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Criticality of Game Situations' Effect on Officials' Stress Levels

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FLORIDA STATE UNIVERSITY

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CRITICALITY OF GAME SITUATIONS' EFFECT ON OFFICIALS' STRESS LEVELS

By

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Dedicated to my family for all their support, patience, love, and grammar edits without them this
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ABSTRACT

Sports officials experience moderate to low amounts of stress, which can affect the outcome of games, seasons, and officials' careers. Furthermore, officials' report that the criticality of game situation (situation criticality) is one of the major sources of stress they experience. Situation criticality is comprised of score differential (i.e., more pressure in close games) and time remaining in a game (i.e., more pressure as time expires). Surprisingly, there is a lack of research examining the association between situation criticality and officials' stress level. However, previous research has indicated that situation criticality impacts athletes' stress levels (Bar-Eli & Tenenbaum, 1998a). Thus, the present study explored the effect of situation criticality on officials' stress levels. Specifically, high school basketball officials were given a survey packet containing game situations that vary in criticality (i.e., score differential: > 6 , < 6 , and tied game; time of game: two minutes into the first half, last two minutes in the first half, last two minutes in the second half). For each game situation (a total of nine) officials completed the Stress Appraisal Measure (SAM). The SAM includes a measure of overall stress level as well as the officials' appraisals of the stressor. Results revealed that situation criticality has an effect on officials' perceived stress levels. Officials' perceived stress levels increased as score differential decreased and as time remaining in the game decreased. In addition, officials reported that a tie game at the end of the second half was the most stressful situation presented. Both threat and challenge appraisals were positively correlated with perceived stress. Furthermore, results indicated that threat appraisal had the greatest impact on overall stress level. These findings indicate that officials' stress levels fluctuate within games depending on score differential and time of game. This finding should encourage officials to manage their stress, possibly through their appraisals, to improve performance and job satisfaction. Additionally, this finding can

impacts the training of officials in the management of stress as well as potential rule changes that reflect the increased situational demands on officials in critical situations (e.g., expanded instant replay).

INTRODUCTION

Psychological stress typically occurs when an individual appraises the environment as taxing or exceeding personal resources (Lazarus & Folkman, 1984). Sport officials have high levels of responsibility and are often under pressure in making calls that are important in determining the outcome of the game. Moreover, officiating requires simultaneous management or control of players and coaches, knowing and enforcing the rules of the game, and communicating with partner officials (Mascarenhas, O'Hare, & Plessner, 2006). Thus, it is not surprising that the high-pressure environment sport officials encounter frequently leads to stress (Balch & Scott, 2007; Weinberg & Richardson, 1990).

Furthermore, officials' stress response can have detrimental effects on their performance during games and on overall job satisfaction. For example, Canadian soccer officials reported that stress increased their dropout intentions and levels of burnout (Taylor, Daniel, Leith, & Burke, 1990). Additionally, Kahill (1988) demonstrated that stress' detrimental impact on job performance is consistent across numerous professions, including officiating. Studies on visual search behaviors of athletes revealed that athletes, while under stress, experience peripheral narrowing and less efficient gaze behavior (Janelle, Singer, Williams, 1999; Williams & Elliot, 1999). This is especially detrimental to officials whose performances rely on efficient and accurate perception (Mascarenhas, O'Hare, & Plessner, 2006). Moreover, officials' increased anxiety caused by crowd noise and fear of failure can lead to biased and incorrect decision-making (Balmer, Nevill, Lane, Ward, Williams, & Fairclough, 2007). Therefore, understanding the magnitudes and sources of officials' stress is crucial for improving performance during games and for increasing job satisfaction.

Sources of stress, in general and specifically in the sport and officiating domains, have been widely studied (e.g., Kahill, 1988; Thatcher, 2004). Two of the main sources of stress reported by officials include *fear of failure* and *game pressure*. Surprisingly, the effect of game pressure (e.g., importance of game, time of game, score differential) on officials' stress level and performance has gone relatively unstudied (e.g., Mascarenhas et al., 2006; Taylor et al., 1990). Given the prevalence of high-pressure situations in sport officiating, the effect of these situations on officials must be studied. Thus, in the present study, the effect of game situation (i.e., score differential and temporal phase) on official's stress is examined.

LITERATURE REVIEW

Stress

Stress occurs when an individual appraises a situation as disrupting the balance between the individual and the environment (Lazarus, 2000). The crucial aspect to experiencing stress is the appraisal process, which involves two cognitive appraisals; primary and secondary (Lazarus & Folkman, 1984). The primary appraisal occurs when the individual evaluates whether or not, and to what degree, the encounter with the situation is important to his or her well-being. Additionally, during primary appraisal the individual determines whether to perceive the situation as threatening or challenging (Lazarus & Folkman, 1984). Importantly, challenge and threat are not mutually exclusive or unidimensional. Thus, an individual may appraise a situation as both highly threatening and challenging (Lazarus & Folkman, 1984). A threat appraisal of the situation results from evaluating a situation as potentially harmful. In contrast, in a challenge appraisal, the focus of the individual is on the potential for growth and successful adaptation to the situation (Lazarus & Folkman, 1984). Threat is associated with impaired performance while challenge is associated with improved performance. However, both appraisals utilize the individual's coping efforts (Lazarus & Folkman, 1984). Threat requires the individual to cope with the situation in order to reduce harm, while challenge encourages/motivates the individual to cope with the situation in order to develop and succeed.

The secondary appraisal consists of coping efforts related to the primary appraisal and occurs when the individual determines what, if anything, he or she can do to prevent harm or improve the benefits of the situation. In addition, during secondary appraisal the individual evaluates the various coping skills and strategies available, which includes assessing the ability

to employ the desired skill or strategy for achieving the desired effect (Lazarus & Folkman, 1984).

Primary appraisals of the potential impact and secondary appraisals of coping options are critical to the magnitude of stress experienced (Lazarus, 2000). The interaction of primary and secondary appraisals is a constant and bidirectional cognitive process that results in a stress response (Lazarus, 2000). Therefore, as an individual's appraisal of a situation changes, the magnitude of stress response changes accordingly.

Perceived Stress in Officiating

There is extant research examining the appraisal and stress response process in the sport domain (e.g., Lazarus, 2000; Thatcher, 2004). Additionally, research has been conducted on the sources and magnitudes of stress in officiating as well as minimal research on the effects of stress on officiating (i.e., performance and job satisfaction). Furthermore, understanding the perceived magnitudes and sources of stress that officials experience is crucial for studying officials' stress and coping mechanisms.

The magnitude of stress experienced by sport officials has been examined primarily by using self-report surveys (e.g., Gencay, 2009; Taylor & Daniel, 1988). For example, in a study examining soccer officials' perceived stress levels, officials reported moderate to low levels of stress. Moreover, 5% of the responding officials reported experiencing high levels of stress (Taylor & Daniel, 1988). In a similar study, findings revealed that the majority of soccer officials' experienced low to moderate levels of perceived stress, while 10% of the officials reported having experienced high levels of stress. In addition, referees and assistant referees experienced similar levels of stress despite the fact that the responsibilities and exposure vary for different positions of referees (Gencay, 2009). The findings of these studies suggest that the

majority of officials experience some stress. Furthermore, a few mediating and moderating variables of stress in officials were reported, including certification level, culture, and timing of the administration of the questionnaire (Gencay, 2009; Taylor & Daniel, 1988).

Certification level, experience, and sport type

An additional study on stress levels examined hockey officials of different certification levels (i.e., six levels) (Dorsch & Paskevich, 2007). Officials reported that they experienced a moderate intensity of stress during the past regular season. The authors attributed the “higher than normal” stress levels to the speed, physicality of the game, and to the proximity of players and coaches inherent in ice hockey. Additionally, lower level officials reported lower levels of stress. This difference was, in part, attributed to a higher importance of income from officiating in higher certification levels. It is important to note that higher certification level allows officials to officiate higher-level games, and higher level of officiating requires a greater commitment from officials. Moreover, at higher levels, performance becomes even more important as promotions and game assignments depend on officials’ performance. The importance of performance combined with the high level of commitment at this level may lead officials to perceive poor performances as career threatening, and thus as more stressful (Dorsch & Paskevich, 2007).

In a similar study, the relationship between stress and officials’ certification level in volleyball and football was explored (Goldsmith & Williams, 1992). Volleyball officials of three different officiating levels, intramural (recreational), noncertified (below high school varsity), and certified (high school varsity) filled out surveys in which they reported perceived sources of stress. Five stressor-related factors were reported including *fear of physical harm*, *pressure game*, *verbal abuse by players and coaches*, *time pressures*, and *fear of failure*. Specific to sport,

football officials perceived higher levels of the stressor *fear of physical harm* than did volleyball officials. However, overall stress levels were similar across sports. Additionally, among certified officials, years of officiating experience was negatively related with their level of *fear of failure*. This may be due to their increased resources as they develop an increased knowledge of officiating and thus perceive potential stressors as less threatening. Alternatively, intramural officials reported lower levels of *fear of failure* and *verbal abuse* than noncertified and certified officials (Goldsmith & Williams, 1992). Together, these findings suggest that certification level, officiating level, and years of experience may moderate the stress process. Furthermore, certification level appears to influence the sources of stress that officials experience.

Culture

A major limitation of the studies mentioned previously was that they only examined North American officials. To address the culture issue, differences in stress experiences between Australian and American basketball officials were examined (Anshel & Weinberg, 1995). Participants from both countries reported that *making a wrong call, being verbally abused by coaches, threatened with physical abuse, being in the wrong location when making a call, and experiencing an injury*, represented the most frequent stressors. Importantly, both Australian and American officials reported experiencing these stressors (Anshel & Weinberg, 1995). In a similar study, the sources of stress for Greek and Australian basketball officials were examined. Findings revealed that officials from both countries perceived the highest stressors as *arguing with players, arguing with coaches, verbal abuse from coaches, verbal abuse from players, and making a controversial call* (Kaissidis-Rodafinos et al., 1998). Thus, based on the results of these studies, there is no evidence of cultural differences in perceived sources of stress.

Time of administration

In addition to certification level and culture, the potential effects of time of survey administration on the sources and magnitude of stress were addressed in a study on basketball officials (Burke, Joyner, Pim, & Czech, 2000). By administering surveys at various times, the authors were able to gather more accurate information on officials' perceptions of the stress process. High school and college basketball officials completed a basketball-modified version of the Competitive State Anxiety Inventory-2 (CSAI-2) 30 minutes prior to game start, at half time, and within 15 minutes of the end of the game (Burke et al., 2000). While anxiety is not stress (Lazarus & Folkman, 1984), it is a related concept that sheds light on the potential difference in stress levels among various game situations. Results revealed that cognitive anxiety was lowest after the contest and highest during pre-game. The effect of time of administration on anxiety provides support for game situations influencing officials' stress levels by indicating that officials' anxiety levels change throughout the game. However, how a stress level changes within game was not examined (Burke et al., 2000). Games situations may play an important role in officials' sources and magnitudes of stress, and needs to be further explored.

