Book Review: The Columbus Panhandles: A Complete History of Pro Football’s Toughest Team, 1900-1922

Reviewed by: David Gargone

The Panhandles, a professional football team known for its toughness and athleticism, was established from workers in the Pennsylvania Railroad shops out of Columbus, Ohio. The Columbus Panhandles had their first documented season in 1901. The team played through the beginning of the 1920’s. Longtime manager and future National Football League commissioner Joseph Carr brought a unique administrative style to the Panhandles, leading the team to historic popularity during his tenure. Relying on the most famous family in pro football history, Carr utilized the Nesser brothers' physical prowess to win games and their unmatched popularity to fill the stands.

The Columbus Panhandles: A Complete History of Pro Football’s Toughest Team, 1900-1922 documents the history of the team through countless newspaper excerpts, ageless photographs, and original interviews. The book provides a detailed account of each season of competition, including the schedule, results, and known statistics for each year. It also provides biographical information on many of the longtime Columbus Panhandles, including the lengthy tenures of each of the six Nesser brothers. Totaling 90 years of service, the Nesser brothers served as the heart and soul of the team. Frank Nesser, a two-sport professional athlete whose abilities were compared to those of Jim Thorpe, led the Panhandles in scoring during most of his professional seasons.

The author, Chris Willis, set out to reestablish the legacy once enjoyed by the Columbus Panhandles. Willis’ experiences include authoring assignments for the Pro Football Researchers Association and a position as the head of the Research Library at NFL Films. His documentation of the Panhandles will peak the interests of a variety of readers. Historians and sport journalists will appreciate the historical portrayal of the Panhandles, while general football enthusiasts will be captivated by the stories of Nesser brothers and their role in the early stages of professional football.

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Professional Team Physicians Beware! Co-employee Status May Not Ipso Facto Confer Tort Immunity

Submitted by: Timothy J. Paterick, Barbara B. Paterick, JD & Timothy E. Paterick, MD, JD

Abstract:

The relationship between a professional athlete, his or her professional sports team, and a team physician is legally complex and has inherent potential for conflict. Although a physician should always consider an athlete's best interest when determining an athlete's fitness to participate in competitive sport, a physician also has a responsibility to his or her employer to act in the best interest of the team. The dual role of a team physician results in the potential for conflict if a professional sports team and the professional athlete's best interests do not coincide. The workers' compensation co-employee doctrine immunizes a professional sports team from vicarious liability in tort for its team physician's negligence. Recent judicial opinions and legal commentary suggest that the workers' compensation law barring tort suits between a professional athlete and a co-employee team physician for injuries caused within the scope of employment should not ipso facto confer absolute tort immunity for a physician. The argument being made is that if a team physician breaches the ethical and legal duty to provide the standard of care, the co-employee doctrine should not provide a shield from tort liability for harm caused to professional athletes. Physicians must be aware of legal opinions surfacing in the literature so they can understand that their most prudent approach, no matter what the circumstance, is to practice in a manner in which a professional athlete's health interest supersedes all other interests.

Introduction:

Present-day judicial opinions and legal commentary suggest that the absolute tort immunity provided under the co-employee doctrine of workers' compensation law may need limits to encourage the implementation of medical care that, above all other interests, protects the
health and safety of professional athletes. Sport-medicine physicians involved as co-employees in the care of professional athletes must be aware of current opinions and commentary to better understand their risk of liability. The shield of workers' compensation law may not be a fail-safe defense for employed team physicians. Judicial and legal commentary about tort immunity in the context of the co-employee professional sports physician demonstrates why a prudent approach by all professional team physicians, despite their co-employee status, would be to act as a fiduciary where an athlete's health interest supersedes all other interests.

**The Team Physician and the Professional Athlete**

The most frequent claim raised against a team physician by a professional athlete is negligence. Negligence for sports medicine physicians may arise for 1) allegedly failing to diagnose a medical condition in an athlete, 2) failing to appropriately warn an athlete of a medical condition when the condition is diagnosed, or 3) improperly deeming an athlete medically safe for sports competition when a physician knows or should know of an imposing medical condition that should limit or suspend competition.

To establish a negligence claim, an athlete must prove four elements: first, that a duty of care exists between the athlete and the team physician; second, that the team physician has breached that duty; third, that the breach caused harm to the athlete; fourth, that the athlete has sustained injuries that can be quantified into damages.

**Physician Duty**

The existence of a patient-physician relationship legally establishes a physician's duty to appropriately diagnose and treat patients. In the environment of sports medicine, this relationship also involves a duty to disclose any material information to an athlete about his or her physical condition and to sufficiently inform an athlete regarding potential risks of participating in the sport. This is, arguably, a variation on the doctrine of informed consent; that is, an athlete must have all available information to make an informed decision to participate in a sport. Team management should expect a sport-medicine physician to discuss with management and athletes the risks and benefits of playing a sport on the basis of a medical evaluation.

**Breach**

Demonstration of a breach of the duty of care requires establishment of the appropriate standard of care. A team physician should consider only an athlete's best interest when determining an athlete's fitness to participate in competitive sports. A physician's determination should be based on a broad range of variables, including 1) the physical demands and intensity of the sport in relation to an athlete's unique clinical condition; 2) whether an athlete has previously participated in a sport with similar physical demands; 3) all available clinical, personal, and family history and a comprehensive physical examination of an athlete; 4) available medical organization and national conference guidelines pertinent to participation in competitive sports; 5) the probability and potential severity of adverse health events from sports participation, given an athlete's unique health status; 6) whether medication, monitoring, or protective equipment could mitigate the potential health risks and support safe sports participation; and 7) in the case of minors and young adults, whether an athlete has the capacity to make an informed decision if risks are present (Krueger v. San Francisco Forty Niners, 1987).

The standard of care has evolved as sports medicine has evolved from general medical practice to specialty practice. Supportive of the theory that sports medicine involves specialized practice and a potentially higher standard of care is the publication of guidelines by medical societies and specialty boards which have articulated medical clearance guidelines for use by clinicians making athletic participation recommendations (Maron et al., 1996). Courts have recognized standards and guidelines by national medical associations as evidence of acceptable medical practice (James v. Woolley, 1988).

Expert medical testimony is necessary to establish a breach of the standard of care. For example, an expert may testify that any treatment that benefits the short-term needs of a team but creates long-term damage to a competitive athlete is a breach of duty to an athlete (Keim, 1999).

**Causation**

The burden of proof that the breach caused injury or harm is an athlete's. A physician's failure to recognize or failure to warn of potential harm must result in injury to an athlete. Causation requires a nexus between a physician's negligence and the actual damage an athlete has sustained.

Causation may be reviewed at two levels: 1) cause in fact and 2) proximate cause. Cause in fact occurs when a physician's action is a cause of the actual harm to an athlete. Proximate cause considers whether a physician's behavior is a substantial factor in causing the harm an athlete may have incurred as a result of a physician's actions or inactions. For example, an argument can be made that a physician's failure to identify risk factors for heat stroke was the proximate cause of an athlete's death (Lapchick, 2006). Alternatively, failure to disclose the extent of an existing injury could be considered the proximate cause of a further injury (Krueger v. San Francisco Forty Niners, 1987).

