Perception vs Reality: The Influence Opposition Ability Has On Physical Output in Youth Football & Futsal

A Thesis submitted in fulfilment of the requirements for the Degree of Master of Science in Psychology At the University of Canterbury University of Canterbury

> Atticus Foulcher 2022

Research Supervisors Professor Katharina Naswall Dr Brad Miles

Acknowledgements	3
Abstract	4
Introduction	5
Home field advantage	6
Fans	7
Opposition factors	8
Cognitive evaluations of opposition ability	11
Objective analysis of opposition ability	11
Arousal & Heart Rate	14
Present Research	16
Rationale	17
Research Framework	17
Hypotheses	20
Study 1 Method	21
Study 2 Method	
Study 1 Results	
Study 2 Results	
Discussion	
Conclusion	43
References	44
Appendix A: Information and consent forms	49
Appendix B: Appendix B player information sheets	55
Appendix C: Child Assent forms	57
Appendix D: Newsletter email	59
Appendix E: Game Day Questionnaire	60
Appendix F: Ethics Approval	61

Table of Contents

Acknowledgments

Firstly, I would like to extend my deepest gratitude to my supervisors Brad Miles and Katharina Naswall. I would like to highlight and recognise the invaluable guidance and mentorship of Brad Miles who has continued to support me from my first visit to his office seeking his advice, throughout my honours qualification and presenting at the SESNZ conference, to the completion of my masters, your support has been unwavering. This project would not have been possible without Katharina Naswall, I am extremely grateful that you facilitated the opportunity to work together over the past year, I am thankful for your guidance and wisdom especially following COVID-19 related dilemmas. Secondly, I would like to thank my mum Susan and sister Darian, I got so much more than I bargained for getting you as a mum, you have always supported me in everything I've done, and words cannot express how much you mean to me. Darian you've always been in my corner through everything, I couldn't have asked for a better sister. Thirdly, I would like to thank my friends for bringing the best out of me and being both supportive and interested in my work. Lastly I'd like to thank my partner Geneva, you've always been my biggest supporter, always challenging me to be better, I love you and the life we've built together, and I cannot wait for what the future holds for us.

Abstract

Opposition ability is a social cognition factor that has been shown to influence physical output, technical variables, and cognitive decision making processes. Previously it has only been measured objectively, this study showed that opposition ability was an individually subjective factor ultimately determined by perception. The purpose of this study was to compare the prediction strength of an objective measure of opposition ability against a perception based measure of opposition ability. This was done in order to determine which measure best and most significantly predicted physical output. The data for this project was collected over the course of six different football and futsal games. Perceived opposition ability score was measured on a seven point Likert scale game day questionnaire, opposition time in possession was the objective measure of opposition ability and was measured in seconds. Heart rate was used as a proxy measure for physical output and was measured at five second intervals using polar H7 heart rate monitors. Multiple regression analysis showed

that perceived opposition ability score significantly positively predicted average and maximum heart rate in both football and futsal. Time in opposition possession was shown to not be a significant predictor of average or maximum heart in either football or futsal. These findings indicate the important role perception plays in the influence opposition ability has. The results of this study highlight and suggest a perception based measure of opposition ability is a more statistically significant predicter of heart rate rather than an objective measure. Highlighting that an individually subjective perception based measure can offer insight and understanding that an objective measure could not provide.

Perception vs Reality: The Influence Opposition Ability Has on Physical Output in Youth Football & Futsal

Psychological factors influence physical, technical, and mental aspects of player performance. Small aspects thought to be insignificant have been shown to be instrumental in the outcome of games and the performance of individuals, for example in football on the international stage taking the first penalty in a shootout can increase your team's chances of winning by up to 20% (Palacio-Huerta, 2017). These influencing variables strongly contributing to positive outcome. These ever present factors show just how heavily both an individual's and team's performance can be enhanced or diminished. The present study investigates two such factors, perceived opposition ability and opposition time in possession, examining and comparing the extent of each factors influence on average and maximum heart rate.

Many of the psychological factors influencing game outcomes can be viewed from the overarching umbrella of social cognitive theory and its relationship with motivation. Social cognitive theory focuses on the interplay between personal, environmental, and behavioural factors, and how they relate and influence one another (Bandura, 2005). The concept of motivation in this case stems from an individual's desire to act in line with their beliefs about what they are capable of and what outcome they expect from their actions (Petri, 2012). Previous research developed a framework to categorise any social cognitive factor into one of three specific factors categories (Plessner and Haar, 2005). Firstly, personal factors can be noted such as an individual's age, their perception and thought process, and past experiences. Secondly, there are environmental factors, such as the resources each one of us has and our

access to these, along with the type and level of support we have from family. Lastly, there are behavioural factors which are the manner and way an individual displays behaviour, what the individual has achieved from repeating the behaviour and their competence with the behaviour (Umphred's Neurological Rehabilitation, 2020). These factors, how they link and interact with one another can influence human conduct and performance in many circumstances. The framework that has been developed can be used by researchers to explore the operation and outcomes of cognitive and affective motivational processes including sporting competitions (Cunningham et al., 2005).

Home field advantage

One of the most famous and widely regarded cases of a social cognitive factor influencing sporting performance is that of home advantage. This benefit the home team receives by playing at their own ground is well recorded, factors linked to specific locations have been suggested as contributing to the home advantage phenomena, yet more often than not the home team have a higher likelihood of winning (Legaz-Arrese et al., 2012). Lago-Penas and Lago-Ballesteros (2011) examined 380 professional football games to show just how impactful simply where you are playing can be. They showed the immense impact home advantage can have, as home teams had significantly higher means for a plethora of attacking and technique-based variables. Home teams scored more goals, had more possession, more total shots, successful passes, and dribbles among other variables. The study highlights just one social cognitive factor that can help or hinder a team and individuals' game simply by the location of the match. Home field advantage has been shown to be rife throughout so many sports, not just football, rugby, volleyball, water polo and roller hockey to just name a few (Gomez et al., 2011). Having such influence across multiple sports shows how far reaching and impactful social cognitive factors can be.

Fans

Surprisingly the COVID-19 pandemic has shown that the absence of external influences can also completely change the game as we know it. With the 2020-2021 English Premier League season played behind closed doors it became apparent just how much fans can influence games. The BBC's "Premier League: Is absence of fans behind the goal *rush?*" compared the beginning of the 2021/2022 Premier League season with previous seasons and showed that with no fans in attendance on average games had just over four (4.05) 'big chances' per game. Big chance can be defined as a situation where there is a reasonable expectation for the player to score, an example of this would be a one on one scenario or from very close range with low to moderate pressure from the opposition and a clear path to goal. The 2021/2022 being the season highest average 'big chances' per game ever recorded, not only that but within the first 38 games of this season there were an average of 3.79 goals per game, the highest the league has seen since 1930-1931 season (Henry 2021). This drastic and almost unheard of change could be attributed to the fact that no fans were at the games. During that season behemoths of the league Manchester United and Liverpool were rocked to shock defeats. Manchester United suffered their worst loss in the last decade and had their worst first half performance in 63 years in a 6-1 loss to Tottenham Hotspur (Goal, 2020). Manchester United's loss was only one day after Liverpool's worst loss in 57 years, a 7-2 thumping by Aston Villa (talkSPORT, 2020). These two losses were the biggest defeats these two high calibre premier league teams had suffered against their respective opponents in over 100 years of competing and playing against one another. These outlier events coincidentally occurring when there are no fans, and the league is having the highest goals per game since 1930 implies just how much the fans as a factor can influence

and sway games, if fans were at the two previous mentioned games then it is possible that there would have been less 'big chances' and less goal scored. If these stark and drastic changes are down to the absence of fans this would again showcase just how much social cognitive factors influence sport.

