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An Examination of Behavioral and Temporal Consistency
Of Pre-Performance Routines In NCAA Division I
Basketball Free Throw Shooting - A Naturalist
Observational Investigation

Jacob Blumberg

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“AN EXAMINATION OF BEHAVIORAL AND TEMPORAL CONSISTENCY OF PRE-
PERFORMANCE ROUTINES IN NCAA DIVISION I BASKETBALL FREE THROW
SHOOTING – A NATURALIST OBSERVATIONAL INVESTIGATION”

by

JACOB MICHAEL BLUMBERG

(Under the Direction of Daniel Czech)

ABSTRACT

Research has shown that pre-performance routines positively influence performance of closed and self-paced skills (Boutcher & Crews, 1987; Cohn, 1990; Otto et al., 2011). Boutcher and Crews (1987) suggested that pre-performance routines improve performance by helping reduce anxiety along with helping athletes’ retain mental sharpness and focus. Furthermore, several quantitative studies have examined the influence of both behavioral and temporal consistency of pre-performance routines on the success of a skill, yielding inconsistent results (Boutcher & Crews, 1987; Lobmeyer & Wasserman, 1986; Lonsdale & Tam, 2008; Jackson, 2003). However, research examining this phenomenon from a qualitative and naturalistic observational perspective is scarce. This four-purpose study sought to examine the influence of (1) temporal and (2) behavioral consistency of pre-performance routines on free throw shooting percentage at the NCAA Division-I level. The final quantitative purpose (3) was to determine if either behavioral or temporal consistency had a stronger association with free throw shooting percentage. Additionally, (4) qualitative interviewing enabled analysis of non-observable aspects of the routine while gaining a deeper understanding of the routine through the participants’ perspective.

INDEX WORDS: Pre-performance routine, Basketball free throws, Behavioral consistency, Temporal consistency, Free throw accuracy, NCAA division-I, Qualitative, Quantitative,

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DEDICATION

I would like to take the time to dedicate this thesis to my family and loved ones. You have always been there when I needed you, through both the tough good times. I would never have made it through graduate school without your support, guidance, and consistent reminders that I am capable of achieving great things. While I have not always believed you, the completion of this thesis proves that you were right. Thank you for taking the time (often late at night) to listen to me complain and vent when I was stressed or just needed someone to listen to me. Those conversations were not always the most enjoyable times, but they usually ended with me having a clearer idea of what I needed to do next. I can't say thank you enough to you guys. I love you.

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CHAPTER 1

INTRODUCTION

The definition for pre-performance routines has been widely accepted as “a systematic sequence of motor, emotional, and cognitive behaviors that are performed immediately before the execution of self-paced tasks” (Cohn, 1990; Lidor 2007). There are two classifications of closed skills, self- and externally-paced. Lidor (2007), defined self-paced closed skills as occurring in a fairly stable and predictable setting in which the performer determines the timing and form of the physical execution of the skill. For example, during a free throw in basketball there is a maximum amount of time that the player has to attempt the shot (10 seconds in American basketball), but during that period the shooter is able to decide how long they will take with each aspect of their preparation and at what point they are going execute the skill (i.e. shoot the ball).

Pre-performance routines have been found to positively influence the performance of many closed and self-paced skills within sports, such as basketball free throws (Czech, Ploszay, & Burke, 2004; Lobmeyer & Wasserman 1986; Lonsdale & Tam 2008; Mack 2001), golf (Cohn, Rotella, & Lloyd, 1990), putting (Boutcher & Crews 1987), and baseball pitching (Otto et al., 2011). These routines have been found to produce several positive outcomes that have been linked to various components of improved performance, including: improved mental preparation, concentration (both in the present and on the specific task or skill), confidence, ability to self-regulate physiological arousal and other responses related to competition, decreased anxiety, and avoidance of dwelling on past failures or negative performances (Boutcher, 1992; Boutcher & Crews, 1987; Cohn 1990; Lidor & Singer, 2000; Singer 2002). There are also several theories

that provide support for the use of pre-performance routines as a means of enhancing performance. One example is the schema theory, which was developed by Schmidt (1975). This theory explains that individuals store motor movements in their memory as a form of generalized patterns, which can later be retrieved and executed. The schema theory states that there are two types of schemas that are a part of motor memory: recall schema and recognition schema. The concept of recall schema implies that completing the components of a pre-performance routine should trigger the performer to retrieve a motor program stored in their memory and thus cueing the execution of the motor response (i.e. actually performing the task). The effectiveness of the pre-performance routine is strengthened by establishing a consistent connection between the completion of the routine, and the start of the skill or task at hand through repeated practice (Cohn, 1990).

A second theory that provides evidence for the usefulness of a pre-performance routine is the mental rehearsal theory. This theory states that practicing a skill mentally (i.e. using imagery, visualization or other mental skills) without incorporating any physical components or actions can improve actual performance of that same skill. In addition, this mental practice can prepare the performer's body and mind to execute the skill or task by "priming the neural pathways" that are linked to the stored memory of the motor performance. Essentially, when a skill or task is practiced mentally the brain is activating many of the same neural pathways that are used when the same skill or task is physically performed. Pre-performance routines that incorporate mental practice have been found to strengthen the neural connections that are necessary for the actual performance (Cohn, 1990).

The set hypothesis theory provides even further support for the use of pre-performance routines. This theory states that a pre-performance routine can function as a mental and/or

physical warm up for an individual, so that when they attempt to execute the skill they are already in an ideal mental state to complete the motor program. This becomes even more important in sports or events that include long periods of time in between execution of the skill or task (i.e. baseball and the breaks between at-bats, and golf with the breaks between strokes or swings). According to the set hypothesis theory, a pre-performance routine can be most effective when used during these breaks or in the time immediately prior to the execution of the skill (Cohn, 1990).

Two frequently studied aspects of pre-performance routines have been the temporal and behavioral consistency of the routine itself. Boutcher and Crews (1987) conducted one of the earliest studies on temporal consistency of pre-performance routines in golf putting. Their results showed that both the male and female participants who learned an attention based pre-performance routine had both longer and more temporally consistent pre-putt routines.

Temporal consistency refers to the regularity at which the routine is completed within a defined range of time. This range is usually established by calculating the standard deviation of the mean routine duration. Additionally, Boutcher and Crews found that an attention-based routine improved the temporal consistency of the pre-performance routines and thus the success rate for the female participants. Boutcher and Crews described the male participants of this study as being “superior on both task and tournament putting performance.” Since the male participants were found to have a higher skill level than the female participants, Boutcher and Crews concluded that, “the effectiveness of the preputt routine will vary with golfing ability.”

Essentially, preputt routines appear to be more effective for performers who are less skilled at the task, which provides a possible explanation for the improved performance of the female (less skilled) participants. Overall, the findings allowed Boutcher and Crews to establish three general

suggestions for why pre-performance routines might improve performance. First, the use of certain components within the routine (specifically cue words) may help reduce the anxiety or stress of the situation experienced by the performer. Second, that the routine could enable the performer to block out irrelevant stimuli and/or avoid attending too closely to the specific steps of executing the skill. This would enable the participants to enter an ideal mental state leading up to the performance of the skill. Finally, Boutcher and Crews believed that the use of a routine helped increase the concentration of the athlete throughout a lengthy competition (i.e. 18 holes of golf) (Boutcher & Crew, 1987).

Wrisberg and Pein (1992) conducted a more recent study focusing on both the duration and temporal consistency of pre-performance routines for free throw shooting at the collegiate varsity and intramural level. Their findings supported the conclusion of Boutcher and Crews (1987) in that the more accurate, and thus successful, free throw shooters were more temporally consistent with their routines. Wrisberg and Pein also found no significant relationship between the mean duration times of the routine and the participant's free throw percentage. According to these results, the more consistent a performer is with regards to the length of their routine, the more accurate or successful they will be.

In a more recent study, Bell, Cox and Finch (2010) examined the relationship between both the duration and temporal consistency of pre-putt routines and the performer's overall accuracy of their putts. The within-subject portion of their study found a significant correlation between the temporal consistency of the routine and the success rate of the golfer, which adds further support to the findings of Boutcher and Crews (1987), and Wrisberg and Pein (1992). Based on these results, Bell, Cox, and Finch concluded that consistent temporal execution of the routine allowed the golfer to think less about the actual performance of the skill, leading to a

higher rate of success. In addition to the within-subject test, Bell, Cox, and Finch also conducted a between-subject test with the same variables over the course of two tournaments. The findings from the between-subject test found there to be no significant relationship between the duration of the routine and the success of the putt. Instead, Bell, Cox, and Finch found that the distance of the putt (i.e. the difficulty of the task) was the only significant factor that predicted success. Based on this, Bell, Cox, and Finch concluded that the situation likely has an impact on the performance, regardless of the use of a pre-performance routine (Bell, Cox, & Finch, 2010).

Jackson (2003) conducted a study that examined the duration and temporal consistency for rugby kickers pre-performance routines. No significant differences were found between the best and worst kickers with regards to both the duration and the temporal consistency of their routines. Instead the findings showed that duration of the routine had a “strong positive relationship” with the difficulty of the kick. Jackson also concluded that the kickers took more mental preparation time and less physical preparation time prior to the execution of the task when the score was close. Thus, situational factors (the score and difficulty of the kick) were associated with the duration of the pre-performance routine instead of the accuracy or successful execution of the skill. These results are consistent with the findings of the between-subject portion of Bell, Cox, and Finch (2010).

Bell, Finch, and Whitaker (2010) conducted a study in which they examined the correlation between the duration of pre-dive routines and the performance outcome. They found that the mean duration of the pre-dive routines for the top eight divers was significantly longer than the pre-dive routines than the bottom eight divers (6.18 and 4.93 seconds respectively). Additionally, the duration of the routine for all divers was found to increase with the difficulty of the dive. Based on this, Bell, Finch, and Whitaker established two conclusions. First, that the

duration of the pre-dive routine was associated with the difficulty of the task (duration increased with the difficulty of the dive), which supports the findings of Jackson (2003). Second, that longer pre-dive routine durations were associated with increased success, which is consistent with past findings (Boutcher & Crews, 1987).

Due to the inconsistent and conflicting findings of these and other previous studies, no definite conclusions can be made regarding the relationship between the success of a performance and the temporal consistency of a pre-performance routine. This validates the inclusion of the temporal analysis in the present study.

There have also been numerous studies that have examined the relationship between behavioral consistency of a pre-performance routine and the performance outcome. Lobmeyer and Wasserman (1986) designed a study to examine if the behaviors of a pre-performance free throw routine were merely superstitious or if they were related to the outcome of the skill. Participants' free throw shooting success was studied in two conditions, one that included the use of their standard personal routine and one when they used no routine at all. The participants were found to shoot a significantly better percentage when they used their personal routine compared to when they used no routine. Thus, Lobmeyer and Wasserman concluded that the physical aspects of the routine did have a significant value to the outcome and were more than merely a grouping of superstitious behaviors. After the behavioral observations, Lobmeyer and Wasserman also had the participants complete a questionnaire assessing how important the participants believed their routine to be with regards to their successful execution of a free throw. The results revealed the participants tended to overvalue the importance of their routine, even though the routines were found to be statistically associated with their free throw percentage. The questionnaire first asked the participants in which condition they made more free throws.

Then the participants were asked to report how many more free throws they made in that condition. The responses to this were compared to the actual difference between conditions. The actual difference was calculated by subtracting the number of free throws made when using their routine from the number made when they did not use their routine. A participant was classified as “overvaluing the importance of the regular free throw pattern” if the perceived difference was greater than the actual difference. Based on the responses to the questionnaire, the mean perceived difference was 3.02 and the mean actual difference was 1.37, which establishes that the participants did overvalue the importance of their routine. Another question of the questionnaire had the participants rate the importance of their routine on a five-point scale with five being very much and one being very little. Seventy-four percent of the participants rated their routine importance as either a four or a five, which adds further evidence to the overvaluing of the pre-performance routine importance. These findings add further support to the inclusion of the qualitative portion of the present study, which sought to establish a similar understanding of perceived value of the routine.

In a similar study, Czech, Ploszay, and Burke (2004) examined the relationship between free throw shooting success and the behavioral adherence to a pre-shot routine from shot one to shot two. In this study, all participants that adhered to the behaviors of their routine on 90% or more of their attempts they were considered to be behavioral maintainers. While the participants that classified as behavioral maintainers did shoot a higher free throw percentage than the participants that were not (74% and 68% respectively), the difference in the percentages was not statistically significant. From a statistical significance standpoint, these results contradict the findings of Lobmeyer and Wasserman (1986), but their practical significance should not be ignored. Any improvement in free throw percentage will result in more points scored for the

team throughout the season, which could impact of outcome of multiple games. Thus, while the findings of this study are not statistically significant they do provide very valuable practical significance.

Lonsdale and Tam (2008) conducted an intra- and inter-individual study that looked at both temporal and behavioral consistency of pre-performance free throw routines. They observed 14 National Basketball Association (NBA) play-off games to assess the duration and behavioral patterns of these pre-performance routines. The intra-individual results found that there was not a significant correlation between the duration of the routine (classified as brief, regular, and long) and the success rate of the free throws. However, they did find that the players that were behaviorally consistent with their routines were significantly more successful than those that were not. The behavioral findings are consistent with the findings of Lobmeyer and Wasserman (1986). The inter-individual analysis of this study separated the participants into two groups, the best and worst free throw shooters. Based on the same behavioral analysis used in the intra-individual examination, these results showed that there was no significant difference in behavioral adherence between the groups even though they had significantly different success rates. The findings of this portion of their study contradict the findings of Lobmeyer and Wasserman (1986).

The inconsistent conclusions regarding the relationship, or lack there of, between successful performance and the behavioral consistency of pre-performance routines establishes the need for further research on this topic, which this study aims to provide.

Another important aspect of pre-performance routine research that has received less attention, focuses on examining how altering the behaviors and/or duration of the routine affects the accuracy or success of the skill. Mack (2001) conducted a four-condition study with the

purpose of determining if either the behavioral or temporal components of a pre-performance routine were significantly related to the success rate of free throw shooting. The conditions included a baseline test with normal behaviors and timing, a condition in which the durations of the routines were altered while maintaining the original behaviors, a third condition in which the behaviors of the routine were altered while maintaining the baseline duration, and finally a condition in which both the duration and the behaviors of the routine were altered. The findings showed that condition three, changing the behaviors of the routine while maintaining baseline duration, was the only condition that resulted in a significantly decreased free throw accuracy. No significant differences were found when the duration of the routine was changed while keeping the baseline behaviors, or when both the behaviors and duration were altered. Based on this, Mack concluded that the behavioral components and behavioral consistency of the routine had a significantly stronger relationship to success of the skill than did the temporal consistency. The lack of additional studies of this nature provides further reasoning to include a similar analysis in the present study.

While there have been countless quantitative studies that have examined pre-performance routines, there is a significant lack of qualitative studies examining these same routines. Studies of this nature can provide a deeper understanding of the routine from the performers' point of view (why they do what they do), along with examining the use and potential value of any non-observable aspects of the routine (i.e. the use of mental skills/techniques). Cotterill, Sanders and Collins (2010) conducted a study in which they interviewed six golfers with regards to various aspects of their pre-shot routine. The interviews created the opportunity for the athletes to provide their personal perspective regarding the nature of their routine, and why and/or how they believed their routine worked for them. This study established nine major themes concerning the

various components of the participants' routines. Based on their findings, Cotterill, Sanders, and Collins determined that the pre-putt routine should be created specifically for each individual based on their "personality, coping resources, and the various situational appraisals." In addition to the findings from this study, the authors reported that future qualitative studies should focus on the athletes' interpretations of the specific aspects of their routines, thus supporting the inclusion of this portion of qualitative interview in the current study.

Otto et al. (2011) conducted a study in which seven minor league baseball pitchers were interviewed regarding their pre-pitch routine. Five base questions were used along with probing questions when needed. These questions ranged from having the participant describe their routine from start to finish, to assessing their beliefs on how important the routine is to their success, to how they developed their routine. Based on these interviews, Otto et al. were able to create two overarching themes (content and reasoning, and routine structure) that were comprised of eight and three subthemes, respectively. One sub-theme that was particularly interesting was the importance of the routine. Otto et al. stated that all the participants in the study reported that they felt that their routine was "incredibly important" to their overall success as a pitcher. Another interesting finding was that while the pitchers all reported having different reasons for using a routine (i.e. refocus, forget about the previous pitch, help slow everything down, developing consistency etc.) in the end they all stated that their routine was used to help them prepare for the upcoming pitch. Additionally, based on the descriptions of their routines, no two routines were exactly the same. This provides further support for the concept of developing a routine that is unique to the individual.

Yancey and Czech (2007) conducted another qualitative study that analyzed the pre-performance routines of professional golfers. Eight male professional golfers were interviewed

with the purpose of gaining a deeper understanding of their pre-performance routines. Each participant was asked one question, “tell me about a specific time when you utilized a preshot routine during golf performance,” and additional probing questions were used to clarify or obtain more detailed responses. Three main themes resulted from the interviews: how the preshot routines helped the participants establish an optimal level of focus, physical descriptions of the routine, and how the participants used different or modified routines depending on the type of shot they were about to attempt. Similar to Otto et al. (2011), while the participants’ routines described in Yancey and Czech might have encompassed similar components, each was unique to the individual (i.e. number of practice swings, use and focus of visualization, physical components, duration, etc.). A very interesting conclusion of this study was that the participants’ reported that the routine used before chipping and putting (compared to a “full swing”) needed to be more detailed as the skill itself requires a much more narrow focus. The participants in this study also all appeared to understand the value and importance of using a routine consistently as a means of improving their overall performance.