Summary of Sources and Magnitudes of Stress

Findings from previous studies indicated that most officials experienced low to moderate stress levels while officiating. Moreover, the low to moderate stress levels were noted as a function of sport type, position (e.g., referee or linesman), and certification level. For example, in some studies, officials reported that they experienced significant *fear of physical harm*, while in other studies they reported very low levels of *fear of physical harm*. Importantly, a majority of officials reported a number of common core stressors (e.g., *fear of failure*, *pressure game* and *game situation*) (Anshel & Weinberg, 1995; Rainey, 1995; Stewart & Ellery, 1998; Stewart et

al., 2004; Taylor et al., 1990). It is important to note that although most officials reported low to moderate stress levels, in most studies 5 - 10% of the officials perceived high to very high stress levels (Gencay, 2009; Goldsmith & Williams, 1992; Rainey, 1994; Rainey & Hardy, 1997; Stewart & Ellery, 1998; Taylor & Daniel, 1988).

Game situation and *pressure game* were reported as prominent and nearly universal stressors for officials. In addition, officials rated an important game or an important moment within that game as the second most significant stressor behind *lack of cooperation of partner official* (Goldsmith & Williams, 1992; Tsorbatzoudis et al., 2005). The prominence of the stressors *game situation* and *pressure game* prompted Burke et al. (2000) to call for research examining how stress levels change within pressure games. Furthermore, research should examine the effect of game situation on officials' stress levels and appraisals of pressure during game situations.

Criticality

In the present study, the term "criticality" (Lowe, 1973) is used to identify important and high-pressure game situations experienced by officials. Criticality is influenced by two main factors: temporal phase and score differential (Lowe, 1973). Bar-Eli and Tenenbaum (1998a, 1998b) conducted one of the few studies in which the effects of situation criticality (i.e., temporal phase) were examined. They divided basketball games into six phases: a beginning, middle, and end phase within each half to investigate the effect on players' competitive psychological crisis vulnerability. Psychological crisis vulnerability is the predisposition of an individual to experience a performance detriment when presented with a stressor that exceeds his/her ability to cope (Bar-Eli, 1985). They found game temporal phases to be strong predictors of crisis vulnerability. Results indicated that certain temporal game situations, specifically the

final phase before the end of the game, increases situation criticality resulting in higher stress levels and decreased performance in athletes (Bar-Eli, 1985).

An additional aspect of situation criticality is score differential. The effect of score differential on anxiety was examined in softball with the use of a quick state cognitive anxiety measure (i.e., Mental Readiness Form) (Krane, Joyce, & Rafeld, 1994). Softball players' anxiety level was measured before batting in various game situations. A tie game was perceived as the most critical (i.e., resulting in highest cognitive anxiety), followed by a score differential of 1 run, and finally by anything greater than 1 run (low criticality). Further validation of these criticality levels came from the head coach who rated each situation's criticality congruently with the cognitive anxiety scores (Krane et al., 1994). Similar relationships were reported between situation criticality and score differentials in basketball: tie game, close game (6 points or less), and secure game (greater than 6 points) (Bar-Eli, & Tractinsky, 2000; Navarro, Lorenzo, Gómez, & Sampaio, 2009).

Thus, it seems that situation criticality predicts crisis vulnerability in athletes. Furthermore, crisis vulnerability is related to the likelihood of athletes engaging in norm- or rule-breaking behavior. More violations in general and more violent violations specifically occur during the end phase of the game (Bar-Eli & Tenenbaum, 1989). This leads to an increase in interactions between officials and players and coaches. Furthermore, officials are likely to be impacted in a similar manner as players, and experience higher stress levels in the final phase of the game. This period of the game may be more stressful for officials due to the increased interaction among officials, coaches, and players. In addition, the increase in violations during the final phase of the game increases the possibility of incorrect calls (or non-calls), thus enhancing the fear of failure and increasing stress levels. Hence, the aim of the present study is

to investigate the effect of situation criticality (i.e., temporal phase and score differential) on officials' stress levels. Findings provide further insights and knowledge on how changes in stress level impact officials' performance and job satisfaction.

Impact of Stress on Officials

Stress has been shown to have an impact on individuals' performance in a number of work settings (e.g., law enforcement, mental health, teaching; Kahill, 1988). These effects tend to be seen as facilitative if the stress is appraised as challenging and debilitating if appraised as threatening (Lazarus, 2000). Challenge appraisals result in increased motivation and job satisfaction, which improve performance in education (LePine, LePine, & Jackson, 2004) while stress' impact on officials, primarily debilitating, has been observed (Nevill, Balmer, & Williams, 2002). This change in performance may result in attentional narrowing, which occurs during periods of high anxiety and limits the processing of peripheral cues (Eysenck & Calvo, 1992).

Regardless of the mechanism, evidence the negative effects of stress on officiating has been observed (Nevill et al., 2002). Specifically, in the officiating domain, the effects of home and away games on officials' stress levels and performance has been examined extensively. The rationale for exploring differences between games played at home and away is based on the notion that a large and hostile home crowd is likely to activate stressors (i.e., *fear of failure*), subsequently leading to officials experiencing higher stress levels during home games and influencing performance. For example, fewer fouls are called on star basketball players during home games than away games (Lehman & Reifman's, 1987). In two related studies, findings indicated that soccer officials administered more penalties and yellow cards to the away team (Boyko, Boyko, & Boyko, 2007), and that yellow cards decreased in frequency as home crowd

size increased (Downward & Jones, 2007). This evidence supports the notion that a crowds' impact on officials' stress levels is dependent on within game variables (i.e., crowd noise and game situation) (Nevill et al., 2002; Stewart & Ellery, 1998).

Given the important role officials play during sport competitions, studying the impact of stress on officiating performance has far-reaching consequences. Therefore, it is important for sport officials to consistently perform at high levels under various conditions and situations. Most officials reported experiencing low to moderate amounts of stress (e.g., Taylor et al., 1990), and that stress has a negative impact on officials' performance (Kahill, 1988). The primary sources of stress reported were *fear of failure*, *pressure game*, *game situation* and *conflict with a partner official*. These stressors may be greatest in situations of high criticality (Anshel & Weinberg, 1995; Bar-Eli & Tractinsky, 2000; Taylor et al., 1990; Tsobatzoudis et al., 2005; Voight, 2009). Burke et al. (2000) found support for this notion by revealing that anxiety levels are highest during pregame and half-time, but lowest after the game. However, there has been a lack of research into how specific game situations (e.g., time pressure, score differential) impact officials' stress levels.

The Present Study

In the present study, I examined the effect of situation criticality on the stress levels experienced by officials. Situation criticality was manipulated by score differential (i.e., tie game, close game, and decided game) and time pressure (i.e., early, middle, and end of the game). Evidence suggests that situations higher in criticality (i.e., the last phase of a close or tie game) lead to altered decision-making, such as the poor performance, which occurs during psychological crisis (Bar-Eli & Tenenbaum, 1989). Furthermore, officials experience critical game situations (i.e., close games) as particularly stressful (e.g., Goldsmith & Williams, 1992;

Tsorbatzoudis et al., 2005). However, the effect of specific game situations on officials' perceived stress levels has not been studied to-date despite the call for additional research (e.g., Burke et al., 2000). Furthermore, how officials appraise stress impacts how that stress affects their performance and job satisfaction (Lazarus, 2000). Both challenge and threat appraisals should be positively related with perceived stress level (Lazarus, 2000). Moreover, threat appraisals are likely to be a greater predictor of perceived stress level than challenge appraisals (Lazarus, 2000). In addition to appraisals, other factors influence officials' stress levels (Anshel & Weinberg, 1995; Bar-Eli & Tractinsky, 2000; Taylor et al., 1990; Tsorbatzoudis et al., 2005; Voight, 2009). The importance of income from officiating, for example, may result in officials experiencing higher perceived stress levels (Dorsch & Paskevich, 2007). Additionally, as officials gain years of experience, they may experience less stress (Dorsch & Paskevich, 2007). Thus, in the present study officials' perceived stress levels, the factors that influence their stress level, and their appraisal process of various game situations were examined.

Hypotheses

It was hypothesized that:

- 1) Officials would experience higher levels of stress when the absolute value of score differential is lowest (tie game).
- 2) Officials would experience higher levels of stress during the last phase of the game (i.e., final two minutes of the second half).
- 3) Officials would report the highest stress levels during a tie game in its last phase (i.e., the final two minutes of the second half).
- 4) Officials' stress levels would be positively correlated with importance of income.
- 5) Officials' stress levels would be negatively correlated with years of experience.

- 6) Officials' stress levels would be positively correlated with both threat and challenge appraisals.
- 7) Officials' threat appraisals would have the largest impact on overall stress levels.

METHODS

Participants

Participants were male and female high school certified basketball officials ($n = 108$). They were recruited from their local officials association. Each officials' association was contacted through the Florida High School Sports Association (FHSAA), which maintains a listing for each local association in the state of Florida.

Of the 108 officials, 102 were male and 6 were female. A small portion of responses contained skipped or improperly completed items. These items were deleted from the data set while the correct portion of their survey was included. The average age of responding officials was 51.1 ($SD = 11.2$) and ranging from 20 to 70 years old. Officials self-reported being predominately White Non-Hispanic ($n = 70$) and Black or African American ($n = 32$) and having between 1 and 52 years of officiating experience ($M = 18.1$, $SD = 11.2$). Officials reported state certification status at Level 1 ($n = 52$), Level 2 ($n = 21$), and Level 3 ($n = 23$) which is the lowest state certification level. The average rules test score was 92.5 ($SD = 5.6$) while the lowest test score reported was 75 (the lowest acceptable score for varsity assignments). Forty-eight officials reported their highest contest officiated as collegiate, while 35 reported high school varsity playoff, 17 high school varsity, 6 high school junior varsity, and 1 reported middle school as their highest contest officiated.