Opposition Factors

Opposition in sport can be defined as the individual or team who you are competing against. Previous research and examination of the topic of opposition has yielded results showing the magnitude of opposition as a factor effecting performance. Opposition affects so many facets of an individuals and teams performance, it can influence physical output such as distance covered or sprint speed (Aquino et al., 2017) or influence technical aspects of one's game be it passing or shooting (Redwood-Brown, 2019). Opposition will always be a factor affecting sporting performance, the better we understand how it influences and affects us the better we as competitors can adjust to ensure every sporting performance is to the best of our ability.

Opposition is a constant factor across direct interactive sports, where players compete directly against other players, like basketball or hockey, and is present in all levels of sport from world class professional athletes to community grass roots competition is opposition. An opposition is the individual or team that you compete against in a sporting match or competition. Without an opposition it would be impossible to have a form of sporting competition or event, yet opposition gives the ability to create addictive narratives, create rivalries and give importance to otherwise less meaningful games. Opposition is a factor that influences sporting outcomes, a match between teams is made that much more entertaining the greater the discrepancy in ability. For example, Buster Douglas shocking the world and

beating the undisputed, undefeated heavyweight champion Mike Tyson in 1990 at a 42/1 odds, or Leicester City shocking the world as only a year after barely surviving relegation, they then go on to win the premier league 2015/2016 season at 5000/1 odds. Opposition ability has been a crucial topic in previous research, as it has been shown that opposition ability can influence both physical and technical output (Redwood-Brown, 2019) as well as influence cognitive evaluation processes (Carlos Lago 2009).

Opposition ability is a far reaching influential factor that can impact a wide range of variables, impacting outcomes on both an individual and team level. Previous research has shown opposition ability capacity to influence many facets of many different sports. Previous research relies heavily on the classification of team quality through k-means cluster analysis, wins, losses, and draws are used, and statistical test determine what category each team is classified as. Teams are categorised to be either weak, balanced, and strong, this objective and statistic categorisation through k-means cluster only considers objective data. Redwood-Brown et al. (2019) and Carlos Lago (2009) both used this methodology and further examine the extent to which opposition ability can influence technical and physical performance in a professional football environment. The studies mentioned gathered technical and individual data on 376 topflight games, from the 2005/2006 Spanish first division and the 2011/2012 English premier league. Their results showed the influence opposition ability truly has, as they found that depending on the level of an opposition ability individuals could assign more or less value to specific moments, scoring or conceding a goal for instance. Teams would perceive these kinds of events to hold more importance if they were playing against a higher calibre opposition. Alternatively the same kind of events would hold less importance or weight if they were playing against a lower calibre team. These findings show that opposition ability has the potential to influence individual cognitive evaluations in the moment, in real

time, during a competitive game. But it was not just perception of events that were shown to be influenced by opposition ability.

Redwood-Brown et al. (2019) also investigated pass accuracy and the types of passes that were played against weaker, balanced, and strong oppositions. One interesting finding was that pass accuracy was not affected by opposition ability, as regardless of the strength of opposition how likely a team were to complete a pass was the same. However, opposition ability did affect the number of passes, and what kind of passes were attempted, as this was dependent on the opposition's level of ability. When teams faced a weaker team there was a significant increase in the number of shorter passes attempted and an increase in pass attempts overall, yet when a team faced an opposition of higher ability they had a lower number of overall passes and a significantly higher number of long passes attempted. The study posited that these changes in the number of different pass types correlated to the style of play associated with the varying levels of opposition ability. For instance, when faced with a higher calibre opposition, teams chose a more direct route of attacking through long passes as a way to bypass the opposition as a whole. However, when playing against weaker teams there were a higher number of short passes attempted as the opposition was more focused on defensive shape and reducing the risk of conceding rather than actively pressing to win the ball, which allowed the team to have more short passing opportunities. These findings further solidify opposition ability influential status when examining cognitive decision making in football.

Cognitive evaluations of opposition ability

Praxdes et al. (2018) highlighted opposition ability and the capacity it has for influencing technical outcomes as well. Praxdes et al. (2018) also used an underrepresented population in current literature when examining the effects of opposition ability as the studies participants were junior footballers, with the participants for the study being U12. Praxdes et al. (2018) studied youth footballers over the course of a 14 week training and intervention program. This program showed average skilled players who trained against categorically weaker players improved their pass accuracy, decision making, and execution at a faster rate than equivalent players who trained against categorically stronger players. The study noted that this discrepancy in development between the groups could be attributed to touches and time on the ball, as with an environment of lower calibre players there was an increase in the time to make decisions and more time to better execute those decisions. This study showcased that opposition ability can affect rate of development in junior footballers, showing that even in a junior football setting opposition ability is an influential factor.

Objective analysis of opposition ability

Aquino et al. (2017) is another example of research using k-means cluster analysis as an objective way to statistically categorise an oppositions ability and showed how differing levels of opposition ability affect performance. The study noted that at the elite adult level when playing against a high level opposition, compared to playing against an opposition of a weaker level, players on average covered a greater total distance during the match, engaged in a higher number of high intensity activities, had a higher average sprint speed and also a higher maximum sprint speed. This study differs from previously discussed research as it

shows level of opposition ability has the potential to influence physical output, pooling these physical outputs together shows that this study is evidence of opposition ability influencing energy o, as it can influence players to work harder, run faster and longer, presenting the notion that as opposition ability increases so do the physical demands of the game.

Taylor et al. (2008) is a rare exception in the research of opposition ability, as although it measured opposition ability objectively through k-means cluster analysis like so many studies its results shed light on an aspect not previously mentioned. The study notes that although a team can be defined as successful and categorised as high ability they in truth may not be as successful, as comparisons of low ability and high ability teams are carried out in finite competitions such as the champions league, lower ability teams may progress to the latter stages of the competition at the expense of higher ability teams due to the competition structure. This highlights the fact that an objective measure and the three tier categorisation that is common practice when researching opposition ability does not encapsulate the entire story. Research has shown the many different and wide reaching ways opposition ability influences performance in sport, from physical demands such as total distance covered, to technical aspects such as number of passes made, or a players cognitive decision making process when their teams score or concede goals, all these facets of performance can be influenced by opposition ability. Taylor et al. (2008) highlights the difference between how players perceive an oppositions ability to be and the statistical measure of their ability. For example, when facing an opposition it is improbable that all players will share the same view of the opposition. One player could seem them as powerhouses, an opposition of high calibre. Yet a player on the same team could likely share a different view, they could see them as nothing more than an average opposition. Or even on the extreme end of the spectrum a player in the same team as the others could see them as nothing more than a bump in the road on the way to victory. Using football as an example with just the starting players there could

be eleven slightly different or substantially different perceptions of the oppositions ability, yet objective performance rankings have been the primary measure used to define opposition ability. It has been shown that opposition ability influences performance but the extent to which it does on an individual level has not been adequately investigated.