As mentioned above, there have been numerous quantitative studies regarding temporal and behavioral consistency of pre-performance routines, many of which have resulted in conflicting conclusions concerning the relationship between routine consistency and improved performance. This three-purpose study sought to provide results to help determine the relationship between the consistency of both the behavioral and temporal factors of a pre-performance routine and free throw shooting success by examining the routines of NCAA Division-I Men’s and Women’s basketball players over the course of a full home season. The first purpose of this study was to examine the association between the temporal consistency of the pre-performance free throw routines and the participants’ free throw percentage. Second,

this study compared the behavioral consistency of the pre-performance routines from shot one to shot two with free throw accuracy. Finally, this study also included a qualitative examination of the athletes' perception of their routine. Additionally, the qualitative interview provided the participants with the opportunity to explain any non-observable components of their routine while also gauging their perceived value of their routine. There is a serious void of qualitative research regarding pre-performance routines from the athletes' point of view, a gap that this study seeks to fill.

CHAPTER 2

METHODS

Pilot Study

A pilot study was conducted to provide the primary observer the opportunity to become familiar with the instruments used to record the pre-performance routines. This pilot study also allowed the observer to become more comfortable with observing and coding the various behavioral and temporal aspects of each routine, along with making sure that all necessary information pertaining to each participant and their routine was included in the recordings (identifying information, specific aspects or steps in the routine, success rate of each free throw etc.). The data for the pilot study was collected during a pre-season game for the men's basketball team.

Participants

The current study involved 10 participants ($n = 10$), all of which were active members of an NCAA Division-I varsity basketball team in the Southeast United States. Six of the participants were males, and four were females. Their ages ranged from 18 to 22. In order to be included in the study, members of both the men's and women's teams needed to attempt 20 or more free throws cumulatively (10 two-shot free throw pairs) during the observed home games (12 games for the women, and 13 games for the men). Even though the participants all signed informed consent forms, in order to maintain both external and internal validity, they were only told that their routines would be observed but not exactly when or how they were observed. In order to adhere to the ethics of APA section 47 pertaining to participant confidentiality, names, likeness and/or images of the participants were not made public. The participants were informed that their identity would be protected to allow them to feel comfortable answering any and all

questions honestly and without concern of any negative repercussions from their responses.

Instruments

The camera application on the Ipad mini was used to record the free throw attempts for both the behavioral and temporal observations so that the specific components of each routine could be accurately analyzed and recorded. Due to the difficulty of accurately coding the behaviors, the order in which they occur, and the duration of the routine all at once, the recordings enabled the observers the ability to review the routine as many times as they needed in order for them to establish the consistency of the routine. The recordings only included the free throw attempts that fit the inclusion criteria for this study.

A hand-held stopwatch (Sportline 240) was used to record the length of the routines. The durations were recorded to the tenth of a second. The same recordings that were used for the behavioral analysis were used to collect the temporal data. Hetzler, Stickley, Lundquist, and Kimura (2008) conducted a study that compared the accuracy and consistency between hand-held stopwatches and electronic timing devices in sprint times. While they found that hand-held stopwatches did consistently result in faster sprint times, it was not significantly different from the times recorded from the electronic timer. Thus they were able to establish that there were no significant differences between using a hand-help stopwatch and an electronic timer for recording sprint times.

Copies of the game tape used by both the men's and women's team was also obtained for this study. These tapes were used primarily as a backup to the recordings made by the primary researcher. Examples of when the tapes were used in the analysis include: when the view of the free throw routine was obstructed, when the recording was not clear or certain components of the routine needed further observation, when the recording started late or otherwise did not include

the entire pre-performance routine, and/or when the primary researcher was not present at the game. There were two games, one men's and one women's, for which the primary observer was not present. Free throw routines from these games were still included in the study, and the data was collected solely from the game tapes provided from the teams.

For the qualitative section of this study, the primary researcher used the same Ipad mini to record the interviews for later analysis and transcription. The recorder plus application was used to record the interviews.

Procedure

For the quantitative purposes of this study, the observations focused on six male and four female intercollegiate varsity basketball players. Prior to any observations being made, all members from both the men's and women's team were provided with an explanation of both the quantitative and qualitative purposes of the study along with consent forms. Any member of the team that was under the age of 18 was given a minor consent form and their legal guardians were sent the same explanation of the study along with a parental consent form via email.

For the purpose of this study, the start of the pre-performance routine was operationally defined as the moment that the participant touched or caught the ball from the referee, and ended when they shot, or released the ball. While this definition excluded any components of the routine that occurred when the participant did not have possession of the ball from the observations, it was created to ensure that all routines were observed consistently along with establishing a universal start and stop time for the temporal observations. Past studies that have examined the behaviors and/or duration of pre-performance free throw routines have also used this same operational definition, which validated its use in the present study (Lonsdale & Tam 2008).

In order to maintain consistent observations, the primary observer sat in the same section and seat for each home game, with the occasional row, but not seat, change due to increased attendance to ensure consistent angle of observation for all free throw attempts. The primary observer started the video recording after a foul that resulted in a two-shot free throw situation was called and stopped the recording after the completion of the second free throw. By following this recording protocol for all included free throws, the primary observer ensured that the recordings captured all components of the pre-performance routine that occurred during the above-defined start and stop points of the routine.

For the purpose of this study, only “two shot” free throw situations were included in the observations. If the first shot of a “one and one” free throw situation (also known as the “front end”) was made, both attempts were included, but if the “front end” was missed the routine from this first attempt were not included in the observations. Any “and one” (one shot free throw situations) or three shot situations were also not included. One-shot situations would provide no behavioral comparison for the routine used since there was not a second shot attempted. Three shot situations were not included because the addition of the third shot provided the participant an additional opportunity for routine adjustment.

Both male and female participants were chosen from the quantitative sample to complete a semi-structured interview with the primary researcher. All interviews took place in person, and were recorded so that later transcription would be accurate. Prior to the start of each interview, the participants were made aware that the conversation was going to be recorded and that a copy of both the transcript and audio recording would be made available to them if they desired. Also, each participant was provided a list of the specific interview questions and was asked to look them over. Before the interview began each participant completed a demographic survey and

signed an informed consent. At this point, the primary researcher asked each participant if they had any questions before which would be addressed prior to the start of the interview. At this time the primary interviewer began the audio recording. Each interview started with the participant reporting their name. Following this information, the interview consisted of the following questions that were adapted from a similar study by Otto, Gentner, Czech, and Burdette (2011) and were asked in the order in which they appear below:

- “Tell me about your pre-shot routine, from the moment you set your feet at the free throw line to the moment you release the ball? If you start your routine before you approach the line, tell me about what you do.”
- “Tell me about how you developed your routine.”
- “Explain why you have/use a pre-shot routine.”
- “Does your pre-shot routine vary or change at all during competition? If yes, how does it change, when does it change, and why do you think it changes?”
- “Discuss your routine in relation to success and/or failure at shooting free throws?”

When needed, probing questions were asked in addition to the above questions. Once each interview was completed it was assigned an ID number to protect the participants right to confidentiality.

After all the interviews were completed, the primary researcher transcribed each in verbatim. The accuracy of the transcription was vital to the breakdown of the data into themes and subthemes.

Data Analysis

Quantitative Data Analysis:

In their study Czech et al., (2004) established that a participant would be considered a “behavioral maintainer” if they adhered to the behavioral components of their pre-performance free throw routine on 90% or more of their observed attempts. For the purpose of this study, the same operational definition was adapted for both the behavioral and temporal consistency analyses. Any participant that adhered either behaviorally or temporally on less than 90% of their attempts was labeled as “non-maintainers.”

For each free throw situation that fit the inclusion criteria for the study, the following information was included in the recorded temporal observations: jersey number, time in the game, the score, whether the free throw was made or missed, and the duration of the routine to the tenth of a second. For the behavioral observations, all behaviors, including any that might involve minimal movement, were included in the coded observations. For each behavioral observation, the following information was recorded: jersey number, time in the game, the score, the physical description of the routine, and whether the shot was made or missed. Behaviors that made up the routine were coded for each free throw attempt using a system created by the primary observer.

In order to determine temporal consistency, the mean duration and the standard deviation for each participant’s pre-performance routine were calculated. Research that examined the duration of pre-performance routines previously established the use of a standard deviation to determine or measure temporal consistency (Boutcher & Crews, 1987; Wrisberg & Pein 1992). For each free throw, if the duration was within one full standard deviation it was labeled “temporally consistent” but if it was outside this range it was labeled “temporally inconsistent.”

Once all the observed free throws were properly classified, the primary observer determined the percentage of free throws that were “temporally consistent” for each participant by taking the total number of “temporally consistent” attempts and dividing that by the total number of free throws attempted. If this percentage was above 90% the participant was classified as a “temporal maintainer.” If it was below 90% the participant was classified as a “temporal non-maintainer.”

Behavioral consistency was established in a similar manner. The primary observer calculated the behavioral consistency percentage for each participant by taking the total number of behaviorally consistent free throw pairs and dividing that by the total number of free throw pairs attempted. If this was above 90%, the participant was classified as a “behavioral maintainer” and if it was below 90% they were classified as a “behavioral non-maintainer” (Czech et al. 2004).

Based on the research questions for the quantitative focus of this study, it was originally intended that three statistical tests would be used. Since all participants classified as both behaviorally and temporally non-maintainers it was not possible to compare the maintainers groups with each other. Instead a Pearson correlation test was run three times, once to determine the association between the behavioral consistency percent and free throw percentage, a second time to determine the association between the temporal consistency percent and free throw percentage, and finally to determine the association between behavioral and temporal consistency percentages. These tests were run using SPSS version 21. The alpha level for these tests were set at $p < .05$ and the confidence interval was set at 95%.

Inter-observer reliability was calculated for both the temporal and behavioral observations from both the secondary observers using a Kappa inter-rater reliability test in SPSS version 21. For this test, the alpha level was set at $p < .05$ with a 95% confidence interval.

Qualitative Data Analysis:

Triangulation was defined by Denzin (1978) as “the combination of methodologies in the study of the same phenomenon.” Jick (1979) explained that using multiple measures to analyze and validate data can result in “new or deeper dimensions to emerge.” Jick also stated that using triangulation “allows researchers to be more confidence in their results.”

The responses gathered from the semi-structured interviews were examined and validated by using three research methods to establish triangulation as a means of understanding the responses and attaching meaning to them. First, the primary researcher transcribed the interviews in verbatim to ensure clarity and analysis of the data and themes. Once the transcripts were finished, member checking was completed by providing the participants with a copy of their interview transcript. This afforded the participants the opportunity to review their responses to ensure that the transcript was accurate, along with allowing the participants the chance to retract or edit any of their responses. The primary researcher explained that if no response or edits were provided, it would be assumed that the transcripts and all themes from their responses were accurate and qualitative analysis would continue.

After member checking, the responses from each interview question were reviewed individually by the primary researcher to establish any themes. The data that supported the themes and subthemes were organized based on which interview question the response came from. Once the original themes and subthemes were established, they were discussed with a professional thematic cross-checker in order to validate and finalize the themes and subthemes. This completed the crosschecking component of the qualitative triangulation.

The final component of the qualitative triangulation was to have a group of five individuals well versed in the field of qualitative research review the original themes and subthemes. The use of group checking enabled the primary researcher to finalize the titles of the themes and subthemes, complete any thematic reduction or eliminate any repetition, and validate the data that was associated with each theme/subtheme.

In summary, the three components of triangulation used for this study were member checking, cross checking, and group checking.

Secondary observers

As a means of establishing reliability for both the behavioral and temporal observations, two volunteer graduate students were recruited. One was assigned to the men's data and the other was assigned to the women's data. Both secondary observers reviewed all the recordings for their assigned team and followed the same coding and timing protocol as the primary researcher. Before the volunteers were given access to the free throw recordings, they were trained on how to consistently operate the stopwatch, how to code the behaviors for each routine and how to establish behavioral consistency or inconsistency. Once this was completed, the volunteers were given access to the pilot study data and were asked to complete the behavioral and temporal observations for these free throws. Their findings were then compared to the findings of the primary researcher to make sure that the volunteers' not only understood how to record the data, but also that all observations were consistent. Once it was determined that the secondary observers understood the data coding process, the secondary observers were given access to actual data for the study. They were instructed to complete their observations independently.

The secondary observers would meet weekly with the primary researcher to review and compare their observations and findings (i.e. behavioral consistency of the observed routines). When there was a difference between how the primary and secondary researchers classified the behavioral consistency of a routine (i.e. if the primary researcher labeled a routine as behaviorally consistent and the secondary observer labeled the same routine as behaviorally inconsistent, or vice-versa), the behaviors of the routine and the order in which they occurred were discussed to determine where the discrepancy between the two observations occurred. Once this was established, the video recording of the specific routine in question was watched and the behaviors were coded together. This would include a discussion regarding the proper behavioral classification of the routine in question, and a final decision was made collaboratively. The primary researcher marked down all free throw pairs for which there was an initial disagreement so that an inter-rater reliability test could later be conducted.

A Kappa inter-rater reliability test was run for both the temporal and behavioral data using the same version of SPSS. The alpha value for this test was set at $p < .05$ and confidence interval of 95% was used. The correlation between the temporal data of the primary observer and secondary observers was weak (kappa = .272 and .361 respectively) but significant (both resulted in $p < .05$). The correlation between the behavioral data of the primary observer and one of the secondary observers was moderate (kappa = .497) while the other correlation was much stronger (kappa = .806). The alpha level for both correlations was significant ($p < .05$).

CHAPTER 3

RESULTS

Behavioral and Temporal Routine Maintenance

Of the 10 participants in this study, six were male and four were female. Of these participants there was one freshmen, two sophomores, two juniors, four seniors, and one red shirt junior. In terms of position played, five participants were guards, four were forwards, and one was classified as a forward/center. The mean free throw percentage for the entire sample size ($n = 10$) was 68% (277 were made out of 408 attempted). The male participants ($n = 6$) averaged a 66% free throw shooting accuracy while the female participants ($n = 4$) averaged a 72% free throw shooting accuracy. The average number of free throws attempted per participant was 41, with the male participants averaging 45 free throw attempts and the female participants averaging 34 free throw attempts. The range of free throws attempted for all participants was 22 to 76. For the purpose of this study, the participants were not separated by gender for any of the quantitative or qualitative analysis. There were 204 two-shot free throw pairs included in the observations for this study. Of those fouls, 22 resulted in a “one-and-one” free throw situation in which the participant successfully made the first shot, thus guaranteeing that a second free throw would be attempted. One two-shot flagrant foul and one two-shot technical foul were also included in the study. The remaining 180 fouls all resulted in conventional two-shot free throw situations in which the participant was either fouled in the act of shooting and missed the field goal or was fouled once the opposing team had accumulated enough team fouls to result in a two-shot free throw situation (10 or more fouls in a half).

As stated previously, in order for a participant to classify as either a behavioral or temporal “maintainer,” they must have had a behavioral or temporal consistency percentage, respectively, of 90% or higher. Based on the operational definition for routine “maintenance,” all 10 participants were classified in as both behavioral and temporal “non-maintainers” ($n=10$). The average behavioral consistency percentage for all participants was 48%, with the range being 0% to 73%.

By using one standard deviation above and below the mean, a range of time was established for determining the temporal consistency. A routine was classified as temporally consistency if it’s duration was within this time range, which was specific to each participant. If the routine duration was outside this range, either shorter or longer, it was labeled temporally inconsistent. Once all routines for each participant were labeled accordingly, the temporal consistency percentage for each participant was calculated. Based on the results of the temporal observations, all 10 participants were classified as “non-temporal maintainers” ($n =10$). The average duration of the pre-performance routine for this study was 5.3 seconds, with a range of 3.6 seconds to 6.7 seconds. The average temporal consistency percentage was 73%, and ranged from 68% to 79%.

Since all 10 participants were classified as “behavioral non-maintainers” and “temporal non-maintainers,” no statistical tests could be run to determine the correlation between the behavioral maintainers and non-maintainers, and temporal maintainers and non-maintainers. Instead, using SPSS version 21 a Pearson Correlation test was run three times to determine the association between free throw percentage and temporal consistency of the pre-performance routine ($p = 0.27$, $r = 0.39$), free throw percentage and behavioral consistency of the pre-performance routine ($p = 0.73$, $r = .12$), and finally to determine the association between

temporal consistency and behavioral consistency of the routine ($p = 0.32$, $r = 0.27$). Based on the results of the Pearson Correlation tests, it was determined that neither behavioral consistency nor temporal consistency were significantly associated with free throw percentage, and that behavioral consistency was not significantly associated with temporal consistency.

Two of the original five hypotheses stated that the maintenance groups (behavioral and temporal respectively) would have a significantly higher free throw percentage than their non-maintenance counter parts. Since all 10 participants were classified as behaviorally and temporally inconsistent, these hypotheses could not be directly tested. The remaining three hypotheses all dealt with determining which component of the routine (the behaviors or the duration) had a stronger association to free throw percentage. The results of the Pearson Correlation determined that neither behavioral consistency nor temporal consistency were associated with free throw percentage. It was also concluded that neither group had a stronger association with free throw accuracy than the other. The third Pearson Correlation test determined that behavioral consistency and temporal consistency were not significantly associated with the each other. In summation, all original hypotheses were rejected, and no significant association was found between free throw percentage and behavioral consistency and temporal routine consistency, respectively.