**Damages**

Damages may include long-term recovery from an injury and loss of salary or limitations to other work capacity because of inability to play after injury. In the case of an athlete's death, the claims are typically pursued by an athlete's estate or surviving kin. It is their responsibility to prove what an athlete's life may have been worth in order for a court or jury to award damages. Awarding damages is an attempt to make an athlete whole, that is, as though the injury never occurred. Expert medical testimonies, in conjunction with an economic analysis provided by an expert economist, are often necessary to measure damages.
Although negligence is the most frequent claim brought against team physicians, other claims have been successfully and unsuccessfully litigated, including, but not limited to, 1) fraudulent misrepresentation, 2) concealment of medical information, 3) intentional infliction of emotional distress, and 4) when an athlete is not cleared to play, discrimination under the Americans With Disabilities Act (1990) and the Rehabilitation Act (1973). Each of these claims deserves to be evaluated as a unique legal concept, and they are not discussed here.

Is the Shield of Workers' Compensation Law a Myth for a Physician Employed by a Professional Sports Team?

Interaction of Workers' Compensation and Tort Law

Workers' compensation law is state defined. Thus, it varies by jurisdiction. Generally, in the case of an employee injured while acting within the scope of employment, workers' compensation law is thought to be an efficient and adequate remedy to compensate injured employees without the necessity of proving fault of an employer. The law allows compensation for employees for work-related injuries. In exchange for the absolute requirement to pay injured employees, the law shields employers by setting recovery limits at modest amounts and specifying the remedy provided as the exclusive remedy (Workers' Compensation Law, 1993). No tort liability is allowed.

A professional athlete is entitled to workers' compensation benefits for aggravation of an athletic injury caused by the negligent care by a team's medical personnel. A player whose injury is secondary to negligent medical care or the failure to provide reasonable medical care is barred from recovering tort damages against the team or its employees, including a team physician who has co-employee status (Keim, 1999; Mitten, 2002).

Generally, the exclusivity provided under workers' compensation law bars all tort claims against physicians employed by professional sports teams. It is likely the defense on which most employed team physicians rely when sued for negligence by an employed athlete.

There is an exception in most jurisdictions for certain common law claims, such as injuries resulting from the fraud or defamation of an athlete by a team physician, team management, or both. Similarly, the exclusivity remedy provisions of the state workers' compensation laws will not bar a medical malpractice claim against an employer or co-employee team physician for an injury caused by conduct intended to harm an athlete (Hertz, 2001; Mitten, 2002).

Beyond the exceptions carved out for fraudulent and intentional tort claims, some courts' dissenting opinions, as well as some legal commentators, argue for the erosion of the shield of workers' compensation as a fail-safe defense for employed team physicians. One argument is that a special relationship exists between a team physician and a professional athlete, extending the duty of care beyond the duty of a company physician to a company employee. The argument is grounded in the belief that professional sports have elevated pressures that are inherent in professional sports. The belief is that potential tort liability creates a legal incentive which urges team physicians not to succumb to the pressures that are inherent in professional sports.

Korey Stringer, a professional football player for the Minnesota Vikings, died from complications of heat stroke during preseason training camp in 2001. His heirs alleged that the Vikings' team physician provided negligent medical care. In Stringer v. Minnesota Vikings Football Club, LLC (2004), the trial court held that there is no immunity if a co-employee, in this case the team physician, owes a personal duty of care to a fellow employee, namely the football player, which is “not pursuant to the employer's non-delegable duty to provide a safe workplace.” Thus, the trial court is saying that the employer has a duty to provide a safe workplace for all employees, and beyond that, team physicians have a separate duty of care to football players that goes beyond the owner's responsibility to provide a safe workplace. Reversing the decision, the Minnesota Supreme Court (Stringer v. Minnesota Vikings Football Club, LLC 2005) subsequently ruled that the Minnesota Vikings team physician's duty to the professional athlete was fulfilled within the employment relationship and the professional sports team's effort to provide a safe workplace for its players. Thus, the Minnesota Supreme Court ruled that, in the case of Korey Stringer's death, the team physician did not have a separate duty of care to the football player beyond that of the team owner to provide a safe workplace. The dissenting opinion for the Minnesota Supreme Court expressed doubt that concealing the duty of a co-employee physician under the umbrella of an owner's responsibility to provide a safe workplace is a reliable legal remedy when a physician co-employee provides medical care to employees. The dissent also articulated a policy argument stating that extending immunity to co-employee physicians would encourage them to neglect their duties. Of note, dissenting opinions do not define the law but can give authority to an argument supporting a change in the law.

The California case of Hendy v. Losse (1990) raised issues that make the absolute immunity of a co-employee team physician less certain. Hendy explored a dual-capacity theory, that is, when an employer has two separate relationships with employees. An employer, normally shielded from tort liability by the exclusive remedy principle, may become liable in tort to an employee if the employer occupies, in addition to its capacity as employer, a second capacity that confers additional obligations. California courts have long recognized that a physician, as an employee of a company, may operate in the dual capacity of co-employee and physician. In Hendy, a professional football player's malpractice case against the team physician was allowed to proceed at the trial level on the basis of the dual-capacity doctrine. The California Supreme Court (1991) dismissed the claims, holding that the state's workers' compensation laws bar tort suits between co-employees for injuries caused within the scope of employment. However, the Supreme Court stated that if a co-employee provides medical care other than that contemplated by the employee's employment, the physician co-employee no longer enjoys immunity from tort.

Some legal commentators have articulated the belief that if a team physician breaches his or her duty of care to a team's athletes, the co-employee doctrine should not provide a shield from tort liability. According to Young (2003), "Any notion that a doctor's co-employee status will shield his liability to a patient he negligently treats should ... be removed." In Mitten's opinion (2005), "[A] team physician should not have immunity from malpractice merely because he or she is characterized as an 'employee.'"
Conclusions:
Professional sport-teams physicians in charge of clearing professional athletes for competition and treating professional athletes' injuries have a complex position with unique responsibilities to athletes. A co-employee professional team physician should be mindful of the best interests of athletes and sustain the appropriate standard of care. If physician negligence is alleged, workers' compensation laws may shield a physician from tort liability arising from injuries occurring in the course of an athlete's employment, so long as there is no finding of fraudulent or intentional misconduct. However, the dual-capacity doctrine articulated in Hendy, the dissenting opinion from the Minnesota Supreme Court in the Korey Stringer case, and expert legal commentary should give physicians, acting in the co-employee role for professional sports teams, reason to reflect on their potential liability. A prudent approach-in an attempt to reduce potential for tort liability-would be to understand that, despite the co-employee status of team physicians, all the inherent responsibilities of independent contractor physicians, who are not shielded from tort liability, may apply in a court of law, and an athlete's medical interest should supersede all competing interests.

References:

Americans with Disabilities Act, 42 USC §§1210 et seq; 1990.