Previous research has been contradictory in their findings about possession being a determining factor in success for football teams. Bate (1988) posited that a more direct tactical approach was a better indicator of success in football, where the number of goal scoring opportunities was the factor that indicated success the best. Football has continually evolved, with there being a possession renaissance in the late 2000's that is still evident in modern football. In the 2021/2022 English Premier season Manchester City is atop of the league for points and possession (68.4%), followed closely by Liverpool (62.3%) FC with Chelsea in third (60.1%) (FBREF, 2021). Jones et al. (2004) examined and compared Bates (1988) conclusions to modern day football, Jones et al. (2004) found that successful English Premier league teams had longer possession than unsuccessful teams, insinuating that in fact it is the duration of the possession that is related to successful performance. When examining the current Premier League statistics it gives further support to Jones et al. (2004) findings, Jones et al. (2004) conclusions were further supported by Ligue 1, the French equivalent of the English Premier league, as they also had findings that mirrored the English Premier league and supported Jones et al. (2004), the two leading teams in the competition PSG (Paris Saint-Germain) and Marseille are also the two leaders in possession, 63.7% and 61.1% respectively (FBREF, 2022). This current day statistical information gives weight to theory that possession is related to both a successful performance and team. Current research shows that possession is related to success, on average the most successful teams retain and have possession of the ball the most, as evident in the statistical information above, successful

teams are the likelier they are to have more possession of the ball than unsuccessful teams (Collet, 2012). Possession is a determining factor in success yet piecing together research and statistics shows that possession does not guarantee success however successful teams have been shown to have more possession.

Arousal & Heart Rate

Arousal in sport can be defined as a human condition on a spectrum from sleep to extreme excitement, arousal is indicated physiologically, behaviourally, and cognitively (Marchant & Morris, 2004). Previous research into sports psychology has examined the relationship between arousal and performance ultimately developing the inverted-U hypothesis, see figure 1. The inverted-U hypothesis states that for optimal performance moderate levels of arousal are needed (Marchant & Morris, 2004). Arent and Landers (2003) showed that heart rate can be used as a proxy for arousal as they examined arousal, anxiety, and performance. The study centred on evaluating the inverted-U hypothesis place in current literature, they had 104 participants perform a basic response time task whilst exercising on a bicycle ergometer. Their results found that optimal performance on response time task was seen at between 60%-70% of relative heart rate reserve, with response times being longer once relative heart rate reserve exceeded 70% and below 60%. This showed that for optimal performance there needs to be moderate levels of arousal and that arousal is linked to heart rate. Inverted-U hypothesis states that there becomes a point of arousal that surpasses what is required for optimal performance, this requirement for optimal performance is not consistent threshold across all sports. For example, the top of a bowls players inverted-U would a relatively lower level of arousal compared to a football player who's inverted-U would exists at higher levels of arousal. Over arousal can be detrimental and negatively affect

performance. Take a test for example, the arousal you experience before taking a test can be a combination of anxiety, stress, and pressure, an optimal level arousal can help you focus, it can help you remember important information you studied, but coincidently too much arousal can lead to stress which will only impair and detrimentally affect your ability to concentrate, and it can make choosing the correct answer that much harder (Bali, 2015, Lopes Dos Santos et al. 2020)

Figure 1: The Inverted-U Hypothesis



Retrieved from Wikimedia commons 2019.

When researching sport heart rate has been shown to be a consistently useful variable for indicating a participant's level of exerted effort, previous research by Di Beradi Luft (2009), Karvonen and Vuorimaa (1988) and Suarez-Arrones et al. (2012) has shown heart rate use in determining the physical demands of different sports, exercise intensity, and use as a measure of exerted effort all with a high degree of validity. Ali and Farraly (2007), Capranica et al. (2001), and Bricout et al. (2010) have shown its useful application in football, not just in the context of an adult professional setting but at a grass roots and adolescent level. Ali and Farraly (2007) conducted a meta-analysis comprising of over 30 studies to determine if during a competitive match and training setting the heart rates of football players could accurately and consistently be recorded. Their findings showed that monitoring and recording the heart rates of football players could be done relatively easily and produce reliable and accurate results. The study noted its limitations due to the fact their entire participant population were adults, insinuating that their findings may not be attributable to youth and junior football. Bricout et al. (2010) reaffirmed Ali and Farraly (2007) conclusions but with youth footballers instead of adults, Bricout et al. (2010) showed that over the course of a five-month research period examining the heart rate of youth footballers in and out of both training and match environments heart rate information could accurately be gathered.

Present Research

Previous research has shown the influencing potential opposition ability has on different aspects of performance, be that physically with change in heart rate (Aquino 2017), technically with types and number of passes being made (Redwood-Brown 2019), or cognitively with decision making processes (Praxdes 2018). Previous research has also shown that heart rate is a reliable measure of exerted effort and an indicator of performance (Ali 2007, Bricout 2009). When reviewing previous research, it is evident that the individual's perspective was not researched to the same extent as an objective measure of opposition ability, research showed that an objective measure does not encapsulate the whole story, as players on the same team may share differing opinions about the opposition ability, leading to one objective measure of opposition ability with multiple measures of perceived opposition ability. Previous research has focused heavily on using an objective measure to

describe what could in truth be an individually subjective phenomenon (Aquino, 2017; Redwood-Brown, 2019; Taylor 2008). With minimal research investigating opposition ability on an individual level across different sports, and specifically none in football, rather instead having all the focus on the team as a whole, the findings on the topic cannot be taken as a certainty, as without adequate investigation ion the individual level conclusion cannot be made.

Rationale

That point of uncertainty is crucial to understanding the gap in current knowledge. Without research examining perception on an individual level the true relationship and extent to which opposition ability influences performance remains unclear and ultimately a mystery. Previous research has identified a defined gap in knowledge and an effective framework can be developed. The present research offers an opportunity to investigate both an objective measure of opposition ability and a perception-based measure of opposition ability and investigate the extent to which both those factors influence a measure of performance, with change in heart rate being used in previously. The present research also allows for the examination of opposition ability influence in different sporting contexts, as opposition is a factor across all sport it is imperative to investigate its influencing prowess in more than one sport, as there is no way to know if opposition ability influences all sport to the same extent.

Research framework

The present study examines how opposition ability, both a perception, subjective measure, and an objective measure, influences heart rate as a measure of performance across

two sports, those being football and futsal. This will give greater understanding to the influence that opposition ability has. Researching perception of opposition ability could shed new light and ultimately new insight into the role perception plays in understanding opposition ability.

The present research examining the influence opposition ability has in two different sports yields far more significant findings than one. Examining whether opposition ability influence on performance is dependent on what sport is played would shed even more light on an area lacking in empirical research. Comparing football and futsal provides a rare opportunity in which there are clear discernible differences in the two sports. For example the number of players, size and surface of the field, weight of the ball and their differing rule set. While simultaneously they share so many key factors, such as basic principles of play and style, scoring system and ball type. The two sports allow the opportunity to examine the same two measures of opposition ability, an objective measure and a perception based measure, comparing them against one another to see which factor influences a measure of performance that is also consistent across both sports.