Qualitative Results:

The six participants that completed this interview were chosen from the sample of individuals that qualified for the quantitative portion of this study. The purpose of this interview was to gain a deeper understanding of the participants' pre-performance free throw routine. Specifically, the interview consisted of five questions that focused on the actual behaviors of the

routine, the development of the routine, why they use or have a pre-performance routine, perception of consistent execution of their routine, and the participants' perceived importance of the routine in relation to free throw accuracy. After analyzing the specific responses to each of the five questions, 10 major themes and nine subthemes were found. Major themes were determined when the majority, at least four of six participants, described similar topics or responses in response to each question, and subthemes were established when at least three of the participants provided responses linked to the major theme. See Table 1 for a list of all themes and subtheme.

Table 1

Qualitative Themes

Interview Question	Themes/Subthemes
<p>“Tell me about your pre-shot routine, from the moment you set your feet at the free throw line to the moment you release the ball? If you start your routine before you approach the line, can you tell me about that as well?”</p>	<ol style="list-style-type: none"> 1. Pre-Routine Behaviors (body position/getting set) 2. Mental Components of Routine 3. Physical Components of the Routine <ol style="list-style-type: none"> a. Dribble b. Spin c. Breath
<p>“Tell me about how you developed your routine”</p>	<ol style="list-style-type: none"> 1. Influence of Outside Resource 2. Learning from Past Routine Failures 3. Comfort <ol style="list-style-type: none"> a. Somatic Feeling of Comfort b. Relaxation
<p>“Explain why you have/use a pre-shot routine”</p>	<ol style="list-style-type: none"> 1. Outside Influence 2. Performance Enhancement <ol style="list-style-type: none"> a. Relaxation/Tempo b. Confidence c. Concentration d. Consistency
<p>“Does your pre-shot routine vary or change at all during competition? If yes, how does it change, when does it change, and why do you think it changes?”</p>	<ol style="list-style-type: none"> 1. No Behavioral Change
<p>“How important do you think your routine is to</p>	<ol style="list-style-type: none"> 1. Acknowledged Importance of Routine

your success at shooting free throws?"	
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Experience of Pre-performance Routine

Question #1: “Tell me about your pre-shot routine, from the moment you receive the ball from the referee to the moment you release the ball? If you start your routine before you approach the line, can you tell me about that as well?”

From this question three major themes were found, (1) behaviors that occur before the operational start of the routine (pre-routine behaviors), (2), mental components of the routine, and (3) physical components of the routine. Of the reported physical components of the routine, three were found to occur in the majority of the reported routines and were thus established as subthemes: (a) dribble, (b) spin, and (c) breath.

Theme #1: Pre-Routine Behaviors (body position/getting set)

Five of the six participants reported that their routine starts before the operationally defined starting point of the routine (the moment that they receive the ball from the referee).

- “Before I get the ball I got to set my feet, you know on the line and get it set up. I don't, I don't like to get the ball and then try to get my feet set up, I like to get my feet set up and then get the ball... I feel it gives, it gives me more confidence and balance on my, on my shot.” (Participant 3)
- “And then before I receive the ball I step up to the line and line my feet up with the basket.” (Participant 5)
- “Well, before I get the ball I make sure I line myself up to the basket. I line my, my right leg and my right arm up to the basket.” (Participant 6)
- “Um yeah, I set uh my right foot um on, usually there's a nail in, right in the middle of the rim and I put my right foot on the nail and then I put my left foot shoulder width apart.” (Participant 1)

Theme #2: Mental Components of the Routine

In addition to the explanations of the behaviors that make up their routine, five of the six participants also stated that their routine contains some type of mental component.

- “Try to stay positive in my mind. Make sure, you know what I’m saying, stay positive make sure I say ‘I’mma make this next shot... Coach always tell me like ‘just be positive, you know to always go to the line with confidence,’ knowing that you’re going to make the next shot.” (Participant 2)
- “Um... just thinking, really just right over the front of the rim...” (Participant 4)
- “Um, depending on the point in the game. You know, if it’s uh, really close game or the end of the game, you know I’m thinking we really need this free throw like concentrate, you know...” (Participant 1)
- “Um, I usually try to calm myself, um, and breathe... Just breathe. Um because usually I’m breathing pretty hard.” (Participant 5)

Theme #3: Physical Components of the Routine

All six participants responded to this question with the physical behaviors of their routine along with the order in which they occur. Three behaviors were found to be present in the majority of the routines: dribble, spin, and breath.

Subtheme A: Dribble

All six participants reported incorporating the dribble behavior into their routine. Four of the six participants reported using three dribbles, and the remaining two reported using two dribbles.

- “Ok. Um when I catch it I take three dribbles...” (Participant 1)
- “I take two dribbles and then I shoot...” (Participant 2)
- “...Then I go in my routine, you know three bounces...” (Participant 3)

Subtheme B: Spin

Four of the six participants reported that spinning the ball was also part of their routine.

- “... And then I spin the ball with my right hand, holding it with my left” (Participant 1)
- “When I receive the ball I spin it, um, ... and then I spin it again in my hand...” (Participant 5)

Subtheme C: Breath

The final subtheme was the use of a breath during the routine. Three of the six participants reported that they include the use of a deep breath at some point during their routine.

- “When I receive that ball I’m trying to take a deep breath...” (Participant 3)
- “... deep breath, look up and shoot.” (Participant 4)
- “Then when I get the ball, I take a few deep breaths...” (Participant 6)

In summary, all participants were able to explain both the specific components of their routine and the order in which they occur from the defined start point (receiving the ball from the referee) to the defined end point (releasing the ball, or shooting).

Question #2: “Tell me about how you developed your routine.”

Based on the responses to this question three major themes were found, along with two subthemes: (1) an outside resource influenced the development of the routine, (2) routine developed by learning from past routine failures, and (3) routine resulted in comfort. The two subthemes were an extension of the comfort theme: (a) a somatic feeling of comfort, and (b) relaxation.

Theme #1: Influence of Outside Resource

All six participants reported that someone else had helped them develop their current pre-performance routine.

- “Well my dad told me that, to find a good routine when I was younger... To do the same thing every time ... He’s the one who taught me like where to put my feet.” (Participant 1)
- “Well, my develop became the way my daddy teach me how to. He just like, I feel it’s, it’s that's the way he was doing it when he played so he teach me the same way and that’s what I try and do, try and keep it simple and the same. ... Um, most of the thing I do when I step on it is what he told me to do...” (Participant 3)
- “...When I was just developing my shot when I was younger a coach of mine said that you know if you spin it and get the feel for the ball ...um, three dribbles and get the feel for the ball one more time before you shoot it, it will help you, you know, be more consistent in your shot.” (Participant 5)

In summary, the participants’ current routine appears to have been influenced to some degree by the instruction of some outside source.

Theme #2: Learning from Past Routine Failures

Four of the six participants reported that at some point in their basketball career they had used a different pre-performance free throw routine than the one they currently use.

- “I tried a few different things and I think it was just what felt the most comfortable.” (Participant 1)
- “In high school I didn't used to dribble the ball at all.” (Participant 2)
- “Um, I changed ... how I position myself on the line and then I also ... what else did I change... um I just, that's where I also added the deep breath.” (Participant 4)

- “I just did three dribbles, um, I didn't have anything other than I did. I didn't necessarily line my feet up all the time, um, and I just kind of, you know, went to shoot my free throws not with any set thing to do.” (Participant 5)

Theme #3: Comfort

This theme includes two subthemes, (a) that the pre-performance free throw routine creates a somatic feeling of comfort, and (b) that the routine allows them to relax prior to executing the skill.

Subtheme A: Somatic Feeling of Comfort

Four of the six participants reported that their pre-performance free throw routine creates a feeling of comfort, and allows them to feel ready to execute the skill (i.e. shoot the free throw).

- “I tried a few different things and I think it was just what felt the most comfortable. You know, not too long, not too short. And, you know, it kind of just got me ready to shoot it...” (Participant 1)
- “It’s just something I felt comfortable doing. So, I mean I just started doing it this year, felt comfortable doing it... It just felt comfortable and I thought that routine felt most comfortable.” (Participant 2)
- “Um, really just did whatever felt comfortable.” (Participant 4)
- “Just something that felt good.” (Participant 6)

Subtheme B: Relaxation

Five of the six participants stated that their routine allows them to feel more relaxed at the free throw line. More specifically, these participants stated that the use of a routine helps them slow down and/or feel more rhythm prior to the execution of the skill.

- “I feel more relaxed. It makes me feel like I’m in a rhythm when I take two dribbles, so that ‘s more like, like it’s a game shot, makes me feel like I’m... like more in the game... Makes me feel a lot comfortable, make me feel a lot comfortable at the line, and uh

makes me get in a rhythm when I'm shooting it. Makes me get more in a rhythm"
(Participant 2)

- "Yeah. I feel like the deep breath give me like a relief... You know like, sometimes in the game you know it be like a tight game, we need that free throw. So that deep breath give me that relief to be confidence." (Participant 3)
- "Um, just more trying to relax where everything is more, is slower, where it's not as fast pace as the game is going." (Participant 4)
- "...the three dribbles helps me take my time... along with spinning it in my hand, and getting my hand set... where I'm not rushing it." (Participant 1)
- "Um, as you know uh a result of the game. So when it slows down I usually try to breathe a little slower and you know, catch my breath." (Participant 5)

In summary, the participants found a specific set of behaviors that felt comfortable to them and established that as their routine.

Question #3: "Explain why you have/use a pre-shot routine."

After analyzing the responses to this question, two major themes were established: (1) outside influence, (2) performance enhancement. The second theme was found to have four subthemes: (a) relaxation/tempo, (b) confidence, (c) concentration, and (d) consistency.

Theme #1: Outside Influence

Three of the participants reported that the reason they first started using a routine was because of something they were told or something they observed at a younger age.

- "Uh I think, you know, told when I was younger you know, you should have a free throw routine... And you know, everybody kind of does it and so you know, and I watched a lot of basketball and um saw that everybody had a routine" (Participant 1)
- "Well I think everyone has one, and I think it help everybody." (Participant 3)

- “Saw multiple people do it.” (Participant 5)

Theme #2: Performance Enhancement

This theme encompasses four subthemes: (a) relaxation/tempo, (b) confidence, (c) concentration, and (d) consistency. All six participants stated that they use a routine because it created a specific feeling or state of mind that put them in an ideal position to perform the skill at the best of their abilities.

Subtheme A: Relaxation/Tempo

Being relaxed in the moments leading up to the execution of an important skill allows the participants to not let the moment or situation impact their performance.

- “Uh, just really to calm myself down, and to uh, in a sense put myself in a less stressful situation in my head.” (Participant 4)

Three participants mentioned that it was important for them to be able to slow everything down prior to shooting the free throw, and that their routine enabled them to control the pace at which they execute the skill.

- “You want to make sure you’re taking your time, and relaxed.” (Participant 2)
- “Um, I usually try to calm myself, um, and breathe. Just breathe. Um because usually I’m breathing pretty hard. Um, as you know uh a result of the game. So when it slows down I usually try to breathe a little slower and you know, catch my breath.” (Participant 5)

Subtheme B: Confidence

Three participants reported that they use a routine because it increases their confidence that they will execute the skill properly and that they will make the free throw.

- “When I get my feet set up and uh, I look at the rim I feel confident...” (Participant 3)
- “Most of the time yeah [the routine helps me execute successfully].” (Participant 3)
- “When I have more of a feeling like I know I’m going to make it instead of I need to make it.” (Participant 4)
- “Well I was missing a lot of free throws. So uh, I decided to, you know, try to fix it and maybe my routine was a part of that so.” (Participant 5)

Subtheme C: Concentration (focus)

Three of the participants mentioned that one reason they have a pre-performance routine because it helps them focus, and not allow outside distractions to impact their performance at that specific moment.

- “If you just keep your mind open, sometimes the crowd can get involved and you might switch it up a little bit, but then it’s really just staying focused at the line. Free throws is like 80 percent focus I believe. If you very focused you going to make it.” (Participant 6)
- “I have more of a feeling like I know I’m going to make it instead of I need to make it.” (Participant 4)
- “Focus on like, you got to focus on the hoop, you got to focus like what you do, like if you not miss, you miss what you doing wrong, you know so next time you can um, you can fix it...and do it better.” (Participant 3)

Subtheme D: Consistency

Four participants reported that repeating the same behaviors in the same order just prior to shooting a free throw creates a consistent environment or feeling, which in turn leads to a higher success rate.

- “So if you learn to make it a certain way, you do the same thing every time, I think that, you know, your percentage will be, become higher if you do that... I think that it helps,

um, with the consistency of your shot. Um, just with anything if you, you know, you learn to do things a certain way um, you know, consistent results will come.” (Participant 5)

- “Um, it helps me get a feel for it. Cuz I know when I don't feel the ridges on the ball sometimes my shot is off. And so when I spin it, it helps with that. Um, the consistency of lining my feet up with the basket. I know that when I shoot it, my arm and my legs, my right leg, is aligned with the middle of the basket then my line, my shot is going to be on straight. Um, and so if... I mean consistency in like those things.” (Participant 5)
- “I use a routine because I feel like even if you're a bad free throw shooter, if you do it the same way every time, like repetition, and you do it every day in practice it should follow in a game. Like you shouldn't get to the game and change the way you shoot from the way you shoot in practice.” (Participant 6)
- “I just try to be consistent with everything I do, every shot I take. You know what I'm saying. Every move, try to make everything consistent, consistent. I was really big on that working out this summer, you know what I'm saying, just making sure I do everything consistent.” (Participant 2)
- “Um, doing the same thing every time because free throws are obviously, they're free nobody is guarding you ... and have the same thing every time because if you go up there and do something different it kind of changes, and like I said it becomes a habit and free throws can be, you know, a habit...” (Participant 1)

Put together, these subthemes illustrate the importance of using a routine for performance enhancement.

Question #4: “Does your pre-shot routine vary or change at all during competition? If yes, how does it change, when does it change, and why do you think it changes?”

Five out of the six participants directly stated that their routine does not change at all during competition, resulting in one theme from this question.

Theme #1: No Behavioral Change

- “No. It's the same every time.” (Participant 1)

- “No. Keep the same routine, you want to be consistent and keeping the same routine.” (Participant 2)
- “Uh, most of the time I stay the same. I try and, try and stay with the same one.” (Participant 3)
- “No. I don't... I try not to never change it. Just block the crowd out, do the same thing every time.” (Participant 6)

Question #5: “How important do you think your routine is to your success at shooting free throws?”

After analyzing the responses to this question, one theme was established. All six participants reported that their use of a pre-performance routine was very important in terms of being a successful free throw shooter.

Theme #1: Acknowledged Importance of Routine

- “I think it’s very important.” (Participant 1)
- “I think it’s extremely important. You want to feel comfortable in anything you do. So, I mean, I think it’s pretty important... No, I don't think [I’d be successful without a routine].” (Participant 2)
- “I think it’s, it’s very important. I think uh, the routine you bring to the game and like, I feel like that’s what going to give you the success at the free throw line...” (Participant 3)
- “Um, because you know, emotions are flying, some something might be going on with your body whatever it might be. Um, but I think that routine keeps you on there for your free throw shot which is always the same every time you take it.” (Participant 5)
- “I feel like it’s very important, cuz I feel like ok say if you go up and you take your two free throws and you miss then you shoot your shot another way and shoot it this way and

you shoot it that way. I feel like if you shoot it the same way then you will make more than you will make if you change your shot every time.” (Participant 6)

CHAPTER 4

DISCUSSION

The purpose of this mixed methods study was to examine the influence of temporal and behavioral consistency (respectively) of pre-performance free throw shot routines on free throw shooting accuracy. Another purpose was to examine pre-performance routines from a qualitative perspective, which included analyzing the use of any non-observable components of the routine.

It was hypothesized that both the behavioral and temporal maintenance groups, respectively, would have significantly higher free throw percentages than the non-maintenance groups. It was also hypothesized that both behavioral and temporal maintenance, respectively, would be significantly associated with free throw percentage. The final hypothesis was that the behavioral maintenance group would have a significantly stronger association with free throw percentage than the temporal maintenance group.

The previously defined inclusion criteria for this study was determined collaboratively between the primary researcher and his thesis committee chair by looking at the free throw statistics for both the men's and women's team over the past two regular seasons. During this period, both teams at the observed university played roughly half of their regular season games at home. It was assumed that roughly half of the free throws attempted by each individual had occurred during home games. Additionally, the inclusion criteria for this study was modeled after Czech, Ploszay, and Burke (2004), who also examined pre-performance routines for free throw shooting at the collegiate level. For their study, any member of the observed team that shot 10 or more free throws cumulatively during five observed games were included. With five games accounting for less than half of a standard collegiate basketball home season, it was

assumed that doubling the number of free throw attempts that Czech, Ploszay, and Burke (2004) used for their inclusion criteria (i.e. 20 free throws or 10 two-shot free throw pairs) was a realistic baseline number for the present study, which observed the free throw routines over an entire home season. It was determined that setting the inclusion criteria at 10 two-shot free throw pairs would be enough attempts to assume that the observed behaviors and durations were an accurate representation of the individuals' true routine, and was also low enough to avoid excluding too many participants. Away games were not included for convenience and financial purposes. Ten participants (six males and four females) attempted enough two-shot free throw pairs to be included in the current study.

For this study, the durations of each routine were recorded down to the tenth of a second. It was decided that one full standard deviation above or below the individual mean routine duration would establish the range used to determine temporal consistency. Wrisberg and Pein (1992) had previously established the use of a full standard deviation to measure temporal consistency of free throw pre-performance routines.