California Supreme Court 819 P.2d 1 (Cal. 1991).

Hendy v. Losse, No. D010557. Court of Appeals of California, 4th appellate District, Division One. 231 Cal. App. 3d 1149; 274 Cal. Rptr. 31; 1990.


Stringer v. Minnesota Vikings Football Club, LLC. 705 N.W. 2d 746, 762 (Minn. 2005).


The Comparison of Maximal Oxygen Consumption Between Seated and Standing Leg Cycle Ergometry: A Practical Analysis

Submitted by: A. Bosak, J. Green, T. Crews & R. Deere

Abstract:
Because previous studies have been equivocal, the current study compared VO₂max between seated and standing cycle ergometry protocols in male (n=14) and female (n=22) volunteers of average cardiovascular fitness. All subjects completed maximal exertion seated (SIT) and
standing (STD) cycle ergometry GXT protocols at 60 rev/min (rpm), with resistance increased by 30 Watts/min. SIT required individuals to remain seated for the duration of the test until achieving volitional exhaustion. For STD, subjects performed seated cycling until they felt it was necessary to stand to continue the GXT. Subjects were then required to stand and perform "standing cycling" (resistance increased 30 Watts/min) to volitional exhaustion. VO\textsubscript{2max} (ml/kg/min), peak HR (b/min), peak RER, and peak V\textsubscript{E} (L/min) were compared between SIT and STD using MANOVA. Results were considered significant at p ≤ 0.05. VO\textsubscript{2max} at 37.9 ± 8.0 was significantly greater than VO\textsubscript{2max} at 36.8 ± 6.6, while HR\textsubscript{SIT} (190 ± 95) was significantly greater than HR\textsubscript{STD} (187 ± 9.6). VO\textsubscript{2max} was, on average 2.0% greater than VO\textsubscript{2max} at 50 rpm, with a range of -16.9 to +17.4%, while HR\textsubscript{STD} was, on average 1.2% greater than HR\textsubscript{SIT}, with values ranging from -5.6 to +7.4%. VE\textsubscript{STD} (86.0 ± 31.6) was not significantly different than VE\textsubscript{SIT} (82.6 ± 26.8), while RER\textsubscript{STD} (1.21 ± 0.096) was significantly lower than RER\textsubscript{SIT} (1.23 ± 0.065). Results suggest that the utilization of a standing protocol should be considered when cycle ergometry is the selected testing mode. Future research should seek to determine the characteristics of subjects who do/do not benefit from a standing cycle ergometry protocol.

**Introduction:**

Maximum oxygen consumption (VO\textsubscript{2max}) represents the highest rate at which oxygen can be consumed and utilized to produce energy sustaining aerobic activity. VO\textsubscript{2max} is regarded as the gold standard for assessing aerobic fitness. It is acknowledged as a substantial backbone for prescribing appropriate exercise and training intensities. Therefore, accurate determination of VO\textsubscript{2max} is vital.

Throughout history, VO\textsubscript{2max} has been assessed during numerous exercise modes such as treadmill, rowing, and cycle ergometry. Different modes and protocols have been compared to determine which protocol and/or mode permits the highest VO\textsubscript{2max} (Beasley, Fernhall, and Plowman, 1989; Coast, Cox, and Welch, 1986; Faria, Dix, and Frazer, 1978; Lavoie, Mahoney, and Marmellic, 1978; McCarthy, Katch, and Katch, 2006; Mckay and Banister, 1976; Moffat and Sparling, 1985; Pivarnik, Mountain, Graves, and Pollock, 1988; Ricci and Leger, 1983; and Welbergen and Clisjen, 1990). Compared to seated cycle ergometry, treadmill exercise usually permits a higher VO\textsubscript{2max} due to the activation of more muscle mass and less pronounced leg fatigue. One of the more common VO\textsubscript{2max} tests implemented in exercise physiology labs is the Bruce treadmill protocol (Beasley et al., 1989; Fernhall and Kothr, 1990; Kelly et al., 1980; Lavoie et al., 1978; Marsh and Martin, 1993; Moffat and Sparling, 1985; Ryshon and Stray-Gunderson, 1991; Verstappen, Huppertz, and Snoeckx, 1982; and Welbergen and Clisjen, 1990). Despite greater VO\textsubscript{2max} values obtained during treadmill exercise, cycle ergometry has many advantages, including preference of subjects to use the cycle ergometer during a VO\textsubscript{2max} test, adaptability, safety, ease of calibration, and subjects’ tolerance of non-weight-bearing exercise (Mckay and Banister, 1976; Pivarnik et al., 1988). Therefore, exercise scientists have continued to explore ways to manipulate cycle ergometry protocols to allow subjects to attain the highest possible "cycling" VO\textsubscript{2max} values (Faria et al., 1978; Heil, Derrick, and Whittlesey, 1997; Kelly et al., 1980; Lavoie et al., 1978; McKay and Banister, 1976; Moffat and Sparling, 1985; Nakadomo et al., 1987; Tanaka and Maeda, 1984; and Tanaka, Nakadomo, and Moritani, 1987).

Montgomery et al. (1971) concluded, for five male subjects, that VO\textsubscript{2max} during standing cycle ergometry (57.35 ml/kg/min) was not significantly different than seated cycle ergometry (54.30 ml/kg/min). Tanaka et al. (1996) also found no significant differences between seated (66.4 ± 1.6 ml/kg/min) and standing (66.4 ± 1.7 ml/kg/min) VO\textsubscript{2max} during level cycle ergometry for seven competitive male cyclists. Conversely, in a sub-study, Tanaka et al. (1996) found, for seven male subjects cycling at a 4% incline, a greater VO\textsubscript{2max} (2.82%) for standing (56.8 ± 0.9 ml/kg/min) vs. seated (55.2 ± 0.9 ml/kg/min) cycle ergometry. Also, Ryshon and Stray-Gunderson (1991) concluded, with 10 cyclists (eight males and two females), that standing submax VO\textsubscript{2} values were 10.8% higher than seated values during 4% incline standing cycling. Kelly et al. (1980) determined, for 12 male university students, that standing (57.91 ± 5.74 ml/kg/min) during a cycle ergometry VO\textsubscript{2max} test produced a significantly greater (4.4%) VO\textsubscript{2max} compared to the seated position (55.12 ± 6.98 ml/kg/min). Also, Nakadomo et al. (1986) concluded that, in 22 male subjects, VO\textsubscript{2max} was 17% higher while standing as compared to the seated position. Support of level standing cycling ergometry eliciting higher VO\textsubscript{2max} values continued when Tanaka et al. (1987) showed that 14 well-trained runners, 8 rowers, and 6 males of average fit attained higher VO\textsubscript{2max} values when standing as compared to seated cycle ergometry.