The review of previous research highlighted a factor consistent across the sports and one which is extremely associated to success, possession of the ball. Measuring perceived opposition ability was accurately measured in the precursor pilot study to this Master of Science research thesis, *"Influence of Perceived Opposition Ability on Exerted Effort in Junior Footballers"* this was the first instance of a solely perception based measure of opposition ability, rather than the traditional objective based measure. The study showed it was possible for participants, even junior footballers, to be able to cognitively discern the quality of the opposition just prior to the match taking place. The results posited that as the players perceived their opponents to be of a higher quality both their average and maximum heart rates increased. Perceived opposition ability was also shown to be a significant

predictor of average and maximum heart rate. Yet as this was the first study of its kind and with the small sample size no discernible conclusion can be gathered. The only definitive conclusion of note that more research needs to be done on perceptions interaction with opposition ability and what influence it holds. These different research strands together form a framework where the same objective and perception measures of opposition ability, opposition time in possession and perceived opposition ability score, can be measured across two different sports. Examining the extent to which they influence a measure of performance/exerted effort, change in heart rate and maximum heart rate, this rare combination of consistent factors provides a platform to research a phenomenon that has not been researched, where so many questions still remain, completing the research is the next logical step in answering those questions.

From examining previous research it can be shown that opposition ability affects physical output. There is no definitive answer as to why this occurs, it could be because teams of different calibre have differing styles of play. For example, it has been shown that teams of higher ability tend to retain possession of the ball, this style of play necessitates more physical output to effectively defend against, like total distance run and number of high intensity activities. Another explanation could be that players calibrate their efforts on the basis on how strong they perceive their opponents to be, raising their effort for opponents they perceive as strong. Because player perception of opposition ability, as opposed to objective measures of opposition ability, has had minimal research previous research has not been able to ascertain what is really happening. The current research uses both perceived opposition ability and an objective measure of opposition ability, time in possession, to investigate the question of whether perceived opposition ability predicts physical output, as measured by heart rate, over and above time in possession.

Hypotheses

The aim of this study is to investigate how a perception and objective based measure of opposition ability affects physical output in football and futsal. Heart rate as used as a measure of performance/exerted effort, perceived opposition ability was measured via selfreporting Likert scale, and opposition time in possession as an objective measure of opposition ability. Examining the relationship that has only been considered objectively and not on an individual level. I hypothesize that perceived opposition ability will be a more significant predictor in average heart rate and maximum heart rate in both youth football and youth futsal players than opposition time in possession.

Hypothesis1:

H₀: Perceived opposition ability will not offer any predictive utility over and above opposition time in possession when predicting average heart rate in youth footballers.

H₁: Perceived opposition ability will offer predictive utility over and above opposition time in possession when predicting average heart rate in youth footballers.

Hypothesis2:

H₀: Perceived opposition ability will not offer any predictive utility over and above opposition time in possession when predicting heart rate when predicting maximum heart rate in youth footballers.

H₂: Perceived opposition ability will offer predictive utility over and above opposition time in possession when predicting maximum heart rate in youth footballers.

Hypothesis 3:

H₀: Perceived opposition ability will not offer any predictive utility over and above opposition time in possession when predicting heart rate when predicting average heart rate in youth futsal players.

H₃: Perceived opposition ability will offer predictive utility over and above opposition time in possession when predicting average heart rate in youth futsal players.

Hypothesis 4:

H₀: Perceived opposition ability will not offer any predictive utility over and above opposition time in possession when predicting heart rate when predicting maximum heart rate in youth futsal players.

H₄: Perceived opposition ability will offer predictive utility over and above opposition time in possession when predicting maximum heart rate in youth futsal players.

Study 1 Method

Participants

Participants were recruited from a local Football club in Christchurch, convenience sampling was then conducted within under 13 team by an expression of interest email being sent out to the entire team asking the players parents to indicate whether they were happy for their child to participate in the study. After all the expression of interest emails were returned, random sampling was then used to randomly select five participants from that group of 16. The perspective population consistent of fifteen male participants and one female participants, ages ranged from 12-14 with an average age of 13.

Design and variables

The study was a repeated measure design, with the same participants experiencing different level of the independent variables, perceived opposition ability and opposition time in possession.

The dependent variable for this study was the heart rate of the participants. The operational variables are average and maximum heart rate which will be measured through The Polar Team app. The independent operational variables were the score on the perceived opposition ability question on the game day questionnaire "our opponents are really good", see appendix, the players then indicate how much they agree with that statement on a scale from one to seven, one indicating they strongly disagree and seven they strongly agree, depending on the degree to which each participant agreed with that statement determined their perceived opposition ability score for that game. For example, if for the second game a player indicated a five for the statement "Our opponents are really good" then a perceived opposition ability score of five. Opposition time in possession was the total time the opposition had and retained the ball within the first 10 minutes of the game, with this being measured in seconds. This did not include when the ball goes out of play or if there was a stoppage in the game, when either one of these things happened the timer was paused. Opposition time in possession was only count when the opposition had possession of the ball, possession can be defined when a player on the analysed team, in this instance the opposition, had adequate control of the ball which then enabled the player a deliberate influence on its direction and outcome. Possession was continually counted until the ball either went out of play, an opposing player touched the ball, or the referee blew the whistle for a free kick or stoppage in play.

Materials

The gameday questionnaire was a seven point Likert scale survey. The questionnaire consisted of seven statements all on the topic of pre-game thoughts and preparations, for game day questionnaire see appendix. The research statement in the questionnaire was "our opponents are really good". Participant then indicated to what degree they agreed with the statement, their answers were on a seven point Likert scale, from strongly disagree as one to strongly agree as seven. The response each participant gave indicated their perception of the opposition ability. The questionnaire was completed on printed out pieces of paper prior to kick off. The Polar Team app was used in conjunction with five H7 heart rate monitors to both test for and record heart rate as a qualitative measurement. The PossesionBasic app was then used to count and record opposition time in controlled possession, this was done by reviewing the recorded game footage. After all the variables were collected the psychology postgraduate lab computers were used for statistical analysis, with excel and SPSS being the programs used. A newsletter style of email was written for the prospective parents/caregivers outlining the proposed research study to keep in accordance with HREC application. If the prospective parents replied with a yes, then they were sent an information sheet for the prospective participants written in plain English that briefly outlined the aims of the study. Both parental/caregiver consent forms and participants consent forms were prepared, age appropriate participant assent forms were also prepared as part of the materials for distribution again keeping in accordance with HREC guidelines. All forms were then sent out and subsequently completed by all prospective players and their parents.

Procedure

This research was first reviewed and approved by the University of Canterbury Human Ethics Committee, once ethical approval was obtained the parents/caregivers of the players were collectively sent a newsletter style of email, asking them to indicate whether they would like their child to participate in the study. The email had a simplified summary of the study, the study's purposes and what participation from their child would entail. Once each participants parent/caregiver had given their consent for their child to participate they were then electronically sent information sheets, one for parents/care giver, and one for the children themselves. They were also be given permission slip for the parents to sign, and an assent form for the children to fill in themselves, forms were either returned in person or electronically.

These forms outlined that the only participants data that will be recorded was heart rate and the answers the participant provides for the questionnaire. The forms also explained that opposition time in possession will also be recorded, and this was calculated from the recorded match footage. Once all the forms had been returned random sampling was conducted, a total of 14 parents responded indicating that they were happy for their child to participate in the study, subsequently those 14 players also returned the child assent form indicating they to where happy to participate in the study. Since more than five parents expressed that they would like their child to participate in the study random sampling was done to randomly select five participants. This was done because there are only five heart rate monitors available.

Before each game starts the heart-rate monitors were fitted to each participant by themselves or their parents. Once fitted they were connected to the Polar team app to ensure

they are working accordingly. After the heart rate monitors were fitted and connected the participants then joined the rest of their team for warm up exercises and experienced a normal pre match routine.