Behavioral and Temporal Routine Maintenance

Overall, the quantitative results of this study found there to be no significant association between either behavioral or temporal maintenance and free throw percentage. It is possible that had the sample size been larger; the statistical tests would have produced more significant results. Since only 10 athletes qualified for inclusion in the study, several statistical tests were unable to be run due to inadequate sample size. After analyzing all the included free throw attempts for the current study, all 10 participants were classified as both behavioral and temporal non-maintainers (consistency percentages below 90%). These results were likely impacted to

some degree by the operational definition of the pre-performance routine, which might not have allowed for all components of the routine to be included in the observations.

While the previous research on the consistency of behaviors and durations of pre-performance routines have resulted in inconsistent findings, the results from this study support the findings of several past projects. For example, Jackson (2003) found that the length of the pre-performance routine for rugby kickers was not associated with the accuracy or success rate, but instead it was related to the difficulty of the kick. Bell, Finch, and Whitaker (2010) conducted a study on the duration of pre-performance dive routines and found similar results. They concluded that the length of the pre-dive routine was also related to the difficulty of the task (i.e. the difficulty of the dive being performed), and not the success of the dive (score received from the judges).

As for past research regarding the behavioral consistency of pre-performance routines, Czech, Ploszay, and Burke (2004) conducted a study that examined the behavioral consistency of pre-performance routines of free throw shooters. They found that while the participants that were classified as behaviorally consistent did shoot a higher free throw percentage than the non-behaviorally consistent participants (74% to 68%); the difference was not statistically significant.

While the participants were not separated or analyzed based on their gender, it is important to examine team free throw percentage for both the men's and women's team this season. According to ESPN.com, the men's team shot 66% from the free throw line, which ranked them 290th out of 351 Men's NCAA Division-I teams. The women's team had a much higher success rate. According to NCAA.com, as a team they shot 73% from the free throw line this season. This ranked them 67th out of 343 NCAA Division-I Women's teams. For the observed free throws in this study, the six male participants averaged 66% from the free throw

line, which is exactly the same as their team average for the season. The female participants averaged 72% on the observed free throws, which is one percent below their team average for the season. These percentages seem to indicate that the sample of free throws that were observed for this study was an accurate sample with regards to the overall free throw shooting accuracy of the two teams. In addition to this conclusion, the team free throw percentages, specifically the men's team, provide a potential explanation to the lack of association between temporal and/or behavioral consistency and free throw percentage. A 66% team free throw percentage put the men's team in the bottom 18% of NCAA Division-I basketball teams. Due to this low free throw percentage, it can be concluded that as a whole the members of the men's team are also poor free throw shooters. It is very possible that their lower free throw shooting impacted any potential associations between either the behavioral or temporal consistency of the routine and free throw accuracy. Since there was such a difference between the men's and women's team free throw percentage (the women ranked in the top 80% of all NCAA Division-I teams), it is also possible that this influenced the findings of this study.

When combined, the average free throw percentage for all 10 participants was 68%, with individual percentages ranging from 47% to 91%. While the male participants did average 11 more free throw attempts than the female participants, this is likely a result of the different style of play between the two genders. Also, the men had 13 home games this season while the women had 12. It is possible that this also contributed to the difference in the average attempts for each gender.

Overall, the average duration for the 10 participants was 5.3 seconds, and the average range for temporal consistency (\pm one standard deviation from the mean) was 1.4 seconds. Practically, it would seem relatively difficult to not only attend to the length of the routine, but

also to consciously complete the routine consistently within 1.4 seconds of the mean duration. By also taking into account situational or environmental factors (i.e. the score or time of the game), it would appear even more difficult for the participant to control, and be aware of the length of time they take to complete their routine. Doing so would likely occupy some level of their concentration, which could then result in less focus or attention being paid to the executing the skill. Since pre-performance routines have been found to improve concentration and focus, the impact of this potential outcome would seemingly be reduced if the individual had to focus on not only following their routine but also completing it within a specific amount of time. The execution of the routine should feel comfortable and fluid to the individual. By focusing on completing the routine within in a specific amount of time, the possibility of rushing through certain aspects would likely decrease the feeling of comfort while also reducing the potential performance enhancing outcomes of a pre-performance routines.

The results of the Kappa inter-observer reliability test for the behavioral data concluded that the secondary observers data was moderately (Kappa = .497) and strongly (Kappa = .806) correlated with the primary observer's data. From this it can be concluded that the behaviors of the routine and the consistency of their execution or use was moderately to strongly consistent between primary and secondary observers. The temporal data was not found to be as strongly correlated as the behavioral data (Kappa = .361 and .272 respectively). The correlations for all the inter-rater reliability were significant ($p < .05$). A few potential reasons for the weaker correlations are possible. One explanation could be that the reaction time of the observers created the differences. The stopwatch was to be started at the moment the participant touched the ball, and stopped the moment they shot the ball, and consistently starting the stopwatch at these moments could have impacted by reaction time. While these start and stop points are

concrete, it was possible that the primary and secondary observers start and stop the stopwatch at slightly different moments. In addition, it was possible that both the primary and secondary observers did not start and/or stop the stopwatch at the exact same moment for each and every observed free throw. Even if all three observers did start and stop the stopwatch at the exact same time for each observed free throw, if those moments were not consistent between all three observers then the temporal data could have been affected. Also, the observers could have determined that the participant first touched the ball at a different times, thus starting the stopwatch at different times. Future research should aim to establish a more consistent means of starting and stopping the timing device when analyzing the duration of pre-performance routines.

Hand-held stopwatches have been found to be a valid source of establishing temporal data in sprint times (Hetzler et al. 2008), but no past research was found that examined the validity for observing the temporal aspects of free throw pre-performance routines. While past studies that have examined the temporal aspects of free throw routines have used hand-held stopwatches it is possible that there is a more valid means of establishing this temporal data that would eliminate the influence of human reaction time.

Experience of Pre-performance Routine

While analyzing the pre shot experience, several themes emerged from the qualitative portion of this study. These themes were established and organized based on which of the five questions the participant was responding to. These questions based on Otto et al. (2011) encompassed the experience of the pre shot routine from the participants in this study.

Question #1: Tell me about your pre-shot routine, from the moment you receive the ball from the referee to the moment you release the ball? If you start your routine before you approach the line, can you tell me about that as well?

Pre-Routine Behaviors (body position/getting set)

The second half of the initial interview question asks if there are any aspects of their routine that start before the participant received the ball. This was asked so that the participants could explain their entire routine and not just the components that occur during the operationally defined routine period. According to the operational definition for this study, all observed routines started the moment the participant caught the ball from the referee. Since the quantitative observations all needed a consistent start time, it was not possible to include any routine components that occur before they received the ball. Responses to this portion of the interview question provided a deeper understanding of the uniqueness of each routine.

It is interesting to note that these pre-routine behaviors all had to do with lining their bodies up to the basket. By doing this, the participants appeared to be putting themselves in a technically proper shooting stance. The participants did not report that their routine consists of any other behaviors prior to receiving the ball. All previous studies found by this author that examined the specific behavioral components of pre-performance routines only included information regarding the behaviors that occurred during the routine. Due to this, no past studies have provided any conclusions that can support or conflict with this present theme. This is an area that future research should seek to focus on.

Mental Components

In addition to reporting on the observable behaviors, five participants stated that they also incorporate some mental component into their routine. In their descriptions, the participants did

not directly state or acknowledge the use of a specific psychological skill, such as self-talk, but appeared to imply they were a part of their routine. Participant 2 connected having a positive mental state with a feeling of confidence in himself and his ability to successfully execute the shot. The internal dialog described by this participant appeared to help produce this positive mental state, which he reported being an important component to his routine. From this it appears that participant 2 includes some form of self-talk in his pre-performance routine. Participant 4 appears to use some form of imagery or visualization during her routine, as she stated that she is thinking about the path of the ball as it approaches the basket. Participant 5 reported that her routine helped her calm down and relax prior to executing the skill.

Cotterill, Sanders and Collins (2010) conducted a qualitative study examining the pre-performance routines of golfers. They found that the use of mental components, or psychological skills, were a common aspect of pre-performance routines, which is supported further by the emergence of this theme. Past research has also found that the use of mental or psychological skills within a pre-performance routine have been associated with improved performance. For example Ploszay et al. (2006) conducted a study in which they examined the effect of having five golfers learn to use a multisensory imagery and simulated putting pre-putt routine on their putting accuracy (distance of missed putts from the cup) and success (number of made putts). They also included an interview after the putt observations that examined how compliant the participants' were with their use of imagery along with their attitudes regarding imagery use. Ploszay and colleagues concluded that the use of multisensory imagery did have some positive impact on putting performance, specifically with less skilled golfers. When interviewed, the participants reported that they felt the intervention improved their ability to "read the green more accurately, visualize the line of the putt more clearly, and improve their

overall confidence, which in turn improved performance.” This finding supports the notion that the use of mental skills within a pre-routine can improve performance. It also validates the use of these skill within the pre-performance routines reported by the participants of this study.

Physical Components

The positive benefits of pre-performance routines for self-paced tasks have been well documented. Lobmeyer and Wasserman (1986) conducted one of the earliest studies on pre-performance routines for free throw shooting. They determined that the behavioral components of these routines were related to high free throw accuracy and thus were more than just superstitious behaviors. The schema theory, developed by Schmidt (1975), provides support for the use of pre-performance routines. This theory states that the pre-performance routine can trigger the athlete’s motor memory, or programing, which in turn will trigger the execution of the skill. Essentially, by associating the use of the routine with the execution of the task, the completion of the routine will cue the athlete to draw from the motor memory and complete the skill (Cohn, 1990). Taken together, the conclusions of these previous studies support the use of physical behaviors within a pre-performance routine.

Based on the responses to this question, it was established that all participants utilize some combination of physical behaviors as part of their pre-performance routine. They were all not only aware of the specific physical components of their routine, but were also able to report the order in which they occur. Three specific behaviors were found in the majority of the pre-performance routines, which then established the three subthemes.

Dribble

All six participants reported that they incorporated at least two dribbles in their pre-performance routine, with four participants citing that they use three dribbles and the remaining

two stating that use two dribbles. Both Southard and Miracle (1993) and Southard and Amos (1996) conducted studies that analyzed the specific behaviors of pre-performance routines. In both of these studies, all the participants (eight and seven respectively) included at least one dribble in their pre-performance free throw routine. The emergence of this subtheme provides additional support to both Southard and Miracle (1993) and Southard and Amos (1996).

Southard and Miracle (1993) also found that having a free throw routine that enabled the individual to be rhythmically consistent produced the highest success, and that incorporating a dribble was an important component on such routines. While this subtheme only focuses on the inclusion of the dribble within the routine, the findings of Southard and Miracle (1993) provide additional support to the use or inclusion of this behavior within a pre-performance free throw routine.

Spin

Four of the six participants reported that they incorporate some form of spinning the ball in their hands as a behavioral component of their routine. Very little previous research was found with regards to the frequency or impact of the use of this behavior in free throw pre-performance routines. As stated previously, Southland and Miracle (1993) found that the most effective free throw pre-performance routines were rhythmically consistent. They stated that such routines are “easier to achieve if ritual behavior include at least one or a combination of dribble, dip, spin...” From this, it can be concluded that including a spin as part of free throw pre-performance routine is not only common but is also associated to some degree with higher free throw success.

Breath

The final subtheme was the use of a breath during the pre-performance routine. Haddad and Tremayne (2009) define a centering breath as “a breathing technique intended to yield physical balance and allow the individual to mentally focus before attempting the task at hand... [and] helps to control physiological arousal and allows athletes to ignore task irrelevant stimuli.” Essentially, by taking and focusing on a deep breath prior to executing a task, the athlete would be able to attend to the relevant stimuli and also gain more control over their body’s physiological state. Based in their findings, Haddad and Tremayne concluded that including a centering breath as a component of a free throw routine was associated with improved free throw percentage, or accuracy. This would support the use of this behavior displayed by three of the participants in this study.

A similar theme was found by Otto et al. (2011). The participants in their study reported that the use of a deep breath, or paced breathing, within their pre-pitch routine allowed them to regulate their body’s physiological responses to performance. Otto et al. determined that when the pitchers were able slow down immediately prior to executing a pitch, they were able improve their performance. This adds further support to the emergence of this theme in the current study.

Question #2: Tell me about how you developed your routine.

The participants cited three major sources of influence for how they developed their pre-performance routine. These were outside resources, learning from past routine failures, and having their routine feel comfortable. The third theme, comfort, included two subthemes, a somatic feeling of comfort and relaxation. Another finding that Cotterill, Sanders, and Collins (2010) established was that the pre-performance routine should be developed in a manner that “would recognize the individuality of the golfer, avoiding any ‘one-size-fits-all’ approach.”

Essentially, the individual athlete should decide what behaviors and/or mental components will make up their routine.

Influence of Outside Resource

All six of the participants cited that some sort of outside resource influenced them in developing their current routine. Four participants reported that their basketball coach served as this outside influence, and two participants reported that their father was this outside resource. One participant stated that their father was a coach-like figure to her, stating that her father taught her proper shooting technique. The other participant that reported their father was this outside influence explained that his father was a basketball player himself, and that the participant had copied much of his father's pre-performance routine. In their qualitative examination of golfers per-performance routines, Cotterill, Sanders, and Collins (2010) found that the development of the routine was "sporadic at best." but that two major sources of influence were a coach or the participants modeling their routine after professional golfers. The findings of this theme appear to support those of Cotterill, Sanders, and Collins in terms of the routine being influenced at least to some degree by any outside source.

Learning From Past Routine Failures

Four of the participants reported that they had previously used a different routine before establishing their current routine. It was very interesting to note that when discussing the changes that they made, all four participants reported adding a component to their routine, and only one participant mentioned that they removed a component from a past routine.

It seems that the routine adjustments were influenced somewhat by the participants maturing as a basketball players. Both Participant 4 and 5 stated that their past routine did not include lining their body up, which is a fundamental component of shooting technique. Through

gaining more experience and exposure to the sport, it would appear that the participants were able apply their improved knowledge of shooting to their free throw routine. No previous research was found that examined the how specifically performs adjusted or evolved their routines. This is an area for future research to examine further.

Comfort

Somatic Feeling of Comfort

Four participants reported that they created a routine that produced a feeling of comfort, which helped them execute the skill of free throw shooting. The participants in this study did not directly state that the feeling of comfort that helped them finalize their routine came from such self-regulation, but it is possible that this was occurring without their direct knowledge.

Regardless of the intent, Yancey and Czech (2007) established that “having a structured routine for focus and comfort during performance can be paramount for peak performance.” This supports the subtheme from the current study. The routines described by these four participants would enable them to achieve a mental state that has been found to be associated with reaching an optimal level of performance (Yancey & Czech, 2007).

Participant 2 provided an interesting response to this question. He stated that a previous coach of his utilized a ‘one-size-fits-all’ approach to how he wanted the team to execute their pre-performance routine, which contradicted the previously mentioned findings from Cotterill, Sanders, and Collins (2010). It is clear from his response that he did not like the routine he was forced to use, which likely impacted its effectiveness. If the routine does not feel comfortable to the athlete, how can it be expected to produce any positive benefits? It is logical to expect that Participant 2 would recreate his routine when given the chance, which he reported doing.

Relaxation

The second subtheme was that the participants' routine was developed because it helped them relax just prior to executing the skill. This included a feeling of relaxation, a feeling of rhythm, and/or slowing themselves down to avoid rushing through the skill. This feeling of relaxation is similar to the idea that pre-performance routines can help self-regulate physiological arousal (Singer, 2002). Singer stated that "self-regulation of thoughts and emotions" is a component of the ideal pre-performance mental state. Thus, it would be idea for a pre-performance routine to establish or enable a performer to feel relaxed and control their emotions just prior to executing the skill.

Otto et al. (2011) conducted a qualitative study on baseball pitchers pre-pitch routine. One of the themes that they found was that the routine helped or enabled the pitcher to slow down either in between pitches or just prior to the execution of the next pitch. The subtheme of relaxation that emerged from the current study supports these findings. There is a slight difference in the two themes though. The theme emphasizes that the participants initially developed or finalized their routine because it resulted in a relaxed state, while Otto et al. focused more on how the routines produced this ability to slow down but did not connect this directly with the initial development of the routine.

Due to the significant lack of qualitative research that examines the development of pre-performance routines, no past studies were found that discussed the impact of relaxation specifically on establishing or developing a pre-performance routine.

Question #3: Explain why you have or why you use a pre-shot routine.

As stated previously, a positive relationship has been found between the use of pre-performance routines and the outcome or performance of self-paced skills. Question #3 was

included in this study to analyze the participants' awareness of these positive benefits, along with examining the specific reasons for their use of a routine.

Outside Influence

It is important to establish that while this theme is similar to the "comfort" theme from Question #2, it differs in that these outside influences did not directly influence the development or inclusion of a specific component of the routine. Instead, this theme encompasses factors that influenced the participants' decision to use a routine in general regardless of what components it is made of.

As stated previously, there is a significant lack of qualitative research that has studied pre-performance routines. Of those that were found by this author, Otto et al. (2011) was the only study that directly examined the reasons that performers use a pre-performance routine. While they did establish several reasons for routine use, none included the influence of other individuals. Cotterill, Sanders, and Collins (2010) did find that other outside influences (i.e. coaches, other participants in the same sport etc.) impacted the development of the routine, but did not establish any findings that explained why these athletes began using a routine in the first place. While the concepts of routine development and reasons for routine use are similar, they also differ. For this study, the logic behind the use of a routine focuses more on the understanding of why the participant initially started to use a routine. The development of the routine relates more to the specific components of the routine and how the athlete established those specific behaviors that comprise their routine. With that said, the lack of previous qualitative research regarding the reasons for pre-performance routine use adds further significance to the findings of this study.