Three a priori power analyses were conducted to determine the number of participants needed for this study (G*Power 3.1.3; Faul, Erdfelder, Lang, & Buchner, 2007). The first power analysis was for the repeated measures (RM) within factors (i.e., score differential and time remaining) analysis of variance (ANOVA) for stress level. A small effect size of $d = .10$ was used based on Goldsmith and Williams's (1992) findings which used a similar definition of game

situation; α was set at .05. The number of groups entered was one and the nine situations (i.e., three temporal phases X three score conditions) were entered as the number of measurements. Correlations among measures were set at .5, and nonsphericity correction was set at 1.0. The results of the analysis revealed that a power of .80 can be achieved with a sample size of $n = 85$. The second a priori analysis was run for correlations of appraisals, income, and experience with stress levels and indicated that power of .80 can be achieved for a moderate effect size of $\rho = .30$ with a sample of $n = 67$ (Cohen, 1988). The third and final a priori analysis revealed that a regression using four predictors, a power level of .80, an alpha level of .05, and an effect size of $f^2 = 1.10$ can be achieved with a sample size of $n = 17$ (Peacock & Wong, 1990).

F tests – ANOVA: Repeated measures, within factors

Analysis: A priori: Compute required sample size
Input: Effect size f = 0.1
 α err prob = 0.05
Power (1- β err prob) = 0.8
Number of groups = 1
Number of measurements = 9
Corr among rep measures = 0.5
Nonsphericity correction e = 1
Output: Noncentrality parameter λ = 15.3000000
Critical F = 1.9521647
Numerator df = 8.0000000
Denominator df = 672
Total sample size = 85

Options: exact distribution
Analysis: A priori: Compute required sample size
Input: Tail(s) = One
Correlation ρ H1 = 0.30
 α err prob = 0.05
Power (1- β err prob) = 0.80
Correlation ρ H0 = 0
Output: Lower critical r = 0.2026735
Upper critical r = 0.2026735
Total sample size = 67
Actual power = 0.8032714

F tests – Multiple Regression: Omnibus (R^2 deviation from zero)

Analysis:	A priori: Compute required sample size		
Input:	Effect size f^2	=	1.1
	α err prob	=	0.05
	Power ($1-\beta$ err prob)	=	0.8
	Number of predictors	=	4
Output:	Noncentrality parameter λ	=	18.700000
	Critical F	=	3.259167
	Numerator df	=	4
	Denominator df	=	12
	Total sample size	=	17
	Actual power	=	0.825488

Questionnaires and Measures

Informed consent form (Appendix A)

The informed consent form states what the participants were asked to do, informs the participants of their rights, assures anonymity, and provides contact information for further issues, questions, or discussions. This form was used to obtain permission from the participants whom, by checking a required box, acknowledged their willingness to participate in the study.

Demographics questionnaire (Appendix B)

This questionnaire contains information on the participant's age, sex, race, years of officiating experience, level of official, highest level of game officiated, and importance of income from officiating. The question about importance of income was based on Dorsch and Paskevich's (2007) finding that officials who depended more on the income from officiating reported higher stress levels.

Stress appraisal measure (SAM) (Peacock & Wong, 1990; Appendix C)

The SAM uses Lazarus and Folkman's (1984) definition of stress based on the two cognitive appraisals (i.e., primary and secondary). The SAM consists of seven four-item subscales for a total of 28 items. Primary appraisal has three dimensions: threat, challenge, and centrality (importance). Secondary appraisal consists of three dimensions: Controllable-by-Self,

Controllable-by-Others, and Uncontrollable-by-Anyone. A final subscale is an overall stressfulness measure. The SAM uses a Likert-type scale ranging from 1 (*not at all*) to 5 (*extremely*). Means are calculated for each subscale to obtain a score resulting in potential scores from 1 - 5.

Previous research has found that each of the six subscales are conceptually independent of each other with an average correlation between scales of $r = .22$ (Peacock & Wong, 1990). Internal consistency for the seven scales were: Threat ($\alpha = .73$), Challenge ($\alpha = .79$), Centrality ($\alpha = .85$), Controllable-by-Self ($\alpha = .86$), Controllable-by-Others ($\alpha = .84$), Uncontrollable ($\alpha = .82$), and Stressfulness ($\alpha = .75$) (Peacock & Wong, 1990). Additionally, a validation study found that the SAM has good internal consistency and high convergent and divergent validity (Zvilna, 2002). Due to the purpose of this study, stressfulness, challenge, and threat subscales were used. The internal consistency reliabilities as measured by Cronbach's alpha for the scales used in the present study had ranged from .75 to .82 for Threat, .70 - .85 for Challenge, and .74 to .83 for Stressfulness .74 - .83.

Task Situations (see Appendix D)

A series of nine hypothetical situations varying in score differential and time of game, which basketball officials face on nearly an every game basis, were presented to the participants. A situation was presented for each combination of score differential and temporal phase. Three temporal phases were used: early (first two minutes), middle (last two minutes in first half), and late (last two minutes in second half) (e.g., Bar-Eli & Tractinsky, 2000). Three score differentials were used: tie game, close game (one team leading by 3 points, one possession), or decided game (one team leading by 9, at least three possessions) (e.g., Bar-Eli & Tractinsky, 2000; Navarro et al., 2009). These situations were selected due to previous research on criticality using score

differential and time of game. Time of game had previously been divided into 6 phases, which were consolidated into the three situations due to lack of differentiation between each of the six phases and to reduce the overall size of the survey (e.g., Bar-Eli & Tractinsky, 2000).

Additionally, score differential values were selected based off previous research and translated into equivalent basketball situations (e.g., Bar-Eli & Tractinsky, 2000; Navarro et al., 2009).

These nine resulting situations were randomized and counterbalanced to eliminate order effects.

The situations are:

You are [there is] (**time of game**) of the biggest game of your officiating career.

The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A and the score is (**score**). Please answer the following questions based on this situation.

Procedure

After local associations agreed to participate, association presidents were sent an email containing instructions for participants and a link to the Qualtrics survey (see Appendix E). Qualtrics is an online data collection and analysis software that allows users to create surveys and generate reports. This email was then sent to all officials in the association via listserv. The email included the purpose of the study, the estimated time the survey takes to complete (15 minutes), the voluntary and confidential nature of the study, contact information of the researcher, as well as a link to the Qualtrics survey. The Qualtrics survey contained an informed consent, demographic questionnaire, situations, and a SAM following each situation. On the last page of the online survey a debriefing page was included stating the purpose of the study and the researcher's contact information.

Each survey began with the informed consent which participants were required to read and indicate agreement and understanding in order to participate. Participants then filled out the demographics questionnaire before beginning the series of situations and SAMs. Each situation had the same instructions:

Please take a moment to recall the highest level/most important basketball game that you officiated. Think about the atmosphere of that game; from the crowds to players/coaches to the arena, as well as how you felt going into that game.

Participants were then asked to recall their highest level or most important game, this was used because most officials work games below their highest certification level (e.g., a high school official that has worked state championships will continue to work middle school games).

Participants then read a hypothetical situation, which varied in score differential and time of game. After reading the situation, participants filled out the SAM with the following instructions:

This questionnaire is concerned with your thoughts about various aspects of the situation identified previously. There are no right or wrong answers. Please respond according to how you view this situation right now. Please answer all questions. Answer each question using the corresponding scale by circling the appropriate number on the scale provided. Remember, the “situation” and “problem” in the items below refer to this specific situation.

For a complete example of a situation and SAM see appendix F. Each of the nine situations with their associated SAM were presented in random order. Surveys were collected through Qualtrics as participants completed them. Finally, participants were debriefed about the purpose of the study and provided the researcher’s contact information for any questions or comments about the study.

Data Analysis

Stress level was analyzed by performing a RM ANOVA using temporal phase (early, middle and end of the game) and score differential (tie, close, and decided) as the two within subject factors. Planned comparisons were used to compare perceived stress levels across temporal phase and score differential. Furthermore, interactions were compared using pairwise t-tests. Additionally, a Pearson product-moment correlation was used to estimate the relationship between perceived stress levels and challenge/threat appraisals. Further correlations evaluated the relationship between perceived stress level and years of experience as well perceived stress level. A final correlation between officials' perceived stress levels and importance placed on income from officiating was examined. To determine how well importance of income, experience, threat appraisal, and challenge appraisal predicted perceived stress level a linear regression was conducted.

RESULTS

Descriptive Statistics

Importance of income was generally low ($M = 2.85$, $SD = 1.15$) and ranged from 1 to 7, representing the full range of the scale. Officials overall perceived a low level of stress ($M = 1.69$, $SD = 0.54$) on a scale of 1 to 5. Threat appraisal had a mean value of 1.42 ($SD = 0.43$) on the same 1 to 5 scale. Challenge appraisal had higher values, an average of 2.73 ($SD = 0.91$) using the same 1 to 5 scale. For further details regarding means and standard deviations of demographic variables, stress levels, and appraisals see Table 1 (page 22).

Statistical Analyses and Assumptions

RM ANOVAs were used to analyze variables related to perceived stress level, challenge appraisal, and threat appraisal using time of game and score differential as within subject factors. The RM ANOVAs, with the exception of score differentials' effect on challenge appraisal, revealed a significant ($p < .05$) Mauchly's test of sphericity, thus violating the assumption of sphericity (see Table 2, page 23). Therefore, RM ANOVA results are reported using Huynh-Feldt corrections ($\epsilon > .75$); with the lone exception of score differential's effect on challenge appraisal, which did not require any correction. Lastly, post-hoc group mean differences on main effects were examined using Bonferroni corrections.

Perceived Stress Levels

A 3 (time) x 3 (score differential) RM ANOVA was conducted on officials' perceived stress levels. A significant main effect for time of game emerged, $F(1.511, 143.82) = 107.55$, $p < .05$, $\eta_p^2 = .531$, with perceived stress levels increasing as time of game expired, supporting the first hypothesis (see Figure 1, page 24). Specifically, perceived stress level was significantly higher at the end of the second half ($M = 2.07$, $SD = 0.70$) than at the end of the first

Table 1.

Descriptive statistics: means and standard deviations of demographic variables, stress levels, and appraisals by years of experience.

