only perform the dribbling task), dual-task (perform the dribbling task and a secondary auditory-word-monitoring task), skill-focus (perform the dribbling task while attending to the part of their foot touching the ball). They then performed a single-task posttest where performers performed the soccer-dribbling task under pressure.

The order of the first three conditions was counterbalanced to prevent order effects. In the practice trials, it was hypothesized that performance would be fastest with the dominant foot under dual task conditions and fastest with the non-dominant foot under skill-focus conditions. If decrements are observed for the dominant foot when performing

under pressure, these would be attributed to self-consciousness leading them to explicitly monitor skill execution. If decrements are observed for the non-dominant foot when performing under pressure, these would be attributed to attention being paid to irrelevant cues, distracting them. If decrements are not observed for the non-dominant foot, this would be attributed to pressure invoking self-consciousness, leading them to explicitly monitor skill execution, and helping their less-skillful performance.

The results of a repeated measures ANOVA indicated that for the dominant foot, performance during the single-task was significantly better than performance in the dual-task and skill-focus conditions ($p < .05$), while results for the non-dominant foot showed that performance was equivalent in the three practice conditions ($p > .05$). A paired samples t-test showed that for the dominant foot, performance under pressure was not significantly different from performance without pressure ($p > .05$). In the non-dominant foot however, results showed that performance actually improved under pressure ($p < .05$). These findings suggest that highly experienced performers may not be as susceptible to experiencing decrements under pressure as are athletes described as "experienced" and "less experienced". Findings also suggest that "highly experienced" athletes may be more likely to improve when executing under a small amount of pressure.

CHOKING IN HIGHLY EXPERIENCED SOCCER PLAYERS

by

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Approved By

_____
Committee Chair

For my late Mother and late
Grandmother, who wanted nothing but
the best for me, and my Aunt who took me
in and raised me as if I was her own son.

APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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CHAPTER I

INTRODUCTION

Although numerous definitions have been proposed, choking is usually described as occurring when a player's typically successful performance is unsuccessful in a closely competitive environment, at a time when the outcome of the competition has yet to be determined. Mesagno, Marchant, and Morris (2009) defined choking as "the critical deterioration in the execution of habitual processes that results from an increase in anxiety under perceived pressure" (p. 131), which leads to decrements in performance. Baumeister (1984) further clarified this definition when he defined pressure as "any factor or combination of factors that increases the importance of performing well on a particular occasion" (p. 610). Over the past decades, research findings have led to the development of two models of choking: the distraction model and the self-focus model. In the distraction model, performance decrements under pressure are thought to occur as a result of increased arousal levels, which shift attention from task relevant to irrelevant cues (Eysenck & Calvo, 1992; Nideffer, 1992; Hardy, Mullen, & Martin, 2001; Mullen, Hardy, & Tattersall, 2005; Wilson, Chattington, Marple-Horvat & Smith, 2007). By contrast, the self-focus model, which was proposed by Baumeister (1984), explains that choking results from an increase in anxiety and self-awareness about performing correctly. It is believed that increases in motivation to perform more efficiently and

accurately lead the athlete to become self-aware and consciously monitor his/her behavior (Fenigstein, Scheier, & Buss 1975; Masters, 1992; Masters, 1993; Beilock & Carr 2001; Beilock, Carr, MacMahon & Starkes, 2002; Jackson, Ashford, & Norsworthy, 2006; Gucciardi & Dimmock, 2008; Marchant & Morris, 2009).

Beilock and Carr (2001) were the first to suggest that both self-focus and distraction models of choking may be applicable to explaining the onset of choking depending on the individual's skill level with the task. They argued that for novices, decrements in performance as a result of pressure are best explained by distraction models. However, for experts, decrements in performance are best explained using self-focus models. They further hypothesized that if explicit monitoring causes choking, then training in an environment that heightens self-consciousness and achievement anxiety would alleviate the negative impact of pressure because performers have now adapted to conditions that cause them to pay a great deal of attention to the step-by-step execution of a skill. Beilock and Carr (2001) conducted two studies designed to train novices so that they would no longer execute a skill through working memory and a step-by-step following of the process, but instead would be able to execute a skill through more of a proceduralized, automated process. The "experienced" novices, were then exposed to high and low pressure in a post-test after training either to be prepared for self-focus or to be prepared for dual-task.

In the first study, novices trained under single task, dual task, or self-consciousness raising conditions until performance plateaued. Novices either learned the sensorimotor skill of golf putting or an alphabet arithmetic task under the three previously mentioned

conditions. Participants in the dual-task condition were instructed to monitor words during putting or the alphabet arithmetic learning trials and each time they heard the word "cognition" they were to repeat it back to the experimenter. Participants in the self-consciousness condition completed either the putting or alphabet arithmetic learning trials while being video recorded with the understanding that their performance would be analyzed. Participants in the single-task condition completed either the putting or alphabet arithmetic learning trials without any secondary attentive obligations. Participants in all three conditions then took part in a high-pressure single-task post-test during which they only performed the primary task of either golf putting or an alphabet arithmetic task.

In the second experiment, the two possible models of choking were examined at different stages of learning. Novices either trained under self-consciousness or dual-task conditions. Participants took part in a putting training trial followed by an 18-putt low-pressure task and an 18-putt high-pressure task. They then took part in another training trial followed by a second 18-putt low-pressure and 18-putt high-pressure task. Participants in the distraction condition carefully monitored a list of recorded spoken words, and when they heard the word "cognition", they had to repeat it. The self-consciousness condition completed the putting training with the understanding that they were being video recorded and analyzed. The four post-test trials (two 18-putt low pressure, two 18-putt high pressure) were used to assess how far participants progressed in learning putting skills. This was important in understanding the participants' stages of skill development. Both conditions experienced the same two high-pressure post-tests,

which only included a single-task performance; where they were only performed the primary task of 18 golf putts.

Results of both experiments showed that as putting skills became more proceduralized, only individuals who were used to performing under conditions that heightened performance anxiety and the explicit monitoring of task processes performed well under performance pressure. These findings were interpreted as providing evidence that there are differences between people who are novices and people who are experts in terms of which mechanism explains choking. Beilock and Carr conclude that the explicit monitoring hypothesis for choking is the most appropriate to explain choking by experts.

Beilock, Carr, MacMahon and Starkes (2002) conducted a subsequent study to learn more about the extent to which experts and novices are affected by directions to self-focus task or to perform a distraction task. The first experiment was designed to assess the attentional mechanisms governing the real time execution of a golf putting task. It was hypothesized that if an expert is performing a skill that is automatic, a dual-task environment that draws attention away from the task should not negatively affect performance. In contrast, explicitly monitoring a well learned skill may disrupt automated skill execution and negatively affect performance.

Experienced golfers performed a putting task in both a skill focused attention condition where individuals were told to attend to a specific component of their swing, and a dual task where experienced golfers performed the putting task while they were to monitor tones and say the word “tone” after hearing the specified target tone. Experienced golfers performed significantly better during the dual-task condition in

comparison with the skill-focused condition. The authors concluded that well learned putting does not require constant online control, which means that if necessary, there is attention available for the processing of secondary task information.

The second experiment was designed to assess the attentional mechanisms supporting soccer-dribbling performance at different levels of skill aptitude. It was hypothesized that if attention to well-learned skill execution disrupts performance, it can be expected that experienced soccer players who are instructed to explicitly attend to their dominant foot while performing a dribbling drill will experience detriments in performance. In contrast, experienced soccer players who are instructed to perform a dual-task while dribbling with their dominant foot will not experience any detriments in performance. Novice and experienced soccer players took part in both dual-task and skill-focused conditions while dribbling a soccer ball with their dominant foot, and again while dribbling with their non-dominant foot. In the skill-focused attention condition, participants had to attend to the side of their foot that was in contact with the ball throughout the dribbling trial, and when they heard a tone, they verbally indicated if the ball was touching the inside or outside of their foot. In the dual-task condition, participants closely monitored a list of words, and when the target word "thorn" occurred, they were to repeat it out loud.

During the dominant foot trials, novices performed at a lower level in the dual task condition, (designed to distract attention from task performance) while experienced performers performed at a higher level in the dual-task condition. In the skill-focus condition experienced performers performed at lower levels. During the non-dominant foot trials, both novice and experts performed better in the skilled focus condition than in

the dual-task. Based upon these findings, the authors concluded that experienced performers must suffer more than novices from conditions which call their attention to skill execution of individual task components because this leads to step-by-step monitoring or online control.

Based upon Beilock et al.'s (2002) findings, Jackson, Ashford, and Norsworthy (2006) were prompted to examine attentional mechanisms governing the real time execution of well-learned skilled motor behavior. In this case they decided to examine this in experienced field hockey players and aimed to replicate the Beilock et al. (2002) study regarding performance under single-task, skill-focused and dual-task conditions. The only difference is that they decided to induce pressure in a post-test. It was hypothesized that skill-focused attention would disrupt performance relative to the single task, that performance under skill-focus conditions would be equal under both low and high-pressure, and that performance in the dual-task condition under high-pressure would be better than performance in the skill-focus condition under high-pressure.

Experienced field hockey players performed trials of a dribbling task under single task, skill focused, and dual task attention conditions, and then performed those same three conditions in the post-test under low-pressure (15 dribbling trials) and high-pressure (15 dribbling trials) situations. In this study, pressure was induced through video recording and analysis of performer's technique. Results showed that under low-pressure (which would be a similar condition to the post-test condition of Beilock et al., 2002), performance was faster in the dual-task condition than in the single-task condition. Performance in the single-task condition was faster than the skill-focus condition. These

findings are consistent with those of Beilock et al. and led Jackson et al. to conclude that this occurred because the external focus required to monitor auditory tones (in the dual-task), weakened any remaining tendency toward explicit monitoring that was present under the single task conditions.

Under high-pressure (which could result in choking), performance deterioration in the skill-focus condition did not occur. The authors concluded that performers could vary the extent to which they explicitly monitor skill execution (they could explicitly monitor, but not consciously control), which then causes performance disruption to vary. The findings with regards to the dual task condition indicated that under high-pressure, performance was poorer (slower), but was better (faster) then the other conditions (single task, self-focus). The authors concluded that this finding supports the idea that dual-task conditions could possibly counteract the tendency for pressure to lead to explicit monitoring.

