Sports Analytics: An ethical assessment of current regulations, current sources of risk, and future sources of risk

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Introduction

Sports analytics, the concept of using data-informed decisions to achieve an upper hand in performance, has become increasingly popular ever since the book "Moneyball" by Michael Lewis (2013) transformed the baseball industry. The latest innovations in sports analytics are presented at the Massachusetts Institute of Technology Sloan Sports Analytics Conference every year, where baseball, basketball, and football have a dominating presence because of their aggressive induction of sports analytics (Sweeney, 2019). Despite the global prolific popularity of golf, and in particular the near 24 million golf players in the US alone, golf has only increased the usage of analytics in the last few years (Gough, 2019). Analytics companies like ShotLink® and ShotByShot® currently offer advance to the Professional Golfers' Association (PGA), but the game falls far behind the curve in achieving the same level of implementation as other major sports (Dusek, 2018). Beyond the PGA stats and analysis, amateur and collegiate players don't have technology to rely on when working to efficiently improve their score.

Our technical team's focus is to use a small subset of round statistics from a player to provide a recommendation for drills that will effectively improve their next round of golf. The advancement into data-driven approaches can be seen trickling down into all sports. A research report expected growth of "the global sports analytics market… [will reach] a revenue of $4.5 billion by 2024" (Infoholic Research LLP, 2018). For data analysts, this expansion is an opportunity to find new breakthroughs hidden in athletic data, but many stakeholders in the global sports market have not considered all of the implications that could result from this expanse of sports analytics. As sports analytics grows at an exceptional rate, concerns about the negative implications of overusing the data without adequate regulation grow in tandem.

The excitement and push for more valuable findings can and often does cloud judgement on which advancements will best serve or harm athletes in the future. While it is impossible to predict every negative outcome or even predict a reasonable number of positive ones ahead of time, it's a worthy goal

to preemptively address any foreseeable issues or problems wherever possible. In this case, the introduction of anticipatory governance protocols are the best way to ensure responsible, ethical engineering from the start; because they provide useful safeguards to limit negative outcomes before analytics are employed in a real way. Any helpful anticipatory governance that would mitigate negative repercussions for athletes and could be put into action beforehand should be implemented from the start. Tackling these issues head-on should be the priority long before the benefits of implementing sports analytics are considered in the industry.

Technical Topic

Golf is one sport that recently began to analyze massive amounts of statistics to inform decisions regarding play, training, and player evaluation. This recent push into data-driven analysis has made companies like Game Forge into trailblazers in the field of golf analytics. Before, golfers both amateur and professional alike would rely on age-old knowledge and training methods that might have no statistical significance in affecting play. The golf market has been flooded with "swing analyzers," "smart golf clubs," and "GPS based stat tracking tools," all of which use comprehensive stats to inform a players' decision (Digest, 2019). A program that recommends training regimens based on a concise set of input statistics to effectively improve a player's score would be a major development in the golf industry.

Game Forge has enlisted our technical team to use their extensive and constantly expanding trove of data from PGA tour, Ladies Professional Golfers Association tour, collegiate, and amateur players. Using the provided data we will formulate a data-driven training recommendation system. A player will input roughly twenty statistics per round, relative to par score, birdies, bogies, etc. From these performance metrics we will create a methodology to form a recommendation on how to improve score. This process takes into account the effect of the Game Forge drills on performance, past performance of a golfer, and golf course difficulty. Our technical team aims to provide our client with a general training regimen process and an in-tournament training recommendation system to fully encompass the purpose of this technology.

Half of the team focused on continuing and refining this method by using the updated dataset of round scores to cluster players by score. For example, one cluster may be made up of golfers that scored a two relative to par and performed well on the greens. Another cluster may be made up of golfers that score a two relative to par and performed poorly on the greens but made up for it elsewhere in the round. The other half of the team has focused on working with the drill data, a dataset that includes performance on drills, among other variables. This subgroup is working to answer questions such as: Does score on a particular drill predict round score? Over what period of time should drills be considered when used to predict round score? Should drills performed long ago be weighted less than drills performed yesterday? If so, what is the function governing this decay? The team's current model is a simple linear model predicting round performance based on drill performance. Moving forward, the team will look to improve the model by incorporating clustering and time series analysis to better predict round performance based on drill performance. From here the team will be able to identify areas for individual players to improve. These areas will likely be the game categories or skill categories defined by Game Forge in which players should practice drills.