The majority of the participants reported that they initially started using a pre-performance routine in part because of an outside influence. This outside influence includes other basketball players and/or a coach. Several participants reported that they initially started to use a free throw routine because they saw other basketball players use them. When asked about this further, no additional patterns or themes emerged in terms of who the participants would see using these routines, just that they were influenced by observing what other players were doing. As for the influence of the coaches, the participants reported that they were taught or told by their coaches that they should be using a routine. Again it is important to establish that these sources of influence did not specifically impact the development of specific components of the routine, but instead did influence their use of a routine in general.

Performance Enhancement

All six participants reported that their use of a pre-performance routine was associated with their belief that it resulted in improved performance. Several quantitative studies have established that the use of pre-performance routines have been linked with improved or enhanced performance for free throw shooting, (Czech, Ploszay, & Burke, 2004; Lobmeyer & Wasserman, 1986; Lonsdale & Tam, 2008; Mack, 2001), which supports the emergence of this theme. The interesting piece of this theme is that while all six participants reported they use a routine because they believe it improves their performance, four different reasons for how their routine improves their performance were established.

Relaxation/Tempo

This subtheme of relaxation differs from the “relaxation” theme from the responses to Question #2. As stated above, Question #2 sought to examine the specific reasons or explanations for the development of the routine, while Question #3 attempted to examine the

general reasons that the participants use a pre-performance routine. Based on the responses from the golfers interviewed in Yancey and Czech (2007), they found that pre-performance routines were used partly because they can trigger a sense of relaxation, which can in turn improve performance. For the current study, the participants reported that relaxing prior to executing a free throw was part of logic behind their use of the routine. Additionally, some of the participants in the current study reported that their routine enabled them ignore the stress of the situation, block out irrelevant stimuli, and thus perform the skill to the best of their ability.

From the responses gathered from this question, several participants reported that they use a pre-performance routine because it improved their performance by enabling them to slow down. The importance of controlling the pace at which the participants execute both their routine and the skill were established as another example for using a routine and how they believed these pre-performance routines improved their performance. Otto et al. (2011) established that being able to slow down prior to executing the skill was found to improve performance. While this finding does provide some support to the current subtheme, it was not established as a reason for why the participants in their study used a routine in general, but instead of was related to the outcome of an ideal routine.

Confidence

Enhanced confidence was found to be another reason that the participants used a pre-performance routine. According to the responses, the use or completion of their pre-performance routine enabled the athletes in this study to feel more confidence in their ability to successfully make the free throw. According to Singer (2002), “the ability to self-regulate arousal level, expectations and confidence, and attention immediately prior to and during performance may be as critical as becoming skilled in carrying out the act itself.” This seems to validate the feelings

of confidence that the participants in the current study reported experiencing by using their routines. Cotterill, Sanders, and Collins (2010) identified that the participants in their study “felt that achieving a super-confident state would make performance effortless... and have an unwavering confidence about the outcome” and that “achieving a super confident state was identified by participants as crucial to the best performances.” The concept of being in a “super confident” state supports the responses from the participants in the current study regarding how their routine enables them create a feeling of confidence prior to executing the skill.

Concentration (focus)

Three participants reported that another reason behind their use of a routine was that it enabled them focus their attention on the skill about to be performed. Previous research has established that pre-performance routines are capable of improving attentional focus, reducing anxiety, eliminating distractions, enhancing confidence, and helping with mental preparation for future performance (Czech, Ploszay, & Burke, 2004). Cotterill, Sanders, and Collins (2010) found that all their participants reported, “that having a specific focus was crucial in determining consistent execution of the shot.” According to Czech et al. (2004) and Cotterill, Sanders, and Collins (2010), having a pre-performance routine that results in enhanced concentration, or focus, will likely lead to improved performance. These findings are further supported by the emergence of this subtheme.

Otto et al. (2011) found focus to be both a specific component of a pre-pitch routine, along with the being linked to improved performance. They found that pitchers used behaviors like deep breathing or planning the next pitch as a means of improving their focus on the task at hand. They also established that focusing on task relevant cues is ideal to achieve optimal performance, and that allowing eliminating distracting cues. Taylor and Wilson (2005)

established that relevant cues are important to attend to as they help improve performance, while task irrelevant cues distract the performer, which results in decreased performance. Again, while the findings of Otto et al. (2011) do provide some support for the present theme, they do appear to once again refer more to specific behaviors or outcomes of the routine itself.

Consistency

The majority of the participants reported that they use a pre-performance routine because it helps them establish a sense or feeling of consistency, and that they associate this feeling to be a positive influence on their ability to shoot free throws. Several of these participants appeared to connect the consistent execution of the routine to the consistent execution of their shot.

Essentially, the consistent use of a pre-performance routine established a consistent environment or feeling for each free throw attempt. The participants in this study associated this consistent environment with improved performance, which provides additional support and logic to their use of a routine. This view of consistency was also found in Cotterill, Sanders, and Collins (2010). They stated “deviation from the ‘normal’ routine resulted in the perception of being ill-prepared to execute the shot.” Based on this, it appears that Cotterill and colleagues established an association between consistent routine adherence and improved performance. This supports the connection that the participants of the current study made regarding the consistent environment established by their routine leads to improved free throw shooting performance.

According to Singer (2002), athletic performance, both in the moment and over time, is decreased if the individual does not have a “meaningful and trusted readying protocol.” Some of the participants in this study reported that if their routine were not executed properly the performance of the shot would be impacted. This would appear to relate back to the quantitative purposes of this study as well. It would seem that the participants believe that consistently

adhering to all aspects of their routine improves their performance, while inconsistent execution of the routine would result in a decreased performance.

Yancey and Czech (2007) found that the participants “liked having a routine that is consistent every time, which kept them from having to think about things.” By using a routine that enabled them to attend to other cues or aspects of the skill itself, the participants in their study reported that were able to perform at an optimal level. Yancey and Czech concluded that routine consistency appeared to be a result of being in an “optimal concentration zone” which provides support to multiple subthemes from the current study.

Question #4: Does your pre-shot routine vary or change at all during competition? If yes, how does it change, when does it change, and why do you think it changes?

No Behavioral Changes

The main quantitative objective of this study was to determine if there was an association between the adherence to the behavioral and temporal components of the pre-performance routine, respectively, and the observed free throw percentage. This question was included in the interview to assess how aware the participants were regarding their consistent execution of their routine, and if they were aware of any inconsistencies. The responses to this question also provided a potential comparison between the quantitative analysis of routine adherence and how consistent each participants believed their personal execution of their routine to be. All ten participants in the quantitative portion of this study were classified as both behavioral and temporal non-maintainers. Five of the six participants in the qualitative portion reported that their routine did not change at all at any point during competition. The results of the routine observations directly contradict the participants’ perception of their adherence to their routine. From this it could be concluded that the participants’ perception of their routine adherence is

very different from their actual performance of their routine. While past research has found routines to be associated with improved performance, there is still disagreement regarding how the consistent execution of the routine impacts performance. These inconsistencies again validate both the mixed methodological approach, and this study's overall purpose. By including both the quantitative observations and the qualitative perceptions of consistency, this study found there to be a clear discrepancy in consistency and perceived consistency.

It is important to note that while the majority of the participants stated that they do not change, or believe that they do not change their routine, the specific language used in several of the responses seemed to relate to their intentions of keeping their routine the same, and were not as concrete as other responses. For example, Participant 2, 3, and 6 reported that they do not believe their routine changes at all, yet their responses only appear to confirm that they do not intentionally change or vary their routine. The use of words like "try" or "most of the time" seem to imply that there is still the potential for inconsistent execution of the routine. These responses leave open the possibility that they are not as consistent with their routine as they believe they are, which could explain some of the observations from the quantitative portion of this study. Based on these responses, it would appear that the participant might not be as aware of, or consistent with, their routine execution as they believe themselves to be. Half of the participant's in Otto et al. (2011) reported that their routine does not change at all, while the other half did in fact state that their routine can, and does, change at times during competition. While this split demonstrates a more realistic understanding or awareness of the routine execution, the language that some of these participants used was very similar to the responses from the current study. Of the participants that reported no changes in their routine, their responses included words or statements that also appeared to focus more on their intent to keep

their routine consistent instead of a more concrete or definite knowledge of this consistency. The similarities between the two studies further supports that the performers might be less consistent with their routine execution than they believe themselves to be.

Since research has yet to conclusively establish if routine consistency is associated with improved performance, the inconsistencies found between the qualitative and quantitative data could raise a new question. Does the perception of being behaviorally and/or temporally consistent with the execution of the routine have a stronger association to the outcome of the skill than the actual physical adherence to the routine? This question is particularly interesting given that the participants believed that they were consistent in their routines but the data show the opposite. Essentially, this question asks whether the performer's belief that he or she is executing their routine consistently has any impact on performance in comparison to actual routine consistency. This is an area that future research should seek to examine further.

Question #5: How important do you think your routine is to your success at shooting free throws?

Acknowledged Importance of Routine

All six participants reported that they believed their routine was very important with regards to their success as free throw shooters. Previous studies have established that the performance enhancing benefits of pre-performance routine use has been found across a variety of self-paced tasks (Boutcher & Crews 1987, Cohn, Rotella, & Lloyd 1990, Czech, Ploszay, & Burke 2004, Lobmeyer & Wasserman 1986, Lonsdale & Tam 2008). While these studies have all provided significant findings with regards to the use of these routines, there are very few qualitative studies that have examined how important these routines are to the athlete themselves. This interview question was also adapted from Otto et al. (2011) and was included in the current

study with the intent of filling this void in qualitative pre-performance routine research. In their responses, all six participants from the present study described their routine as being either “very important” or “extremely important.” Their responses left no doubt that these athletes believe their routine to be an essential piece to their success as free throw shooters, which coincides directly with the research that has established the positive benefits of pre-performance routine use.

Participant 2 went one step further when he stated, “no, I don't think [I'd be successful without a routine].” The universal agreement between the participants was not totally surprising. With all six participants confirming that they do indeed have a pre-performance routine (see Question #1), one could ask why they would have or use a routine if they did not believe it was somehow related to their success at shooting free throws. If the participants doubted that their routine had any impact on their performance, it would seem illogical for them to use any sort of pre-performance routine.

As part of their study on free throw routine use and free throw success, Lobmeyer and Wasserman (1986) included an questionnaire that asked the participants to not only report which condition (routine use vs. no routine use) they performed better in and how many more free throws they made in that specific condition. The questionnaire also had the participants' rate how important their routine was. Based on these aspects of the questionnaire, Lobmeyer and Wasserman determined that the participants overvalued their pre-performance routines. Taken together the six qualitative participants from this study shot an average of 58% on their observed free throws from the quantitative portion. By combining the quantitative findings that none of the participants were classified as behaviorally or temporally consistent with the responses to this

interview question, it would appear possible that these participants also overvalue their routine. This is another area for future research to examine.

Limitations

Despite the researcher's best effort to maintain the highest possible level of integrity, careful selection of instruments, choice of measurements and sample for this study, limitations were still present. There were multiple threats to the internal and external validity of this study. Of major concern were the limitations regarding the generalizability of the results of this study. The participants were not randomly selected, and instead were chosen based on their inclusion within the specialized population of elite collegiate varsity basketball players. Furthermore, the participants in this study were all from one university located in Southeastern United States. Only free throws attempted during home games were included in the observations for this study, which might result in a more controlled and comfortable environment for the players shooting free throws. In general, basketball teams tend to consist of very few players, so the potential participants came from a very small population. When combined with a somewhat restrictive inclusion criteria, the resulting small sample size was only 10. The small sample size for this study was a limitation, in that a larger sample size would have likely resulted in more significant quantitative findings.

Another potential limitation had to do with the free throw situations that will be included and excluded from the observations. As stated previously, only two shot free throw situations were included in this study. Thus the results may only be generalized to pre-performance routine use in two shot situations.

Maturation over the season could also have influenced the consistency of the routine. As the season progressed, players had the chance to make a variety of changes to their routine. Any

such changes could have impacted either the behavioral or temporal consistency of the routine. Additionally, participant mortality was possible. To the knowledge of the primary researcher, no players from either the men's or women's team that began the season healthy sustained an injury that resulted in them missing entire home games. But injuries do occur, and the impact of less significant, or minor, injuries could have had an impact on the free throw shooting performance of a participant, along with influencing their playing time. Any change in amount of playing time, whether it be entire games missed or a reduction in playing time due to injury or any other reason, would likely have impacted the number of free throws attempted by that participant. Since the only inclusion criteria was attempting a minimum number of free throws, any reduction in playing time could have altered the inclusion or exclusion of a specific individual.

Another limitation that was discovered after analyzing the behavioral data was related to the operationally defined start point of the routine. The operational definition for the starting point of all pre-performance routine for this study was the moment the participant received the ball from the referee. This was established in order to allow for consistent observations of both the duration and behaviors for all routines. While this was necessary to establish consistent data, the universal starting point excluded any components of the pre-performance routine that occurred before the participant received the ball. Thus, if a participant's actual routine started before or after they received the ball, the behavioral and temporal observations and analysis were likely not accurate for this participant.

Additionally, since the behavioral observations began the moment the participant touched the ball, the manner in which they caught the ball (i.e. both hands, with their right hand, or with their left hand) was included in the behavioral analysis even if this specific behavior was not a part of the routine. It is important to acknowledge that the participants' appeared to have

minimal, if any, control over how the ball was passed to them. If the referee passed the ball directly at the participant on one free throw resulting in the ball being caught with both hands, but passed the ball off to either side on the second attempt, the participant would likely not be able to catch the ball with both hands. Even if all other behaviors that occurred after catching the ball were the same for both free throws, the routine would have been labeled as behaviorally inconsistent if the participant caught the ball differently (i.e. with both hands on one attempt and one hand on the second). Finally, when the participants described their routine, none included a specific manner of catching the ball. Based on this, it would appear that the observations could have included a behavior that was not only uncontrollable by the participant but was also not included in descriptions of their specific routine.

Future Research

In future naturalistic observational studies, it would be beneficial for the researcher to establish the specific components and the order in which they occur for each participant's routine. This could benefit both behavioral and temporal consistency analysis. By establishing the real start point for each individual routine, instead of relying on a universal starting point, every behavioral component of the routine could be included in the analysis. This also could provide a more accurate temporal analysis since the duration of the routine would start based on the specifics of the routine provided by the participant instead of relying on a universal starting point. Finally, this new approach could address the issue of "the catch" that was presented early in this study. By determining if how the participant specifically catches the ball is or is not part of their routine (i.e. if the participant does not include a specific way of catching the ball in their routine) the behavioral analysis could be adjusted accordingly.

Other future studies should also consider using a larger sample size. This could be done by including both home and away games, including more teams in the observations, or adjusting the inclusion criteria.

Due to the significant lack of qualitative studies on this topic, there are several areas that future research could and should focus on. Studies could examine more specifically the development of pre-performance routines from the athlete's point of view. This could include examining how the athletes believe the use of pre-performance routine influences their performance, and what their routine specifically does to improve performance. Studies could also seek to examine the benefits of certain aspects of the routine, including the use of certain behaviors and/or mental skills.

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APPENDIX A

RESEARCH QUESTIONS, HYPOTHESES, LIMITATIONS, DELIMITATIONS, ASSUMPTIONS, OPERATIONAL DEFINITIONS

Research Questions:

For the quantitative purposes of this study, there were three quantitative research questions. First, was there a relationship between temporal consistency of the pre-shot routine and free throw accuracy? Second, was there a relationship between behavioral consistency of the routine and free throw accuracy? Third, did either behavioral or temporal consistency have a stronger association with free throw percentage than the other?

For this study, the qualitative research question was what was the experience of the pre-performance routine from the perspective of the participant.

Hypotheses

It was hypothesized that the behavioral maintenance group would have a significantly higher free throw percentage than non-behavioral maintenance group. Second, the temporal maintenance group would also have a significantly higher free throw percentage than non-temporal maintenance group. Next, it was predicted that behavioral maintenance of the routine would be significantly related to free throw percentage. The fourth hypothesis was that temporal maintenance of the routine would be significantly related to free throw percentage. And finally, the fifth hypothesis was that behavior maintenance, or consistency, would be more significantly more associated with free throw accuracy than temporal maintenance, or consistency.

Limitations

1. Participants were selected from a convenience sample and all attended the same university in Southeastern United States
2. Only home games were observed
3. Very small sample size
4. Participant maturation with regards to their pre-performance routine over course of season could have impacted behavioral and temporal observations and analysis
5. Participant mortality with regards to any change (increase or decrease) in playing time could have influenced the inclusion or exclusion of participants
6. Behavioral observations and analysis included a behavior (how the ball was caught) which the participant was not in total control over
7. Operationally defined start point excluded any components of the routine that occurred prior to receiving the ball from the referee from observations
8. Temporal observations could have been affected by human reaction time

Delimitations

1. Only two shot free throw situations were included in observations
2. Participants were selected from convenience sample (NCAA Division-I basketball players)
3. Members of the men's and women's team must have attempted 10 two-shot free throw situations over the course of all home games to be included
4. Only home games were included in this study

Assumptions

1. All included participants had a pre-performance routine

2. At least one participant would qualify for each of the four maintenance groups (behavioral maintenance, behavioral non-maintenance, temporal maintenance, temporal non-maintenance)
3. All participants would attempt to make all observed free throws
4. Knowing that their routines were being observed would not influence either the performance of the routine or accuracy of their free throw shooting
5. There would be equal participants from the men's and women's teams
6. All routine observations from both the primary and secondary observers would be consistent and accurate
7. All responses to interview questions would be honest

Operational Definitions

While the definition of the pre-performance routine is widely accepted, there are various aspects that remain less concrete. In order to maintain observer consistency for this study, the specific components of the pre-shot routine were defined as follows. The starting point of the pre-performance routine was defined by the moment the participant received or caught the ball from the referee. The end of the routine was defined as the moment that the ball was released by the participant (Lonsdale & Tam 2008). All temporal and behavioral observations of the routine would take place only during this window.