It is important to point out that in the Jackson et al. (2006) study, pressure was induced through video recording and analysis of performer's technique. Past studies have shown that this causes increases in self-awareness (Beilock & Carr, 2001; Masters 1992; Mullen & Hardy, 2000). This is problematic in this study, which was designed to analyze how training under single-task, self-focus, and dual-task conditions impacted choking. It is problematic because the pressure manipulation that was used is one that invokes self-consciousness along with evaluation apprehension. This makes it hard to find any accurate effects of dual-task or single-task on performance under pressure if that pressure was more likely to invoke self-consciousness, which would cause decrements in performance to be more suitable for explanations of choking in the self-focus model. If

the pressure were more neutral, this would be more of an accurate depiction of why performers choked because they would not have been induced by pressure that could "lead" them to invoking a form of attention that would benefit explanations of one model (self-focus) over the other (dual-task).

Research Purpose

Given the current state of the literature, what needs to be done next is to further explore the original question of the role of experience in choking. Specifically, further examination is needed on the differences between the dominant and non-dominant features of skill-execution within an experienced performer. Although Beilock et al. (2002) used this design to look at proceduralized versus non-proceduralized skill, they did not then test the influence of pressure on performance. Jackson et al. (2006) did take this step, but their results may reflect the fact that they used a self-consciousness manipulation to induce pressure. Therefore, the proposed study will add to the literature by utilizing a different manipulation of pressure that does not specifically "lead" performers to invoking a form of attention (self-consciousness), which could benefit a particular explanation of choking.

Hypothesis

Based on past findings, it was hypothesized that performance would be fastest in the practice trials in the dominant foot under dual task conditions and that performance would be fastest in the practice trials with the non-dominant foot trials under skill-focus conditions.

In the post-test, it was predicted that if performance decrements under pressure in the dominant foot occur, this would be due to the participants allowing pressure to invoke self-consciousness leading them to explicitly monitor skill execution. If performance decrements do not occur, this would be due to participants not allowing pressure to invoke self-consciousness. If performance decrements occur under pressure in the non-dominant foot, this would be due to participants allowing pressure to invoke attention to irrelevant cues, leading them to being distracted. If performance decrements do not occur, this would be due to participants allowing pressure to invoke self-consciousness, leading them to explicitly monitor skill execution, helping their less-skillful (non-dominant foot) performance.

CHAPTER II

REVIEW OF LITERATURE

The definition of choking has been widely discussed and debated. The lack of a universally accepted definition has contributed to the misunderstanding and confusion of the correct and appropriate usage in the media and society. Mesagno, Marchant and Morris (2009) defined choking as the critical deterioration in the execution of habitual processes that results from an increase in anxiety under perceived pressure and that leads to substandard performance. This definition includes the individuals' perception of pressure, and it acknowledges the increases in anxiety levels that result from this perceived pressure.

Over the past decades, advances have been made in understanding the mechanisms that are relevant to choking onset (e.g., Baumeister, 1984; Beilock & Carr, 2001; Hardy, Mullen, & Martin, 2001; Jackson, Ashford & Norsworthy, 2006; Master, 1992; Masters, Polman, & Hammond, 1993). Research findings have led to the development of two models of choking: the distraction model and the self-focus model.

Supporters of the distraction model (Eysenck & Calvo, 1992; Nideffer, 1992) have explained that performance decrements under pressure occur as a result of attention shifting from task relevant to irrelevant cues. The belief is that as arousal levels increase

athletes become preoccupied with irrelevant thoughts, which ultimately "distract" them from attending to important cues (Hardy, Mullen & Martin, 2001).

Researchers have extended the applicability of the distraction model with the development of two supporting hypotheses: processing efficiency theory and attentional threshold hypothesis. The distraction model's "applicability" has been extended because these two hypotheses strengthen the distraction model's argument as an explanation for choking. This is done by these two supporting hypotheses, which further describe the possible components and circumstances that can be attributed to performance decrements under pressure from a distraction model view.

The processing efficiency theory is often discussed in conjunction with the distraction model, because it argues that cognitive anxiety (i.e., worry) can reduce processing and storage capacity of working memory, which reduces the resources available for the task at hand (Eysenck & Calvo, 1992). This reduction in resources is then expected to decrease performers' ability to perform at their optimum level. In the attentional threshold hypothesis, researchers believe that when experienced in isolation, irrelevant cues such as anxiety-related cognitions (i.e., worry) and explicit instructions will not hinder performance; but when experienced together, these irrelevant cues may exceed a threshold of attentional capacity and negatively affect performance (Hardy, Mullen & Martin, 2001; Mullen, Hardy & Tattersall, 2005; Wilson, Chattington, Marple-Horvat, & Smith).

In contrast to the distraction models, Baumeister (1984) has proposed a self-focus model, which explains that choking is a phenomenon that results from an increase in

anxiety and self-awareness about performing correctly. Fenigstein, Scheier, and Buss (1975) further defined self-awareness as "self-directed attention due to transient situational variables, chronic disposition, or both" (p. 522). It is believed that increases in motivation to perform more efficiently and accurately lead the athlete to become self-aware and consciously monitor his/her behavior.

Researchers have extended the applicability of the self-focus model of choking with the development of the conscious processing hypothesis (Masters, 1992). The conscious processing hypothesis suggests that pressure produces increased attention to apply explicit rules to control movements. The premise is that when explicit rules are formed the individual may resort to reinvestment (conscious processing) in those rules which could lead to diminished performance. The explicit monitoring hypothesis also further extends the self-focus model. The explicit monitoring hypothesis suggests that pressure produces increased attention to the step-by-step procedures required to perform a task. However, this hypothesis suggests that although this increased pressure causes one to consciously monitor movements, which is counterproductive to the performance of skilled tasks, conscious processing alone will not necessarily lead to performance decrements. Rather, substandard performance occurs when performers attempt to both consciously monitor and consciously control movements of skill execution. These adjustments together then have a disruptive effect on motor skills during execution. (Beilock and Carr, 2001; Jackson, Ashford, and Norsworthy, 2006).

Baumeister (1984) examined the factors that contribute to choking onset and performance decrements. He suggested that the occurrence of pressure was responsible for increasing a person's self-consciousness (through increases in arousal levels) and, due to this inward focus of attention, skillful performance suffers. The idea was that when under pressure the individual consciously realizes the importance of a successful outcome. Baumeister (1984) defined pressure as any factor or combination of factors that increases the importance of performing well on a particular occasion. Due to this "consciousness", individuals attempt to ensure the faultlessness of the skill they are performing by monitoring the process of performance. However, this proves to be counter productive, because raising consciousness does not facilitate the operation of well learned or automatic skills.

In a series of six studies, Baumeister (1984) was interested in exploring self-consciousness and the paradoxical effects of incentives on skillful performance. In the first three studies, the aim was to verify that performance decrements are caused by an increase in awareness of the performance process and measure dispositional self-consciousness. The task used in the first five studies was the commercially available "roll up" game, a task that requires both motor and visual motor coordination. In this task participants were told to either be aware of their hands as they were performing the task or to be aware of the ball. The object of the task is to use rods (which are attached to a vertical board) to roll the ball as far as possible and drop it in the hole furthest from you. Points were scored by moving the rods apart so that the ball drops into one of the holes in the platform beneath the rods. Performance was measured by an analysis of covariance

using baseline (practice trial) scores as the covariate. The results of the first study showed poorer performance for those who were told to be aware of their hands, and showed better performance for those who were told to attend to the ball.

In the second study there remained a hands group who were told to be aware of their hands, but instead of a ball group, the hands group were compared to a control group, and the control group did not receive a manipulation of awareness. Although the results did not reach statistical significance, the subjects in the hands condition still tended to perform worse than those in the control condition. The findings from the second study were consistent with the findings from the first study: increased awareness of one's internal performance can diminish skillful performance.

The third study replicated the second study but this time dispositional self-consciousness was measured. Twenty-five undergraduate students participated and completed the measure of self-consciousness before the practice trial. Scores on this measure were used to separate the participants into two groups: those high in self-consciousness and those low in self-consciousness. Participants, who were identified as low in self-consciousness displayed more disruption of performance than did those high in self-consciousness when they were instructed to attend to their hands (Baumeister, 1984). This finding was interpreted as indicating that those who are habitually self-conscious (high in self consciousness) may find it easier to cope with situations that give rise to self-consciousness because they are more accustomed to performing while self-conscious. As a result, the authors speculated that the increase in self-consciousness

caused by going from a non-pressure situation to a pressure situation might be greater for a person who is dispositionally low in self-consciousness.

Studies four and five were designed to examine whether situational manipulations of pressure, could affect performance decrements similarly to those caused by attentional refocusing in the first three studies. In the fourth study, Baumeister (1984) used Wankel's three components of competition (rivalry, coaction, and audience) to induce pressure. The premise was that if one were slightly ahead in a competition, the perceived pressure would be high; and if one were moderately behind, and thus had a possibility of success with good performance, pressure would also be high. Based upon this premise, two different high pressure situations were selected and compared to a no competition control condition. Forty-five male undergraduate participants performed the task in a competition with a confederate who performed either moderately better or moderately worse than the participant.

Participants completed the dispositional self-consciousness scale and were identified as either high self-conscious or low self-conscious. Participants low in self-consciousness performed significantly better then those high in self-consciousness in the control condition. When those low in self-consciousness were under pressure, they performed much worse then those high in self-consciousness, while those high in self-consciousness actually showed a non-significant improvement. Results showed that in the absence of situational pressure, high dispositional self-consciousness hurt skillful performance, but those who were not accustomed to being self-conscious (low in self-consciousness) were the ones who did not perform well under pressure (Baumeister, 1984).

The fifth study was designed to test the effects of choking with a different manipulation of pressure. In this study, pressure was induced in the thirty-seven participants by a financial incentive for performing at a certain level. Participants were told that they would receive one dollar for each trial in which their performance exceeded the criterion level that was set at 14 points above the participant's practice trial score. Participants completed the dispositional self-consciousness scale and were identified as either high self-conscious or low self-conscious. All subjects showed signs of choking although the effect was stronger for those low in self-consciousness. Offering a reward for improved performance actually caused them to perform worse. This finding is consistent with study four's finding, in that when those who were identified as low in self-consciousness were under pressure, they performed much worse then those high in self-consciousness; showing that situational manipulations of pressure could also affect performance with similar effects as observed relative to attentional refocusing in the first three studies.