This drill recommendation system is an easily accessible tool that provides valuable insight with minimal effort from the players. Since most golf analytics companies require five hundred statistics per round, Game Forge's twenty statistics are convenient and easy for players to contribute. The value of sports analytics can provide a competitive advantage for players, but problems do arise when analytics on player data go too far without proper consideration of the implications.

The Need for Ethically Responsible Sports Analysis

The development of a drill recommendation system for golfers will provide players with training techniques to improve play without negative side effect, but when high-powered data analytics starts using biometric and performance data to value players, ethical and legal problems start to arise. Analysis of athletic data can provide insights into improving performance, mitigating injury, and streamline the recruitment process, but with those advancements comes some major threats for the athlete's themselves. Current regulations are insufficient when it comes to the collection and usage of biometric and

performance data from professional and collegiate athletes, often leaving players exposed to "risks of exploitation, coercion, and employee discrimination" (Karkazis & Fishman, 2017, p. 46). Regulations must be enacted to prevent unintended consequences and to maintain responsible innovation protocols for those directly affected: the athletes themselves.

The framework anticipatory governance includes the four main pillars of maintaining foresight and future orientation, integrating technical and social knowledge, reflecting as an organization, and making a value judgement on whether such steps should be taken. Anticipatory governance framework focuses on creating "future oriented dimensions of responsibility… that offer greater potential to accommodate uncertainty and allow reflection on purposes and values" (Stilgoe, Owen, & Macnaghten, 2013, p. 1569). This urges policy-makers and regulators to work with data analysts to foresee the future developments and ensure all athletes are protected from the negative implications that could arise. New innovations in sports analytics must be met with social and political responsibility for them to succeed without harming athletes. The current regulations and laws in place that address sports analytics need to be modified and adapted to each new development and concern discovered. For collegiate athletes that are not protected under Health Insurance Portability and Accountability Act, "NCAA does not currently address the use or collection of performance data in its bylaws" (Smolenski, 2019, p. 289). This leaves athletes' data to be used at the discretion of each specific team. Even for professional athletes, the protections in place are no more regulated or clear since "biometric and biomechanical data are typically not categorized as personal health information under existing federal framework" (Osborne, 2017). This exemption in federal law can be used by teams as an excuse to not comply with federal requirements. These nonspecific and unsupportive regulations leave the collection and use of athletic biometric data up to team preference, which in most cases is not in the best interest of the athletes.

In the article "Beyond Regulation: Risk Pricing and Responsible Innovation," the idea of innovation governance is described as "the need to drive responsibility 'upstream' in the innovation process" which is precisely what needs to happen in the world of sports analytics (Owen et al., 2009, p.

6903). The ethical responsibility to players needs to be prioritized among stakeholders in initial phases of the technologies rather than post-implementation. Reconstructing the framework of developing sports analytics responsibly will have to consider the multitude of stakeholders and different categories of data collected, biometric and performance amongst collegiate and professional athletes. The actors in charge of creating the regulations are team managers, league policy makers, lawmakers, player's union reps, and the engineers, and data scientists. Each stakeholder has some ability to regulate the negative outcomes with preventative measures. This regulation could occur in the form of contracts, security measures, collective bargaining agreements, leaguewide by-laws, and more.

At some point, the constant evolutions and improvements in sports analytics are bound to reach a level of personal data acquisition where any further would land users in murky water ethically. The personal data required to reach a point where a complete biometric evaluation of a player, for instance, might be something supremely attractive to stakeholders, who can see the financial value in it, while being so complete as to also invade on the privacies of the players. On professional and collegiate levels, athletes are facing the decision to release their data for analysis without comprehensive knowledge of the future outcomes or risks. The athlete's biometrics, "the measurement and analysis of any particular physical characteristic", or health data can include sensitive information about an athlete (Osborne, 2017, p. 38). On the other hand the performance data, game or practice statistics, are becoming so honed and advanced with analytics that even the slightest measurement could mean the difference between receiving a scholarship or not. Coaches and managers of teams are implementing the collection of both types of data, often forgetting to respect a player's right to privacy. The sources of risk in implementing analytics include threats to privacy, ownership of data, misinterpretation of data, confidentiality, data security, and coercion of players. An athlete's need for protection from these risks should not hinder their chances to have a successful career.

Research Question

This research addresses: What are the unintended consequences of utilizing sports analytics without sufficient regulation? And how can anticipatory governance mitigate the negative implications for athletes?