Behavioral maintenance was defined as adhering the same behaviors from shot one to shot two on 90% or greater of the total free throw pairs observed. This percentage was calculated by taking the total number of behaviorally consistent routines, and dividing that by the total number of free throw pairs attempted by the participant. Behavioral non-maintenance was defined as adhering to the same behaviors from shot one to shot two on less than 90% of the total

free throw pairs observed. Temporal consistency was defined as any routine duration that was within one standard deviation above or below the participant's mean routine duration. The temporal consistency percentage was calculated by taking the total number of routines that were classified as temporally consistent and dividing that number by the total number of free throws attempted for each participant. Inclusion in the temporal maintenance group was established by a participant having a temporal consistency of 90% or greater, and the temporal non-maintenance group consisted of any participants that had a temporal consistency of less than 90%. These inclusion percentages for the present study were established based on the precedent set by Czech, Ploszay, and Burke (2004).

Only two shot free throw situations were included in the observations for both behavioral and temporal consistency. This included standard two shot situations along with any foul that resulted in a 'one-and-one' free throw situation. For each half of play, the total number of fouls committed by each team is recorded. When a team commits their seventh, eighth, or ninth team foul of the half the result is a "one-and-one" free throw situation. The player that was fouled is awarded one free throw attempt (known as the "front end"). If that attempt is made, the player is awarded a second free throw, but if the first attempt is missed no second free throw is awarded. For the purpose of this study, only one-and-one free throw situations in which the first shot is made, thus establishing a second attempt, were included.

APPENDIX B

LITERATURE REVIEW

Lobmeyer, D.L., & Wasserman, E.A. (1986). Preliminaries to free throw shooting: Superstitious behavior? *Journal of Sport Behavior*, 9, 70-78.

This study examined whether the use of a pre-free throw routine had a relationship with free throw accuracy. Participants were observed in two conditions. The first condition had the participants shoot 20 free throws while using their regular routine. The second condition had the same participants shoot another 20 free throws this time they were instructed to use no routine and instead to just shoot the free throws. Lobmeyer and Wasserman found that accuracy was significantly higher when the participant used their routine (condition one) compared to when they did not use any routine (condition two). A questionnaire was also included in this study, which assessed the participants' perceived importance of their free throw routine and whether they believed their routine was superstitious in nature. This questionnaire was completed two weeks after the free throw shooting observations. It was found that the participants tended to overvalue the importance of their routine. The results of this study showed that free throw pre-performance routines were not just superstitious in nature, and did have some psychological importance or relationship to the performance of the skill.

Cohn, P. J. (1990). Pre-performance routines in sport: theoretical support and practical applications. *The Sport Psychologist*, 4, 301-312.

This review focused on both empirical and theoretical support for using cognitive behavioral pre-performance routines in sport. Several theories were reviewed in this publication, all of which provided positive support for the use of pre-performance routines. Three of the theories, schema theory, mental rehearsal theory and set hypothesis theory, touched on how a pre-performance routine can improve performance through mental and physical preparation. In addition, this article provided recommendations for development and structuring of both cognitive and behavioral routines based on the sport, various aspects of the task being performed, the ability/skill level of the athlete, and other personal preferences of the individual. According to this review, pre-performance routines should be developed by the individual and specialized based on various personal preferences to ensure that it will be effective and beneficial to their overall performance. Also, it reviewed previous applied work and research on the influence of cognitive behavioral pre-performance routines on sport performance.

Cohn, P. J., Rotella, R. J., & Lloyd, J. W. (1990). *Effects of a cognitive-behavioral intervention on the pre-shot routine and performance in golf*. Human Kinetics.

This study examined the influence of teaching a cognitive-behavioral intervention to three collegiate golfers with regards to their overall adherence of a pre-shot routine. Both mental and physical routines were examined in this study. The participants were taught how to consistently line up to their target, to make a good decision for each shot, and to be committed to each shot they attempt. It was found that the intervention resulted in an increased adherence to both mental and physical pre-shot routines. A second purpose examined the effects of the pre-shot routine and the cognitive-behavioral intervention on the actual performance of the golfer. At the

start of the study, all three participants were interviewed regarding their use of a pre-shot routine. This included what their routines consisted of (behaviorally and mentally) along with their perceived consistency of their use of the routine. These players and their routines were then observed while playing nine consecutive holes of golf. Cohn et al. did not find any immediate performance improvements even though the participants had increased their adherence to their pre-shot routine. A post treatment interview found that the participants did report that they felt an improvement in their overall performance, even though during the study no performance enhancements were observed. Specifically, all three participants reported an improvement in concentration. A four-month follow-up was conducted after the study, which showed actual performance improvements in the three participants. Based on these findings it would appear that using a pre-shot routines has some association to improved performance but that the athletes' likely need time to practice and perfect the routine as a means of incorporating it into their golf game.

Wrisberg, C. A., & Pein, R. L. (1992). The pre-shot interval and free throw shooting accuracy: An exploratory investigation. *The Sport Psychologist; The Sport Psychologist*.

This article focused on the relationship between pre-performance routine use and free throw accuracy. Specifically, the study focused on the duration and temporal consistency of the pre-performance routine. The study used NCAA Division-I basketball players, along with A and B level collegiate intramural basketball players, all of which included both male and female athletes. The findings showed that temporal consistency was more closely related to free throw accuracy than the mean duration of the routine.

Mack, M. G. (2001). Effects of time and movements of the pre-shot routine on free throw shooting. *Perceptual and Motor Skills*, 93, 567-573.

In this study, Mack had 17 members of an NCAA Division I basketball team attempt 20 free throws in four different conditions. Condition one had the individual perform their normal routine (both behaviorally and temporally). In condition two, the behaviors were retained but the duration of the routine was increased by at least 200%. Condition three had the athletes learn and use a novel the pre-shot routine but kept the timing of their baseline pre-shot routine. Finally the fourth condition had the participants change both the time and behaviors of their routine. The results of this study showed that condition three (changing just the behaviors of the pre-shot routine) was the only condition that resulted in a significant decrease in free throw percentage. Changing the duration of the routine, and changing both the duration and time of the routine at the same time did not have a significant effect.

Jackson, R. C. (2003). Pre-performance routine consistency: Temporal analysis of goal kicking in the rugby union world cup. *Journal of Sports Sciences*, 21, 803-814.

This study looked to assess the relationship between temporal length and consistency of pre-performance routines in rugby kicking, with accuracy or success of the kick under situations differing in difficulty. The participants in this study were 20 players that took a total of 572 place kicks during the Rugby Union World Cup in 1999. It was predicted that the best kickers would be more consistent with regards to their concentration duration and physical preparation than the worse kickers. Physical preparation referred to the period of time from when the kicker finishes setting up the kick (i.e. placing the ball down or on the tee) to the end of the “walk back” (similar

to the steps taken by a field goal kicker in football). The concentration period was defined as the duration of time from the end of the “walk back” to the start of the approach to kick the ball (i.e. the length of time that the kicker is standing still preparing for the kick). Based on Jackson’s findings, there were no differences in routine duration or consistency with regards to the skill of the kicker, and instead the length and consistency of the pre-kick routine was linked to the difficulty of the kick itself. Routines were found to be shorter when the kick was deemed to be less difficult (both distance and angle). The score of the game also influenced the routine length, with duration of concentration times increasing the closer the score was. Overall, this study found that duration and consistency of the routine was related to the difficulty of the task, not the overall skill or ability of the kicker.

Czech, D. R., Ploszay, A. J., & Burke, K. L. (2004). An examination of the maintenance of preshot routines in basketball free throw shooting. *Journal of Sport Behavior*, 27(4), 323-329.

This study examined the relationship between behavioral maintenance a pre-shot routine and free throw percentage for both male and female NCAA Division-I basketball players. The athletes were divided into two groups, those that maintained their routine consistently (defined as doing so on at least 90% of their attempts), and those that did not behaviorally maintain their routine (defined by players that maintained their routine on 0 to 30% of their attempts). The findings established that while there was a difference in free throw percentage between the two groups (maintenance group shot 74%, non-maintenance group shot 68%), the difference was not significant. In addition, this study found that the maintenance group improved their percentage from their first shot to the second (shot one 65%, shot two 83%), while the non-maintenance

group dropped in accuracy from shot one to shot two (70% down to 65%). All free throw attempts were observed and the information related to the behaviors of the routines was recorded live at the games themselves.

Yancey, A. K., Czech, D. (2005). Experience of preshot routines among professional golfers: an existential phenomenological investigation. (Unpublished thesis) Georgia Southern University, Statesboro

This qualitative study interviewed eight professional golfers in order to gain a deeper, phenomenological understanding of their preshot routine. The interview consisted of one main question (“tell me about a specific time when you utilized a preshot routine during golf performance”) along with probing questions when deemed necessary. Three main themes were found: the positive impact of routine on optimal focus, physical descriptions of their routine, and how the situation or type of shot (i.e. full swing shots, chipping, and putting) resulted in using a different or modified routine. While all the routines described integrated similar aspects or features, the full routine was found to be unique to each individual participant. Based on the responses of the participants, the preshot routines that were used before chipping and putting (shots that require more finesse and planning) were longer and more detailed than the routines used prior to a full swing shot. Finally, the participants in this study stated that using a preshot routine was very important to their overall success as a golfer.

Foster, D. J., Weigand, D. A., & Baines, D. (2006). The effect of removing superstitious behavior and introducing a pre-performance routine on basketball free-throw performance. *Journal of Applied Sport Psychology*, 18(2), 167-171.

This study examined the effects that superstitious behaviors had on free throw shooting, what

would happen to free throw shooting success if the superstitious behaviors were removed, along with the effects of replacing the superstitious routines with a novel pre-performance routine on free throw accuracy. Three sessions were conducted consisting of 15 free throws each. During the first session, all participants used their standard superstitious routine. The participants in the experimental group did not use their personal routines during their second session, and during the third session these same participants were taught a new pre-performance routine. There was scheduled practice time for each session so that the participants could get used to the new routine. The results showed that the experimental group produced its lowest free throw percentages occurred during the second session, when they did not use either pre-performance routine or superstitious routines. The free throw success of the control group was consistent throughout the study. During the third experimental session, when the novel pre-performance routines were used, the free throw success essentially returned to the participants' baseline performance. Based on these findings the authors concluded that superstitious behaviors do have some relationship to the successful performance of this skill.

Lidor, R. (2007). Preparatory Routines in Self-Paced Events: Do They Benefit the Skilled Athletes? Can They Help the Beginners? *Handbook of sport psychology*, 445-465.

This chapter focused on three main areas related to pre-performance routines. First, previous research on the use of these routines in self-paced skills or events was reviewed. Second, information related to the use and application of pre-performance routines was discussed. Lidor provided reviewed how consultants or other individuals could use this information to educate athletes with regards to improving their performance on self-paced skills, (i.e. that the use of a pre-performance routine has been found to improve performance). Last, models of teaching pre-

performance routines to young and/or beginner athletes were proposed. Sport specific examples and situations were provided for a range of self-paced skills or sports, such as golf, and free throw shooting. At the basis of the information discussed was the understanding that these routines, when created and used properly, often improve performance of self-paced tasks, but that further research is needed to provide additional support to these findings.

Lonsdale, C., & Tam, J. T. (2008). On the temporal and behavioural consistency of pre-performance routines: An intra-individual analysis of elite basketball players' free throw shooting accuracy. *Journal of sports sciences*, 26(3), 259-266.

This study included observations of pre-performance routines from 14 NBA playoff games in an attempt to determine if there was a relationship between the temporal and behavioral consistency of the pre-performance free throw routines and the athletes overall free throw percentage. Based on the findings, no relationship was found regarding the duration of the pre-shot routine and the free throw percentage, or success rate. Yet there was a statistically significant difference between the free throw percentages of the players that adhered to the physical behavior of their routine compared to those that did not. The behaviorally consistent group shot close to 84% while the individuals that were not behaviorally consistent shot 71% as a group.

Bell, R., Finch, W., & Whitaker, Z. (2010). Duration of pre-performance routines and outcomes of divers. *The Sport Journal*, 13, 4.

The relationship between the temporal duration of pre-dive routines, the difficulty of the dive being attempted and the resulting score of the dive (i.e. performance outcome) for NCAA

Division-I divers were examined in this article. It was found that the more successful divers had significantly longer pre-performance routines than the less successful divers. Also, the length of the routine was found to increase with the difficulty of the dive itself, but was not associated with the outcome of the performance (i.e. score received for the dive). Thus, Bell et al. concluded that there was no significant relationship between the duration of the pre-dive routine and the score, or outcome, of the dive, which conflict with findings of previous studies that examined the same relationship. Bell et al. did establish a significant relationship between the duration of the pre-dive routine and the difficulty of the dive, with longer durations occurring prior to more difficult dives. This is consistent with several studies including Jackson (2003).

Mesagno, C., & Mullane-Grant, T. (2010). A comparison of different pre-performance routines as possible choking interventions. *Journal of Applied Sport Psychology*, 22(3), 343-360.

The purpose of this study was to further the research of “theory-matched choking interventions” by looking at which aspects of a pre-performance routine had the most beneficial influence on performance under pressure, thus minimizing, reducing, and/or eliminating choking. In addition, this study also looked at the effect that increasing the duration and temporal consistency of the routine had on the outcome of the skill under a pressure situation. The idea that state anxiety increases during times of increased pressure was a basis for this study, and that the pre-performance routine would ideally reduce that anxiety. Sixty Australian football players were broken up into five groups, four of which were taught different pre-performance routines, and the fifth was the control group. All 60 participants completed a baseline test under “low pressure” conditions, and then were randomly assigned to one of the five groups (deep breath training, cue

word training, temporal consistency training, extensive pre-performance training and a pressure control group). After the training, the participants attempted to complete the skill (kicking goals) with an audience watching to simulate increased pressure. All participants in the pre-performance groups improved their success, with the extensive pre-performance training having the greatest impact.

Bell, R., Cox, K., & Finch, W. (2010). Pre-putt routines of collegiate golfers and putting outcomes. *Journal of Sport Behavior*, 33,239-257

The purpose of this study was to determine if there was a relationship between the duration of elite college golfers pre-putt routines and their putting accuracy, or success rate. Putts of 3 to 10 feet were examined over the course of two tournaments. After combining the results of the made and missed putts from both tournaments, no significant relationship was found between the duration of the pre-putt routine and the success rate (between subject design). However, when taken separately the putts from one tournament did produce a significant relationship between duration and success (longer routine resulted in a lower probability of making the putt) while the other did not. For both tournaments, the distance of the putt was found to have a significantly negative relationship with the number of made putts (the longer the distance, the less putts made). There were 15 golfers that played in both tournaments that attempted three or more putts within the predetermined distance (within subject design). Those that had more temporal consistency with their pre-putt routines had a higher success rate. Also, the distance factor continued to be related to the success of the putts (further from the cup, the more they missed). The overall results from this study (longer pre-putt duration, lower probability that the putt will be made) were not consistent with previous findings of similar research.

Cotterill, S. T., Sanders, R., & Collins, D. (2010). Developing effective pre-performance routines in golf: Why don't we ask the golfer? *Journal of Applied Sport Psychology*, 22(1), 51-64.

In this qualitative study, six golfers were interviewed regarding their pre-performance routines.

The purpose of these interviews was to gain an understanding of each participant's perception of both the function and nature of their routine. Nine major themes related to why the participants have routines and the impact of the routine were determined. As a result, the authors were able to suggest that creating and developing these pre-performance routines should be individualized based on personality, situational appraisal, and coping resources of each athlete.

Otto, J., & Gentner, N., Czech D., Burdette, T. (2011). An examination of professional baseball pitchers' pre-performance routine: A qualitative study. (Unpublished Master's thesis). Georgia Southern University, Statesboro

This Master's thesis took a qualitative approach to examining the pre-performance routines for pitchers at the minor league and professional level. The qualitative examination allowed the author to gain an understanding of the routine from the pitcher's perspective, which included their thoughts about their routines and the reasoning behind using a routine in general and the specific behaviors of their routine. The results of the interviews allowed the author to establish four major themes and 13 subthemes regarding the various aspects of their pre-pitch routines.

These themes can now be used in future work with pitchers to help them create appropriate and functional pre-pitch routines.

APPENDIX C

IRB FORMS

Instructions: *Please respond to the following as clearly as possible. The Narrative should include a step by step plan of how you will obtain your subjects, conduct the research and analyze the data. Make sure the narrative clearly explains aspects of the methodology that provide protections for your human subjects. Your narrative should be written to be read and understood by a general audience who does not have prior knowledge of your research and by committee members who may not be expert in your specific field of research. Your reviewers will only have the information you provide in your application. Explain any technical terms, jargon or acronyms. The narrative is a part of the complete application.*

The application may be submitted electronically at irb@georgisouthern.edu (email attachment) or sent to the Office of Research Services and Sponsored Programs, at P. O. Box 8005, Statesboro, GA 30460, fax (912) 478-071.