		Years of Experience															
		0 - 5		6 - 10		11 - 15		16 - 20		21 - 25		26 - 30		Above 30		Total	
		<i>n</i>															
Measure		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	Age	43.50	13.60	45.63	11.81	49.58	10.80	52.46	7.16	55.40	7.12	57.23	6.67	58.27	10.40	51.07	11.24
	Test Score	87.08	6.07	90.15	5.83	91.54	6.28	95.29	2.55	95.22	3.51	94.20	5.07	93.46	5.30	92.50	5.63
	Importance of Income	2.27	1.39	3.00	1.54	2.91	1.64	3.14	1.88	3.18	1.47	2.54	1.39	2.80	1.55	2.85	1.54
	Stress Level	1.62	0.36	1.73	0.57	1.69	0.58	1.75	0.62	1.58	0.58	1.76	0.49	1.76	0.65	1.69	0.54
Total	Threat Appraisal	1.49	0.34	1.42	0.51	1.31	0.22	1.46	0.60	1.31	0.41	1.52	0.40	1.42	0.39	1.42	0.43
	Challenge Appraisal	2.70	0.87	3.08	1.05	2.73	1.03	2.66	0.81	2.62	1.12	2.60	0.56	2.61	0.78	2.73	0.91

Table 2.
Mauchly's test of sphericity for factors' main and interactional effects

Factor	Measure	Mauchly's W	χ^2	df	p	Epsilon Huynh-feldt
Time	Stress	.66	39.03	2	<.01	.76
	Threat	.73	29.35	2	<.01	.80
	Challenge	.90	10.35	2	.01	.92
Score differential	Stress	.87	12.63	2	<.01	.90
	Threat	.88	11.80	2	<.01	.91
	Challenge	.96	3.69	2	.16	.98
Time x score differential	Stress	.81	20.28	9	.02	.94
	Threat	.79	22.36	9	.01	.92
	Challenge	.83	17.05	9	.05	.96

half ($M = 1.60$, $SD = 0.60$) ($d = 0.72$, $t(104) = 11.50$, $p < .017$) which was, in turn, significantly higher than at the beginning of the first half ($M = 1.44$, $SD = 0.50$) ($d = 1.04$, $t(103) = 5.12$, $p < .017$). Furthermore, perceived stress was reported to be higher at the end of the first half than at the beginning of the first half ($d = 0.29$, $t(105) = 10.52$, $p < .017$). In addition, the second hypothesis was supported by a significant main effect of score differential on perceived stress level, $F(1.81, 171.77) = 11.91$, $p < .05$, $\eta_p^2 = .111$, with perceived stress level increasing as score differential decreased (see Figure 2). Tie game ($M = 1.80$, $SD = 0.65$) resulted in a significantly higher perceived stress level than close game ($M = 1.69$, $SD = 0.59$) ($d = 0.18$, $t(106) = 3.39$, $p < .017$) and decided game ($M = 1.60$, $SD = 0.52$) ($d = 0.34$, $t(106) = 4.18$, $p < .017$), but there was no significant difference between close game and decided game ($d = 0.16$, $t(104) = 1.46$, $p = .143$). Finally, the interaction of time of game and score differential was significant, $F(3.77, 358.30) = 8.88$, $p < .05$, $\eta_p^2 = .086$, a finding that supported the third hypothesis. Explicitly, a tie game at the end of the second half ($M = 2.21$, $SD = 0.89$) resulted in the highest perceived stress

levels. Furthermore, perceived stress increased from the end of the first half to the end of the second half more for decided game ($d = .97, t(106) = 9.84, p < .017$) than tie ($d = .56, t(104) = 7.59, p < .017$) and close game ($d = .40, t(105) = 9.84, p < .017$). Additionally, between the beginning of the first half and the end of the first half tie game resulted in a larger increase in stress level ($d = .47, t(103) = 5.63, p < .017$) than close ($d = .20, t(105) = 2.80, p < .017$) or decided game ($d = .07, t(105) = 1.52, p = .133$) (see Figure 3).

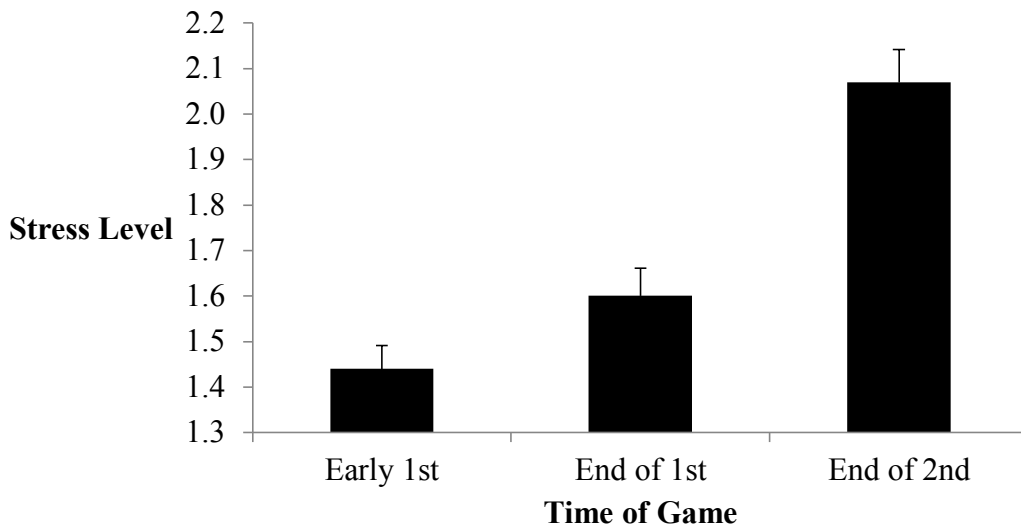


Figure 1. Mean and standard errors of stress (1-5) by time of game.

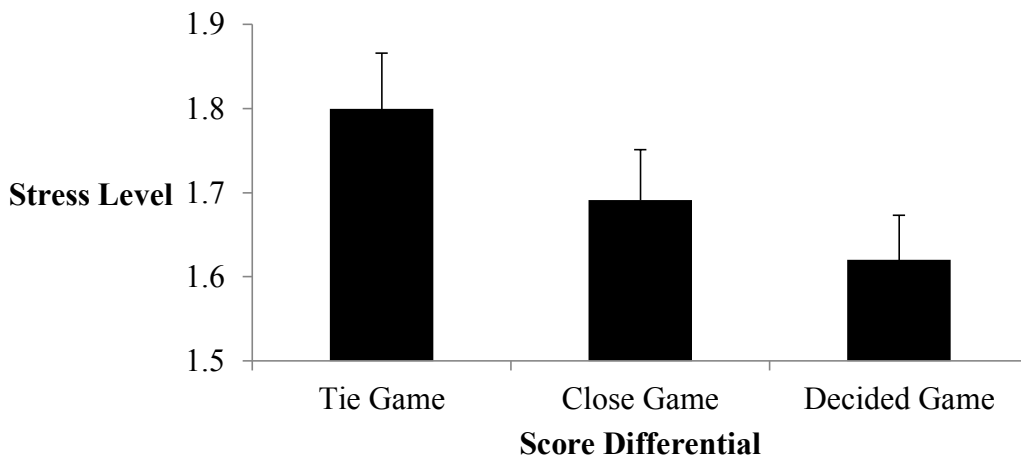


Figure 2. Mean and standard errors of stress (1-5) by score differential.

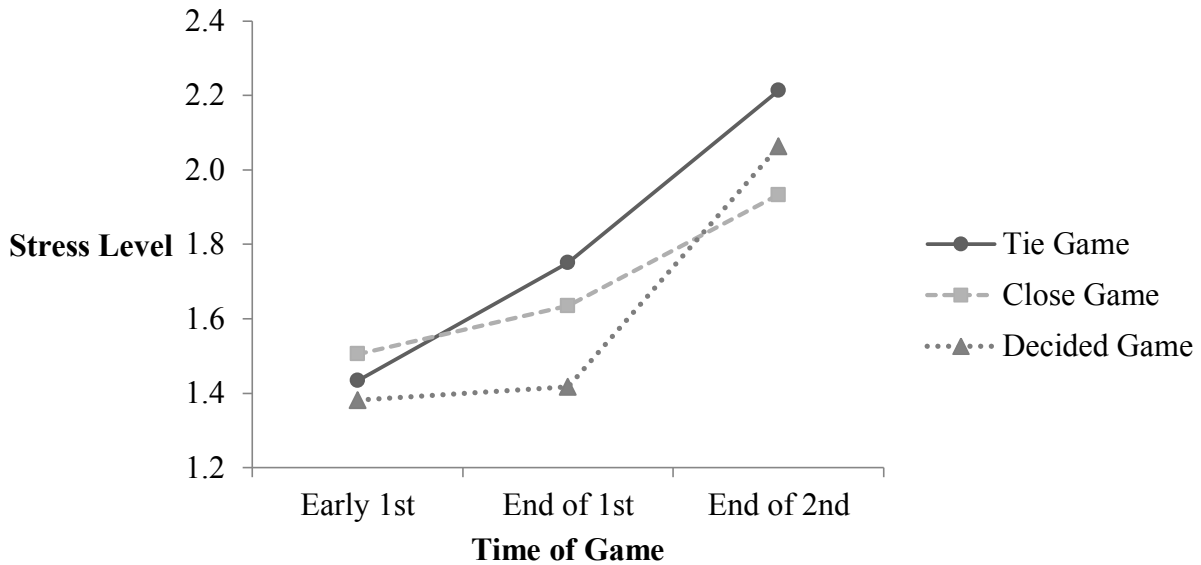


Figure 3. Mean reported stress (1-5) by time of game and score differential.

Threat Appraisal

Additional 3 (time) x 3 (score differential) RM ANOVA was employed to examine officials' threat appraisals. The RM ANOVA revealed a significant main effect for time of game $F(1.60, 151.92) = 41.76, p < .05, \eta_p^2 = .305$, where threat appraisal increased as time expired (see Figure 4). There was a significantly higher threat appraisal at the end of the second half ($M = 1.60, SD = 0.58$) than at the beginning of the first half ($M = 1.27, SD = 0.37$) ($d = 0.68, t(105) = 7.53, p < .017$) and the end of the first half ($M = 1.39, SD = 0.48$) ($d = 0.39, t(105) = 5.65, p < .017$). Furthermore, threat appraisal was significantly greater at the end of the first half than at the beginning of the first half ($d = 0.28, t(105) = 4.51, p < .017$). Additionally, a significant main effect for score differential was revealed $F(1.82, 173.00) = 28.22, p < .05, \eta_p^2 = .229$, with threat appraisal increasing as score differential decreased (see Figure 5). Specifically, threat appraisal was significantly higher for tie game ($M = 1.50, SD = 0.53$) than decided game ($M = 1.31, SD = 0.37$) ($d = 0.42, t(105) = 6.24, p < .017$), but not close game ($M = 1.45, SD = 0.48$) ($d = 0.10, t(105) = 1.33, p = .19$). Additionally, decided game was accompanied with a significantly lower

threat appraisal than close game ($d = 0.33, p < .017, t(105) = 5.71$). Finally, the interaction of time of game and score differential was significant, $F(3.68, 349.34) = 5.50, p < .05, \eta_p^2 = .055$. Specifically, a tie game at the end of the second half ($M = 1.60, SD = 0.52$) resulted in the greatest threat appraisal. Furthermore, larger increases in threat appraisal were reported for the beginning of the first half to the end of the first half in tie game ($d = .42, t(105) = 4.66, p < .017$) than close ($d = .15, t(105) = 2.63, p = .10$) or decided game ($d = .13, t(105) = 1.40, p = .16$) (see Figure 6).