Fitness level, as well as the type of athlete and gender, can affect VO\textsubscript{2max} values (Bassett and Howely, 2000; and Foss and Keteyian, 1998). For example, trained cyclists achieve higher VO\textsubscript{2max} values during cycle ergometry compared to sedentary individuals and trained runners (Tanaka et al., 1996). This trained versus untrained comparison supports the notion that athletes who train in a certain mode of exercise can attain a higher VO\textsubscript{2max} in that specific mode (Fernhall and Kothr, 1990; Ricci and Leger, 1983; Tanaka et al., 1996; and Verstappen et al., 1982). Also, males tend to have higher VO\textsubscript{2max} values than females due to greater lung capacity and greater amounts of hemoglobin (Foss and Keteyian, 1998). Subjects in previous studies varied in terms of fitness level and preferred mode of exercise, which may have influenced results.

Another important component of cycle ergometry protocols is the revolutions per minute (rpm). As noted earlier, leg fatigue, particularly in the upper thigh, may cause an individual to finish a cycling GXT prematurely (Mckay and Banister, 1976). Lower rpm tend to increase leg fatigue (Beasley et al., 1989). Typically, for untrained individuals, 40-60 rpm provide the most economical cadences, yet 80-120 rpm yield the greatest VO\textsubscript{2max} and lowest perceived leg fatigue at similar workloads (Beasley et al., 1989; and Marsh and Martin, 1993). Cyclists prefer to cycle at 90 rpm (Marsh and Martin, 1993). However, disparity does exist between the optimal cadences for trained and untrained individuals. Beasley et al. (1989) and Pivarnik et al. (1988) showed there were no differences in VO\textsubscript{2max} and peak HR at 50 rpm and 90 rpm with trained male subjects, while Coast, Cox, and Welch (1986) showed the most economic range of rpm for this group was 60-80. Swain et al. (1992) determined that VO\textsubscript{2max} and HR were actually lower at higher (84 rpm) vs lower (41) rpm. Hagan, Weis, and Raven (1992) concluded that, at higher rpm, (90 rpm vs 60 rpm) HR, VE, and cardiac output will be greater, while cycling economy decreases. In contrast to the results of Hagan et al. (1992), Nickleberry and Berry (1996) determined that recreational cyclists were able to increase their time to exhaustion by 6 minutes, while competitive cyclists continued for 8 minutes longer at 80 versus 50 rpm.
In examining standing cycle ergometry, it may be prudent to recruit a more homogeneous group with respect to fitness and with representatives of both genders being tested. This process may improve validity in comparisons of standing and seated \( VO_2_{\text{max}} \) values, which can be applied to a larger population. Based on previous results, it is unclear whether standing \( VO_2_{\text{max}} \) values will be greater than seated \( VO_2_{\text{max}} \) values. In previous research, all standing cycling protocols varied in terms of when to stand during trials, duration of standing, protocol duration, cadence, fitness levels of subjects, and number of subjects. The differences among procedures and methodology may partially explain the contradictory results. Since equivocal results have occurred regarding standing cycle ergometry, the purpose of this study was to compare \( VO_2_{\text{max}} \) between standing and seated cycle ergometry protocols in female and male subjects.

### Methodology:

Subjects included 14 males and 22 females. All were apparently-healthy volunteers from 18-28 years of age. Subjects were of average fitness abilities. All subjects were made aware of the risks and requirements of participating in the study and all signed a written informed consent prior to any testing. To ensure the safety of the subjects, individuals were required to complete a physical-activity readiness questionnaire (PAR-Q) and a health status questionnaire prior to data collection.

Subjects were tested on a model 824E Monark Cycle Ergometer. Each subject wore a Hans Rudolph facemask with expired gas being collected and \( VO_2 \) being analyzed by a Sensormedics 2900 Metabolic Measurement System. Individuals also wore a Polar Heart Rate Monitor (Model Polar Beat HRM) to determine exercise heart rate. Body-fat percentage was determined using Lange skinfold calipers with a 3-site skinfold method. Weight and height were measured using a detecto balance type scale with an attached measuring rod.

Descriptive data was collected immediately prior to the initial \( VO_2_{\text{max}} \) test. After subjects reported to the lab, an explanation of the study was provided and the initial screening procedures were administered. Instructions regarding the exercise trial were also provided to the subjects. Subjects were then assessed for height, body weight, and body-fat percentage using a 3-site skinfold technique (Pollock, Schmidt, and Jackson, 1980).

Subjects underwent two \( VO_2_{\text{max}} \) tests (SIT and STD) on a cycle ergometer. Because subjects were of average fitness, cadence was set at 60 rpm for the duration of the tests (Beasley et al., 1989; and Marsh and Martin, 1993). Initially, subjects warmed up at a resistance of 30 watts for four minutes at 60 rpm. Every minute thereafter, resistance was increased by 30 watts until the subjects reached volitional exhaustion. SIT required each individual to stay seated until the test was terminated (at volitional exhaustion), while STD required individuals to stand at the point at which they felt they could no longer continue in a seated position. They continued to perform “standing cycling” to volitional exhaustion. All tests were stopped when subjects reached volitional exhaustion or when testers felt it was not safe for the subjects to continue. At the completion of each \( VO_2_{\text{max}} \) test, subjects were monitored during a low intensity cool-down. SIT and STD lasted approximately 7 to 15 minutes and were completed in a counterbalanced order on two separate days with three to seven days between each session.

Expiratory gas was analyzed using a Sensormedics 2900 Metabolic cart, which was calibrated prior to each test using a three-liter syringe and gases of known concentration. The system provided updates of metabolic data (\( VO_2 \), \( VO_2 \), \( RER \)) every 20 seconds. Also, a Polar Heart Rate monitor was used to monitor heart rate response (HR) every 60 seconds. Heart rate, \( VO_2_{\text{max}} \), \( RER \), and \( VE \) were compared between SIT and STD. The highest observed values for metabolic data were considered “max” values for each respective cycle ergometry trial. The criteria for achieving a “true” \( VO_2_{\text{max}} \) were a) failure of HR to increase with further increases in exercise intensity, b) \( RER \) exceeded +1.15, and c) a rating of perceived exertion (RPE) of more than 17 (Balady et al., 2000). In the present study, meeting two out of the three criteria satisfied the requirement for achieving a “true” \( VO_2_{\text{max}} \). \( VO_2_{\text{max}} \), HR, \( RER \), and \( VE \) were analyzed using a multivariate repeated measures analysis of variance (MANOVA). Mean time to exhaustion for STD and SIT were compared using a paired t-test. Results were considered significant at \( p \leq 0.05 \).

### Results:

Descriptive characteristics of all subjects are displayed in Table 1. Physiological responses to seated and standing cycle ergometry are presented in Table 2. Percent increases of standing cycle ergometry are found in Table 3. The results suggest that \( VO_2_{\text{max}}_{\text{STD}} \) was significantly greater than \( VO_2_{\text{max}}_{\text{SIT}} \) with a mean difference of 1.1 ml/kg/min. Also, \( HR_{\text{STD}} \) was significantly greater than \( HR_{\text{SIT}} \) with a mean difference of 2.4 b/min. For \( VO_2 \), \( VE_{\text{STD}} \) was not significantly different (\( p = 0.08 \)) than \( VE_{\text{SIT}} \). However, \( RER_{\text{SIT}} \) was significantly greater than \( RER_{\text{STD}} \).