Personnel. *Please list any individuals who will be participating in the research. Also please detail the experience, level of involvement in the process and the access to information that each may have.*

In addition to the primary researcher and the thesis committee, there will be 1-2 volunteer graduate students assisting with the quantitative data collection and data analysis processes. These individuals will be properly trained by the primary researcher, and will have completed all necessary IRB training/certifications required for research participation. The individuals will be volunteer graduate students from the Health and Kinesiology Department at Georgia Southern University. At this time the specific volunteers have not been determined, and once they are their information and IRB training certificates will be provided. For the qualitative portion of this study, the primary researcher will ask for members of his thesis committee along with 2-3 graduate students (also from the Health and Kinesiology Department) for support in data analysis. These individuals will also be properly trained, have prior experience to qualitative data analysis and will have completed all necessary IRB training/certification required for research participation. The thesis committee members include Dr. Daniel Czech, Dr. Brandonn Harris, and Dr. Trey Burdette and are all faculty members of the Health and Kinesiology Department. The individuals assisting in the qualitative data analysis will only have access

to the written transcripts of the interviews, which will already have been assigned an identification number to maintain participant confidentiality.

Purpose. *1. Briefly describe in one or two sentences the purpose of your research. 2. What questions are you trying to answer in this experiment? Please include your hypothesis in this section. The jurisdiction of the IRB requires that we ensure the appropriateness of research. It is unethical to put participants at risk without the possibility of sound scientific result. For this reason, you should be very clear about how participants and others will benefit from knowledge gained in this project.*

There are multiple purposes of the current mix-methodological study. First, is to examine the association between behavioral and temporal maintenance, respectively, of the pre-shot routine and free throw percentage. Second, to determine which component of the routine (behavioral or temporal) has a stronger association with free throw percentage. For both quantitative purposes, only two-shot free throw situations will be observed. This will exclude any one-shot or three-shot situations from data collection. This is done to maintain consistent free-throw shooting situations throughout the entire data collection process, and is also consistent with previous research on temporal and/or behavioral analysis of pre-free throw shot routines. Finally, the last purpose of this study is to gain a deeper understanding of various components of the routine from the participant in a qualitative manner.

The questions to be answered include the following: Does maintenance (behavioral and/or temporal respectively) of the pre-performance routine have a relationship with the success rate (i.e. free throw percentage) of the skill? Is there a difference between behavioral maintenance and temporal maintenance with regards to the relationship to free throw percentage? Which component of the routine (behaviors or temporal) has a strong relationship with free throw percentage? And finally, how does the individual participant view the various components of their routine (specific behavioral components, development of routine, do they believe they are consistent with their execution of the routine), and do they believe that pre-performance routines aid in skill performance.

It is hypothesized that both behavioral and temporal maintenance groups will have a significantly higher free throw percentage than the behavioral and temporal non-maintenance groups respectively. It is also hypothesized that both behavioral and temporal maintenance will have a strong association with free throw percentage. Finally, it is believed that the behavioral consistency of the routine will have a significantly stronger association with free throw percentage than the temporal maintenance group.

There are no additional risks to participating in this study than the risks of participating in the sport itself, as I will only have contact/interaction with the participants during the qualitative interviews and not during any of the quantitative purposes. The results of this study will ideally provide documentation for coaches and players in the proper development and use of a pre-performance routine for free throw shooting. If focusing on consistent execution of one portion of the routine (behavioral or temporal) is ideal in terms of optimal performance, emphasizing that component during the development of the routine should result in a more useful and influential routine.

Literature Review. *Provide a brief description of how this study fits into the current literature. Have the research procedures been used before? How were similar risks controlled for and documented in the literature? Have your instruments been validated with this audience? Include citations in the description.*

A pre-performance routine has been defined as “a systematic sequence of motor, emotional, and cognitive behaviors that are performed immediately before the execution of self-paced tasks” (Lidor 2007, Tenenbaum & Eklund, 2007, Cohn, 1990). For the purpose of this study, the pre-performance routine window is defined as starting at the moment the participant receives the ball from the referee to the moment they release the shot (Mack 2001, Lonsdale and Tam 2007). Previous research has focused on examining the relationship between temporal maintenance of the pre-performance routine and free throw percentage, behavioral consistency of the routine and free throw percentage, and a few studies have examined both components at once. The results of these previous studies have been rather inconsistent in that some will conclude that the consistency of either temporal or behavioral aspects of the routine will have a significant relationship with the outcome of the skill or task, and others will report that there is no significant relationship. For example, Wrisberg and Pain (1992) examined the temporal components of the pre-performance routine for free throw shooting. They found that there was no significant relationship between the length of the routine and free throw percentage, but they did find that the participants that were more successful free throw shooters were consistent with the duration of their routine. Countering this, Jackson (2003) studied the temporal components to elite rugby kickers pre-kick routine. Based on the findings, Jackson concluded that there was no significant relationship between either the routine duration or the temporal consistency between the best and worst kickers. Instead, Jackson found that the routine duration was significantly associated with the difficulty of the tasks (the more difficult the kick the longer the kicker took with their routine).

As for previous studies on the behavioral components of pre-performance routines, similar inconsistencies have been found. For example, Lobmeyer and Wasserman (1986) studied the behavioral components of pre-performance routines for free throw shooters to

determine if these actions were beneficial or purely superstitious. They found that individuals shot a significantly higher free throw percentage when they used their specific routine than when they shot free throws using no routine at all. Again, countering this was the Czech et. al (2004) study that examined the behavioral adherence to routines in two-shot free throw situations. This study found that the behavioral adherers did shoot a higher free throw percentage than the non-adherers, but this difference was not statistically significant.

There is also a very limited amount of qualitative studies that have examined pre-performance in terms of gaining a deeper understanding of the routine and its importance from the participant's point of view. Otto et. al (2011) conducted a study of minor league baseball pitchers that sought to gain a deeper, individualized understanding of their pre-pitch routine. Based on the participants' responses, Otto et. al determined that routine structure, and the reasoning and content of the routine were two major themes. The interview questions for my proposed study were adopted from Otto et. al (2011). Another example of a qualitative analysis of pre-performance routines is Yancey and Czech (2007). In this study, golfers were interviewed to gain an expanded understanding of the pre-performance routines used during a round of golf. Three major themes were created based on the data: routines contributed to the participants' optimal performance, structure of the routine, and how and when the golfer's pre-shot routine changed during performance. The participants all reported that the routine prior to their full swing shots (drive or longer distance shots) was shorter; less structured and included fewer practice swings. The routines prior to the execution of shots that require a narrower attention focus (chips and putts) was longer, included more concentration/focus time, along with more practice swings. The qualitative portion of this proposed study seeks to add to the relatively small knowledge base of pre-performance routines from the point of view of the actual athlete.

For the quantitative observations, the primary researcher and all supporting volunteer graduate students will be using a handheld stopwatch. This stopwatch will measure time down to the hundredth of a second, even though the temporal data will only be recorded down to a tenth of a second. There has been previous research conducted regarding the use and accuracy of human operated handheld stopwatches. Two studies (Hetzler et al. 2008, Mayhew et al. 2010) compared the use of handheld stopwatches to electronic timing in sprint timing (Hetzler et al. looked at 200m sprints and Mayhew et al. timed 40 yard dash). Both studies found that handheld stopwatches reported faster sprint times than the electronic timers, but that the times recorded with the handheld stopwatches were consistent. Hetzler et al. (2008) reported that electronic timing should be used when "high degrees of precision are required" but that "the small mean errors and high interclass correlation values found in the current study suggest that handheld stopwatches may

provide reasonably accurate data for a given study's purpose." Hetzler et al. went on to explain that while the times from handheld stopwatches appear to be faster, when reporting this data no attempts to correct or adjust the times should be made. Instead, the data should be reported as is and any potential "shortcomings of the handheld stopwatch method" should be considered when interpreting the results. Mayhew et al. (2010) found similar results in terms of the differences between electric and handheld stopwatches. Mayhew et al. did report that the electronic timers were the ideal means of measuring 40 yard sprint times, but that if handheld timers were the method being used there are ways to minimize any potential problems with this instrument, including: using multiple handheld timers of the same make and model (i.e. multiple observers), taking the average time recorded from the multiple timers, ensuring that the timers are all in a consistent position for each measurement/observation (be in the same area/place for all measures), and "timing initiation should always be with the index finger and never with the thumb." Both studies commented on the importance of having the timers (or researchers) be properly trained to use the handheld timers. This included several practice sessions with the specific stopwatch being used so that the observer could learn/become familiar with the characteristics of that specific unit (i.e. sensitivity of the buttons, practicing start/stop reactions etc.). Essentially, both studies reported that the use of electronic timing for gathering sprint times is idea, but that handheld timers can be used as long as the potential for human error is acknowledged.

The research procedures for this current study have been adopted and modified from previous studies to fit the target population and other specifications of this study. As stated above, there are no additional risks to participating in this study that do not already present themselves in participation in the sport itself.

Outcome. *Please state what results you expect to achieve? Who will benefit from this study? How will the participants benefit (if at all). Remember that the participants do not necessarily have to benefit directly. The results of your study may have broadly stated outcomes for a large number of people or society in general.*

The findings of this study will ideally allow for both coaches and athletes to benefit in terms of proper development and application of pre-performance routines. It is hypothesized that both the behavioral and temporal maintenance groups will have a significantly higher free throw percentage than the non-maintenance groups. In addition it is hypothesized that both behavioral consistency and temporal consistency of the pre-performance routine will be significantly associated with free throw percentage, and finally that the behavioral maintenance of the routine will be significantly more associated with free throw percentage

than temporal maintenance. Based on these expected results, when developing a routine the coach and/or athlete can emphasized the importance of consistently following the behavioral aspects of the routine as a means of maximizing the impact of the pre-performance routine on the success of the task.

Describe your subjects. *Give number of participants, and applicable inclusion or exclusion requirements (ages, gender requirements, etc.).*

This study will consist of a total of 10 members of the men’s and women’s basketball team from Georgia Southern University. There will ideally be a 50-50 gender split amongst the participants. The age range of the participants will be 17-22. At least one member of one of the basketball teams is under 18 years old and thus the need for obtaining parental consent in order to include this/these individuals in the current study. The quantitative observations will be conducted over all home games. The inclusion criteria for the quantitative portion study is that the participants must attempt at least 20 free throws cumulatively over the course of those home games. There are no other components that will determine inclusion to or exclusion from this study other than that all participants must be members of the Georgia Southern Men’s and Women’s basketball programs.

Recruitment and Incentives: *Describe how subjects will be recruited. (Attach a copy of recruitment emails, flyers or etc.) If provided, describe what incentives will be used and how they will be distributed.)*

All members of both the Men’s and Women’s team will be potential subjects for this study. I, the primary researcher, have previously spoken to the head coaches from both the men’s and women’s team, and they both agreed to allow their teams to participate in this study. Prior to the start of any observations, I will meet with all members of both teams in order to explain the purposes of my study and have them sign the informed consent form. If any members of the team are under the age of 18 at the start of the study, the proper and necessary steps for obtaining consent from their legal guardians will be followed and documented.

There are no incentives to participating in this study.

Research Procedures and Timeline: *Enumerate specifically what will you be doing in this study, what kind of experimental manipulations you will use, what kinds of questions or recording of behavior you will use. Focus on the interactions you will have with the human subjects. (Where applicable, attach a questionnaire, focus group outline, interview question set, etc.) Describe in detail any physical procedures you may be performing.*

After gaining formal approval to begin observations, and obtaining consent from all members of both the men's and women's basketball teams, a pilot study will be conducted for both the behavioral and temporal observations. This will include following the designed observational procedures (explained in detail below) to ensure that all components of the study (technology, observing and recording data accurately) proceed as expected. Before the pilot study is conducted, ample training for the use of both the handheld timers and the video recorder will be provided for all observers. This training will allow for the observers to become familiar with the technology and to ensure that the use of both the stopwatches and video recorders will be consistent throughout the duration of the actual study. For the behavioral data collection, the start of the observations will begin at the moment that the participant receives the basketball from the referee. This is when the recording of the pre-performance routine will start. The recordings for the behavioral purpose will end the moment the ball is released, or shot. Due to the complexity of these pre-performance routines, the actual observations of the behavioral components of the routine will be analyzed only using the video recordings. This will be done to ensure that all components of the routine are observed and that placement into either the behavioral maintenance or non-maintenance group is done accurately. One video recording will be created and then used for behavioral analysis. These recordings will be conducted from the same seat/angle for all home games to ensure consistency of the material. The second recording will be obtained through the access of the game tape that both the men's and women's team use for their personal analysis. This would be used as back up to the previously recording. For example, if the recording of the routine is obstructed, behaviors could not be explicitly determined, recording did not capture the entire routine, or if the primary research was not present at a game the provided game tape will be used for observational data. Using both types of recordings will allow for a greatly increased validity and consistency of the behavioral observations. Once all two-shot free throw situations have been recorded, the behavioral components of the routine will be analyzed. For the temporal maintenance observations, a handheld stopwatch will be used in order to determine the length in seconds of the routine, from the moment the participant receives the basketball from the referee to the moment the ball is released for the shot. These observations will be recorded down a tenth of a second. All temporal observations will be made using the videotapes created for the behavioral observations. Myself and the other observer (same individual that will be assisting the behavioral observations/videotaping) will conduct the temporal observations. Any potential differences in terms of durations observed will be discussed, and if determined to be significant the appropriate statistical adjustments will be made. By making the observations based on the recordings, various technological advantages (i.e. slow motion, rewinding tape if timer start was delayed or inaccurate, etc.) can ideally be used to reduce

the impact or frequency of human error or otherwise inconsistent or invalid observations. Based on these final temporal observations, the participants will then be placed into either maintenance or non-maintenance groups. Once all the data from the home games (the length of the quantitative study) have been collected, all participants will be properly grouped into their respective maintenance and non-maintenance groups (behavioral maintenance, behavioral non-maintenance, temporal maintenance, and temporal non-maintenance).

The qualitative interviews will be conducted at the earliest availability of the participants. Participants will be randomly selected from both the men's and women's team respectively. These participants will have attempted the minimum amount of required free throws to be included in the quantitative purpose of this study. The interviews will be the only actual interaction that I or any of the other observers/researchers have with the participants other than when consent for participation is obtained. Five questions will be standard for all interviews, and probing questions will be added when further explanation for a response or information is needed. The five questions aim to gain a deeper understanding of various components of the pre-performance routine (development of the routine, assessment of the perceived importance of the routine, why they have or use a routine) along with allowing the subject to include and/or explain the use of any potentially non-observable aspects of their routine. These could include any mental skills (i.e. self-talk, imagery, visualization etc.) or any minute/minor behavioral components that could be missed during the behavioral analysis of their routine. Below are the set questions for the interviews that have been adopted from Otto et. al (2011).

1. *"Tell me about your pre-shot routine, from the moment you receive the ball from the referee to the moment you release the ball? If you start your routine before you approach the line, can you tell me about that as well?"*
2. *"Tell me about how you developed your routine?"*
3. *"Explain why you have/use a pre-shot routine?"*
4. *"Does your pre-shot routine vary or change at all during competition? If yes, how does it change, when does it change, and why do you think it changes?"*
5. *"How important do you think your routine is to your success at shooting free throws?"*

Data Analysis: Briefly describe how you will analyze and report the collected data. Include an explanation of how will the data be maintained after the study is complete and anticipated destruction date or method used to render it anonymous for future use.

For the two qualitative aspects of this study, data will be collected through the analysis of video recordings. For the temporal maintenance data, the duration of each pre-performance routine will be recorded down to the tenth of a second. The timer will be

started the moment the participant receives the ball from the referee and the time will be stopped the moment the ball is released, or shot. Once all the data has been collected, the mean duration will be calculated for each participant respectively. To determine the consistency (or temporal maintenance) of the routine, the standard deviation from the mean will be calculated for each individual temporal observation. If the duration of the routine is within a standard deviation of the mean on 90% or greater of the attempts, that participant will be placed into the “temporal maintenance” group. If less than 90% of the routines observed fall within that standard deviation, that individual will be placed into the “temporal non-maintenance” group. The use of standard deviations as a means of grouping maintenance or non-maintenance follows previous studies that examined temporal consistency of pre-performance routines. In addition to the temporal recordings, the time of the game (first VS second half), score, jersey number and whether the shot was made or missed will be recorded as well. A template will be created which will include all the previous categories to allow for the observations to be grouped based on the individual who is actually attempting the free throw. To minimize the impact of human error with the stopwatch timing, all temporal observations will be conducted using the tape recordings of the routines. Also, at least two observers will be making the temporal observations. This is done to increase the validity and consistency of the data. If there are significant differences in the temporal data between observers, the specific routines will be analyzed and discussed as a group and any corrections or statistical adjustments will be made. If any discrepancies occur, they will be documented and the process for eliminating the discrepancy will be included as well. All behavioral data will be collected by analyzing the same recordings used to conduct the temporal observations. To analyze behavioral consistency, all two shot free throw attempts will be grouped in pairs (shot 1 and shot 2) and the behavioral maintenance between these two shots will be analyzed. Two observers (the primary researcher and a second trained volunteer) will view the tapes separately and then compare the observed behaviors and the order in which they occurred for each free throw attempt. In addition to the behaviors and order of occurrence, the time of the game (first VS second half), score, jersey number, and if the free throw was made or missed will be recorded for each observed attempt. If any differences between the two observations do occur, the tape of the specific routine in question will be watched together by both observers and the differences will be discussed until there is an agreed single analysis. Once all behavioral components and order have been agreed on for each free throw observed, the pairs of shots (again shot 1 and shot 2) will be labeled as behavioral maintenance or behavioral non-maintenance. To be included in the behavioral maintenance group, the participant must perform a routine that contains the same behaviors and perform these behaviors in the same order on at least 90% of his/her free throw pairs. Anything less than 90% behavioral consistency will result in being placed into the behavioral non-maintenance group. All data will be kept until the completion of the

study in a password protected folder on the primary researchers personal laptop. The data collection will be maintained and kept securely for three years at which time all data collected in this study will be properly disposed of.