In the sixth study the goal was to provide a clear demonstration of choking on a well-learned task in a field setting. The thirteen participants of this study were customers at a video arcade game store. Possible participants were observed as they played the arcade game, and their performance on this game would dictate if they were approached to be a part of the study. They were not included in the study if they failed to meet a particular score (which was used as a cut off point), if they had not played the same game on at least several previous days, or if they were below the age of thirteen. Participants were told that if they were able to get "their best score", they would receive a free game.

Results showed that participant's performance on the study task was always inferior to the performance that was recorded prior to being a part of the study (Baumeister,1984).

Baumeister's (1984) research provides support for the self-focus models of choking. Participants who were instructed to attend to the process of skillful execution performed more poorly. An increase in self-consciousness, caused by going from a non-pressure situation to a pressure situation, impacted performance negatively for all, but these effects were greater for people who were dispositionally low in self-consciousness. For example, offering a reward for improved performance caused those both high and low in self-consciousness to perform worse. Further, when offered a valuable incentive for performance, video game players could not better their previous scores suggesting that they "choked" under the pressure.

Early formation of the Self-Focus Models of choking

Researchers have continued to be interested in the underlying causes of self-focusing. Researchers have been particularly interested in how the way in which an individual learns can contribute to his/her attentive actions when experiencing pressure (Berry & Broadbent, 1988; Hayes & Broadbent, 1988; Reber, 1989). Researchers believe that knowledge can be acquired either explicitly or implicitly. Explicit knowledge is made up of rules and facts we are able to articulate to others because we are aware of them. Implicit knowledge is harder to articulate because it is made up of what we know, but we are not consciously aware of this knowledge. When developing a skill, a learner typically passes through a cognitive, an associative, and finally an autonomous phase (Fitts &

Posner, 1967). In the cognitive phase, knowledge is explicit which causes performance to be slow and to require effort. In the associative phase, components of the skill execution begin to be linked together for smooth action, but practice of the skill and the utilization of feedback are necessary to perfect the skill. In the autonomous phase, knowledge has become implicit (through practice), which results in a more fast and fluid process (Masters, 1992).

Reinvestment takes place when individuals are under pressure and due to consciously thinking about how they are executing the skill; they then resort to operating with their explicit knowledge of its mechanics (Baumeister, 1984). Many researchers feel that because progressive experience leads to increasing characteristics of expert performance (i.e., the performance becomes more automatic, implicit, and effortless) it would be counterproductive for skilled performers to "reinvest" in performance of the skill by focusing on explicit knowledge.

Masters (1992) was interested in the role of knowledge that was gained explicitly and implicitly in the performance of a complex motor skill under pressure. In particular, Masters was interested in whether a skill that was learned implicitly could withstand the disruption of automaticity when performed under pressure. Forty novices at golf putting were randomly assigned to one of five groups: explicit learning, implicit learning with stress, implicit learning without stress, control with stress, and control without stress. The study included two phases: a skill acquisition phase and a test phase.

In the skill acquisition phase, participants were taught the complex motor skill of golf putting. Explicit learners learned to putt by following detailed written instructions.

Implicit learning groups practiced putting through a dual task method, in which constant verbal generation of random letters at a specific rate was required while learning to putt. The control groups were instructed to practice on their own and improve as much as possible during the skill acquisition phase. For all groups, the practice phase took place over four sessions of 100 putts.

In the test phase, the explicit learning group, the two implicit learning groups, and the two control groups were further divided into groups that performed under stress and groups that performed without stress in the fifth session. In this test phase, all five of the groups performed 100 putts, but only three of the conditions (the explicit learning, implicit learning with stress, and no learning with stress group) were placed in a stressful situation. Pressure was induced through planned payments, and through the emphasizing of payments being reduced if performance was poor.

Results indicated that, in contrast to the explicit learning group, the implicit learning group showed no decrements in performance under stress. Verbal protocols collected after the final session, showed that the implicit learning group had far less knowledge of the rules for execution available for conscious processing then the control groups and the explicit learning group. The authors concluded that since explicit learning was minimized during the "practicing" stages, the implicit learners had less conscious knowledge of the rules for execution of the learned skill, which made them less able to reinvest their knowledge when performing under stress, thus allowing them to perform well. This suggests that when experiencing pressure, those who have learned a task explicitly are more likely to reinvest, which hurts performance.

The researchers were next interested in determining if reinvestment is a dimension of personality. If reinvestment were a dimension of personality then this would suggest that certain players might be more likely to have performance decrements under pressure (since high reinvestment scores would be likely to result in a higher likelihood of explicit monitoring and control under pressure).

According to the self-focus model explanations of choking, in order to observe performance decrements in response to pressure, there has to be knowledge for the participant to attempt to reinvest. In a series of four studies conducted by Masters, Polman and Hammond (1993), they examined whether reinvestment of conscious processing was a possible dimension of personality. In the first study, items from the Cognitive Failures Questionnaire, the Rehearsal factor from the Emotional Control Questionnaire, and the Public and Private factors from the Self-Consciousness Scale were incorporated into one 75-item questionnaire, and administered to 144 students to explore the existence of a reinvestment dimension. The purpose of the first study was to locate and identify the factors associated with reinvestment. A factor analysis resulted in the creation of a 20-item scale of reinvestment. Subsequent studies were designed to explore and validate the scale on the premise that those with a high predisposition towards reinvestment would be more likely to have performance decrements under pressure.

The second study was designed to validate the Reinvestment Scale. In study 2 a score one standard deviation below the mean was categorized as a low score and any score one standard deviation above the mean was categorized as a high score. Participants were selected from the pool of 144 who completed the original scale (from study 1) and placed

into one of three groups: a high reinvesters group (4 males and 4 females), a low reinvesters group (4 females and 3 males), and a mixed group consisting of 5 high reinvesters and 6 low reinvesters (5 females and 6 males). These participants were invited to complete a two-dimensional rod-tracing task.

The mixed group practiced the rod-tracing task and was asked to verbally describe their technique while performing. Verbal protocols were given by the mixed group as a way of obtaining a valid network of explicit rules for performing the task, so the other two groups (high and low reinvesters) could be provided with a similar pool of explicit knowledge about the skill. The experimental trials performed by both the high and low reinvestment groups consisted of an acquisition phase (15 practice trials) followed by the stress phase (only 1 test trial). In the experimental groups, a brief stress induction statement was presented to induce pressure. This statement explained that one test trial was to be completed, and that errors would result in the reduction of 25 pence from the amount owed for participating in the experiment. The apparatus was also altered so that every time an error was made a loud buzz was emitted from the computer. Results showed that there was no support for the prediction that high reinvesters would be more likely to fail under pressure. However, the authors concluded that this may have occurred due to the motor skill used lacking enough complexity, and failing to create the type of demands that would call for greater explicit rule use, when under pressure (Masters, Polman & Hammond, 1993).

Thus, the third study focused on examining if performance decrements that result from pressure are related to reinvestment scores in the more complex skill of golf putting.

This was done by contrasting the reinvestment scores of individuals in the Masters (1992) study. Performance under pressure while golf putting, and the new reinvestment scores were obtained from the stressed control and explicit learning groups from the Masters (1992) study. Results showed that there was a significant relationship between the reinvestment score and putting performance differences from pre to post-test with high reinvesters being more likely to fail under pressure. The authors concluded that their findings in study 2 were a result of the rod-tracing task being too simple and devoid of explicit rules to result in reinvestment under pressure (Masters, Polman & Hammond, 1993).

In the fourth study, the Reinvestment Scales' predictive validity was tested in the field. Two leaders of a university squash club team and a university tennis club team rated 12 players on their team on their tendency to fail under pressure. Stress failure ratings were made on a scale of 0 to 4, and club team members also completed the Reinvestment Scale. The ratings from leaders were significantly correlated with the ratings participants gave themselves. There was a high inter-rater reliability, which suggests that it was reasonable to use the opinions of teammates to examine how susceptible players were to decrements of skill under pressure.

In summary, Masters (1992) results showed that skills which are learned implicitly can be performed better when experiencing pressure because the performer has less conscious knowledge of the explicit rules for execution of the learned skill and, thus, is less able to reinvest. The Masters (1993) findings showed that there is a correlation between reinvestment scores and failure of skill during a putting task and that high

reinvesters are more likely to fail under pressure. Findings also provided psychometric support for the Reinvestment Scale.

Findings that support the Distraction Models of choking

Hardy, Mullen, and Martin (2001) investigated the effect of task-relevant cues and state anxiety on motor performance under pressure. The purpose of their study was to examine whether conscious processing effects could be obtained using task relevant cues on female national standard trampolinists. The conscious processing hypothesis predicts that the combination of high state anxiety and task relevant cues (skill-focus during skill execution) should result in greater performance decrements.

Twelve female national standard trampolinists took part in the study. Participants performed voluntary competition trampoline routines in high anxiety conditions and in low anxiety conditions. In the high anxiety conditions, anxiety was induced by asking participants to perform their routines two hours before a national competition. Asking them to perform a week after the competition created the low anxiety conditions. In the anxiety conditions, routines were performed once while shadowing coach points, which involved the coach calling out technical points as task-relevant cues (skill-focused execution) to induce conscious processing, and once without shadowing coach points. Anxiety levels were assessed using the State-Trait Anxiety Inventory. Although neither the main effect for anxiety nor for shadowing was significant, there was a significant interaction. Performance in the high anxiety shadowing condition was significantly worse than performance in the other three conditions.

The performance scores were consistent with the notion that the combination of task-relevant explicit cues and anxious states actively encourages conscious processing, but it appears that performers did not consciously control their moves in either the low anxiety condition or in the high anxiety non-shadowing condition. Though performers were unaffected in all other conditions, the fact that there were performance decrements in only the high anxious shadowing condition could possibly have occurred due to participants exceeding some threshold for attentional capacity (Hardy, Mullen, and Martin, 2001). The authors interpreted these findings to suggest that instead of anxiety and task-relevant cues causing conscious processing to lead to conscious control of skill execution (self-focus model), maybe the addition of task-relevant cues to their voluntary competition trampoline routines, took up some of their attentional capacity, while anxiety took up some more of their attentional capacity, thus exhausting the available attentional resources for performance. The authors believe this supports a distraction model explanation of choking.