Regardless of mean to exhaustion, subjects cycled 10:15 ± 2:21 minutes during SIT, with individuals cycling between 7-15 minutes. Although the difference only approached significance (\( p = 0.064 \)), subjects were able to cycle on average 11 seconds longer (10:26 ± 2:06 minutes) during STD, with participants cycling between 7:20, and 15:20. When subjects were in the standing position, the mean duration of standing cycle ergometry time to volitional exhaustion was 50.42 ± 15.57 seconds.

### Table 1: Descriptive Characteristics of Subjects (n=36)-Values are means and standard deviations.

<table>
<thead>
<tr>
<th></th>
<th>Males (n=14)</th>
<th>Females (n=22)</th>
<th>All Subjects</th>
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</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>23.07 ± 2.97</td>
<td>19.73 ± 1.20</td>
<td>21.03 ± 2.63</td>
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<tr>
<td>Height (inches)</td>
<td>70.93 ± 3.17</td>
<td>65.59 ± 2.11</td>
<td>67.67 ± 3.66</td>
</tr>
<tr>
<td>Weight (lbs)</td>
<td>190.14 ± 23.36</td>
<td>139.00 ± 15.79</td>
<td>158.89 ± 31.49</td>
</tr>
<tr>
<td>Body Fat (%)</td>
<td>10.90 ± 4.45</td>
<td>21.41 ± 4.20</td>
<td>17.33 ± 6.71</td>
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</table>
The current study showed a significantly greater (2.0%) VO$_2$max and a significantly greater (1.2%) HR during STD compared to SIT. The greater VO$_2$max and HR during STD can be explained by a variety of reasons. Based on previous research, it is likely that with greater force production, a larger amount of muscle mass was involved during STD (McLester, Green, and Chouinard, 2004; Nordeen-Strider, 1977). Also, standing during STD may have activated more muscle mass, as the legs supported the individual's body weight as opposed to being supported by the saddle during SIT (Nakadomo et al., 1987; Ryschon and Stray-Gundersen, 1991; and Tanaka et al., 1987). Also, as noted by Ryschon and Stray-Gundersen (1991), and Tanaka et al. (1987), during standing cycle ergometry, the upper body is involved to a greater degree in torso stabilization and purposeful side-side rocking, compared to seated cycling. Kelly et al. (1980) and Ryschon and Stray-Gundersen (1991) suggested the standing cycle ergometry protocol provides more extensive involvement of the arm and leg muscles, eliciting greater blood flow and higher work output and contributing to a higher peak HR and VO$_2$max, which may have also contributed to the findings of the current study.

Tanaka et al. (1987) suggested that decreases in subject cycling economy and attenuated leg fatigue might also explain the greater VO$_2$maxSTD and HRSTD. Ryschon and Stray-Gundersen (1991) note that greater cardiorespiratory and metabolic requirements of the standing position decreases the efficiency of the rider, yet provides an increase in the total work output. For leg fatigue, subjects in the current study often verbally reported feelings of intense local discomfort and fatigue in the region of the quadriceps muscle when in the seated position and near or at volitional exhaustion. This leg fatigue and discomfort, coupled with gradual increases in resistance, may have limited the ability of the subject to continue cycling in the seated position (Nakadomo et al., 1987; Tanaka and Maeda, 1984; and Tanaka et al., 1987). However, many subjects verbally reported that at the onset of standing cycling, leg fatigue and local discomfort was comparatively less than during seated cycling, which could have accounted for the extended time to fatigue during STD (Ryschon and Stray-Gundersen, 1991; and Tanaka et al., 1987). Variations in perceived feelings might have been due to the redistribution of the workload over a greater muscle mass and alterations in the muscle recruitment pattern (Ryschon and Stray-Gundersen, 1991). Another factor that may have contributed to greater VO$_2$max during STD is the increase in joint angles when the individual comes out of the saddle and performs standing cycling. When standing, the hip, knee, and ankle joint excursions increase, which provides a greater range of motion within the respective joints (Nordeen-Snyder, 1977). Although not measured in the current study, it is possible that increases in the hip, knee, and ankle joint angles allowed for a more advantageous muscular force production and subsequent extended time to fatigue (Heil, Derrick, and Whittlesey, 1997; Nordeen-Snyder, 1977; and Shennum and devries, 1976).

Millet et al. (2002), Tanaka et al. (1996), and Ryschon and Stray-Gundersen (1991) showed greater standing cycle ergometry HR. Although those differences occurred during a 4% incline protocol, significantly greater HR (1.2%) occurred during the current study, which utilized a level protocol. The extended time to fatigue allowed by standing may have contributed to a higher HR because earlier termination of the test due to leg fatigue and discomfort may have interfered with attainment of a true max HR.

Although only approaching significance (p = 0.08), an 0.83% greater VO$_E$ occurred during STD compared to SIT. The increases in VO$_E$ can be attributed to some of the reasons that likely contributed to a greater VO$_2$max during standing cycle ergometry. Generally when VO$_E$ increases, so too does VO$_2$ (Foss and Keteyian, 1998).
As previously mentioned, when an individual leaves the seated cycle ergometry position to stand, a greater involvement of upper and lower body muscle mass occurs. The activation of more muscle mass may allow for greater work output (Reiser, et al., 2002), which increases oxygen requirements of the muscles. In turn, ventilation increases. Cardiac output is also increased when participating in the standing position, which contributes to higher VO$_2$max and VO$_E$ (Kelly et al., 1980). Also, because lower leg fatigue may be altered in the standing position, VO$_E$ increases, and subjects are able to extend time to exhaustion.

For RER, SIT showed a significantly greater (2.3%) RER as compared to STD. Although SIT produced significantly greater RER compared to STD, the difference was of little practical significance. All RER values in both STD and SIT surpassed the criteria indicative of a “true” VO$_2$max (+1.15).

The current study showed that VO$_2$max$_{STD}$ and HR$_{STD}$ were significantly greater compared to SIT. However, despite the significant differences, it is important to note that discrepancies between the present study and previous studies (Montgomery et al., 1971 and Tanaka et al., 1996) could be a result of the protocol differences, variations in fitness levels, and low subject numbers. Many subjects benefited from the STD protocol as 20 of 36 (55.6%) individuals had greater VO$_2$max (up to 13.6%) and 25 of 36 (69.4%) subjects had greater peak HR (up to 7.4%). While means were significantly different, it should be noted that inter-individual variability was high. Some subjects had a much lower VO$_2$max during STD. Differentiating between those who respond positively and those who respond negatively to a standing protocol is difficult and was beyond the scope of the current study.