Methods

Analyzing how athletes are at risk and identifying where there is cause for new regulation or governance will aid analysts, players, team managers, and leagues to implement sports analytics in a effective way. The research offers case studies of how analytics have been misused or created negative consequences for athletes, and identifies sources of risk in professional football, baseball, basketball, and collegiate sports. The evaluation of current regulations surrounding the technology uses the dimensions of anticipatory governance to highlight the ethical issues at hand. Case law will be analyzed for its content to realize consequential ambiguity and necessity for revisement, specifically and primarily including *Rosenbach v. Six Flags*, as it is the seminal ruling available on biometric information privacy. Using policy as evidence with content analysis from case studies, the research will address the areas of concern where current regulations fail to protect athletes' rights. This research takes into account the athletes perspective from the case studies and synthesizes the requirements not being met, which will reveal the gaps regulation of athletes privacy.

Results

Technological advancements have generated ways to gauge performance and athleticism which have not been considered before. Prior to the popularization of analytics on the world stage of sports, this method of data collection was less scrutinized. While this exponentially growing field is meant to educate athletes and enhance athletic performance, the sensitive data being collected has the capability to impair athletes in ways not correlated to their on-field performance.

An athlete exposes themselves to unforeseen risks by divulging all rights to their biometric and personal information. An unregulated release of data to a professional organization or a provider of biometric equipment leaves the athletes vulnerable to breaches of privacy, confidentiality, data security, and threats of coercion (Mintz, 2017). Existence of any one of these risks jeopardizes a player's career

and reputation. Direct pressure from team management, along with subtle pressure from teammates, for an athlete to participate in a data collecting practice believed will result in team success can strip a player of their autonomy. In addition to athletes being induced to hand over their data, the prevalent reliance on objective and precise data can diminish an athletes ability to voice their own competencies. In the U.S. the team or the third party analytics firm acquiring data has control over usage and distribution of the data. Whereas in the EU and Canada, a subject maintains ownership of their biodata, the US is trailing on the world stage of anticipatory governance of biometric analytics (Zeiger, 2017). The majority of sources of risk athletes face could be mitigated if two questions that were left unanswered by the creators of the technology were addressed properly. Who should own the rights to this data and how exactly should it be used and collected? Since the application of analytics, stakeholders have realized such issues and are beginning to bring about more protective regulation.

Though at the collegiate level, the National Collegiate Athletic Association (NCAA) has no current regulatory framework for the usage and collection of athletic data and yet there are "460,000 NCAA student athletes, more than ever before" (NCAA, 2019). Whereas at the professional level, some level of protection has been implemented in small doses and only as an afterthought from negative implications post implementation. Professional athletes have taken it upon themselves to demand the right to own their own data under league specific contracts, known as Collective Bargaining Agreements. This clarification is the beginning transition to a smarter, safer use of biometric data. Although data security measures and total prevention of coercion have not been fully fulfilled, this is a step in the right direction to provide a responsible tool that can be trusted to do more good than damage to athletes. Before sports analytics dives into deeper learning and develops further, these protective measures need to be unarguable and all encompassing.

There is undoubtedly an exuberance about the positive progress that can be made with the use of biometric data gathering due to how refined that data can be, especially if used to develop an individual's portfolio over an extended period of time. Extensive tracking can detect abnormalities that may lead to physical catastrophe and proper action can be taken in order to prevent severe injury from occurring. In a

less urgent example, athletic training can be managed at a whole new level, optimizing each exercise for individuals based on how their body is responding, overtraining can be prevented which normally leads to stagnation in athletic performance, and recovery rates can be monitored in order to perfect the levels which an athlete should be exerting themselves allowing for faster injury recovery and rehabilitation. While all of the above examples show endless possibility for the advancement of athletic performance and protection of athletes, a collection of data that is composed of such sensitive material also encompasses a number of factors which could be used against athletes as well.