Prior to kick off during the warmup the participants were asked separately one at a time to fill out the game day questionnaire, each participant was given one minute to complete the questionnaire and directed to complete it independently of one another. Once the game had started the heart rates of the participants were recorded for the first 10 minutes, after that no more heart rate data was collected. The first 10 minutes of recordings of the games were analysed to determine opposition time in possession.

Only the first ten minutes of the game had any data recorded or gathered from, this was done to combat three main obstacles. Firstly, this is a children's sport, where substantial or equal participation of all team members is paramount. In keeping with is none of the participants played the whole game, as every player regardless of study participation should still receive substantial or equal game time.

Secondly, as the game goes on motivation levels can change depending on the events that have occurred. Motivation levels could be widely differing depending on the score. If an individual's team is up five to nothing, they might become complacent and lose motivation as there is not a challenge to overcome. Alternatively, if a team is losing five to nothing they may disengage from the game and slack off.

Thirdly, this was done to combat fatigue in these young players. If the data collection were to run later in the game each participant's level of fitness becomes an issue, and a barrier

they cannot overcome. The results then may not be a fair representation of the perceived opposition ability effect on heart rate. With just the first ten minutes being recorded the chances of fatigue setting in and obscuring the results is minimalised.

Once all the data was collected it was then stored on a secured password protected University of Canterbury server. All questionnaire data was stored in a locked filling cabinet in the School of Health Sciences at the university.

Once the season had concluded and all the data had been collected SPSS was used to examine the data and work out the statistical significance of perceived opposition score and opposition time in possession. One-way ANOVA was used to evaluate the impact each independent variable had on average and maximum heart rate. Multiple regression analysis was conducted to investigate and examine both perceived opposition ability and opposition time in possession as predictors of average and maximum heart rate, ultimately to determine the strength and statically significance of each variable.

Study 2 Method

Participants

The participants for this second study were again recruited from the same local football club. Convenience sampling was conducted was within an under 16 futsal team since there are only four outfield players per team on the court at one time only four participants are required for the study. Random sampling was then conducted to determine the four

participants from the prospective population, that population consisted of six male youth futsal players aged between 15-16.

Design and variables

Study 2 was the same repeated measure design as Study 1, with the same participants experiencing different level of the independent variables, perceived opposition ability and opposition time in possession.

As with study one with heart rate of the participants is the dependent variable for this study. Average and maximum heart rate are the dependent operational variable, heart rate was measured at five second intervals through The Polar Team app. The independent operational variables were again consistent with study one with the score on the perceived opposition ability question on the game day questionnaire and total opposition time in possession. Perceived opposition ability score was measured by the rating each player gave in response to the research statement "our opponents are really good" on the game day questionnaire, see appendix. Opposition time in possession was measured by the total time the opposition had and retained the ball within the first five minutes of the game, with this being measured in seconds and assessed by the researcher. The first five minutes were recorded rather than the first ten, as in study one, due to the games being far shorter, 40 minutes for futsal compared to 70 minutes for football and because substitutions in futsal were run every five minutes. This did not include when the ball goes out of play or if there was a stoppage in the game, when either one of these things happened the timer was paused. Opposition time in possession was only counted when the opposition had possession of the ball, possession can be defined when a player on the analysed team, in this instance on the opposing futsal team,

had adequate control of the ball which then enabled the player a deliberate influence on its direction and outcome, examples of this would be striking the ball or dribbling with it. Possession was continually counted until the ball either went out of play, an opposing player touched the ball, or the referee blew the whistle for a free kick or stoppage in play.

Materials

The same seven point Likert scale gameday questionnaire was used for both studies. The questionnaire consisted of five statements covering different aspects of pre match thoughts and experiences, covering topics like breakfast; and sleeping, whilst also covering topics like players preparedness and how "up" for the game they were, for game day questionnaire see appendix. The statement in the questionnaire that was the focus of this research and both studies was "our opponents are really good". After reading the statement participants then noted to what level they agreed with the statement, with possible answers ranging between 1 and 7, 1 representing strongly disagree and 7 representing strongly agree. The response each participant gave indicated how they perceived the opposition and in turn their level of ability. The questionnaire was completed on printed out pieces of paper prior to kick off. The combination of the Polar Team app and five H7 heart rate monitors were used to record heart rate. Video analysis was conducted on the recorded game footage and using the PossesionBasic app opposition time in controlled possession was determined. After all the variables were collected the same statistical analysis procedure from study one was followed with excel and SPSS being used on the psychology postgraduate lab computers for statistical analysis. Prospective parents/caregivers were sent a newsletter style of email outlining the research study, this was done to keep in accordance with HREC application. When a prospective parent returned yes, indicating they were happy for their child to participate, they were then sent an email containing the information sheet for the which was written in plain

easily understandable English. This information sheet briefly outlined the aims of the study and detailed the process of study and what to expect. As well as an information sheet prospective parents were sent consent forms for themselves; and participants consent forms. The forms for participants were age appropriate participant assent forms, again keeping in accordance with HREC guidelines. All forms were then sent out and subsequently completed by all prospective players and their parents.

Procedure

The research was first reviewed and approved by the University of Canterbury Human Ethics Committee, this was done prior to the futsal competition starting and once ethical approval was obtained players parents were sent a newsletter style email with brief information on the study and asked if they could indicate whether they were happy for their child to participate in the study. Once they replied with confirmation and gave consent, they were happy for their child to participate they were then sent information sheets via email, there was an information sheet specifically for the parent and one for their child. The information sheets were also accompanied by a permission slip for the parents to sign, and an assent form for the children to read over and complete. All forms were either returned in person or electronically via email.

These forms outlined and clarified that participant heart rate and their answers the for the game day questionnaire were the only data from to be recorded. The forms also explained that opposition time in possession will also be recorded, noting that this was calculated from the recorded footage of each game. Random sampling was conducted once all the forms had been returned. There was a total of six prospective participants who themselves and their parents responded indicating that they were happy to participate or happy for their child to participate in the study. Since there were only four outfield players on each futsal team randomly sampling was conducted to determine and select the four participants.

Before each game starts the heart-rate monitors were fitted to each participant by the participant themselves. After they were fitted and connected to the Polar team app to ensure they were functioning. After the heart rate monitors were fitted and connected the participants then joined the rest of their team for warm up exercises and experienced a normal pre match routine.

During the warmup, prior to kick off the participants were separately, one at a time, asked one at a time to fill out the game day questionnaire. There was a time limit of one minute for each participant to complete the. Heart rate data was recorded once the referee whistle for the game to begin, only the first five minutes of the game had any data recorded as after that substitution had to be made. The same time frame was used for the video analysis of the game footage, with only the first five minutes being examined to determine opposition time in possession.

Only the first five minutes of the game had any data recorded or gathered from, this was done to combat three main obstacles that are evident at any youth sport level. Firstly, this is a children's sport, where substantial or equal participation of all team members is crucial and a must. With futsal's constant substitution all players received equal game time regardless of their participation in the study, with all players playing three quarters of each game.

The second reason as to why only the first five minutes being recorded was to combat and control for changes in motivation. Motivation levels can change constantly throughout the match depending on what has occurred during the game. Motivation levels can be influenced by the score line. If an individual's team losing ten to one, they might become disengaged and lose motivation as there is an insurmountable challenge to overcome. Limiting the recording to only the first five minutes reduces the amount of in game motivation level changing events.