Conclusions:

The results of the current study support previous findings, showing a greater VO$_2$max during standing versus seated cycle ergometry (Kelly et al., 1980; Nakadomo et al., 1987; and Tanaka et al., 1987). Results of the current study also show significantly greater HR$_{STD}$. The current results support the use of a test protocol that allows an individual to stand during a cycle ergometry GXT. Therefore, since a higher VO$_2$max value was elicited using the standing protocol in the current study, a standing protocol should be considered for implementation when individuals are assessed for cardiorespiratory responses to maximal work using cycle ergometry. Future research should seek to determine characteristics of subjects who do/do not benefit from a standing versus seated protocol.

References:


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**The NFL Rookie Cap: An Empirical Analysis of One of the NFL’s Most Closely Guarded Secrets**

March 14th, 2008 | Contemporary Sports Issues, Sports Coaching, Sports Facilities, Sports Management | Comments Off

Submitted by: McDonald P. Mirabile

**Abstract:**

This article presented an empirical analysis of the relationship between the portion of the “Entering Player Pool” (Rookie Cap) for each of the
The National Football League has experienced both expansion and relocation of its franchises in the past decade. It is a dynamic market; the relocation of an NFL franchise is an annual possibility. This study looked at the demographic and economic factors that determine the current locations of NFL teams. The top 50 metropolitan areas were empirically examined to explain why some cities have an NFL team and others do not. These factors included population, per capita income, the number of other sports franchises, and the number of Fortune 500 companies, geographic factors, and television ratings for “Monday Night Football.” This model can identify cities for possible expansion and those that would serve as relocation sites in the future. Special attention was paid to the Los Angeles and New Orleans markets.

Introduction:

The National Football League has experienced a dynamic period of expansion and relocation in the past decade; the league seeks to position itself with the optimal configuration for long-term growth of the professional football market. Although expansion is not a current short-term goal for the NFL, the relocation of weak teams remains an annual possibility.

Moving an existing sports franchise is not new. After the 1995 season, Los Angeles lost both of its football teams. The Rams moved from the old Rose Bowl in Pasadena to the brand-new TWA Dome in downtown St. Louis. The Raiders moved from the Los Angeles Coliseum to the newly renovated Oakland Coliseum. In 1996, the Cleveland Browns moved into a new stadium in Baltimore and became the Ravens. Most recently, the Houston Oilers moved to Tennessee and became the Titans in 1999.

The city of Los Angeles, which lost its chance to gain an expansion team in 2002 to Houston because it was unable to approve financing for a new stadium, remains without a team. Although this leaves the second largest television market without its own team, it also offers a credible relocation threat for existing team owners in their new stadium negotiations with local authorities.¹

Expansion and relocation of franchises in professional sports leagues have been studied for baseball and basketball; however, as far as the researchers know, a location model had never been created for the National Football League. Bruggink and Zamparelli (1999) produced a location model for Major League Baseball. The top 50 metropolitan areas were chosen for the sample. The explanatory variables for the regression model are population, population growth, and per capita income, in addition to the number of other professional sports teams in the area, the number of headquarters for Fortune 500 companies in the area, and the distance to the closest city with a baseball team. As one would expect, all variables had positive coefficients in the regression model. A more recent sports model by Rascher and Rascher (2005) estimated the probability that a particular city will have a National Basketball Association team by using the same core set of variables and adding factors such as the average NBA Nielsen television ratings for each city.

One interesting application of our model was applied to the New Orleans Saints football team. Even before the Hurricane Katrina damage to the Superdome, the owners of the Saints hinted that a move to a new location was in the offering.² Of course, this is the typical ploy to gain public subsidies for a new or improved stadium, but the closure of the Superdome for the 2005 season made this relocation potential very real. The re-scheduled 2005 games found the Saints playing in the welcoming city of San Antonio with capacity attendance at the Alamodome. Although the Saints played the 2006 season in a repaired Superdome, they are in position to pursue one of two options after 2006: 1) stay in New Orleans with a long term city commitment to help build a new or improved stadium, or 2) move to a new location in Los Angeles (Maske and Shapiro, 2005) or San Antonio (Orsborn 2006). Our location model used estimates of New Orleans depopulation to give a perspective on the potential consequences for the city’s viability as a home to a NFL franchise.

Location Model

There are a number of factors that influence the selection of cities for NFL relocation or expansion. Based on demographic and economic factors in the largest 50 metropolitan areas, the researchers constructed a logit model to determine the relationship of these factors \( X_1, X_2, X_3, X_4, X_5, X_6, X_7 \) to the expected conditional probability \( \Pr ) \) that each city (represented as \( i \)) would have one or more NFL teams:

(Read More...)

Location Model in the National Football League: Predicting Optimal Expansion and Relocation Sites

Submitted by: Thomas H. Bruggink & Doug Schiz

Abstract:

The National Football League has experienced both expansion and relocation of its franchises in the past decade. Although the formula for determining each franchise’s Rookie Cap is closely guarded by the NFL, the author hypothesized that it should be possible to model the deterministic structure used to calculate franchise spending for each rookie’s contract. The OLS-estimated models revealed statistically significant relationships between groups segmented by draft selection order and each franchise’s Rookie Cap. The model was verified in an out-of-sample test using the Rookie Cap values for the 2007 NFL season. It was found to have a mean absolute percentage error of 2.1%. The implications of these findings were contrary to language in the NFL Collective Bargaining Agreement, as the majority of rookie contracts are implicitly determined by each franchise’s Rookie Cap. The published estimates of each selection’s NFL determined cap value will provide useful bargaining information for rookie contracts.

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(more...)
$P_i = E(Y_i = 1 | X_{1i}, X_{2i}, X_{3i}, X_{4i}, X_{5i}, X_{6i}, X_{7i})$

where

$Y = 1$ if metropolitan area has one or more NFL teams; 0 otherwise

$X_1 = \text{POP2000} = \text{population in metropolitan area } i \text{ (millions)}$

$X_2 = \text{POPGROWTH} = \% \text{ population growth of a city the decade before the current team located in city } i \text{ (if the city does not have a team, the current decade of growth is used)}$

$X_3 = \text{INC} = \text{income per capita in metropolitan area } i \text{ ($1000)}$

$X_4 = \text{DISTANCE} = \text{distance to closest football franchise city (miles) from city } i$

$X_5 = \text{F500} = \text{the number of Fortune 500 company headquarters in metropolitan area } i$

$X_6 = \text{OTHER/POP2000} = \text{the number of other professional sports teams per million population in city } i \text{ (men's basketball, hockey, and baseball)}$

$X_7 = \text{NIELSEN} = \text{“Monday Night Football” Nielsen ratings in metropolitan area } i \text{ using the 2002-3 season}$

The NFL wants to expand or relocate to a metropolitan area with a large and growing population in order to maximize stadium revenues from attendance, concessions, and parking fees. The researchers expected positive coefficients for the population and population growth. In addition to market size, standard microeconomic demand theory suggests that per capita income will be a positive influence. According to a 2003 survey, football fans had the highest median salary in all sports at $55,115 (USA Today, 2003).

The distance to the closest NFL franchise city is a major aspect for the location of a franchise. The NFL does not want all of its teams in one part of the country because there will be interest only in that part of the country, not the whole United States. This is especially important for a sport driven by national television revenues. Furthermore, locating a new franchise close to an existing franchise (generally up to 75 miles) would financially hurt the owner of the latter. The league does not approve of these territorial infringements.