Employers in the United State must abide by the Americans with Disabilities Act (ADA) and the Genetic Information Nondiscrimination Act (GINA) and their restrictions on access to employee information. Even though professional athletes are considered employees, these restrictions include health and safety loopholes that team lawyers currently utilize when addressing athletic biometric data (Karkazis & Fishman, 2017). Because of the lack of specificity or applicability of the federal mandates protecting civilian's health data, athletes must rely on other forms of protection such as league wide regulations and contracts. The National Football League Players Association (NFLPA) has opted to utilize wearables, a term given to biometric data collection devices that an athlete may wear during practice or everyday activity that tracks specific biometric readings, to track the effect of travel, sleep, scheduling, injuries, etc. on recovery and generate reports to advance player safety and maximize athletic performance (Mintz, 2017). The collective bargaining contract states that the biometric data collected is owned specifically by the players and that they personally are in control of what is done with the data. If a third party wishes to commercialize their data, they may do so, but only with the player's direct consent.

All league's collective bargaining agreements and health information authorizations (HIAs) must include some path for disclosure of health information to other entities in order for a doctor to address medical concerns or injuries, but the current HIAs that players sign leave data sharing relatively unrestricted. For example, the National Basketball Association players sign a HIA that is supposedly voluntary, but no player has ever refused. The "health information" in question here is defined as "my *entire* health or medical record, including, but not limited to, all information relating to any injury,

sickness, disease, mental health condition, physical condition, medical history, medical or clinical status, diagnosis, treatment or prognosis, including without limitation clinical notes, test results, laboratory reports, x-rays and diagnostic imaging results" (Karkazis & Fishman, 2017, p. 51). The NBA's HIA permits a team to release "any medical or information pertinent to us playing basketball...with physicians, doctors, other teams, D-league teams, and basically anybody that's NBA related" (Roberts et al. 2016, p.). Meaning when a player is traded a team could release his data to the procuring team without any consent from the player himself. To protect their rights, NBA players were forced to renegotiate their collective bargaining agreement to address this lack of proper oversight.

While the provisions within the NBA 2017 CBA do attempt to preemptively address the moral and legal hazards of using analytics without anticipatory governance they do not come without pitfalls. Drawing conclusions from the three pages pertaining to the biometric collection within the 600-page document display the exact issues that athletes and the league were discussing when negotiating this new contract. The nature of collecting sensitive data should automatically create the need for a large amount of discretion and therefore hyper-accountability. As listed within the CBA, only one brand of wearables was approved for players to use. Eliminating variables between the different types of wearables creates not only more consistent readings which can easily be compared, but also places sole accountability on a singular company which is responsible for guarding this information. The most telling sign of how deeply revealing much of this information can come from the stipulation within the contract that the information collected may not be used during negotiations of players' contracts. Any team found violating this provision is subject to a fine of $250,000 (Leung, 2017). This regulation enacted shows a step in the right direction, but as pointed out in a commentary on the updated CBA, a $250,000 fine is minuscule in comparison to the millions of dollars that could be shaved off of a player's contract by using biometric data in contract negotiations. The information to evaluate a player's longevity on the court or risk of injury during the season is too enticing for a team to not find work arounds to utilize this data when hiring players (Venook, 2017). Placing monetary value on how an athlete's body is performing internally, not just in gameplay, raises a variety of ethical questions. Players may be assigned numerical values based on

how efficient their bodies are, rather than how they are able to perform with a team or on the field. While genetics inevitably play a large part in how an athlete is able to develop, it should not be a true gauge of the true athleticism a person may possess.

Fortunately, the issues that come with biometric data collection have already been realized and are still being examined. Outside of the world of athletics, biometrics usage without full knowledge and consent from the subject has been scrutinized heavily as well. There exists no current overriding case law with respect to data collection of athlete's personal information, however the primary persuasive case in the U.S. regarding the use of biometric data is *Rosenbach v. Six Flags*. Six Flags was collecting fingerprint recognition data from its season pass holders at their theme parks without informing their informed consent and were ruled in violation of the Biometric Information Privacy Act (BIPA) and were required to pay out damages between $150k to $1.5M in the class action lawsuit (2019). This ruling further protected the public (and thus also athletes) by holding any company or organization in violation of BIPA accountable for their actions.

Aforementioned, BIPA was created in Illinois in 2008 as a way for the public to be protected from illegal collection and storage of biometric data. It is a strict guide that outlines exactly how a company may legally go about collecting this data in a legal sense and provides grounds for any individual to follow suit if a company or another individual were to deviate from this set parameters. While BIPA is effective only within the borders of Illinois, other states such as Washington and Texas have followed suite and created similar doctrines (2008). Due to the fact there is no overarching bill that has been created at a federal level to protect the general population from this type of collection, taking proper precautions when allowing this type of collection on oneself is vital in order to protect this new highly sensitive information. Without federal oversight, the best case scenario in any legal dispute would be to consider the ruling in *Rosenbach v. Six Flags* as persuasive and relevant no matter the court circuit.