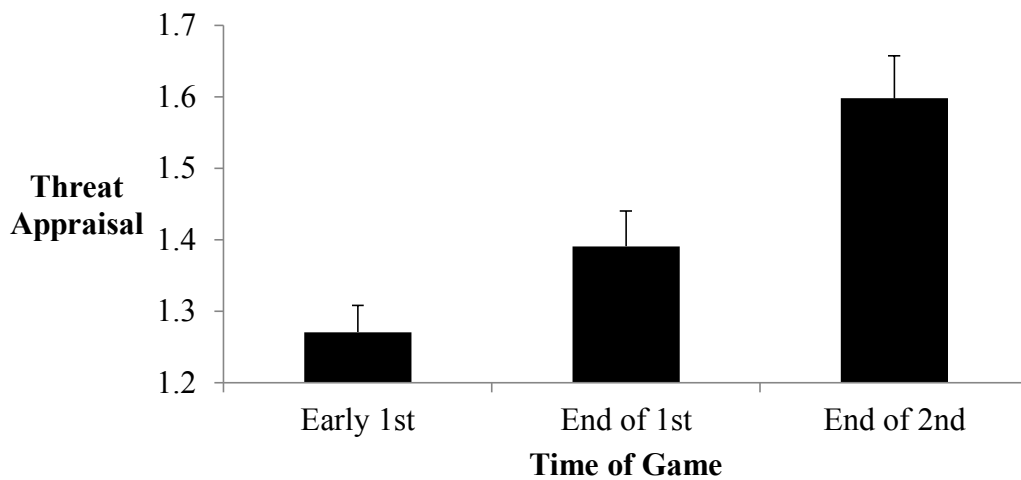


Figure 4. Mean and standard errors of threat appraisal (1-5) by time of game.

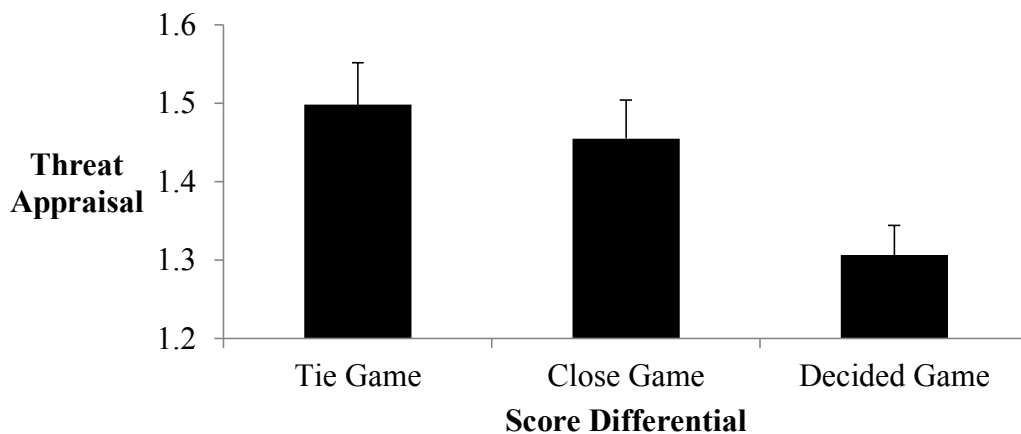


Figure 5. Mean and standard errors of threat appraisal (1-5) by score differential.

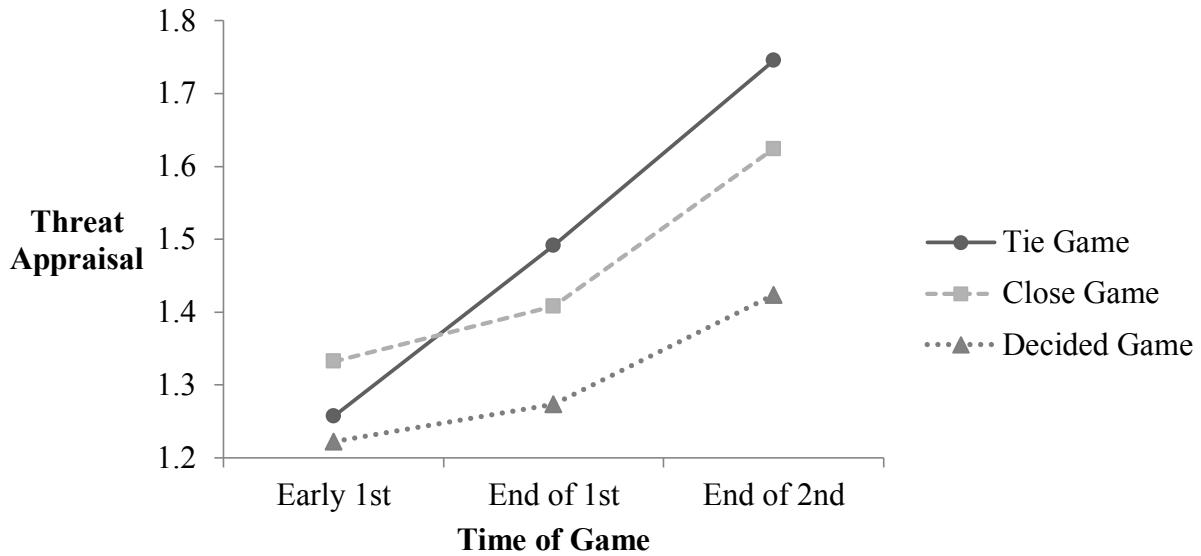


Figure 6. Mean reported threat appraisal (1-5) by time of game and score differential.

Challenge Appraisals

A final 3 (time) x 3 (score differential) RM ANOVA was conducted on officials' challenge appraisals. The RM ANOVA revealed that there was a significant main effect for time, $F(1.84, 175.21) = 49.68, p < .05, \eta_p^2 = .343$, with challenge appraisal increasing as time elapsed (see Figure 7). At the end of the second half, challenge appraisal ($M = 3.07, SD = 0.91$) was felt higher than at the end of the first half ($M = 2.65, SD = 1.01$) ($d = 0.44, t(104) = 7.43, p < .017$) and the beginning of the first half ($M = 2.49, SD = 1.00$) ($d = 0.61, t(103) = 8.40, p < .017$). Additionally, challenge appraisals were significantly higher at the end of the first half than the beginning of the first half ($d = 0.16, t(105) = 3.00, p < .017$). Furthermore, a significant main effect of score differential was revealed $F(2, 190) = 32.61, p < .05, \eta_p^2 = .256$, with threat appraisal increasing as score differential decreased (see Figure 8). Explicitly, decided game had significantly lower challenge appraisal ($M = 2.52, SD = 0.97$) than both close game ($M = 2.79, SD = 0.96$) ($d = 0.28, t(103) = 6.03, p < .017$) and tie game ($M = 2.90, SD = 0.94$) ($d = 0.40, t(104) = 7.16, p < .017$). There was no significant difference in challenge appraisal between close

and tie game ($d = 0.12$, $t(105) = 1.75$, $p = .083$). Finally, the interaction of time and score differential was significant, $F(3.85, 365.97) = 4.98$, $p < .05$, $\eta_p^2 = .050$. Specifically, a tie game at the end of the second half resulted in the highest challenge appraisal ($M = 3.3$, $SD = 0.99$). Furthermore, tie game resulted in a larger increase in challenge appraisal from the beginning of the first half to the end of the first half ($d = .29$, $t(105) = 4.27$, $p < .017$) than close ($d = .12$, $t(103) = 1.84$, $p = .07$) or decided game ($d = .02$, $t(104) = 0.29$, $p = .77$) (see Figure 9).

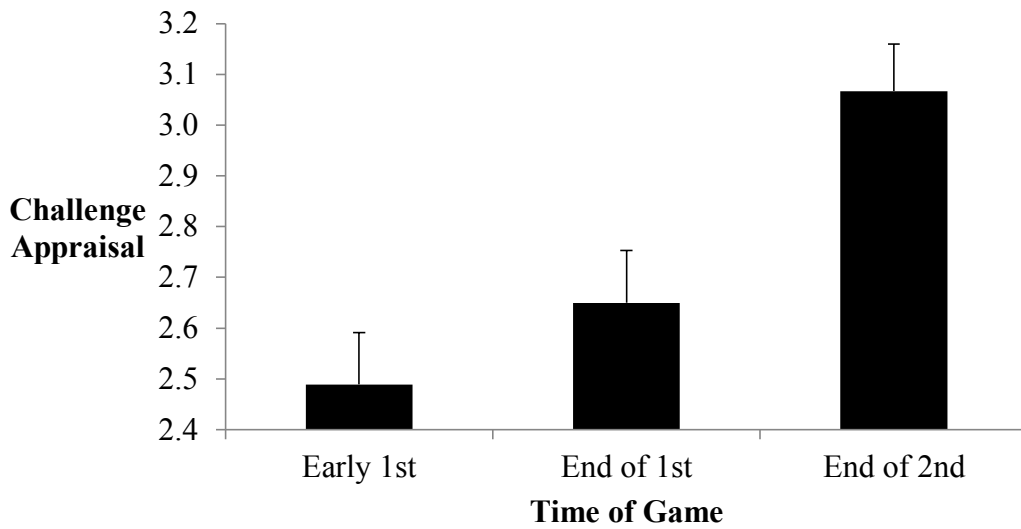


Figure 7. Mean and standard errors of challenge appraisal (1-5) by time of game.

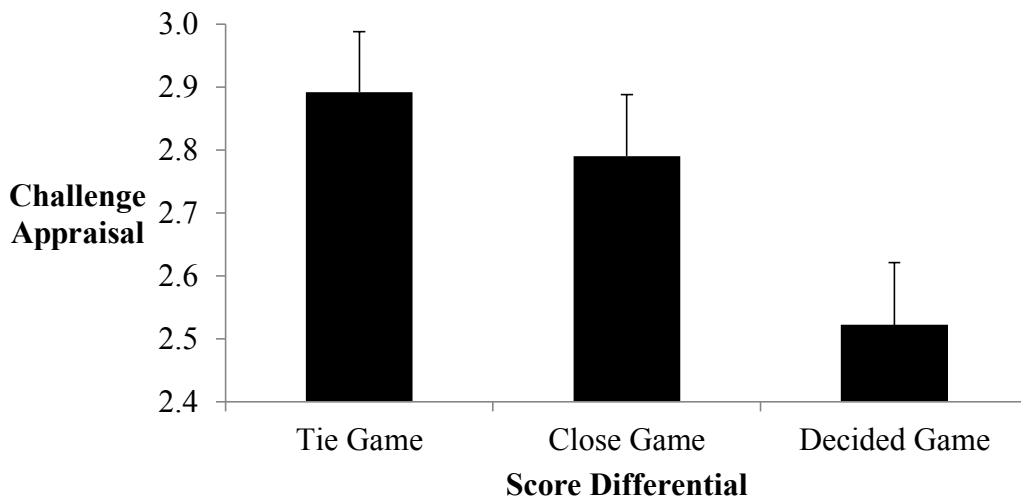


Figure 8. Mean and standard errors of challenge appraisal (1-5) by score differential.