Mullen, Hardy, and Tattersall (2005) were interested in examining the effects of anxiety on motor performance, to test a form of the self-focus models of choking: the conscious processing hypothesis. Twenty-four experienced male golfers took part in the study. Participants were tested on two separate days, once in a neutral instructional set under low-anxiety and once in an evaluative instructional set under high-anxiety. To induce high-anxiety, the evaluative instructions group was informed that they could possibly win a monetary reward, based on judgments made on their putting performance and evaluations made on their putting strokes. To induce low-anxiety in the neutral

instructions informed group, they were told that their scores would not be compared with anyone else's, but would be combined with those of other players of a similar standard in order to expand the experimenter's database for future work. The Competitive State Anxiety Inventory-2 measured anxiety.

The instructional sets were administered in counter balanced order and required participants to complete 10 putts in single task, task-irrelevant, and task-relevant conditions. This means that participants completed three sets of 10 putting trials in both the evaluative and neutral instructional sets. In the task-relevant condition participants putted while being shadowed by coaches who supplied task-relevant coaching points to encourage conscious processing. They were told to allow the coaching points to guide their performance. In the task-irrelevant condition participants where asked to putt while listening to randomly generated high and low pitched tones. They were instructed to count the number of high pitch tones produced during each putt. In the single task condition participants were asked to putt as they normally would. Putting performance for all twenty-four experienced golfers, was assessed using the two-dimensional error scores based on the *x, y* coordinates of each putt, with the hole as the origin of the axes.

It was proposed that according to conscious processing, task execution in low and high-anxiety conditions should be unaffected when skilled participants are required to use a task-irrelevant secondary task. In contrast, attending to explicit components of a well learned skill should disrupt task procedures that are normally automatic. Single task performance should only be disrupted in high-anxiety conditions as performers lapse into conscious processing.

Results showed that the evaluative instructions significantly increased cognitive anxiety levels. Putts were significantly less accurate in the high anxiety tone counting and shadowing conditions compared to all other conditions, and there was no significant difference between the tone counting and shadowing conditions. Performance was impaired in both the task-irrelevant and task-relevant conditions. These findings were interpreted as failing to support the conscious processing hypothesis. Performance data support an attentional threshold (distraction model) interpretation, because performance effectiveness was impaired in both task-relevant shadowing and task-irrelevant tone counting conditions when participants were anxious. As mentioned earlier, according to conscious processing, task execution in low and high-anxiety conditions should be unaffected when skilled participants are required to use a task-irrelevant secondary task. Only attending to explicit components of a well-learned skill (in the task-relevant shadow condition) should have disrupted task procedures that are normally automatic. Thus, it was concluded that this could mean that both secondary tasks combined with anxiety, caused increased cognitive state anxiety to reduce attentional resources.

Wilson, Chattington, Marple-Horvat, and Smith (2007) were interested in comparing self-focus and distraction explanations of choking. The main aim of their study was to extend previous research adopting dual-task designs to test the predictions of explicit monitoring accounts of performance decrements. Twenty-four women volunteered to take part in the study. Participants were tested using evaluative (high-threat) and neutral (low-threat) instructional sets, which were administered in counterbalanced order. Within each instructional set participants completed two laps of a computer driving task in single

distraction (tone recognition) and skill-focused (hand positioning) conditions. Participants had no previous experience with the driving task so they underwent training trials where they were instructed to complete laps as quickly as possible. The participants were not instructed on how they should drive; instead they were allowed to develop explicit knowledge during learning by testing hypotheses about how best to perform the skill.

The single task required participants to drive laps without any additional secondary tasks. The distraction task required the participants to attend to the particular pitch of a tone before they began the driving task. They were instructed to remember the pitch of the tone and told they would be presented with one of three tones during the driving task (one higher, one lower, and one the same pitch as the tone they were originally presented). They were asked to respond as accurately and quickly as possible to whether the tone was “lower”, “higher”, or the “same” pitch as the original tone they heard before the driving task. The skill-focused task required the participants to respond to a single tone that occurred at a random time period. Participants were told to be aware of the positioning of their hands on the steering wheel at all times, so that when the tone was produced they could verbally indicate their hand positioning (i.e., which hand was higher than the other or were they at the same height on the steering wheel).

In the low-threat condition (neutral instructional) nonevaluative instructions were provided to participants. They were only told to do their best and drive the course as quickly as possible. In the high-threat condition (evaluative instructional) participants were informed that their mean driving performance and secondary task performance

during the training trials would be calculated and if they could increase their score by 20% then they would receive a monetary reward if their randomly assigned unknown driving partner also improved her driving score by 20%. They were then informed that their partner had improved their driving score by 20% and now it was up to them.

It was predicted that based on the self-focus models of choking, the skill-focused task should require participants to attend to an explicit component of their driving task, and induce explicit monitoring which would result in performance decrements. Participants in the high-threat single task condition should experience performance decrements, as increased pressure should cause pressure-induced explicit monitoring.

Although participants reported higher levels of cognitive anxiety in the high-threat condition than the low-threat condition, driving performance did not differ between conditions. In regards to performance on the secondary tasks, participants made significantly more mistakes in both secondary tasks in the high-threat conditions compared to the low-threat conditions. Performance depletion on a secondary task indicates that more effort is being applied to maintain performance on the primary task. Thus, the authors concluded that their results are more supportive of distraction explanations of choking then self-focus explanations.

In summary, Hardy, Mullen, and Martin (2001) found that participants who performed competition trampoline routines under increased pressure and when provided with task-relevant explicit cues, experienced decrements in performance, the results were supportive of a distraction model as an explanation of choking. Mullen, Hardy, and Tattersall (2005) showed that golf putting performance was impaired in both a task-

irrelevant tone counting condition and a task-relevant shadowing condition and suggested that a distraction model interpretation may explain this occurrence. This could mean both secondary tasks combined with anxiety, increased cognitive state anxiety, which reduced attentional resources. Wilson, Chattington, Marple-Horvat and Smith (2007) found that skill-focus during performance of a driving task did not hinder performance, as would be expected from the explicit monitoring hypothesis. This was interpreted as meaning that the decrements in driving performance were more a result of attentional explanations of choking then self-focus explanations.

Findings that support the Self-Focus Models of choking

Gucciardi and Dimmock (2008) were interested in examining choking under pressure in sensorimotor skills. They wanted to compare the conscious processing hypothesis with the attentional threshold hypothesis as explanations for choking under pressure. They believed that while the evidence in Mullen, Hardy, and Tattersall (2005) appeared to support the attentional threshold hypothesis, a conscious processing interpretation could not be totally ruled out because attending to explicit cues also resulted in performance decrements under high anxiety. Thus, the aim of their study was to further test both choking models using more realistic experimental manipulations, by requiring participants to think rather than verbalize different attentional cues.

Twenty experienced golfers participated in the study. In three independent conditions, participants performed a putting task and were instructed to either focus on three task-irrelevant thoughts, focus on three explicit cues relating to their own putting technique, or

focus on a single swing thought cue word representative of their own putting technique. The use of evaluative instructions and a financial incentive were designed to induce pressure. Results showed that putting performance only deteriorated in the explicit knowledge condition under increased pressure. An attentional threshold explanation for decrements in performance is unlikely, because performance did not deteriorate under increased anxiety when participants putted with task irrelevant knowledge.

If there was an attentionional threshold explanation for performance decrements, then there should have been decrements in performance in both the explicit knowledge condition and the irrelevant knowledge condition because in both those cases, secondary attention (attending to not only one but two things at once) is being required while performing the primary task. In this case the secondary attention is either focusing on three explicit cues relating to their own putting technique, or focusing on three task-irrelevant thoughts. Either way, if an attentional explanation was to explain performance decrements, both of the conditions (explicit knowledge & irrelevant knowledge) should have shown decrements in performance, but they didn't, only the explicit knowledge caused performance decrements. Thus results were interpreted as supportive of the conscious processing hypothesis.

Based upon the aforementioned expectation that individuals are more prone to "choke" when high in self-consciousness (Baumeister, 1984; Master, 1992), Mesagno, Marchant, and Morris (2009) were interested in testing an intervention specifically designed to manipulate self-consciousness. They used music as a means of diverting attention and thereby decreasing self- consciousness. Five experienced basketball players

(four female, one male) who met the choking-susceptibility selection criteria were chosen to participate out of a pool of forty-one, after completing three psychological inventories to identify choking susceptible athletes. A single case A1-B1-A2-B2 design was used while they performed basketball free throw shooting, and shooting percentage was the dependent variable. Participants also took part in follow-up interviews that lasted between 35 and 75 minutes. The four phases consisted of low-pressure (A1), high pressure (B1), low-pressure (A2), and high pressure plus music intervention (B2) phases. All four phases were scheduled separately, and took place over a four week period.

In both the B1 and B2 phases, pressure manipulations consisted of videotaping all shots, audience presence, and a performance contingent incentive. In phase B2 participants performed with a Sony Walkman for the music intervention. Participants were to listen to a portion of the song, "Always Look on the Bright Side of life" from Monty Python's Life of Brian, and were told to focus primarily on the music lyrics while shooting. By attending to the lyrics while performing, participants were expected to experience less self-consciousness. Participants completed the Self-Consciousness Scale, Sport Anxiety Scale, Coping Style Inventory for Athletes, and Competitive State Anxiety Inventory-2.

All participants described an increase in self-consciousness during the high-pressure conditions. During the B1 phase participants identified their increase in public self-awareness and explicit monitoring of execution, and these were associated with performance decrements under pressure. Results for the B2 phase showed that participants demonstrated a 19.4% average performance improvement with the music

intervention compared to performance under pressure without music. This suggests that using music as a dual (distraction) task was beneficial possibly because it decreased the likelihood of self-focusing under pressure, which could have led to the B2 phase participants experiencing decreased self-awareness, and thus positively impacting performance (Mesagno, Marchant, & Morris, 2009). These results were, therefore, interpreted as being supportive of the self-focus model explanations of choking.

In summary, Gucciardi and Dimmock (2008) showed that an attentional threshold explanation for decrements in golf putting performance is unlikely, because if putting performance were relevant to attentional threshold, performance should have deteriorated under increased anxiety when participants putted within the irrelevant knowledge condition and the explicit knowledge condition. However, performance only deteriorated in the explicit knowledge condition, when attending to several explicit cues under increased pressure. The interpretation of this finding suggests that the conscious processing hypothesis is valid in explaining decrements in performance under pressure. Mesagno, Marchant, and Morris's (2009) results show that as a dual-task, listening to music may be beneficial because it decreases the likelihood of self-focusing under pressure, which could decrease self-awareness. Their results suggest that the self-focus model is a sound explanation of choking.