The number of other professional sports teams (baseball, basketball, and hockey) in the metropolitan area can have an impact on the demand for football games. The other sports could be considered substitute goods, or, on the other hand, a measure of fan interest for sports in general (a complement good). Rascher and Rascher (2005) found a negative and significant relationship between the number of other teams and the probability that a city had a professional basketball team. However, Bruggink and Zamparelli (1999) found just the opposite for baseball, supporting the fan intensity argument. The difference could be in overlapping the season with other sports. Basketball overlaps the most, competing with hockey, football, and the beginning of baseball. Baseball and football face less severe overlaps, and at times have the season to themselves.

Another location factor is the number of headquarters for Fortune 500 corporations in the metro area (F500). NFL owners are allowed to keep all the stadium revenue from luxury box receipts (i.e., no revenue sharing), and corporations are the largest patrons of these seating sections (which are also called corporate sky boxes). This is one of the reasons that owners desire new stadiums, because it affords them an opportunity to maximize the number of luxury box seats.

The last location factor is the number of households in the metro area watching football on television. In this study, the average Nielsen ratings for the 2002-3 “Monday Night Football” games are used for the 50 metropolitan areas. “Monday Night Football” games were selected because the same game is watched by the entire nation, whether a city has a NFL team or not. Nielsen ratings are particularly important for the National Football League because there are no local television contracts, only a national contract divided equally among the 32 teams, and it is the single largest source of income.

**Empirical Results and Simulation:**

The preliminary estimation of the model included the top 50 metropolitan areas (those with populations of approximately one million or more). About half had one or more teams. However, with Los Angeles in the data set the estimated coefficient of the population variable is negative instead of positive. This preliminary model showed how sensitive the population factor is to the inclusion of Los Angeles (by far, the largest metro area in the sample that has no team). As discussed earlier, league owners receive value from having a viable city without a team because it poses a credible threat for a team to relocate, allowing them to negotiate with local government for sports subsidies. In this sense, the no-team status of Los Angeles is not a market outcome but a strategic ploy. When Los Angeles was excluded, the researchers actually had a sample of cities that was more representative of market conditions. The estimated model without Los Angeles had a positive coefficient for population and a better overall fit. This sensitivity is the reason the researchers relied on this as the final model for the predictions.

In this study, the researchers: 1) examined the statistical results, 2) tested the within-sample predictions for each city, 3) determined a list of
viable cities for the NFL expansion or relocation, and 4) ran a simulation on the effect of New Orleans’ recent depopulation on its viability of retaining its football team.

Table 1 shows all the statistical results for the fitted model using the logistic function shown below. The logistic function is the natural log of the odds ratio in favor of a metropolitan area having a team ($P = 1$ if the metro area has a team, $P = 0$ if it does not). There are three advantages to using the logistic curve rather than an ordinary least squares regression: (1) the predicted probabilities for a city having a team are constrained to lie between 0 and 1 for the logistic curve, whereas for a linear regression model the predicted probabilities could exceed 1 or fall short of zero, both of which are impossible values, (2) the slope coefficients in the logit model are more realistic than ordinary least square because they vary in magnitude, depending on the size of the corresponding explanatory variable, and (3) the variance is more constant in the logit model than with ordinary least squares, which makes the t-tests more valid.

$$\log\left(\frac{P}{1-P}\right) = -17.6 + 0.98 \text{POP2000} - 0.0063 \text{POPGROWTH} + 0.21 \text{INC} + 0.114 \text{DISTANCE} + 0.4573 \text{F500} + 0.33 \text{NIELSEN} + 3.656 \text{OTHER/POP2000}$$

Table 1: Location Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Stat</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-17.5895</td>
<td>8.8715</td>
<td>-1.983</td>
<td>0.0474</td>
</tr>
<tr>
<td>POP2000</td>
<td>0.9754</td>
<td>1.1482</td>
<td>0.849</td>
<td>0.3956</td>
</tr>
<tr>
<td>POPGROWTH</td>
<td>-0.0063</td>
<td>0.0363</td>
<td>-0.174</td>
<td>0.8619</td>
</tr>
<tr>
<td>INC</td>
<td>0.2096</td>
<td>0.2096</td>
<td>1.000</td>
<td>0.3173</td>
</tr>
<tr>
<td>DISTANCE</td>
<td>0.0114</td>
<td>0.0087</td>
<td>1.315</td>
<td>0.1884</td>
</tr>
<tr>
<td>F500</td>
<td>0.4573</td>
<td>0.2747</td>
<td>1.665</td>
<td>0.096</td>
</tr>
<tr>
<td>NIELSEN</td>
<td>0.3347</td>
<td>0.2401</td>
<td>1.394</td>
<td>0.1634</td>
</tr>
<tr>
<td>OTHER/POP2000</td>
<td>3.6594</td>
<td>2.3024</td>
<td>1.589</td>
<td>0.112</td>
</tr>
</tbody>
</table>

Mean dependent 0.59184 S.D. dependent 0.4966
S.E. of regression 0.27766 McFadden R-s 0.6609

All the coefficients but one have the correct sign. Four of the seven are statistically significant at a 10% level or better in a one-tailed test. The statistically significant coefficients are for the following variables: the distance from the nearest NFL city, the number of other sports teams in the city per million population, the "Monday Night Football" television ratings, and the number of Fortune 500 headquarters in the city. The income variable missed being significant at only a 10% level. The only high correlation among the independent variables is between F500 and POP2000. This may explain why the coefficient of POP2000 does not appear statistically significant.

Table 2 shows the standardized coefficients in the logit model. Standardized coefficients scale the coefficients in the model using the standard deviations of the each independent variable and the dependent variable. By this method, the Fortune 500 and population variables have the most effect on whether a city has a team or not. Each have more the twice the size and therefore twice the impact than the other standardized coefficients. Distance and the presence of other professional teams rank next in importance followed by Nielsen ratings and income.

Table 2: Standardized Coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standardized Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>F500</td>
<td>11.33</td>
</tr>
<tr>
<td>POP2000</td>
<td>7.35</td>
</tr>
<tr>
<td>DISTANCE</td>
<td>3.01</td>
</tr>
<tr>
<td>OTHER/POP2000</td>
<td>2.56</td>
</tr>
<tr>
<td>NIELSEN</td>
<td>1.99</td>
</tr>
<tr>
<td>INC</td>
<td>1.89</td>
</tr>
<tr>
<td>POPGROWTH</td>
<td>-0.0024</td>
</tr>
</tbody>
</table>

Table 3 shows the results of the in-sample forecasts. The logit model correctly predicted the current NFL franchise status in 45 out of the 50 metropolitan areas. The missed predictions included Los Angeles (this outcome is made using an out-of-sample prediction), San Antonio, Salt Lake City, Buffalo, and Jacksonville. For the first three misses, the model predicted the cities would have teams but they do not (for our purposes, any probability greater than 0.50 means the city should have a team). Buffalo and Jacksonville have teams but the model predicted that they do not.