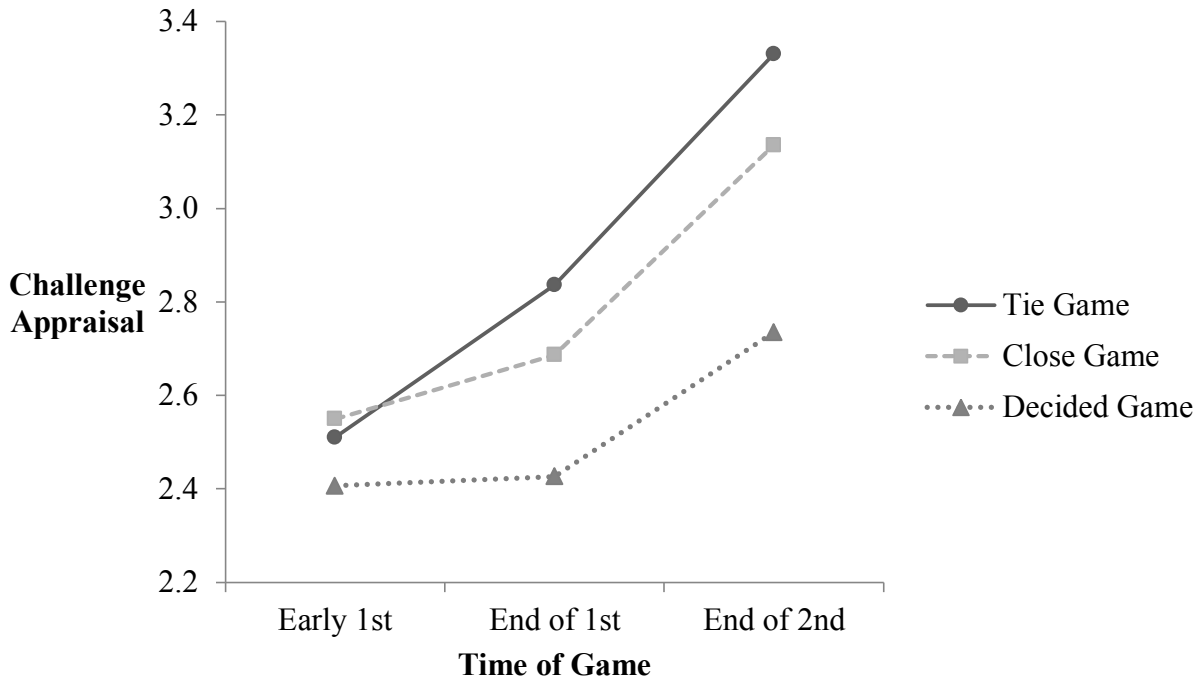


Figure 9. Mean reported challenge appraisal (1-5) by time of game and score differential.

Perceived Stress Levels, Demographic Variables, and Appraisals

Pearson correlation coefficients were calculated for years of experience and importance of income with perceived stress level, threat appraisal, and challenge appraisal. There was a trend towards positive, but weak, correlations between importance of income and perceived stress level, $r = .16$, $p = .054$, contrary to the fourth hypothesis. Additionally, importance of income trended towards a weak positive correlation with threat appraisal, $r = .17$, $p = .053$. There was no significant correlation with importance of income and challenge appraisal, $r = .032$, $p = .379$. Perceived stress level ($r = .020$, $p = .419$), threat appraisal ($r = -.011$, $p = .457$), and challenge appraisal, ($r = -.081$, $p = .203$), all had no significant correlation with years of experience. The lack of significant correlation between perceived stress and years of experience is counter to the fifth hypothesis.

Perceived Stress Levels and Threat and Challenge Appraisals

Additional Pearson correlation coefficients were computed for the two appraisals and perceived stress level. These correlations revealed a strong positive correlations between threat appraisal and perceived stress level, $r = .74, p < .05$, as well as challenge appraisal and perceived stress level, $r = .35, p < .05$, supporting the sixth hypothesis. Additionally, there was a weak positive correlation between threat and challenge appraisal, $r = .16, p < .05$.

In addition to correlations, a regression was conducted to determine if the two appraisals, years of experience, and importance of income predicted officials' perceived stress levels. The correlation between threat and challenge appraisals was corrected for by using a centered interaction term. The regression revealed that this model accounted for 62.8% of the variance, $R^2 = .63, F(5, 95) = 30.44, p < .05$. Furthermore, as hypothesized, threat appraisal was the strongest predictor, $\beta = .68, t(89) = 9.73, p < .05$, followed by challenge appraisal, $\beta = .251, t(89) = 3.53, p < .05$, which added 5% accounted variance and both significantly predicted perceived stress level (see Table 3 for predictor coefficients). The rest of the variables in the regression did not account for any additional variance.

Table 3.

Threat appraisal, challenge appraisal, their interaction term, years of experience, and importance of income coefficients, regressed on stress levels.

Model	Unstandardized Coefficients		Standardized Coefficients	t	p
	B	SE	Beta		
(Constant)	-.06	.16		- 0.37	.72
Threat appraisal	.87	.09	.68	9.73	<.01
Challenge appraisal	.15	.04	.25	3.53	<.01
Interaction term (threat x challenge)	.13	.12	.08	1.10	.28
Years of experience	.00	.00	.06	0.96	.34
Importance of income	.01	.02	.04	0.60	.55

Summary

A combination of RM ANOVAs, correlations, and a regression tested the hypotheses of the present study. The results of these analyses largely supported these hypotheses. First, a RM ANOVA supported the hypothesis that perceived stress increases as time of game remaining decreases. Specifically, officials perceived higher stress levels on scenarios representing the end of a game than the beginning or end of the first half.

Results for the second hypothesis were similar. The hypothesis that perceived stress increases as score differential decreases was supported. Furthermore, officials reported that situations representing a tie game had higher stress levels than close and decided games.

The final RM ANOVA revealed a significant interaction between score differential and time of game. This result supports the third hypothesis that stress level would be highest at the end of a tie game. The highest levels of perceived stress were reported for situations representing a tie game at the end of the second half.

The fourth and fifth hypotheses were evaluated using correlations which did not reveal significant relationships. Regarding the fourth hypothesis, stress was found to have a non-significant, weak and positive relationship with importance of income. Additionally, a correlation between stress and years of experience did not reveal a significant relationship as predicted by the fifth hypothesis.

The last correlation conducted did support the sixth hypothesis by revealing a significant relationship between perceived stress and threat appraisal as well as perceived stress and challenge appraisal. Both threat and challenge appraisals were positively related with overall stress level.

Finally, a regression provided support for the last hypothesis stating that threat was the largest predictor of stress level. This regression revealed that both threat and challenge were significant predictors of stress but that threat accounted for a greater portion of stress.

DISCUSSION

In the present study, I investigated how officials experience stress within games as a function of game criticality (i.e., time of game and score differential). Findings indicated that the perceived stress levels reported by officials increased as game criticality increased. The two factors used to define criticality; time of game and score differential, both affected officials' appraisals and perceptions of stress. Officials reported higher stress levels as time of game remaining and score differential decreased. This result is congruent with previous research on game criticality's effect on stress among athletes (Bar-Eli, & Tractinsky, 2000; Krane et al., 1994; Navarro et al., 2009). Furthermore, in line with previous research, officials' perceived stress levels were reported as low with some officials experiencing higher levels of stress (e.g., Gencay, 2009; Rainey & Hardy, 1997; Stewart & Ellery, 1998). Additionally, threat and challenge appraisals predicted perceived stress level with threat appraisal explaining the largest amount of variation in perceived stress level. These results generally supported the proposed hypotheses.

Game Criticality and Stress

The hypothesis that officials will experience higher levels of perceived stress when the absolute value of score differential is lowest (tie game) was confirmed. Specifically, officials reported their highest perceived stress levels during tie games, followed by close games, and lastly by decided games. Research on score differential's (i.e., criticality of game situation) effect on athletes' stress levels supports this finding (Bar-Eli, & Tractinsky, 2000; Krane et al., 1994; Navarro et al., 2009). Furthermore, it is plausible that as game criticality increases officials experience elevated levels of fear of failure, which subsequently results in higher perceptions of stress. Thus, during close and especially tie games, officials may feel that failure is more costly,

perhaps even deciding the game, resulting in elevated stress levels (e.g., Mascarenhas et al., 2006; Taylor et al., 1990).

Regarding score differential, there was a significantly higher perceived stress level during a tie game than in a close or decided game, while no significant differences were reported between close and decided games. One explanation for this result may be attributed to the different demands of a tie game compared to close or decided games. This may be due to ambiguity resulting from a tie game where neither team has an advantage, so their actions are less predictable (Bar-Eli & Tractinsky, 2000). For example, in a close game, the losing team may foul to try to conserve time, while in a decided game the winning team may try to maintain possession and consume time. However, in a tie game both teams can try to consume or conserve the time resulting in higher uncertainty during a tie game. This uncertainty may lead to elevated perceived stress levels (Lazarus, 2000). An alternative explanation is that the selection of point spread (i.e., a tie, three-point difference, or a nine-point difference) may not be sufficiently wide to reveal a significant difference in perceived stress between close and decided games

In addition to score differential, the findings support the hypothesized increase in perceived stress as time remaining in game decreased. Officials perceived lower stress levels at the start of the first half than the end of the first half, with the highest levels of perceived stress at the end of the second half. These findings are similar to the findings on game situation and athletes' stress levels where increases in stress were related to variables (e.g., anxiety, crisis indicative behaviors) such as time of game expired (Bar-Eli, 1985; Krane et al., 1994). The present study expands on this research by including officials and measuring stress specifically. One possible explanation for this finding is that during the final phase of a game time pressure increases. As time pressure increases situations become more demanding and restrictive, thus

more stressful (e.g., Lazarus, 2000). Since time pressure has been shown to be a stressor for officials, time pressure is a likely source of additional stress (Goldsmith & Williams, 1992).