Major League Baseball's Players Association amended their collective bargaining agreement in 2017 that specifically outlines the most well governed implementation of sports analytics to date. The agreement is very strict on the league and teams management to ensure vital player safety and privacy are

respected during the usage of wearable devices (Zych, 2018). The agreement requires the use of all devices are strictly voluntary and no consequences will come to a player that refuses to participate. Secondly, the agreement outlines exactly what such devices fall under this category, and who exactly has the opportunity to access the data collected from these devices. The enactment of a joint committee on wearable technology (JCWT), comprised of representatives from player's union, analytics technology expertise, and sports management will govern the implementation and usage of such devices. The JCWT will have the ability to recall any technologies usage that have been allowed before and determine exactly what extent any future technologies will be used in the MLB (Brown, 2020). These specific rules and governing committee will protect players from the risks the technology could put athletes in. Of all of the examples of anticipatory governance in sports analytics listed, this three page outlined regulation for the MLB proves to be the most effective, complete, and align to the framework of anticipatory governance.

Discussion

Many unintended consequences of this new form of monitoring can be proactively eliminated by strictly enforcing contracts that protect the athlete's information first. The world of data analytics must begin engaging with anticipatory governance to form a more risk adverse way to use data to enhance athletic efficiency. It is important to consider what negative effects will evolve from this technology before it becomes so integrated to sport that no amount of regulation or recall could stop widespread misuse.

Our team often found it difficult to reach sources and were hamstrung by the lack of specific case studies or firsthand athlete testimonies (understanding interviewees risks their careers by speaking out against athlete data issues within the industry). Ethical implications of biometric data proved to be a controversial and sensitive topic that most athletes, coaches, and team owners are wary of discussing with the public because of the weighty implications. Choosing a less controversial research topic with lower profile stakeholders would have made case studies more readily available while also providing access to

firsthand interviews. Nevertheless, a review of regulations was indicative enough to show the issues and areas for improvements necessary in sports analytics regulation.

Engineering a new technology has a significant number of implications. In the case of athletic biometric data analysis, many aspects and risks were not properly evaluated before implementation. Not all future results are foreseeable, but this process has shown that as innovation develops and continues to be widely implemented, careful consideration for protective measures needs to be married to the innovation process. Anticipatory governance proposes establishing a decision-making framework that will account for a wide range of future outcomes in data analytics. The framework requires continual monitoring and evaluation of the long term effectiveness of previously-enacted regulatory policies to guide future decisions. Requiring all future usage of analytics, biometric or alike, to be governed by this framework would make for the most responsible transition to a data-driven world.

Conclusion

There are many unintended consequences that can come from the use of more aggressive and advanced sports analytics. While there is no question about the medical and athletic advancements that can be made by using athlete's biometric data, the implicit risks raise ethical concerns. By safeguarding the data and giving sole ownership of what is collected to the athletes themselves, a player would not be at an unfair negotiating advantage with a team they would wish to sign with. Compartmentalizing the use of the data to only training and research while heavily penalizing any other entity wishing to acquire these records is a safer way to utilize this new technology. With the proper use of contracts, such as the MLB's collective bargaining agreement amendment in 2017, the pros vastly outweigh the cons of using wearable devices. At Howard University, the use of a wearable was able to alert staff to the rising core temperature of an athlete before they began to show signs of heatstroke and dehydration, allowing the proper measures to be taken before any serious harm came to the athlete (Sanyal, 2018).

Revolutionizing the field of sports analytics to promote a protection of athlete's rights will aid in ethically implementing the use of analytics in other industries in the future. Biometric analytics technologies are becoming increasingly widespread in our world. Although professional sports is a major

frontrunner in industry-wide implementation of biometric analytics, collegiate and high school athletes are right behind as new technologies become more available. Military and commercial usage would be the next logical fields to fully adopt biometric analytics to improve efficiency, health outcomes, etc. (Karkazis & Fishman, 2017). If this expansion into other consumer, civilian, and military fields continues without proper protection regulations, the world could see detrimental effects even beyond the risks that athletes currently face. The invasion of privacy is a pressing issue globally, thus using a foresight oriented framework to govern preemptive regulations will mitigate risks of negative outcomes.

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