Table 3: Predictions* All predictions are within-sample, except for the out-of-sample forecast for Los Angeles.

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Actual Outcome</th>
<th>Probability of a Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>Los Angeles*</td>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>Chicago</td>
<td>1</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Table 4 shows the top five candidate cities to have teams either through expansion or relocation. The logit model predicted that Los Angeles would have a team with a probability of 1.0, which is not surprising given that it once had two teams. However, if NFL owners continue to use the city as a credible threat, and if a new stadium is not in the package for the Los Angeles team, then the other cities in this list deserve consideration. Next is San Antonio, where the Saints have already tested the waters with great success. The logit model estimated that San Antonio had a probability of 0.56 in obtaining an NFL franchise either through relocation or expansion. Salt Lake City is a more marginal candidate at 0.51, and the model suggests that both Sacramento and Columbus are not viable candidates (their predicted probabilities are less than 0.5).

Table 4: Predicted Probabilities for Candidate Cities from the Sample

<table>
<thead>
<tr>
<th>CITY</th>
<th>PREDICTED PROBABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles</td>
<td>1.0</td>
</tr>
<tr>
<td>San Antonio</td>
<td>0.56</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Table 4: Predicted Probabilities for Candidate Cities from the Sample

CITY       
Los Angeles 1.0
San Antonio 0.56
Salt Lake City 0.51

League expansion and the open Los Angeles market have been discussed in the NFL by both the outgoing Commissioner Paul Tagliabue (NFL.com, 2004) and the new Commissioner Roger Goodell (Farmer, 2007), but there is no short term timetable for expanding to a 33rd team or moving a troubled franchise there. Nonetheless, the league has been working with investor groups representing sites at the Los Angeles Coliseum and the Rose Bowl in Pasadena (NFL.com 2004). Besides New Orleans, Buffalo and Jacksonville are mentioned as cities that might lose their franchises (The Sports Economist, 2006).

**Do the Saints Go Marching Back In?**

Under pre-Katrina conditions, New Orleans had a probability of 0.85 for its in-sample prediction for having a team (see Table 3). But this changes when the potential depopulation of New Orleans is considered. The extensive damage to the city of New Orleans was not only to the industrial and commercial structures. Whole residential sections of the city were destroyed and depopulated.

The model prediction included depopulation in two parts. First, the New Orleans metropolitan area population was reduced by 10, 20, 25, and 30%. Second, the Nielsen television ratings were correspondingly reduced. No adjustment was made to the Fortune 500 headquarters because New Orleans has only one such company, Entergy Corporation, and it will remain in the area.

Table 5 shows the simulation results for different assumptions about permanent depopulation for New Orleans. The most recent population estimate from the Census Bureau dates from July 1, 2006. At this time, a 400,000 loss was announced (Whoriskey, 2006). This 30% decline would put the predicted probability for New Orleans at approximately 0.43. Only Buffalo and Jacksonville have teams with lower probabilities than this. But this worse case scenario is outdated. A portion of the 400,000 have returned to the metro area since June 2006, but how many will ultimately return? At this time, there is no planned Census Bureau update for the New Orleans metropolitan population.

Should half of the displaced 400,000 return, the model would put place a probability of 0.59 that New Orleans will have (in this case keep) a team. The most optimistic non-official estimate (as of December 20, 2006) put the metro area at 1.2 million (Savidge, 2006). This is less than 10% depopulation, and the model provided a more comfortable 0.74 probability of having (retaining) a football team.

**Table 5: Predicted Probability of a Team in New Orleans with Depopulation**

<table>
<thead>
<tr>
<th>PERCENT POPULATION REDUCTION</th>
<th>PREDICTED PROBABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>0.74</td>
</tr>
<tr>
<td>20%</td>
<td>0.59</td>
</tr>
<tr>
<td>25%</td>
<td>0.51</td>
</tr>
<tr>
<td>30%</td>
<td>0.43</td>
</tr>
</tbody>
</table>

**Conclusion:**

Expansion and relocation of franchises in the National Football League remains an active topic when one considers the fates of both the Los Angeles and New Orleans markets. Although expansion is not a current short term goal for the NFL, relocation of teams in weak markets remains an annual possibility. The researchers have estimated a model that identifies those weak teams based on economic and demographic factors, and, more importantly, identifies candidate cities for new or relocated teams. Buffalo, Jacksonville, and a depopulated New Orleans are vulnerable to losing their teams, while Los Angeles and San Antonio are viable candidates to offer new homes to teams. What happens next depends on the interests of the current owners and the investor groups in the candidate cities, as well as the state and local government support for new stadiums in the old or new locations.

**Endnotes:**

1 “The most recent NFL expansion, when the league was deciding between Houston and Los Angeles, is instructive on this point. In general terms, the decision between the two locations hinged on two considerations regarding the Houston and Los Angeles markets. First, the league considered the financial contribution that either location would make to the league. Second, it considered the value of an open location and the negotiating advantages it provided to current league membership. Keeping the best believable threat location helps owners in negotiations with their current host cities (Fort, 2006, p. 393).

2 Gary Roberts, a professor at Tulane University Law School and an expert in sports business issues, states “Everyone knows New Orleans was a marginal major league market. More and more, the NFL has come to rely on corporate dollars and New Orleans doesn't have a very large corporate base” (Isidore, 2005).

Then Football Commissioner Tagliabue comments on whether New Orleans can support an NFL team long term: “[team owner] Benson has strong personal and professional ties to San Antonio, the suspicion remains that he would prefer to permanently locate the franchise there. Benson fears that the rebuilding of New Orleans, a process expected to take years, will threaten the team's financial viability” (Pasquarelli, 2005).

3 A Nielsen TV rating is the percentage of households watching that particular television program out of all households with televisions. A TV share is the percentage of televisions in use that are watching that particular program.
The population growth variable was not altered because its coefficient 1) had the wrong sign, 2) a very small magnitude, and 3) was highly insignificant statistically.

“As a city in flux New Orleans remains statistically murky, but demographers generally that the population replenishment after the storm, as measured by things like the amount of mail sent and employment in main economic sectors, has leveled off” (Dewan. 2007).

The Census Bureau is “just not equipped to provide real time population estimates in a situation that is changing as rapidly as New Orleans” (Plyer, 2007).

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Abstract
The notion of paying college football players has been an ongoing debate since the early 1900's. With current television revenue resulting from NCAA football bowl games and March Madness in basketball, there is now a clamoring for compensating both football and basketball players beyond that of an athletic scholarship. This article takes a point/counterpoint approach to the topic of paying athletes and may have potential implications/consequences for college administrators, athletes, and coaches. Dr. John Acquaviva defends the current system in which colleges provide an athletic scholarship that provides a “free college education” in return for playing on the university team. Dr. Dennis Johnson follows with a counterpoint making the case that athletes in these sports should receive compensation beyond that of a college scholarship and forwards five proposals to pay the athletes.

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