The third and final reason to limit the data recording was to control for fatigue. The later the data collection were to run the higher chance an fatigue can influence and obscure the results. Each participant's level of fitness is an issue, and everyone has their limits. The results then may not be a fair representation, and the real relationship perceived opposition ability and opposition time in possession have with heart rate could be obscured. Limiting these obscuring factors allows us to ascertain a clear understanding of the true relationship between perceived opposition ability and opposition time in possession have make a fair understanding of the true relationship between perceived opposition ability and opposition time in possession and players average and maximum heart rate.

Once all the data collection was complete it was then stored a University of Canterbury server that was secured, and password protected. Completed consent forms and questionnaire data was stored in a locked filling cabinet in the School of Health Sciences at the university.

Once the futsal season had finished and in turn all the data had been collected SPSS was used to inspect and the data and find out the statistical significance of perceived

opposition score and opposition time in possession. One-way ANOVA was used to evaluate the impact each independent variable had on average and maximum heart rate. Multiple regression analysis was conducted to investigate and examine both perceived opposition ability and opposition time in possession as predictors of average and maximum heart rate, ultimately to determine the strength and statically significance of each variable.

Study 1 Results

	Ν	Minimum	Maximum	Mean	Std. Deviation
Average heart rate	30	149.00	197.00	174.23	12.93
Max heart rate	30	169.00	229.00	198.47	16.13
Perception score	30	1.00	7.00	4.07	1.72
Opposition possession	30	192.00	312.00	236.00	39.91
Valid N (listwise)	30				

Table 1: Study 1 Descriptive Statistics

There was a total of 30 data entries in study 1, these data entries were obtained across six different games. Table 1 contains the descriptive statistics for study 1, across the six games the participants had a mean average heart rate was 174.23 beats per minute, with a range from 149 to 197 beats per minute, the participants had a mean maximum heart rate of 198.47 beats per minute, with a range from 169 to 229 beats per minute. Both average heart rate and maximum heart rate had a somewhat similar range. Average heart rate had a range of 48 and maximum heart rate a range of 60. Mean perceived opposition ability score was 4.067 across the six games, with a there being at least one data entry for each different perceived opposition ability score. Opposition time in possession had a mean score of 236 seconds, with a range from 192 to 312 seconds.

 Table 2: Study 1 Average Heart Rate Model Summary

				Std. Error of the
Model	R	R Square	Adjusted R Square	Estimate
1	.616 ^a	.379	.333	10.560

a. Predictors: (Constant), Opposition time in possession, Perceived opposition ability.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1836.510	2	918.255	8.234	.002 ^b
	Residual	3010.857	27	111.513		
	Total	4847.367	29			

Table 3: Study 1 Average Heart Rate ANOVA

a. Dependent Variable: Average heart rate

b. Predictors: (Constant), Opposition time in possession, Perceived opposition ability score

				Standardized		
		Unstandardize	Unstandardized Coefficients		_	
Model		В	Std. Error	Beta	t	Sig.
1	(Constant)	168.885	13.176		12.817	.000
	Perception score	5.798	1.703	.772	3.404	.002
	Opposition possession	077	.073	238	-1.052	.302

Table 4: Study 1 Average Heart Rate Coefficients

a. Dependent Variable: Average heart rate

Hypothesis 1 proposed that perceived opposition ability score would offer predictive utility over and above opposition time in possession when predicting average heart rate in youth footballers. Multiple linear regression was used to test if perceived opposition ability and opposition time in possession significantly predicted average heart rate in youth footballers. The overall regression was statistically significant, $R^2 = .379$, F(2,27) = 8.234, p = .002. The results showed that perceived opposition ability score significantly positively predicted average heart rate in youth footballers, B = 5.798, p = .002. It was also found that opposition time in possession did not significantly predict average heart rate in youth footballers, B = -.077, p = .302. The multiple regression analysis showed that hypothesis 1 was supported.

				Std. Error of the
Model	R	R Square	Adjusted R Square	Estimate
1	.534 ^a	.285	.232	14.13168

 Table 5: Study 1 Maximum Heart Rate Model Summary

a. Predictors: (Constant), Opposition time in possession, Perceived opposition ability.

Table 6: Study 1 Maximum Heart Rate ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2151.446	2	1075.723	5.387	.011 ^b
	Residual	5392.020	27	199.704		
	Total	7543.467	29			

a. Dependent Variable: Maximum heart rate

b. Predictors: (Constant), Opposition time in possession, Perceived opposition ability.

		Unstandardiz	ed Coefficients	Standardized			
Model		B	Std. Error	Beta	- t	Sig.	
1	(Constant)	181.294	17.633		10.282	.000	
	Perception	5.324	2.279	.568	2.336	.027	
	score						
	Opposition	019	.098	047	193	.848	
	possession						

- -

Table 7: Study 1 Maximum Heart Rate Coefficients

a. Dependent Variable: Maximum heart rate

Hypothesis 2 proposed that perceived opposition ability score would offer predictive utility over and above opposition time in possession when predicting maximum heart rate in youth footballers. Multiple linear regression analysis was used to determine if perceived opposition ability and opposition time in possession significantly predicted maximum heart rate in youth footballers. The overall regression was statistically significant R²= .285 F(2,27) = 5.387, p= .011. The results showed that perceived opposition ability significantly positively predicted maximum heart rate in youth footballers, B = 5.324, p = .027. It was also found that opposition time in possession did not significantly predict maximum heart rate in youth footballers, B = -.019, p = .848. This multiple regression analysis shows that hypothesis 2 was supported.

Study 2 Results

1 dole 0. Siddy 2 Des	Tuble 0. Shildy 2 Descriptive Statistics							
	Ν	Minimum	Maximum	Mean	Std. Deviation			
Average heart rate	24	163.00	190.00	176.2500	7.14599			
Maximum heart	24	181.00	205.00	190.7083	5.56760			
rate								
Perception score	24	1.00	6.00	3.9583	1.36666			
Opposition	24	72.00	111.00	86.0000	13.51328			
possession								
Valid N (listwise)	24							

Table 8: Study 2 Descriptive Statistics

In study 2 there were 24 data entries in total, these entries were gathered from six futsal different youth futsal games. Table _X_ shows the descriptive statistics for study 2, over the course of the six recorded games participants had a mean average heart rate of 176.25 beats per minute, with entries ranging from 163 to 190 beats per minute. The participants also had a mean maximum heart rate of 190.71 beats per minute, with entries ranging from 181 to 205 beats per minute. Perceived opposition ability had a mean score of 3.958, with perceived opposition ability score responses ranging from a score of one to a score of six. Opposition time in possession had a mean time of 86 seconds, with opposition time in possession entries ranging from 72 seconds to 111 seconds.

				Std. Error of the
Model	R	R Square	Adjusted R Square	Estimate
1	.569 ^a	.323	.259	6.15186

 Table 9: Study 2 Average Heart Rate Model Summary

a. Predictors: (Constant), Opposition time in possession, perceived opposition ability score.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	379.748	2	189.874	5.017	.017 ^b
	Residual	794.752	21	37.845		
	Total	1174.500	23			

Table 10: Study 2 Average Heart Rate ANOVA

a. Dependent Variable: Average heat rate

b. Predictors: (Constant), Opposition time in possession, Perceived opposition ability score

				Standardized			
		Unstandardiz	ed Coefficients	Coefficients	_		
Model		В	Std. Error	Beta	t	Sig.	
1	(Constant)	161.055	8.396		19.181	.000	
	Perception score	2.599	1.176	.497	2.209	.038	
	Opposition possession	.057	.119	.108	.480	.636	

Table 11: Study 2 Average Heart Rate Coefficients

a. Dependent Variable: Average heart rate

Hypothesis 3 proposed that perceived opposition ability score would offer predictive utility over and above opposition time in possession when predicting average heart rate in youth futsal players. Multiple linear regression was used to test if perceived opposition ability score and opposition time in possession significantly predicted average heart rate in youth futsal players. The overall regression was statistically significant R²= .323 F(2,21) = 5.017, *p* = .017. Through this statistical analysis the results showed that perceived opposition ability significantly positively predicated average heart rate in youth futsal players, $\beta = 2.599$, *p* = .038. It was also found that opposition time in possession did not significantly predict maximum heart rate in youth footballers, $\beta = .057$, *p* = .636. The multiple regression results showed that hypothesis 3 was supported.