Self-Focus and Distraction models of choking in different domains

For most of the late 1980's and 1990's researchers were focused on defining and determining causes for decrements in performance under pressure and increased anxiety.

This investigation led to the development of many different models and theories but for the most part, all of them either supported self-focus models of choking or distraction models of choking. As mentioned, distraction models propose that pressure creates a distracting environment, which shifts attentional focus to task irrelevant cues (such as worries) about the situation and its consequence. Self-focus theories, which Beilock and Carr (2001) term explicit monitoring theories, suggest that pressure raises anxiety and self-consciousness about performing correctly. This increased anxiety and self-consciousness causes attention to shift to the skill process and to the step-by-step control of the process, which disrupts well-learned or proceduralized skill performance.

Beilock and Carr (2001) argued that both the distraction models and the self-focus models may provide valid explanations of choking, and actually have different domains of applicability. They argued that distraction models might best explain the effects of pressure on the performance of skills that rely on working memory for storage of decision-making and action-relevant information. The choking effect may then be due to dual-task interference. However explicit monitoring theory may best explain choking for tasks that have become automatic and proceduralized, and may be susceptible to failure due to introspection and conscious processing during skill execution (Beilock & Carr, 2001).

In a series of studies, Beilock and Carr (2001) wished to examine what governs the onset of choking under pressure, and if the two choking models could possibly exist as an explanation for decrements in performance in different domains. In the first and second studies, the goal was to identify a particular skill that consisted of the right properties to

be susceptible to choking according to only one of the two models. Forty-eight participants (intercollegiate golf team members, intercollegiate athletes without golf experience, and non-athletes with no golf experience) performed three sets of a putting task consisting of a 20 putt pre-test, 30 putt practice, and 20 putt post-test condition. Knowledge and recollection of detailed steps in putting were assessed after the first two putting tasks, while episodic recollections of a particular putt were assessed after the third putting task.

Expert golfers gave longer and more detailed descriptions of the steps involved in a typical putt. Their descriptions dealt more with assessing and planning a putt than did the descriptions provided by the novices. However, expert golfers had shorter less extensive episodic recollections of a particular put when compared to novices and made fewer references to putting mechanics in their episodic recollections than did novices. Beilock and Carr believed this pattern followed the prediction of expertise-induced amnesia, which suggest that an expert's extensive knowledge of putting is declaratively accessible during post-performance reflection, but is not used during real time performance because the "extensive knowledge of putting" is controlled by automated procedural knowledge.

Based upon the results from study 1, Beilock and Carr hypothesized that if golf putting for experts is proceduralized, then the disruption caused by the use of a "funny putter" should not only lead to lower level of performance, but should also lead to an increase in episodic memory of a particular putt. This should occur as a result of needing to attend to the specific processes of skill execution due to the new altered putter.

In the second study, 36 experienced golfers and 36 introductory psychology students with no golf experience were recruited. The difference this time was that descriptive steps and episodic recollection were assessed after not only the standard putting task, but also during an altered putting task (using a funny shaped putter). Participants were randomly assigned within skill level to either a regular putter or funny putter condition, which meant there were18 participants within each group (18 novices regular putter, 18 novices funny putter, 18 experts regular putter, 18 experts funny putter).

This time they performed four sets of a putting task consisting of a 20 putt pre-test, 30 putt practice, 20 putt post-test, and 10 putt second post-test condition. Knowledge and recollection of detailed steps in putting were assessed after the first two putting tasks, episodic recollections of a particular putt were assessed after the third putting task, and before the fourth putting task participants were told to attend to the process involved in making their next putts, because they would be completing another episodic questionnaire identical to the one completed after the third putting set.

Results indicated that experts who were using the regular putter gave longer and more detailed descriptions of the steps involved than novices, and again experts had diminished episodic accounts of a particular putt, and fewer references to putting mechanics. Experts using the funny putter also gave more detailed descriptions of steps involved than did novices, but unlike the experts using the regular putter, funny putter experts did not show diminished episodic memories for specific performance. Diminished episodic memory would be expected if real time performance was executed automatically, but the use of

the funny putter actually caused the expert group using it to produce more elaborate episodic recollection than regular putter experts and both novice groups.

This finding suggests that putting performance for experienced golfers is supported by proceduralized knowledge, which may be disrupted through the addition of new and unknown task restraints. Beilock and Carr (2001) argued that putting is a task that consists of complex proceduralized sensorimotor skill (as shown in both study one and two) and therefore, according to explicit monitoring theory, it should be extremely susceptible to decrements in performance under pressure, due to the skill being explicitly attended to in real time during putting skill execution.

In the third study, participants (n=108) with little to no experience in golf were randomly assigned to either learn the sensorimotor skill of putting or an alphabet arithmetic task under single task, dual task, or self-consciousness raising conditions. Single task conditions required the participant to only attend to the task at hand, without any further attentive obligations or performance manipulations. Dual task conditions required the participant to attend to two separate tasks while performing both at the same time. The purpose of the dual task condition was to create a situation where the participant was likely to have decrements in performance due to attending to both task relevant and irrelevant cues. Decrements in performance in this condition would support the distraction model of choking. Self-consciousness task conditions required the participant to perform a task while experiencing some self-conscious inducing pressure. It was expected that this would lead to self-consciousness and self-focusing (a scenario

supported by the self-focus model of choking) and would result in decrements in performance.

When taking part in the putting or alphabet arithmetic learning trials, those in the dual-task condition were told that while they were putting they would be listening to a recorded list of spoken words being played from a tape recorder. They were instructed to monitor the words carefully and each time they heard the word *cognition,* to repeat it back to the experimenter. Those in the self-consciousness condition completed either the putting or alphabet arithmetic learning trials, with the understanding that they were being video recorded and the expectation that golf experts and math experts would analyze their footage. Those in the single-task condition completed either the putting or alphabet arithmetic learning trials, without any secondary attentive obligations.

For all three conditions, following learning trials of 270 putts or learning trials of 270 alphabet arithmetic equations, participants were exposed to an 18-putt low-pressure and 18-putt high-pressure post-test situation, and an 18 question low-pressure and 18 question high-pressure situation. In the post-test, the low-pressure trial was just another series of putts or questions, mimicking the learning trials. In the high-pressure trials, participants were told that they would receive $5 if they improved their putting accuracy or percentage of correctly answered questions by 20%, but that this was also dependent on their randomly assigned unknown partner also improving by the same amount. They were then informed that their partner had improved by 20% and now it was up to them to improve theirs or neither they nor their partner would receive the $5.

The main finding from the third study was that, following single-task practice, choking only occurred in the putting tasks. Findings showed that performance was reduced when participants practiced under dual task conditions, in putting and alphabet arithmetic. Susceptibility to choking was not altered in either putting or alphabet arithmetic, though practice benefits were altered in the alphabet arithmetic task. Practice under conditions intended to raise anxiety and self-consciousness (i.e., the conditions in which participants were video recorded and expected that golf experts and math experts would analyze their footage), did not harm performance or change practice benefits relative to single-task practice in either skill, but did inoculate putters against choking in the high pressure situation (Beilock & Carr, 2001).

The authors interpreted their findings as suggesting that choking arises in a task where underlying knowledge base is thought to be procedural (an automated sequence of actions or steps to be followed in accomplishing a task), but will not arise in a task whose underlying knowledge base is assumed to be more explicitly accessible. Thus Beilock and Carr state that choking results from explicit monitoring in response to self-consciousness and achievement anxiety.

In the fourth study, the two possible sources of choking were examined at different stages of learning. Thirty-two undergraduate students with little to no experience in golf were randomly assigned to either self-consciousness or dual-task distraction training. In this study, participants took part in a 27 putt training trial followed by an 18-putt low-pressure task and an 18-putt high-pressure task. After this they then took part in a 225-putt training trial followed by a second 18-putt low-pressure task and 18-putt high-

pressure task. When taking part in the golf putt training trials, those in the distraction condition were told that while they were putting they would be listening to a recorded list of spoken words being played from a tape recorder. They were instructed to monitor the words carefully and each time they heard the word *cognition,* to repeat it back to the experimenter. Those in the self-consciousness condition completed the putting training with the understanding that they were being video recorded and the expectation that golf experts would analyze their footage.

When completing the 18-putt low pressure post-test, participants were not made aware of the second upcoming "post-test" situation, but were told their mean putting performance for those 18 putts. For both of the high-pressure trials, participants were given the scenario that they "needed" to improve their putting accuracy in both post-test situations to receive their $5. The four post-test trials (performance following 27 putts of training under low and high pressure, performance following 225 putts of training under low and high pressure) were used to assess how far participants progressed in learning putting skills. This was important in understanding the participants' stages of skill development, and how progression through those stages could possibly alter how the distraction and self-consciousness conditions affect performance.

It was proposed that if distraction is a reason for performance decrements, those training in either self-consciousness or dual-task environments should show performance decrements in pressure situations early in training. This is proposed because individuals in either training condition have not adapted to performing under divided attention, neither have their putting skills become proceduralized. Later in training however, those

individuals who trained in a dual-task environment will be accustomed to training under divided attention conditions, and those who trained under self-consciousness should have declined performance.

If explicit monitoring is a reason for performance decrements, those training in either self-consciousness or dual-task environments should improve under pressure in low levels of practice. If, as the explicit monitoring hypothesis predicts, pressure induces attention and control to skill performance, novices may benefit from performance pressure (which again EMH says causes attention and control to skill performance) in the early learning stages, but as putting skill becomes proceduralized (e.g., automatic), only those who were training in the self-conscious environment should improve under pressure, because they adapted to the demands to explicit monitoring skill performance.

Results were consistent with the predictions of the explicit monitoring hypothesis of choking under pressure. Results showed that early in practice and regardless of the training environment, pressure facilitated performance. As golf putting skills became more proceduralized at later stages of practice, the participants who were in the self-conscious training group were inoculated to the detrimental effects of performance pressure. Self-conscious training was the only condition that did not leave the participants susceptible to performance decrements under pressure, and some performers who experienced self-conscious training actually improved under pressure.