For the qualitative portion of this study, all interviews will be recorded (with the permission of each participant) and then transcribed verbatim by the primary researcher. Each transcript will be assigned an identification number to maintain participant confidentiality. Once the transcripts are completed, they will be given back to the participants to ensure that they are accurate while also allowing them to add or take out any portion of the interview. At this time, the primary interviewer and his committee will analyze the data to determine and create categories, themes and subthemes. The recordings of the interviews will be kept in the same manner as the quantitative data (under a password secured folder on the primary researcher's personal laptop) for three years after data collection has been completed. After this time, all data collected for this study will be properly destroyed.

Special Conditions:

Risk. *Is there greater than minimal risk from physical, mental or social discomfort? Describe the risks and the steps taken to minimize them. Justify the risk undertaken by outlining any benefits that might result from the study, both on a participant and societal level. Even minor discomfort in answering questions on a survey may pose some risk to subjects. Carefully consider how the subjects will react and address ANY potential risks. Do not simply state that no risk exists. Carefully examine possible subject reactions. If risk is no greater than risk associated with daily life experiences state risk in these terms.*

There are no additional risks to participating in this study that are not already present in the participation in the sport. While it is possible that the Hawthorn effect will occur, the observers will be no more visible or noticeable than any of the other individuals attending the basketball game (i.e. parents, friends, family etc.). As for the qualitative component, the participants will not be forced to respond to any question/s that they find uncomfortable or otherwise undesirable to answer. If the participant does choose to not answer one or more of the questions, it will be noted in the data collection. The planned questions being asked are minimally invasive and to the best knowledge of the primary researcher do not include any controversial or detrimental topics. All participants will be reminded that only the primary researcher will know their identity or any other personal information provided, and that while the thesis committee will review the transcripts, all

means of identifying the participant (names, jersey number, position played etc.) will be removed from those copies of the transcripts.

Research involving minors. *Describe how the details of your study will be communicated to parents/guardians. If part of an in-school study (elementary, middle, or high school), describe how permission will be obtained from school officials/teachers, and indicate whether the study will be a part of the normal curriculum/school process. Please provide both parental consent letters and child assent letters (or processes for children too young to read). If not applicable indicate N/A or delete this section.*

For all members of either the men's or women's basketball team that are under the age of 18, proper consent from their legal guardian/s will be obtained in addition to their personal consent. This will be completed prior to start of any observations involving the specific individual. A letter and/or email will be sent to these specified individuals containing a summary of the purpose of the study, the extent of both the players' and the researchers' involvement/interactions, potential risks, benefits of both participation and potential outcomes of the study, and personal contact information for myself as the lead researcher.

Deception. *Describe the deception and how the subject will be debriefed. Briefly address the rationale for using deception. Be sure to review the deception disclaimer language required in the informed consent. **Note:** All research in which active deception will be used is required to be reviewed by the full Institutional Review Board. Passive deception may receive expedited review. If not applicable indicate N/A or delete this section.*

N/A

Medical procedures. *Describe your procedures, including safeguards. If appropriate, briefly describe the necessity for employing a medical procedure in this study. Be sure to review the medical disclaimer language required in the informed consent. If not applicable indicate N/A or delete this section.*

N/A

GUIDELINES FOR MODEL INFORMED CONSENT

Note: When using this model as a template – remove instructions for each numbered item, modify the title and delete sections that are not applicable to your research from your final copy. The informed consent should be written to the participants.

1. Identify who you are, your relationship to Georgia Southern University, and why you are doing this research.
2. Purpose of the Study: The purpose of this research is to...

Hello, my name is Jacob Blumberg and I am a second year graduate student in the Sport and Exercise Psychology Master's program here at Georgia Southern. The purpose of my thesis is to examine both the temporal consistency and behavioral consistency, respectively, of pre-performance free throw routines and the relationship that both of these components have with free throw percentage. [why: I chose to focus on pre-performance routines for a few reasons including personal past experiences and a general interest with the concept of a pre-performance routine.

3. Procedures to be followed: Participation in this research will include completion...

In order to participate in this study, you must attempt at least 20 free throws over the course of the 10 observed home games. If you are able to reach that volume of free throw attempts you will also be potentially chosen to participate in a qualitative interview towards the end of the regular season. This interview will address various components of your pre-performance routine including your description of your routine, how you developed your routine, and your perceived importance of the routine to the outcome or success of the free throw.

4. Discomforts and Risks: Include all possible risks, including minor issues such as embarrassment or dealing with sensitive issues. If the possibility of injury exists, physical or psychological, include this statement: "I understand that medical care is available in the event of injury resulting from research but that neither financial compensation nor free medical treatment is provided. I also understand that I am not waiving any rights that I may have against the University for injury resulting from negligence of the University or investigators." Referral information (including a phone number) for those who wish to seek assistance should also be included (e.g. Counseling Center, Health Services). The statement should not read there is no risk .

There are very few, if any, additional risks to participating in this study that do not already exist in the participation/playing of basketball. The behavioral and temporal observations will be made during live game play, and will be done so without interfering or interacting with you as you shoot your free throws. All observations will be made via the use of video recording obtained at the games. As with the data collected for both the quantitative and qualitative components of this study, the videos created will be kept securely for three years prior to the completion of data collection. Once the three years have expired, the tapes and data will be destroyed appropriately. The only potential risks could come in the form of embarrassment or feeling uncomfortable during the qualitative interviews. Those interviews will be the only other time that I am interacting with you, the participant, during this study.

5. Benefits:

- a. The benefits to participants include...
- b. The benefits to society include...

There are no incentives or direct benefits to participating in this study. As for potential benefits to society, I am hoping that my findings allow both coaches and players to develop a pre-performance routine for free throw shooting that focuses on and encompass the proper components to allow for maximal performance and comfort during the execution of the skill (i.e. focusing on either or both behavioral or temporal consistency of the routine itself).

6. Duration/Time required from the participant:

The behavioral and temporal observations will be conducted during live gameplay and will thus not require any additional time from you. Free throws will be observed over the course of 10 home games during the 2013-2014 basketball season. The interviews that will occur towards the end of the regular season will last roughly 20-30 minutes. If you are selected for the qualitative interview, that is the only additional time that this study will require of you.

7. Statement of Confidentiality (e.g., Who will have access to their information and how will it be maintained. When will it be discarded? Note: data must be maintained in a secure location for a minimum of 3 years following completion of the study.):

The information obtained/observed during this study will be kept confidential. Myself (the primary researcher), 1-2 trained volunteers, and my thesis committee (consisting of 3 professors at Georgia Southern University) will be the only ones to see the data. I will be the only one to see the data and/or information before all identifying information is altered and/or eliminated

from the recordings. All interviews will be coded with an identification number in order to maintain your confidentiality. I will be the only member of this study to know any personal information provided. All data that is collected will be kept in a locked up when not in use for analysis. Upon completion of the study, the data (including any and all personal information provided) will be kept securely for three years. After this time all data will be properly disposed of.

8. Right to Ask Questions: Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-0843.

Right to Ask Questions: You and all participants have the right to ask questions at any point and have those questions answered. If you have questions about this study, please contact Jacob Blumberg or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-0843.

9. Compensation: Clearly identify any stipend, credit or other incentive to participation. Explain any additional costs that may result from participation in the research and any compensation that will be provided to Participants. If applicable, you may need to include the following statement: "If you are an employee of Georgia Southern University, the compensation you receive for participation will be treated as taxable income and therefore taxes will be taken from the total amount. If you are not employed by the University, total payments within one calendar year that exceed \$600 will require the University to annually report these payments to the IRS. This may require you to claim the compensation that you receive for participation in this study as taxable income."

There is no compensation or incentive to participate in this study. There are no costs or financial obligations related to your participation.

10. Voluntary Participation: Explain that the subjects don't have to participate in this research; that they may end their participation at any time by telling the person in charge, not returning the instrument or other options; that they do not have to answer any

questions they do not want to answer. (For juveniles in classroom settings, add that they may decide to stop working on the project at any time and discuss how they should communicate this to the researcher; also state what alternative activity is available to a juvenile if the research takes place in a classroom setting.

Please know that your participation in this study is completely and 100% voluntary. You may also end any and all participation in this study at any time by notifying myself, Jacob Blumberg, the lead researcher. You also have the right to refuse to answer any questions asked of you during any portion of this study.

11. Penalty: Advise the subject that there is no penalty for deciding not to participate in the study; that they (or the juvenile) may decide at any time they don't want to participate further and may withdraw without penalty or retribution. (For studies offering incentives and/or compensation, please describe how withdrawal will effect their compensation.).

There is no penalty for choosing not to participate or for ending participation prior to the conclusion of this study.

12. HIPAA: If the research falls under the HIPAA regulations, please go to the following site where additional information can be located on wording that will need to be included in the informed consent form: [HIPAAIC](#) **PLEASE NOTE: If your research project does not fall under the HIPAA regulations, please delete this statement (12).**

13. If the study involves deception, the following statement must be included: **"Because the validity of the results of the study could be affected if the purpose of the study is fully divulged to me prior to my participation, I understand that the purpose of the study cannot be explained to me at this time. I understand that I will have an opportunity to receive a complete explanation of the study's purpose following my participation in the study."**

14. You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H14106.

Title of Project: An Examination of Behavioral and Temporal Consistency of Pre-Performance Routines in NCAA Division-I Basketball Free Throw Shooting: A Naturalistic Observational Investigation

Principal Investigator: Jacob Blumberg, (781) 454-5439, jb12488@georgiasouthern.edu

Other Investigator(s): (Department of Health and Kinesiology graduate students to be trained and determined later)

Faculty Advisor: Dr. Daniel Czech (912) 478-5267 drczech@georgiasouthern.edu

Participant Signature Date _____

I, the undersigned, verify that the above informed consent procedure has been followed.

Investigator Signature Date _____

PARENTAL INFORMED CONSENT

Dear Parent or Guardian:

Hello, my name is Jacob Blumberg and I am a second year graduate student in the Sport and Exercise Psychology Master's program here at Georgia Southern. As part of my program, I will be conducting a thesis that seeks to analyze the behavioral and durational components of your child's pre-performance routine for shooting free throws (i.e. their routine or ritual before attempting the free throw). There are three components to my thesis. The first two include observing and assessing the consistency with which your child performs the behavioral components of her pre-free throw shot routine, and the duration or length of time it takes her to complete the routine. Based on these findings I am hoping to determine if either or both behavioral or durational consistency of the routine has a relationship with free throw percentage. I will also be looking to determine which component (behavioral or durational consistency) has a stronger relationship with free throw percentage as a means of helping future basketball players and coaches develop routines in a manner that would allow for optimal performance. The final component of my thesis is a short interview during which your child will be asked five basic questions regarding their understanding of their routine, how they developed their routine, and why the use or have a routine. These interviews will take roughly 15-20 minutes.

If you give permission, your child will have the opportunity to participate in my study. The observations of their routines will be conducted during actual game play, and thus will require no

additional time commitment. Observations will all be made without interfering or interacting at all with your child as they perform the skill. Video recordings of the routines will be made, and will be protected following the ethical confidentiality procedures for studies of this nature. All data will be kept in a password-protected folder on my personal computer. This data will be kept securely for three years after the data collection process has been completed, at which time all data related to and collected during this study will be properly destroyed.

Your child's participation in this study is completely voluntary. The risks from participating in this study are no more than would be encountered by participation in the sport of basketball. Your child will be told that she has the right to stop participating in the study at any time without any penalty. During the interview portion of this project, your child may choose to not answer any question(s) she does not wish to for any reason. Your child may also refuse to participate even if you agree to her participation.

In order to protect the confidentiality of your child, all personally identifying information will be substituted for an identification number or code number and your child's name will not appear on the information recorded during the experiment. No one outside of myself and my thesis committee (made up of three professors and two to four volunteer graduate students) will see the information recorded about your child.

If you have any questions or concerns regarding this study at any time, please feel free to contact me, Jacob Blumberg, Sport and Exercise Psychology major, at (781) 454-5439, or Dr. Daniel Czech, thesis chair/advisor, at (912) 478-5267.

To contact the Office of Research Services and Sponsored Programs for answers to questions about the rights of research participants please email IRB@georgiasouthern.edu or call (912) 478-0843.

If you are giving permission for your child to participate in the experiment, please sign the form below and return it to your child's coach or myself as soon as possible. Thank you very much for your time.

Jacob Blumberg
Sport & Exercise Psychology Major

Dr. Daniel Czech
Sport & Exercise Psychology
Professor
(912) 478-5267
drczech@georgiasouthern.edu

Investigator's Signature _____

Child's Name: _____

Parent or Guardian's Signature: _____

Date: _____

MINOR'S ASSENT

Hello,

I am Jacob Blumberg a graduate student at Georgia Southern University and I am conducting a study on "An Examination of Behavioral and Temporal Consistency of Pre-Performance Routines in NCAA Division-I Basketball Free Throw Shooting - A Naturalistic Observational Investigation."

You are being asked to participate in a project that will be used to help future development of pre-free throw routines. If you agree to participate, your free throw attempts will be observed during 10 home games in the upcoming basketball season. Also by voluntarily participating, you will be eligible for random selection for a brief (15-20 minute) interview aimed to gain a deeper understanding of your pre-performance routine. If you are selected for this interview, that will be the only additional time commitment as all other observations will be conducted during game play.

You do not have to do this project. You can stop whenever you want. If you are chosen for the interview, you have the right to refuse to answer any and all questions without reasoning. There is no consequence for not participating or ending participation prior to the end of the study. Since you are under 18 years old, your parents' permission is also required. If they agree you still have the right to refuse to participate and no consequences will come of that decision.

No one at Georgia Southern outside of myself and my research committee (made up of three professors) will see the answers to the questions that I ask you. All data collected will be kept in a password protected folder on my personal computer. All personal or otherwise identifying information that you provide will be replaced by an identification number or code as a means of maintaining confidentiality.

If you or your parent/guardian has any questions about this form or the project, please call me at (781) 454-5439 or my advisor, Dr. Daniel Czech, at (912) 478-5267. Thank you!

If you understand the information above and want to do the project, please sign your name on the line below:

Yes, I will participate in this project: _____

Child's Name: _____

Investigator's Signature: _____

Date: _____

CERTIFICATION OF INVESTIGATOR RESPONSIBILITIES

By signing below I agree/certify that:

1. I have reviewed this protocol submission in its entirety and I state that I am fully cognizant of, and in agreement with, all submitted statements and that all statements are truthful.

2. This application, if funded by an extramural source, accurately reflects all procedures involving human participants described in the proposal to the funding agency previously noted.

3. I will conduct this research study in strict accordance with all submitted statements except where a change may be necessary to eliminate an apparent immediate hazard to a given research subject.
 - a. I will notify the IRB promptly of any change in the research procedures necessitated in the interest of the safety of a given research subject.
 - b. I will request and obtain IRB approval of any proposed modification to the research protocol or informed consent document(s) prior to implementing such modifications.

4. I will ensure that all co-investigators, and other personnel assisting in the conduct of this research study have been provided a copy of the entire current version of the research protocol and are fully informed of the current (a) study procedures (including procedure modifications); (b) informed consent requirements and process; (c) anonymity and/or confidentiality assurances promised when securing informed consent (d) potential risks associated with the study participation and the steps to be taken to prevent or minimize these potential risks; (e) adverse event reporting requirements; (f) data and record-keeping requirements; and (g) the current IRB approval status of the research study.
5. I will not enroll any individual into this research study: (a) until such time that the conduct of the study has been approved in writing by the IRB; (b) during any period wherein IRB renewal approval of this research study has lapsed; (c) during any period wherein IRB approval of the research study or research study enrollment has been suspended, or wherein the sponsor has suspended research study enrollment; or (d) following termination of IRB approval of the research study or following sponsor/principal investigator termination of research study enrollment.
6. I will respond promptly to all requests for information or materials solicited by the IRB or IRB Office.
7. I will submit the research study in a timely manner for IRB renewal approval.
8. I will not enroll any individual into this research study until such time that I obtain his/her written informed consent, or, if applicable, the written informed consent of his/her authorized representative (i.e., unless the IRB has granted a waiver of the requirement to obtain written informed consent).
9. I will employ and oversee an informed consent process that ensures that potential research subjects understand fully the purpose of the research study, the nature of the research procedures they are being asked to undergo, the potential risks of these research procedures, and their rights as a research study volunteer.
10. I will ensure that research subjects are kept fully informed of any new information that may affect their willingness to continue to participate in the research study.
11. I will maintain adequate, current, and accurate records of research data, outcomes, and adverse events to permit an ongoing assessment of the risks/benefit ratio of research study participation.

12. I am cognizant of, and will comply with, current federal regulations and IRB requirements governing human subject research including adverse event reporting requirements.

13. I will notify the IRB within 24 hours regarding any unexpected study results or adverse events that injure or cause harm to human participants.

14. I will make a reasonable effort to ensure that subjects who have suffered an adverse event associated with research participation receive adequate care to correct or alleviate the consequences of the adverse event to the extent possible.

15. I will notify the IRB prior to any change made to this protocol or consent form (if applicable).

16. I will notify the IRB office within 30 days of a change in the PI or the closure of the study.

Principal Investigator Name (typed) Principal Investigator Signature Date

Faculty Advisor Name (typed) Faculty Advisor Signature* Date

***Faculty signature indicates that he/she has reviewed the application and attests to its completeness and accuracy**