Table 12: Study 2 Maximum Heart Rate Model Summary

				Std. Error of the
Model	R	R Square	Adjusted R Square	Estimate
1	.698 ^a	.487	.439	4.17136

a. Predictors: (Constant), Opposition time in possession, Perceived opposition ability score.

Table 13: Study 2 Maximum Heart Rate ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	347.553	2	173.777	9.987	.001 ^b
	Residual	365.405	21	17.400		
	Total	712.958	23			

a. Dependent Variable: Maximum heart rate.

b. Predictors: (Constant), Opposition time in possession, Perceived opposition ability score.

				Standardized		
		Unstandardized Coefficients		Coefficients	_	
Model		В	Std. Error	Beta	t	Sig.
1	(Constant)	176.093	5.693		30.930	.000
	Perception	2.476	.798	.608	3.105	.005
	Opposition possession	.056	.081	.136	.694	.495

Table 14: Study 2 Maximum Heart Rate Coefficients

a. Dependent Variable: Maximum heart rate.

Hypothesis 4 proposed that perceived opposition ability score would offer predictive utility over and above opposition time in possession when predicting maximum heart rate in youth futsal players. Multiple linear regression was used to test if perceived opposition ability score and opposition time in possession significantly predicted maximum heart rate in youth futsal players. The overall regression was statistically significant R^2 = .487 F(2,21) = 9.987, *p* = .001. Through this statistical analysis the results showed that perceived opposition ability significantly positively predicated maximum heart rate in youth futsal players, β = 2.476, *p* =

.005. It was also found that opposition time in possession did not significantly predict maximum heart rate in youth footballers, $\beta = .056$, p = .495. The multiple regression results showed that hypothesis 4 was supported

Discussion

This study was tasked with investigating whether a perception based measure of opposition ability was a better predictor of heart rate than an objective measure, specifically whether perceived opposition ability score was a better predictor of average and maximum heart rate in both youth football and futsal players than opposition time in possession.

The one consistent results across both studies and all regression analyses was that perceived opposition ability score was a significant predictor of average and maximum heart rate, furthermore opposition time in possession was shown to not be a significant predictor in any scenario. Opposition time in possession was used as a proxy measure of objective opposition quality and giving insight as to what was happening on the pitch. Previous research theorised that if an opposition team had long periods of possession then it may require greater levels of physical output to play against them and thus explaining any increase in heart rate. But the results showed that this was not the case, as the results showed that opposition time in possession did not significant influence heart rate. Perceived opposition ability score predicted average heart rate in youth footballers more significantly than maximum heart rate, yet the opposite was the case for futsal. Perceived opposition ability score predicted maximum heart rate in futsal players more significantly than average heart rate. Both studies had a similar mean perceived opposition ability score. Opposition time in possession was less comparable as opposing football teams had possession of the ball for an average of 39% of the first 10 minutes of their game yet opposing futsal team only had

possession of the ball an average of 28.6% in the opening 5 minutes, this discrepancy in possession percentage could be attributed to the more frequent stoppages in play in futsal, as the ball goes out more frequently in a smaller space and the timer has paused whenever the ball went out of play.

The results of this study presented similar findings to those that Aquino et al. (2017) presented, showing that as opposition ability increased so did average and maximum heart rate. The results also suggest that perceived opposition ability score is a more significant predictor of heart rate than opposition time in possession. The results replicate that opposition ability does affect performance but not in the way that previous research has shown. Previous research using an objective measure of opposition ability, k-means cluster analysis, suggested a direct relationship, opposition ability influences performance (Aquino et al., 2017), an A to B, yet the current study's findings suggest that perception moderates. A possible explanation of the findings suggests that the extent to which opposition ability influences heart rate is dependent on how the individual perceives them. As previously highlighted a team can have one indicator of opposition ability yet players on the same team may view the opposition ability differently, leading to multiple differing perceived opposition ability scores. This point is evident in the results as in every game, whether it was football or futsal, players shared differing views of oppositions ability and there were not any games where all players shared a consistent view. This would change how opposition ability is defined, as the findings of this study suggest the relationship that previous research has presented is although accurate it does not present the full story. Previous research would suggest that an opposition ability has a blanket effect on players (Aquino et al., 2017; Redwood-Brown et al., 2019), everyone experiencing the same level of influence. The combination of players perceiving the same opposition differently, perceived opposition ability score being a significant predictor of average and maximum heart rate in youth football and futsal players and that opposition time

in possession was not a significant predictor in any case showcase that there is more to quality of opposition and the influence it has than what previous research has presented.

A crucial reason as to why opposition time in possession was used as an objective in game measure of oppositions ability is because of its high correlation to end of season league placement. For both the football and futsal leagues at the end of the season all the opposition final standings were recorded. The results of this study are also consistent with the conclusion Redwood-Brown et al., (2019) presented, as they noted that oppositions of higher quality tend to retain possession of the ball more. When correlating opposition time in possession and final league table ranking it was found that they had an extremely high correlation, above .90 in both studies. These correlations concur with Redwood-Brown et al., (2019) conclusion about higher calibre teams retaining the ball for longer but the results of this study suggest that possession is not significant predictor of exerted effort, but perceived opposition ability score is. This does not indicate that opposition time in possession is the best measure of opposition ability but give more reason as to why it was used and highlights the relationship between high calibre successful oppositions and prolonged possession of the ball.

The results of the study showed that perceived opposition ability association with heart rate was evident in both studies, supporting the robustness of the effect. Perceived opposition ability score was a more significant predictor of average heart rate than maximum heart rate in youth football players. Coincidently the study showed that perceived opposition ability score was a more significant predictor of maximum heart rate than average heart rate in youth futsal players, with perceived opposition ability score predicting maximum heart rate of youth futsal players equating to the highest R² value across the study, R² = .487. These findings suggest that influence perceived opposition ability possess is different across differing sports, as similar as futsal is to football there is still a clear discernible difference in the results of the study. One possible explanation for these finding could be due to the differing physical demands, size of field and number of players of each sport. In futsal all outfield players are actively engaged with what is occurring during the game, whereas in football there are moments where players are not actively engaged. An example of this would be where the ball is on the right hand side of the pitch those players in the immediate area are actively engaged but the players on the far left are not actively engaged. This period of nonactive engagement allows to the opportunity for players to recover, this recovery period could lead to a decrease in heart rate. Futsal does not afford players the same period of non-active engagement, as all outfield players are directly actively engaged. Futsal players are actively engaged because of the negative effect it would have on their team if they were not. For example, in futsal there are four outfield players per team yet in football there is more than double that with ten outfield players, if one futsal player is not actively engaged with the game then the team loses 25% of their outfield players. In football if a player is not actively engaged with the play then it is only a 10% loss of a team outfield players. This difference in percentage highlights that there could be a far greater risk of conceding in futsal if an outfield player is not actively engaged versus if a football player was not actively engaged. This constant engagement aligns with futsal's high intensity environment because there is always a demand to be actively engaged. This notion of intensity could explain why perceived opposition ability score a more significant predictor of average heart rate in football, and why it was a more significant predictor of maximum heart rate in futsal. The differences in physical demands when playing an opposition scored a two versus an opposition scored a four in futsal could be far less than the difference in physical demands in football who play against the same rating of opposition.