One aspect of high level performance that has not yet received adequate attention is the manner by which expert performers allocate attention to skill processes and procedures during skill execution in real time. Beilock, Carr, MacMahon and Starkes

(2002) were interested in examining the impact of divided attention and skill-focused attention on novice and experienced performance of sensorimotor skills.

Beilock et al. (2002) performed two studies. The first assessed the attentional mechanisms supporting performance of two sensorimotor skills in real time, and the second examined the relationship between attentional demands of online skill execution and degree of task aptitude. In the first study, experienced golfers (n=21) performed two tasks: a putting task in a skill focused attention condition where individuals were told to attend to a specific component of their swing and to say "stop" at the exact moment they finished their follow through, and a dual task where experienced golfers performed the putting task while they were to monitor tones and say the word "tone" each time they heard the specified target tone. They were instructed to perform one set of 20 putts, which constituted the practice condition, and then a set of 20 putts for the skilled focus condition, and 20 putts for the dual-task condition.

Experienced golfers performed significantly better during the dual-task condition in comparison with the skill-focused condition. Putting in the skill-focused condition was significantly less accurate than putting in the practice condition, while performance in both the dual-ask and practice conditions were not significantly different. The authors concluded that well learned putting does not require constant online control, which means that if necessary, there is attention available for the processing of secondary task information.

The aim of the second study was to replicate the findings in the first study by assessing the attentional mechanisms supporting soccer-dribbling performance at

different levels of skill aptitude. This study was designed to examine the effects of dual-task and skill-focused attention on the performance of twenty participants who were experienced or novices at soccer. The researchers also explored the effects of these attentional manipulations on dominant and non-dominant foot performance within soccer skill level. This was done to see if differing foot skill aptitude in both experts and novices would elicit different causes for performance decrements under pressure.

In study two, right foot dominant novice and experienced soccer players performed a dribbling task in which they dribbled a soccer ball through a slalom course made up of a series of pylons. Participants took part in both attention conditions (dual-task and skill-focused) while dribbling with their dominant foot, and again while dribbling with their non-dominant foot.

In the practice condition, participants performed two dribbling trials with their dominant foot only, and then with their non-dominant foot only. In total, there were four dribbling trials in the practice condition. In the skill-focused attention condition, individuals dribbled through the slalom course while a single tone occurred at a random time. Individuals were instructed to attend to the side of their foot that was in contact with the ball throughout the dribbling trial, so that when they heard the tone they could verbally indicate whether the ball was touching the outside or inside of their foot. In the dual-task condition, individuals were asked to perform a secondary auditory word-monitoring task while dribbling the soccer ball through the slalom course. They were told to closely monitor the list of words in the task. During the task, words were presented at a random time, and when the target word “thorn” occurred, individuals were told to repeat

that specific word out loud. The mean of two error-free dribbling trials performed with each foot under each condition, was used as a measure of dribbling performance for that specific foot and condition. Results showed that for dominant foot dribbling, novices performed at a lower level in the dual task condition designed to distract attention from task performance.

However, experienced performers showed an opposite pattern. They performed at lower levels in the skill-focused condition compared to the dual task. However, performance outcomes with the non-dominant foot showed a different pattern of findings. Both novice and experts performed better in the skilled focus condition than in the dual-task. This suggests that experienced performers suffer more than novices from conditions that call their attention to individual task components of skill execution which elicit step-by-step monitoring or even online control. Performance from experts on a task that is not based on proceduralized knowledge can benefit from attention that is skill-focused.

Jackson, Ashford, and Norsworthy (2006) were interested in the extent to which dispositional reinvestment or self-consciousness can predict skill failure under pressure. They designed two studies to replicate the results of the Beilock, Carr et al. (2002) study regarding performance under single task, dual task, and skill focused conditions, while also examining the moderating effects of pressure and dispositional reinvestment. In both experiments they sought to explore how attentional conditions interact with situational pressure and dispositional reinvestment to influence skill performance.

In study one, thirty-four field hockey players performed 30 trials of a dribbling task under single task, skill focused, or dual task attention conditions under low-pressure (15

dribbling trials) and high-pressure (15 dribbling trials) situations. Before the task, participants completed the Reinvestment Scale and were identified as either low reinvesters or high reinvesters. Pressure was induced by the presence of a cameraman who video recorded the performance. Results showed that performance in the dual-task condition was faster then performance in the single-task condition, which in turn was faster then performance in the skill-focus condition. These results from the three attention conditions were consistent with the findings of Beilock, Carr, et al. (2002).

In the second study they introduced a task relevant dual task condition, which made participants focus on a process goal under low and high-pressure. This was of interest because the underlying idea of process goals (when in the context of explicit monitoring/self-focus theories) presents a paradox in that they seem to encourage performers to focus consciously on normally automatic aspects of performance. Twenty-five varsity soccer players performed the soccer-dibbling task used by Beilock, Carr et al. (2002). Before the task, participants completed the Reinvestment Scale, and were identified as either low reinvesters or high reinvesters. Pressure was induced by the presence of a cameraman of the same gender recording the session with a video recorder.

Results showed three main findings: skill-focus attention had a detrimental effect on dribbling speed, high reinvesters in the single task condition showed a greater tendency toward poorer performance under pressure, and movement related process goals were detrimental to performance regardless of dispositional reinvestment or situational pressure. Findings suggest that although skilled movement process goals may lead to

explicit monitoring, process goals relating to strategic features of positioning may direct the performers' attention away from their physical movements.

In summary, Beilock and Carr (2001) showed that unlike the experts who used the regular putter and had diminished episodic accounts of a particular putt and fewer references to putting mechanics, experts using the funny putter did not show diminished episodic memories for specific performance, which suggests that putting performance for experienced golfers is supported by proceduralized knowledge and may be disrupted through the addition of new and unknown task restraints. Other results showed as the putting skills became more proceduralized in later practice stages, only individuals who were used to performing under conditions that heightened performance anxiety and the explicit monitoring of task processes, performed well under performance pressure.

Beilock et al.'s (2002) findings suggest that well learned putting does not require constant online control, which means attention may be available for the processing of secondary task information. Other findings suggest that performance from experts on a task that is not based on proceduralized knowledge can benefit from attention that is skill-focus. Jackson, Ashford, and Norsworthy (2006) findings were consistent with those of Beilock, Carr, et al. (2002), in that performance was faster in the dual-task condition then the single-task condition, which in turn was faster then performance in the skill-focus condition. Also findings suggest that process goals relating to strategic features of positioning may direct the performer's attention away from self-monitored skill execution.

CHAPTER III

METHODS

Participants

Eighteen experienced male soccer players' ages 16-23 (*M* = 17.5 years, *SD* = 1.97) were given written consent to participate in the study. Participants were assessed to determine if their right-foot was the dominant foot. The sample was comprised of participants who competed in organized soccer for a minimum of 8 years (*M* = 10.05 years, *SD* = 3.18), at the recreational, junior varsity, high school varsity, and club level, and also included athletes currently competing at the collegiate varsity level at UNCG. The majority of the participants knew each other and were either from the same traveling team, the same high school team, or the same collegiate team.

Measures and Instrumentation

State Anxiety: The cognitive and anxiety subscales of the revised CSAI-2 (CASI-2R: Cox, Martens and Russell, 2003) was used to assess state anxiety and measure how anxious participants felt directly before taking part in the experiment. The CSAI-2 consists of 27 self-report statements designed to measure three components of state anxiety: cognitive anxiety, somatic anxiety, and self-confidence. Participants rated anxiety intensity on a 4-point scale anchored by 1 (not at all) and 4 (very much so), and

anxiety direction on a 7-point scale from -3 (very debilitative) to +3 (very facilitative) Cox et al. (2003) reported acceptable internal validity coefficients of .83 and .88 for cognitive and somatic subscales, respectively.

Pressure Measurement: A Post Performance Questionnaire was given to each player that instructed them to identify if they felt they were under any pressure for the Post-Test and, if so, to identify how much pressure they experienced on a scale of 1 to 5 ("1" meaning very little pressure, "5" meaning very high pressure).

Foot dominance measure: Participant foot dominance was assessed when participants volunteered to be in the study. Upon volunteering, they were asked to identify which hand and foot they prefer to use. For the purposes of this study, "foot dominance" was considered to be the foot the participant preferred to kick a soccer ball with. This was then further measured through an evaluation, which consisted of the experimenter instructing the participant to perform a task designed to confirm which foot is the participant's dominant foot. They were instructed to kick a soccer ball and we watched to see which foot they preferred to kick with. All participants included in the study preferred to kick with their right foot.

Task Performance Measures: The mean of two error-free soccer-dribbling trials performed with each foot under each condition, was used as a measure of dribbling performance for the specific foot and condition.

Design

Practice conditions & dribbling task. The soccer dribbling task and all three practice conditions (dual-task, skill-focus, and single-task) were the same as those used in the Beilock et al. (2002) study. However, unlike in the Beilock et al. (2002) study, these participants did not perform the soccer dribbling tasks inside on an indoor gymnasium type surface, but rather they performed outside on a soccer field. In most cases the study was conducted before the participants had soccer practice, and in few occasions the study was conducted after their soccer practice. This meant that their teammates were in a fairly close proximity and could view them participating in the study, though the distance from the teammates to the study site was at least the length of a soccer field.

Soccer-dribbling task. Individuals performed the soccer-dribbling task outdoors. The task required participants to dribble a soccer ball as rapidly as possible through a slalom course that consists of six cones set 1.5m apart for a total of 10.5m from start to finish. Before each dribbling trial, participants were instructed to dribble the ball through the cones with either their dominant foot or non-dominant foot. Participants were also given instructions concerning the single-task, dual-task, or skill-focus attention manipulation. This task is the same as used by Beilock and Carr (2002). Performance was measured as the time it took participants to complete the task and errors were recorded when participants knocked over a cone.

Dual task. The dual-task condition involved dribbling through the slalom course while performing a secondary auditory-word-monitoring task. Individuals heard a series of single-syllable concrete nouns spoken from a tape recorder. Words were presented at a

random time period once within every 2 second time interval. The target word, thorn, occurred randomly, averaging once every three words (6 seconds). Participants were instructed to monitor the list of words and to repeat the target word out loud every time it is played. The randomly embedded target word and the randomly placed filler words were used as a way to prevent participants from anticipating secondary task word presentation.