Importantly, the hypothesized interaction between score differential and time of game was also found to be significant. Specifically, the highest level of perceived stress was associated with a tie game at the end of the second half. Inversely, perceived stress level was lowest during a decided game early in the first half. This finding has numerous potential implications on how officials manage highly critical situations. For example, during highly critical situations officials may wish to manage their stress level to maximize performance (e.g., Eysenck & Calvo, 1992; Kahill, 1988). Furthermore, because these situations are more critical to the outcome of a game, a greater emphasis is placed on making correct calls. The National Basketball Association (NBA) and National Collegiate Athletic association (NCAA) rules support this by allowing for expanded instant replay in the final minutes of a basketball game (National Basketball Association, 2013; National Collegiate Athletic Association, 2011). Given the increased importance of officials' calls in these situations, the necessity to understand and manage the stress that officials experience in these situations is of vital importance. Furthermore the result that stress level was higher for decided games than close games at the end of the second half is in line with previous research that indicates NBA and NCAA basketball officiating favors keeping the game close (Anderson & Pierce, 2009; Price, Remer, & Stone, 2012). During decided games players and coaches engage in more crisis indicative behavior such as committing more frequent and more intense fouls (Bar-Eli, 1985). This likely increases the number and intensity of confrontations between players, coaches and officials. This confrontation has been reported as a prominent stressor for officials. Therefore, officials may, consciously or unconsciously, favor avoiding these decided game situations. This possibility, that officials keep games close in order

to avoid the higher stress levels associated with the conclusion of decided games requires additional research. An additional rationale for better understanding and management of stress is provided by research findings' revealing that stress level is an important factor in job satisfaction, burnout, and intention to quit a job (e.g., Taylor et al., 1990; Kahill, 1988). Research to better understand and manage stress can improve these factors and performance.

Demographic Variables and Stress

In addition to the effects of game criticality on stress, the relationship between demographic variables (e.g., income) and stress were examined. It was assumed that importance of income from officiating and perceived stress level would be positively related because research evidence indicates that officials at higher certification and pay levels perceive more stress (e.g., Dorsch & Paskevich, 2007). However, contrary to the proposed hypothesis, the relationship was not significant. There was a trend towards a positive and weak correlation with a higher importance of income associated with higher perceived stress levels. This weak trend may be a result of a lack of variability in the sample. Specifically, the sample used in this study reported low importance of income. This result may be indicative of officials in general or it may conceal a weak correlation between perceived stress and importance of income, as a more variable sample should include officials with higher importance of income, which was not found in this study. Further research should examine whether importance of income does have a significant impact on officials' perceived stress levels using a wider sample, particularly higher level or professional officials who place a higher importance on the income earned from officiating.

Furthermore, contrary to the proposed hypothesis, the present study did not reveal a significant correlation between years of experience and perceived stress levels. It was expected

that experienced officials would experience less stress. This was proposed to be a result of their increased experience and coping skills, thus reducing stress (Lazarus, 2000). This notion was supported by previous research findings indicating that years of experience decreased overall stress levels (Dorsch & Paskevich, 2007). Officials of any experience level were found to perceive stress levels which remained stable despite increases in experience (Stewart & Ellery, 1998). Alternatively, the self-selected sample in this study may have been disproportionately resilient to changes in stress level as experience increased. Specifically, officials with enough motivation to complete the survey packet are likely to apply this same motivation to officiating in general, which likely increases their officiating skills. Due to these increased skills they are better able to cope with situational demands and thus shield themselves from situational stressors which might otherwise affect their stress level (Lazarus, 2000). This explanation has support from the demographic results that indicate a well-established and motivated sample in the present study and a lack of variability.

Appraisals and Stress

The present study examined a hypothesized relationship between threat and challenge appraisals and perceived stress. Results revealed that both threat and challenge appraisals had a positive correlation with perceived stress level supporting previous research (e.g., Eysenck & Calvo, 1992; Lazarus, 2000; LePine et al., 2004; Nevill et al., 2002).

Expanding on that finding, the present study examined the predictive power of both threat and challenge appraisals on perceived stress. Findings revealed that perceived stress was predicted by both threat and challenge appraisals. Furthermore, threat appraisal was a stronger predictor of perceived stress than challenge appraisals; a finding supported by previous research, which indicated that threat appraisal has a strong positive relationship with stress level (Lazarus,

2000). Specifically, a situation appraised as a threat is perceived as more stressful than one appraised in similar magnitude but seen as a challenging situation. Furthermore, the potential exists for training officials to regulate their appraisals to help manage their stress levels. It may be possible that, through methods such as cognitive reframing, that perceived stress levels can be managed to beneficially affect performance (Beck & Weishaar, 1995). Further research is needed to determine if techniques such as cognitive reframing could have this beneficial effect.

Game Criticality and Appraisals

In addition to the hypotheses results, supplementary results regarding the two appraisals revealed significant differences. Threat appraisal was significantly affected by score differential and time of game with threat appraisal increasing as score differential and time of game remaining decreased. Specifically, tie and close games were significantly more threatening than decided games. During close and tie games, the situation becomes more demanding. In these situations, a missed or incorrect call potentially affects the outcome of the game, which in turn leads to a more threatening appraisal of the situation (Lazarus, 2000). This also applies to the finding that threat appraisals increased at each phase of game used in the present study.

Moreover, as the game nears completion the potential for a missed or incorrect call affecting the outcome of the game is increased, which leads to more threatening appraisals as the game progresses.

Additionally, challenge appraisal was affected by score differential and time of game. Precisely, challenge appraisal was lower for decided games than tie or close games. Decided games cause less situational demands on officials and thus reducing challenge appraisals (Lazarus, 2000). A similar explanation applies for why challenge appraisals were lower at the

beginning of the first and second half than at the end of the second half. The lower situational demands in these situations may result in lower challenge appraisals.

Demographic Variables and Appraisals

Additional results addressed both appraisals' relationship with importance of income and years of experience. In regards to importance of income, there was a marginal effect of importance of income on threat appraisal. This result indicated higher importance of income having a positive relationship with threat appraisal. This result is intuitive as officials who place a high importance on income from officiating are likely to place a higher demand on their performance and thus increase situational demand. This results in more threatening appraisals (Lazarus, 2000). Alternatively, importance of income did not affect challenge appraisal because of low importance of incomes' average and variability.

Furthermore, there was no significant relationship between years of experience and threat or challenge appraisals. The lack of relationship between years of experience and challenge appraisal, as addressed previously, may be a result of some characteristic in the officiating population that makes years of experience less relevant in the stress appraisal process. Finally, may be that the sample used in the present study was too heavily weighted towards established and veteran officials as well as younger, more motivated, and accomplished officials.

Limitations and Future Research

The major limitation of this study is the use of hypothetical situations to evaluate how officials experience stress during game situations. The use of hypothetical situations was adopted to improve internal validity (extent to which an effect can be attributed to the experimental manipulation, i.e., time and score), as well as practical considerations for data collection. Furthermore, hypothetical situations limited threats to internal validity by controlling extraneous

variables that would have been included if an observational or naturalistic design had been used (e.g., crowd reaction, tempo of game, foul situation). Measuring these extraneous variables, while interesting to examine, would require a larger sample size than practically possible via available courtside measures of perceived stress and appraisal. Additionally, there is support for hypothetical situations accurately reflecting their tangible equivalents (e.g., Gould, Finch, & Jackson, 1993; Petróczi & Aidman, 2008; Strelan & Boeckmann, 2006). However, the limitations of using hypothetical situations are significant and worthy of consideration. Future research should examine officials stress levels within actual games and include objective measures related to stress (e.g., cortisol levels and biofeedback).

An additional limitation, previously alluded to, is the self-selection of officials. Using local associations throughout the state to recruit participants established a potentially diverse subject pool. However, once associations had sent the email containing the survey, participants then self-selected whether or not to complete the survey. This likely resulted in a higher response rate among motivated and successful officials compared to less motivated and perhaps less successful officials. This limits the generalizability of the present study, and future studies are encouraged to foster the recruitment of less motivated officials to better understand if their stressors differ from those of highly motivated officials.

One limitation that may be addressed through future research was the use of an official's biggest game as the basis for the hypothetical situations. By definition, this game has only occurred once in the official's experience and was included to increase the power of the present study. As such, this is not representative of many games that an official may work. Therefore, additional research should examine how officials' perceived stress levels are impacted by the type of game they worked (e.g., a low level youth game versus a competitive high school game).

In regards to increase generalizability, it is important to note that the present study focused on one state's high school certified basketball officials. This limitation was partly addressed through the high number of college officials in the sample. Additionally, the within game pressures experienced by officials are likely consistent across sport and level. The need to succeed and perform well is consistent across officials of all sports and levels (Dorsch & Paskevich, 2007). This need increases the tendency to perceive a situation as stressful and thus are suspect to the effects of highly critical situations regardless of sport type and level. However, additional categories of sport officiating should be considered such as additional sports, populations, certification levels, and specific officiating positions to determine if different game situations have a different effect than was found in the present study.

An important question for future research is how does stress effect officiating performance? Very limited research exists to support the notion that stress does affect officials in the same way that it does athletes and other performers (e.g., Eysenck & Calvo, 1992; Kahill, 1988). Future research should further examine how stress affects performance. The present study provides a possible way to manipulate stress levels which future research on stress and performance can utilize. Such research can examine performance in real game situations under varying stress levels or use simulated situations under differing stress conditions. If this research solidifies that stress affects officials' performance, than future research can examine how to improve performance and increased job satisfaction.

Summary

The findings of the present study reveal that officials' stress level is likely influenced by within-game factors, specifically score differential and time of game. The potential impact of stress on officials' performance requires additional research but suggests a similar effect to that

of athletes and other performers (e.g., Downward & Jones, 2007; Eysenck & Calvo, 1992; Kahill, 1988; Nevill et al., 2002). This is counter to the stated beliefs of some in the officiating community, including NBA president Joel Litvin who stated in response to a then unpublished Price et al.'s (2012) finding that officials were keeping games close : “I do believe, and I think it is the case, that [NBA referees] are, in fact, immune to the things that you and I would say are just human nature” (Bachman, 2009). Raising awareness that officials do experience stress and further that their stress level fluctuates within games is an important first step to understanding how officials can manage their stress to improve performance.

Given the importance of managing stress, understanding the magnitude of perceived stress is paramount. The levels of stress reported, ranging from low to moderate, were similar to past results on officials' stress levels (e.g., Gencay, 2009; Rainey & Hardy, 1997; Stewart & Ellery, 1998). Officials' threat appraisals predicted stress level.