Skill-focus task. The skill-focus condition involved dribbling through the slalom course while attending to a single tone that will occur at a random time period once in every 6-s interval. Participants were instructed to attend to the side of their foot that is in contact with the ball during the entirety of the dribbling trial, and when the specified tone was heard they were to verbally indicate if the inside or outside of their foot just touched the ball.

Single-task. Participants performed the soccer-dribbling task without any additional directions.

Pressure manipulation. Pressure was induced by the inclusion of a cover story and a monetary reward. Participants were told that they had two sets of 2 dribbling trials to perform (a total of 4), and that they had a chance to win $50 if their dibbling time was the fastest out of all the other participants, but that in order to qualify they had to improve their overall dribbling time by 20%,. They were then told this was dependent on their randomly assigned unknown partner also improving by 20% as well. They were then informed that their partner improved by 20% and now it was up to them to improve their performance or neither they nor their partner would qualify for the 50%.

Procedures

Participants completed a consent form and demographic sheet with the purpose of giving details on their previous soccer experience. Individuals reported their dominant foot before the session. To confirm right foot dominance, the experimenter further explored individuals' foot preference by asking the participants "Which foot would you normally prefer to kick the ball with?" Only the individuals who were self-proclaimed right-footed were included in the study, and participants took part in all three conditions.

They were instructed that the purpose of the task was to dribble a soccer ball as quickly and accurately as possible through the series of cones set up in front of them. Before each dribbling attempt, they were informed as to which foot to use, and told that the experimenter would time each dribbling trial. If the wrong foot was used in the dribbling trial, the dribbling trial was repeated to make sure the participants completed the entire course with the specified foot. The dependent measure was the time it took to complete each trial error-free, measured by a stopwatch to the nearest tenth of a second. Each participant performed two error-free dribbling trials with their dominant foot only and non-dominant foot only.

These four dribbling trials served as the practice trials. The order of the remaining 12 dribbling trials were counterbalanced between participants. Individuals performed six sets of two dribbling trials (a total of 12), alternating foot usage (i.e. dominant foot only, non-dominant foot only) every two trials. For each task (single, dual, and skill-focused), consisting of four dribbling trials (a total of 12), participants established baseline performance. After the completion of every two trials participants received a short break.

During the break they were asked to count backwards from 100 by 7s, to limit the influence of persisting thoughts about the previous attention condition on subsequent skill performance.

Post-test. After the participants finished establishing their baseline performance for all three task conditions, they were presented with the cover story mentioned earlier to induce pressure. They then performed an additional single-task set of four dribbling trials (2 trials for each leg) alternating foot usage every two trials.

Data Analysis

A repeated measures Analysis of Variance was used to see if there was a difference in performance between the dominant and non-dominant foot. A T-Test was used to examine if the errors that occur at the post-test differed based on the foot used.

A repeated measures Analysis of Variance was also used to see if practice trial performance with the dominant foot differed as a function of the practice conditions (single-task, dual-task, skill-focus). The same design was used to see if practice trial performance with their non-dominant foot differed as a function of the practice conditions (single-task, dual-task, skill-focus). Significant effects were followed up with Tukey's post-hoc analyses.

Two paired samples T-Tests were used to examine if there were performance decrements under pressure, by observing single-task non-dominant foot vs. post-test non-dominant foot and single-task dominant foot vs. the post-test non-dominant foot.

CHAPTER IV

RESULTS

State Anxiety Measurements

Only one participant failed to complete the CSAI-2. Total scores for the CSAI-2 ranged from 9 to 36. Results showed that cognitive anxiety (M = 13.82, SD = 4.21) and somatic anxiety (M = 15.06, SD = 2.56) were low for participants, and they showed high levels of self-confidence (M = 27.59, SD = 4.82).

Pressure Measurements

Only three participants answered "no" to experiencing pressure, but the average score was 2.25, which equated to experiencing "little pressure" (M = 2.25, SD = 0.93).

Confirmation of Foot Dominance

Performance with the dominant foot and the non-dominant foot were examined through a repeated measures ANOVA to see if they differed in terms of performance, and this showed that there was a significant difference, F (1, 17) = 10.65, p = .005. Performance was better in the dominant foot (M = 11.66, SE = 0.23) than in the non-dominant foot (M = 12.06, SE = 0.18).

The paired samples t-test showed that in the post-test, under pressure, there was a significant difference in the errors made by the non-dominant foot when compared to the dominant foot, t (17) = 3.06, p = .007. Significantly more errors were made with the non-dominant foot (M = 0.61, SD = 0.70) than with the dominant foot (M = 0.17, SD = 0.38).

Hypothesis Tests

A repeated measures ANOVA for soccer dribbling performance indicated that there was a significant difference in performance in the practice trials, with the dominant foot as a function of practice condition, F (2, 34) = 5.54, p = .008, partial η^2 = 0.24. Performance during the single-task (M = 11.17, SE = 0.17) was significantly better than performance in dual-task, (M = 11.72, SE = 0.26) and performance in skill-focus, (M = 11.74, SE = 0.20). A repeated measures ANOVA indicated that there was a non-significant difference in the practice trial performance, with the non-dominant foot as a function of condition, F (2, 34) = 1.24, p = .301, partial η^2 = 0.06. Neither practice conditions were significantly different from each other: single-task (M = 12.60, SE = 0.28), dual-task (M = 12.41, SE = 0.27) and skill-focus (M = 12.72, SE = 0.27).

The paired samples T-Test showed that there was not a significant difference in performance when comparing the single-task dominant foot (M = 11.17, SD = 0.73) and the post-test dominant foot (M = 10.87, SD = 1.37), t (17) = 0.99, p > .05, two tailed. However there was a significant difference in performance when comparing the single-task non-dominant foot and the post-test non-dominant foot, t (17) = 3.59, p = .002, two

tailed. Performance was significantly worse under the single-task condition (*M* = 12.60, *SD* = 1.19) as compared to the post-test non-dominant (*M* = 11.63, *SD* = 1.17)

Table 1. Practice trial times and post-test performance times.

Condition	Foot	Mean	Std. Deviation
Single Task	**Non-dominant**	**12.60**	**1.1928**
	Dominant	11.17	.7290
Dual Task	**Non-dominant**	12.41	1.1468
	Dominant	11.72	1.1168
Skill Focus	**Non-dominant**	12.72	1.1661
	Dominant	11.74	.8540
Post Test	**Non-dominant**	11.63	1.1734
	Dominant	10.87	1.3710

CHAPTER V

DISCUSSION

The purpose of this study was to examine the role of experience in the phenomenon of choking. Choking is defined as "the critical deterioration in the execution of habitual processes that results from an increase in anxiety under perceived pressure" (Mesagno et al., 2009, p. 131). Theories of performance decrements under pressure point to two distinct models of choking: the self-focus model and the distraction model. The self-focus model explains that performance decrements under pressure occur as a result of increased arousal levels that lead the athlete to become self-aware and to consciously monitor performance execution. The distraction model explains that performance decrements under pressure occur as a result of increased arousal levels, which shift attention from task relevant to irrelevant cues. To test the relative efficacy of these two models in explaining choking, differences in performance of a soccer-dribbling task were observed between the dominant foot and non-dominant foot within experienced soccer players who were asked to perform under pressure. This was important in testing both models of choking because when a person experiences pressure, certain types of pressure can influence how the participant perceives the situation. To examine how experienced participants would be affected when performing in a pressure setting that caused them to

be distracted or self-focused, we established performance baselines in practice trial (dual-task, skill-focus) designed to mimic the situational aspects of those attentional settings. Experienced soccer players were assessed as they performed a soccer-dribbling task with their dominant foot and non-dominant foot in three practice conditions: single-task, dual-task, and skill-focus, and at a post-test (single-task with induced pressure).

Performance during the practice trials was examined under various conditions to enhance our understanding of performance on tasks that replicate the attentional demands invoked under pressure, of both distraction and self-focusing models of choking. Based on the past research conducted by Beilock et al. (2002) it was hypothesized that when experienced participants performed the soccer dribbling tasks in the practice trials (single-task, dual-task, skill-focus), performance would be fastest in the practice trials in the dominant foot under dual-task conditions and would be fastest in the practice trials with the non-dominant foot under skill-focus conditions. However, in contrast to the findings of the previous research, results from this study showed that performance with the dominant foot was faster in the single-task trials than in the dual-task and skill-focus conditions and that performance with the non-dominant foot was equivalent in the three practice conditions. Since the findings in the practice trials did not match the hypotheses, which were based upon the findings from Beilock et al. (2002) study, it is important to consider the possible reasons behind why these experienced performers did not respond the same way to the practice conditions as has been demonstrated in previous research.

Practice Trial Performance

In contrast to the findings in previous studies (Beilock, Carr, et al. 2002; Jackson, Ashford, & Norsworthy, 2006), the experienced participants in this study performed fastest during the single-task trial in the practice trials with their dominant foot. It is not clear as to why this happened. Jackson et al.'s findings were similar to those of Beilock et al., in that they both found when executing with the dominant foot under low pressure (this means under no more pressure than an individual would normally feel when performing a task), performance was fastest in dual-task conditions, than they were in skill-focus or single-task conditions. Based upon their findings, these authors explained that the reason for improved performance in dual-task compared to single-task is that the external focus needed to monitor auditory tones (in the dual-task condition) reduces any remaining tendencies to explicitly monitor throughout the task. Thus, because the task is more automatic for the dominant foot, the reduction in explicit monitoring results in better performance. One possible explanation of the lack of our findings in the practice trials matching the previous research is that for our participants, they may have been at a higher level of performance experience as compared to those in the previous research. Evidence supporting this interpretation is presented subsequently. Based upon this interpretation, the higher level of experience in this sample meant that for them executing in dual-task did not help them perform better than when they executed in single-task, because the task of dribbling a soccer ball in single-task may have been so automatic that it was never disrupted by any explicit monitoring. In this case, unlike the previous studies, "distraction" did not help them and "no distraction" did.

Findings also showed that these experienced participants did not display any performance decrements when performing with their non-dominant foot under the three practice conditions. In this case it was thought that performance would be fastest under skill-focus due to previous research by Beilock et al. (2002). Beilock et al. explained that the execution of a skill with a non-dominant foot benefits from constant online attention. Thus, self-focusing is expected to improve performance. Beilock et al. (2002) showed that performing a task with the non-dominant foot and having to attend to it while doing so helped the performer execute faster, because that skill was not yet executed at an automated level. One possibility for why we did not observe similar findings is again because our participants may have been at a higher level of experience than the participants in Beilock et al. If this is the case, then they may have been more skilled at dribbling with their non-dominant foot, thus allowing them to rely on automatic execution. This would explain why performance under skill-focus, single-task, and dual-task conditions was equal for these participants.