The knowledge that threat appraisal predicts stress level is potentially useful for the training of officials. Further research must be directed towards managing stress through modifying appraisals. This research may reveal that officials benefit from training how to manage stress and therefore improve performance.

The central findings of this study revealed that sport officials' stress levels change within games, and that threat appraisals are influential to that stress level. These findings are important to officials, clinicians, and researchers. Officials' awareness of their stress levels may allow them to manage their stress level to improve performance. Furthermore, clinicians can use these findings to improve officials' performance and job satisfaction. Finally, additional research on the generalizability of these findings and potential training implementations are called for.

APPENDIX A

INFORMED CONSENT FORM

Florida State University Consent to Participate in a Research Study

Please read the following carefully. In order to participate in this study, you must read and agree to the following. The study: The study is being conducted in order to gather information on the effects of situation criticality and officials stress levels. Participants will be recruited through their local officials associations. Your participation in this study is strictly voluntary and there are no consequences if you decide not to participate in the study. This study is being conducted under the supervision of the Department of Educational Psychology and Learning Systems.

As part of the study, you are asked to complete a demographic questionnaire. During the study you will answer a brief questionnaire for which you will be provided with instructions. Your participation in this study will involve completing a questionnaire lasting approximately 15 minutes.

Confidentiality: The records of this study will be kept confidential, to the extent permitted by law and only the researchers will review this information. The survey will ask only for gender, age, and officiating experience and will not include your name or other personal identifiable information. All questionnaires will receive an alphanumeric code in order to ensure confidentiality. Furthermore, this security will be maintained for three (3) years after this study ends in a locked cabinet and office and password safe computer. At the end of that time period, these records will be destroyed.

Voluntary Participation: Your participation in this study is completely voluntary. If you decide to take part, you are free to not complete the survey or task, skip any questions, or stop at any time. You will not receive any compensation regardless of whether you participate in the research study or not.

If you have any further questions please contact me.

Thank you.

If you have any questions about your rights as a participant in this, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at (850) 644-8633.

Printed Name: _____

Signature: _____ Date: _____

APPENDIX B

DEMOGRAPHICS QUESTIONNAIRE

Age _____

Sex: M F

Race/ethnicity

How do you describe yourself? (please check the one option that best describes you)

- a) American Indian or Alaska Native
- b) Hawaiian or Other Pacific Islander
- c) Asian or Asian American
- d) Black or African American
- e) Hispanic or Latino
- f) White Non-Hispanic

Officiating Experience

- 1) How many years of Basketball officiating experience do you have? _____
- 2) What level of Basketball official are you? _____
- 3) What was your most recent rules test score? _____
- 4) How important is the income from this job for you? _____

Low							High	
Importance							Importance	
1	2	3	4	5	6	7		

- 5) What is the highest level basketball game you have officiated?
 - a. Middle School
 - b. High School JV
 - c. High School Varsity
 - d. High School Playoffs
 - e. College

APPENDIX C

STRESS APPRAISAL MEASURE (SAM)

This questionnaire is concerned with your thoughts about various aspects of the situation identified previously. There are no right or wrong answers. Please respond according to how you view this situation right NOW. Please answer ALL questions. Answer each question using the corresponding scale by circling the appropriate number on the scale provided. Remember, the “situation” and “problem” in the items below refer to this specific situation.

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

1. Does this situation create tension for me? (stressfulness)
2. Does this situation make me feel anxious? (threat)
3. Is this going to have a positive impact on me? (challenge)
4. How eager am I to tackle this problem? (challenge)
5. To what extent can I become a stronger person because of this problem? (challenge)
6. Will the outcome of this situation be negative? (threat)
7. Does this situation tax or exceed my coping resources? (stressfulness)
8. To what extent am I excited thinking about the outcome of this situation? (challenge)
9. How threatening is this situation? (threat)
10. To what extent do I perceive this situation as stressful? (stressfulness)
11. To what extent does this event require coping efforts on my part? (stressfulness)
12. Is this going to have a negative impact on me? (threat)

APPENDIX D

TASK SITUATIONS

Please take a moment to recall the highest level/most important basketball game that you officiated. Think about the atmosphere of that game; from the crowds to players/coaches to the arena, as well as how you felt going into that game.

		Score Differential		
		Tie	≤ 6	>6
Temporal Phase	Early 1 st half	<p>It is 2 minutes into the first half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A and the score is tied 5-5. Please answer the following questions based on this situation.</p>	<p>It is 2 minutes into the first half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A who is leading 8-5. Please answer the following questions based on this situation.</p>	<p>It is 2 minutes into the first half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A who is leading 11-2. Please answer the following questions based on this situation.</p>

		Score Differential		
		Tie	≤ 6	>6
Temporal Phase	Middle of game	It is the final 2 minutes of the first half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A and the score is tied 21-21 . Please answer the following questions based on this situation.	It is the final 2 minutes of the first half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A who is leading 20-17 . Please answer the following questions based on this situation.	It is the final 2 minutes of the first half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A who is leading 24-15 . Please answer the following questions based in this situation.
	Late 2 nd half	It is the final 2 minutes of the second half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A and the score is tied 42-42 . Please answer the following questions based on this situation.	It is the final 2 minutes of the second half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A who is leading 46-43 . Please answer the following questions based on this situation.	It is the final 2 minutes of the second half of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A who is leading 56-47 . Please answer the following questions based on this situation.

APPENDIX E
EMAIL TO OFFICIALS

Hello Everyone,

a master's student at Florida State University, has asked for our help on his master's thesis examining stress in officiating. Please take 15 minutes and complete the survey at the link below. The survey is confidential and participation is voluntary.

https://fsu.qualtrics.com/SE/?SID=SV_1REafPE6LbiIwPX

If you have any questions please contact at

Thank you,

APPENDIX F

SAMPLE PAGES

Please take a moment to recall the highest level/most important basketball game that you officiated. Think about the atmosphere of that game; from the crowds, to players/coaches to the arena, as well as how you felt going into that game.

You are **2 minutes into the first half** of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A and the score is **tied 5-5**. Please answer the following questions based on this situation.

This questionnaire is concerned with your thoughts about various aspects of the situation identified previously. There are no right or wrong answers. Please respond according to how you view this situation right NOW. Please answer ALL questions. Answer each question using the corresponding scale by circling the appropriate number on the scale provided. Remember, the “situation” and “problem” in the items below refer to this specific situation.

1. Does this situation create tension for me?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

2. Does this situation make me feel anxious?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

3. Is this going to have a positive impact on me?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

4. How eager am I to tackle this problem?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

5. To what extent can I become a stronger person because of this problem?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

6. Will the outcome of this situation be negative?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

7. Does this situation tax or exceed my coping resources?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

8. To what extent am I excited thinking about the outcome of this situation?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

9. How threatening is this situation?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

10. To what extent do I perceive this situation as stressful?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

11. To what extent does this event require coping efforts on my part?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

12. Is this going to have a negative impact on me?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

Sample Page 2

Please take a moment to recall the highest level/most important basketball game that you officiated. Think about the atmosphere of that game; from the crowds to players/coaches to the arena, as well as how you felt going into that game.

It is the **final 2 minutes of the second half** of the biggest game of your officiating career. The crowd behind you is louder than any crowd you have heard. You are inbounding the ball to Team A who is **leading 24-15**. Please answer the following questions based on this situation.

Please answer ALL questions. Answer each question using the corresponding scale by writing the appropriate number in the space provided. Remember, the “situation” and “problem” in the items below refer to this specific situation.

1. Does this situation create tension for me?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

2. Does this situation make me feel anxious?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

3. Is this going to have a positive impact on me?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

4. How eager am I to tackle this problem?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

5. To what extent can I become a stronger person because of this problem?

Not at all	Slightly	Moderately	Considerably	Extremely
1	2	3	4	5

6. Will the outcome of this situation be negative?

Not at all	Slightly	Moderately	Considerably	Extremely
------------	----------	------------	--------------	-----------

- | | | | | | |
|--|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
7. Does this situation tax or exceed my coping resources?
- | | | | | |
|------------|----------|------------|--------------|-----------|
| Not at all | Slightly | Moderately | Considerably | Extremely |
| 1 | 2 | 3 | 4 | 5 |
8. To what extent am I excited thinking about the outcome of this situation?
- | | | | | |
|------------|----------|------------|--------------|-----------|
| Not at all | Slightly | Moderately | Considerably | Extremely |
| 1 | 2 | 3 | 4 | 5 |
9. How threatening is this situation?
- | | | | | |
|------------|----------|------------|--------------|-----------|
| Not at all | Slightly | Moderately | Considerably | Extremely |
| 1 | 2 | 3 | 4 | 5 |
10. To what extent do I perceive this situation as stressful?
- | | | | | |
|------------|----------|------------|--------------|-----------|
| Not at all | Slightly | Moderately | Considerably | Extremely |
| 1 | 2 | 3 | 4 | 5 |
11. To what extent does this event require coping efforts on my part?
- | | | | | |
|------------|----------|------------|--------------|-----------|
| Not at all | Slightly | Moderately | Considerably | Extremely |
| 1 | 2 | 3 | 4 | 5 |
12. Is this going to have a negative impact on me?
- | | | | | |
|------------|----------|------------|--------------|-----------|
| Not at all | Slightly | Moderately | Considerably | Extremely |
| 1 | 2 | 3 | 4 | 5 |

APPENDIX G

HUMAN SUBJECTS COMMITTEE APPROVAL MEMORANDUM



Office of the Vice President for Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 11/25/2013

To: Jason Ritchie [REDACTED]

Address: [REDACTED]

Dept.: EDUCATIONAL PSYCHOLOGY AND LEARNING SYSTEMS

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Game Criticality's Effect on Officials' Stress Levels

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 11/24/2014 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Gershon Tenenaum [REDACTED] Advisor

HSC No. 2013.11540

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BIOGRAPHICAL SKETCH

Jason attended high school at Oviedo High School in Oviedo, FL. While at Oviedo High School Jason was a member of the debate and math/stat clubs, an AP scholar with distinction, and a four-time scholar athlete. Jason then received his Bachelor of Science in Psychology at the University of North Florida minoring in mathematics and chemistry. While at the University of North Florida, Jason was a member of the Psi Chi, the honors and leadership programs, frequently on the dean's list, and a program assistant at intramural sports. In addition to his studies, Jason was very involved in research, recreational sport officiating, youth sport coaching and a captain of the UNF lacrosse team. His current research interests center around anxiety and performance with a developing interest in officiating.