Foot Performance in the Post-Test

The primary purpose of this study was to explore the effects of pressure on performance. When examining performance under pressure with the dominant foot, it was predicted that if performance decrements occurred, this would be because pressure caused participants to explicitly monitor skill execution. If performance decrements did not occur, this would be because pressure did not invoke self-consciousness, which meant participants would not be led to explicitly monitor skill execution. Analyses revealed that

performance under pressure with the dominant foot was not significantly different from performance without pressure. When examining performance under pressure with the non-dominant foot, it was predicted that if performance decrements occurred this would be because the pressure caused participants to be distracted. If performance decrements did not occur, this would be because participants allowed pressure to invoke self-consciousness, leading them to explicitly monitor skill execution, helping their less-skillful (non-dominant foot) performance. However, the findings of this study revealed that when under pressure, experienced performers actually improved their soccer dribbling performance with their non-dominant foot when compared to the performance without pressure.

These findings point to the possibility that the pressure in this study was not sufficient to invoke decrements in performance. In the pressure manipulation used in this study, efforts were made to insure that the manipulation did not "lead" a performer to either have self-consciousness or become distracted: this occurrence would benefit one of the two explanations of choking (distraction model or self-focus model). This was done in response to the fact that in the Jackson et al. (2006) study that they induced pressure through video recording and analysis of performer's technique. This form of induced pressure was a self-consciousness manipulation, which means there was a chance performers were being "led" to experience decrements in performance through self-focusing. The goal of this study was to use a more neutral form of pressure. Although we were likely successful in inducing a more neutral form of pressure relative to the two proposed explanations of choking, the limitation of the manipulation used in this study

was that the Post Performance Questionnaire showed that participants perceived that there was actually very little pressure. In order for pressure to have been disruptive, it is likely that the average score would have needed to be a “4” (high pressure) or higher as compared to the 2.25 that was observed.

Due to the fact that the participants did not perceive the pressure to be high, participants probably improved their performance time because dribbling a soccer ball between cones was an automated task, which was, therefore, not sensitive to decrements under pressure. In the Post-Test participants had to dribble the soccer ball as fast as they could through the slalom course without knocking over a cone, but the act of dribbling so fast may not have been enough of a processing task to be threatened under the little pressure they may have felt. There is also the possibility that participants were able to use the task itself as a way of blocking out any form of pressure they did experience, due to the task calling for fast action and less decisive maneuvers such as soccer players are used to performing. For the participants, this automatic processing and speed requisite could have counteracted the pressure making it hard for it to be present while performing.

Lastly, it is possible that simply performing the task under the three conditions of the practice trials then led to a performance improvement when asked to repeat the single-task condition in the post-test.

Skill Differences in Participant Samples

Overall, our findings did not match Beilock et al. (2002) for either performance during the practice trials or for performance under pressure. When observing the sample

of participants used in both studies, a possible reason behind these disparate findings became clear. Although, we attempted to use participants similar in skill to the participants used in the Beilock et al. (2002) study, it appears that the samples were not as similar as intended.

In both studies, the samples were described as consisting of experienced soccer players. However, it is likely that the experienced soccer players in our study were more advanced players than the experienced soccer players in Beilock et al. (2002) study. Beilock et al. do not describe the playing ability of their sample, but describes them as having an average of 8 years of soccer playing experience. In the sample used in the current study, participants had slightly more playing experience (9 years). Also, in the current study participants had an age range between 16 and 23 (only three of the 18 participants were in their 20's: 20, 21, and 23). Given that participants had an average of 9 years of soccer playing experience, this means that they started playing soccer at approximately 8 years of age. In Beilock et al.'s (2002) study, participants were between the ages of 18 and 26, suggesting that they started playing at approximately 10-18 years of age. Further, 10 of the 18 boys in the current sample were currently playing at the varsity level in high school and on traveling teams, while 2 of the remaining 8 experienced soccer players were varsity level collegiate players. The remaining 6 players were at junior varsity levels in high school and on traveling teams as well. Again, although playing level was not described in Beilock et al., the obviously high playing level of the sample in this study in conjunction with the slightly more years of playing

experience and the earlier age at which they started playing soccer suggests that there is a difference in performance levels when comparing the two samples.

One other aspect that points to the possible experience disparity between Beilock et al.'s study and this study is the speed at which participants in the current study completed the slalom course. In Beilock et al.'s (2002) study, participants were asked to complete the dribbling task from one end of the slalom course to the other and the average time to completion with the dominant foot in dual-task was 6.55 seconds, while it was 8.38 seconds in skill-focus. In this study, the same slalom course was used (six cones set 1.5m apart for a total of 10.5m from start to finish). However, when performance was observed in a single experienced soccer player (female) before formal data collection, the average completion time with the dominant foot in the dual-task was approximately 6.30 seconds, while it was 6.90 seconds in skill-focus. After testing the first participant in this study, it was observed that the player was able to complete the soccer dribbling practice trials at a much faster pace than in the Beilock et al. study. Their average completion time with the dominant foot in dual-task was approximately 5.65 seconds, while in the skill-focus it was 5.40 seconds. Thus, because of concerns that the players were going to finish the dribbling task too quickly (so that the external stimuli could not be administered enough times), participants were asked to go through the slalom course twice.

This increased their performance time to an average of 8 to 10 seconds. Our experienced participants went through the slalom course twice in nearly the same amount of time it took Beilock et al.'s (2002) experienced participants to go through it once. This difference in speed was also evident when observing the magnitude of the difference

between performance with the dominant foot and the non-dominant foot in the single-task. Beilock et al.'s sample had an average performance time of 6.85 seconds for their dominant foot and 7.93 seconds for their non-dominant foot in the single-task, which results in a difference of 1.08 seconds. The sample in this study had an average performance time of 10.87 seconds for the dominant foot and 11.63 seconds for the non-dominant foot in the single-task, which points to a 0.76 milliseconds magnitude of difference. These finding offer additional support for the possibility that the disparity in the results is related to the expertise of the participants.

Conclusion

Based on the evidence provided showing the advanced playing experience of our sample, it is more accurate to categorize the soccer players in this study as "highly experienced" participants. This means that there may exist a group of athletes who are more advanced in their skill set, and because of their "highly experienced" levels they may not be susceptible to experiencing decrements under performance at the same level of "experienced" and "less experienced" athletes. This could also mean that if they do experience decrements, it is not for the same reasons as the "experienced" and "less experienced" athletes.

These athletes show an increased ability to not only perform through pressure, but also possibly consciously monitor their skill execution without consciously controlling it when performing. They also appear to have reached a performance level where not only are automatic performance tasks (i.e. dribbling a soccer ball under pressure) less likely to

be affected when performed with dominant and non-dominant feet under pressure, but these “highly experienced” athletes are also more likely to improve when executing under pressure (at least with these automatic performance tasks). It is possible this occurs because the pressure helps them focus more, ultimately limiting irrelevant attentional distractions (whether they be internal or external), benefitting their execution of these automatic performance tasks.

Study Limitations & Direction of Future Research

One of the limitations for this study was that a majority of the soccer players who participated knew each other and where either from the same traveling team, the same high school team, or the same collegiate team. This could have affected the level of pressure the participants perceived they were under, and it could have also had an influence on participants before they took part in the study: possibly increasing the level of effort they gave in their performance.

Limitations also include the fact that these participants did not perform the soccer dribbling tasks inside on an indoor gymnasium type surface (as was done in the Beilock et al. 2002 study). Instead, they performed their tasks outside on a soccer field. This could have benefited them in some way, improving their performance in the soccer dribbling tasks and, hence, impacting the findings of this study. The fact that the study was conducted after their soccer practices could have also had an impact on performance, due to participants’ higher likelihood of being tired. This could have slowed down performance time. However, it is important to remember that the use of a within-subjects

design means that these effects would have been experienced in all trials. Thus, it seems unlikely that these differences in the setting and potential fatigue of the participants would have impacted the influence of pressure on performance.

There should have also been more of a concerted effort to take note of not only the participants' performance times, but also their errors made during performance. The combination of time and accuracy measurements during performance could have provided a better look into performance decrements. Future research should be attentive to error data and include it in analyses of performance with and without pressure.

Other limitations from this study also include the fact that the way the skill-focus practice trial condition was executed did not only require participants to attend to the execution of a skillful performance, but the skill-focus task also required participants to split their attention two ways during their soccer dribbling trials. This was made evident after examining the way participants were instructed to perform the skill-focus task. Participants were instructed to listen for tones played as they performed the soccer dribbling slalom course, and to verbalize what part of their foot was touching the ball when they heard a tone. This was thought to be a good way to have participants focus on their execution, mimicking the attentional demands that occur when pressure causes a performer to self-focus on their skill execution. The issue though, is that this task actually causes the participant to have to attend not only to their foot while performing the task, but it also causes them to have to attend to the external stimuli of the tones playing.

This created a situation where their attention had to shift from attending to their execution of the skill, to attending to the tones being played. This ultimately produced an

experience that was actually more challenging for them. It would have been more appropriate to have the participants perform a skill-focus task that required them to verbalize the placement of their foot on their own (without any external prompting). This would have been more conducive to replicating an attentional demand where they were attending to the execution of a skill. Future research utilizing the skill-focus task should look to implement the task in this fashion.

Further research should also find ways to include video analysis of participants' performance in studies such as these. Video analysis could have provided us additional help in assessing performance of the participants (reaction time to the external stimuli, confirmation of errors) as long as the participants were video recorded discretely. Video recording participants in an indiscrete manner may increase the risk of inducing self-consciousness in the participants, which could then lead them to self-focusing during their performance. Future research should further look into examining the extent to which "highly experienced" athletes are impacted by what they perceive as "light pressure" compared to what they perceive as "high pressure". Research should also be designed to identify which tasks are still operationally fluid under "light pressure" and which tasks are negatively impacted from "high pressure". In particular, research should seek to understand at what point does pressure start to hurt a "highly experienced" athlete's performance, and if tolerance for pressure increases as athletes become more experienced and skilled

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