Limitations & Future Research

This study was not exempt from suffering from limitations. Due to the small sample size and small number of data entries for both studies, although the results suggest a 41

previously unexamined relationship, there is a risk that the findings from both studies can be explained by type II error. The small sample size also limited the statistical test that could be conducted, as there were some perceived opposition ability score levels that did not have two data points. Ensuring a larger sample size and a minimum number of data entries per perceived opposition ability score would mean more conclusive results and present a more detailed view of the relationship between perceived opposition ability and heart rate. However, the results across both studies were consistent, supporting the notion that the results were not due to chance.

Another limitation this study faces is whether heart rate is an acceptable proxy measure of exerted effort. This study centred around the notion of opposition ability influencing exerted effort. Heart rate has been effectively shown to be a competent measure of exerted effort Barbero-Alvarez et al., (2008) but heart rate alone cannot define exerted effort. Sprint speed, total distance run, number of high intensity activities are all differing components that collectively create exerted effort. Heart rate was chosen for this study due to the greater insight into intensity that total distance run does not have. Sprint speed would not have been an appropriate variable to be measured as the participant population was aged between 13-16, during these development times individuals develop at differing rates (Praxdes et al., 2018). Future research in this area should use a multitude of different variables to encapsulate exerted effort, instead of just having heart rate it could be measured alongside total distance run and average and maximum sprint speed. Gathering more partial measures of exerted effort could shed light on whether perceived opposition ability influences the variables the same or to different extents.

Due to the study only focusing on youth football and futsal players overarching generalisations to other groups of players cannot be made. Although youth players are a population that has not been researched to the same extent as adults the conclusion this study

presents cannot be applied to the general population without first examining the other populations in the same research context. Future research should focus on teams across different level of age and ability, in doing so this would show whether the influence perception of opposition ability has is consistent across age and ability. But this study was not without its strengths, as with the present study having youth participants when most of the previous research focused on adults extends the understanding of the developmental trajectories of the effects found. The present study also demonstrated the influence of perceived opposition ability across two different sports, further adding weight to the robustness of these findings.

Conclusion

The current study gives important insight into the role perception plays in the influence opposition ability has. The results of this study highlight and suggest a perception based measure of opposition ability is more statistically significant predicter of heart rate than an objective measure, opposition time in possession. Additionally the results suggest that perceived opposition ability influence heart rate differently across sports that are even similar such as football and futsal. Future research could expand on the foundation this study has set by examining different populations and competition levels to see if the influence perceived opposition ability has is dependent on age and calibre of competition. Perhaps the most crucial finding from this study is that perceptions of opposition ability can have an effect on athlete behaviour, as indicated by heart rate, and an individually subjective perception based measure can shed light on aspects an objective measure could not.

References

- Ali, A. Farrally, M. (1991) Recording soccer players' heart rates during matches, *Journal of Sports Sciences*, 9:2, 183-189, DOI: 10.1080/02640419108729879
- Aquino R, Munhoz Martins GH, Palucci Vieira LH, Menezes RP. Influence of Match Location (2017) Quality of Opponents, and Match Status on Movement Patterns in Brazilian Professional Football Players. J Strength Cond Res. 2017 Aug;31(8):2155-2161. doi: 10.1519/JSC.00000000001674.
- Arent, S. M., & Landers, D. M. (2003). Arousal, anxiety, and performance: A reexamination of the inverted-U hypothesis. *Research quarterly for exercise and sport*, 74(4), 436-444.
- Bali, A. (2015). Psychological factors affecting sports performance. International Journal of Physical Education, Sports and Health, 1(6), 92-95.
- Bandura, A. (2005). The Evolution of Social Cognitive Theory. In K. G. Smith, & M. A. Hitt (Eds.), *Great Minds in Management* (pp. 9-35). Oxford: Oxford University Press.

Bate, R. (1988). Football chance: tactics and strategy. T. Reilly, A. Lees, K. Davids e.

- Barbero-Alvarez, J. C., Soto, V. M., Barbero-Alvarez, V., & Granda-Vera, J. (2008). Match analysis and heart rate of futsal players during competition. *Journal of sports sciences*, 26(1), 63-73.
- Bricout, V. A., DeChenaud, S., & Favre-Juvin, A. (2010). Analyses of heart rate variability in young soccer players: the effects of sport activity. *Autonomic Neuroscience*, 154(1-2), 112-116.
- Capranica, L., Tessitore, A., Guidetti, L., & Figura, F. (2001). Heart rate and match analysis in pre-pubescent soccer players. *Journal of sports sciences*, *19*(6), 379-384.

- Collet, C. (2012). The possession game? A comparative analysis of ball retention and team success in European and international football, 2007–2010. *Journal of Sports Sciences*, 31(2), 123–136. https://doi.org/10.1080/02640414.2012.727455
- Cunningham, G. B., Bruening, J., Sartore, M. L., Sagas, M., & Fink, J. S. (2005). The Application of Social Cognitive Career Theory to Sport and Leisure Career Choices. *Journal of Career Development*, 32(2), 122–138. https://doi.org/10.1177/0894845305279164
- Di Bernardi Luft, C. Takase, E. Darby, D. (2009) Heart rate variability and cognitive function: Effects of physical effort. *Biological Psychology*, Volume 82, Issue 2, 2009, Pages 186-191, <u>https://doi.org/10.1016/j.biopsycho.2009.07.007</u>.
- Goal (2020, October 5th) Man Utd suffer record-equalling Premier League defeat after hitting 63-year low with disastrous first-half defensive display against Tottenham.
 Goal https://www.goal.com/en-us/news/man-utd-suffer-record-equalling-premierleague-defeat-after/1r4hz5ne1s49x17v7pnoi9haac
- Gómez, M. A., Pollard, R., & Luis-Pascual, J. C. (2011). Comparison of the home advantage in nine different professional team sports in Spain. *Perceptual and motor skills*, *113*(1), 150-156.
- Henrey, M. (2020, October 6). *Premier League: Is absence of fans behind the goal rush?* BBC. https://www.bbc.com/sport/football/54433028
- Jones, P. D., James, N., & Mellalieu, S. D. (2004). Possession as a performance indicator in soccer. International Journal of Performance Analysis in Sport, 4(1), 98–102. https://doi.org/10.1080/24748668.2004.11868295

- Joseph B. Taylor, Stephen D. Mellalieu, Nic James & David A. Shearer (2008) The influence of match location, quality of opposition, and match status on technical performance in professional association football, *Journal of Sports Sciences*, 26:9, 885-895, DOI: 10.1080/02640410701836887
- Karvonen, J., & Vuorimaa, T. (1988). Heart rate and exercise intensity during sports activities. *Sports medicine*, *5*(5), 303-311.
- Lago, C. (2009) The influence of match location, quality of opposition, and match status on possession strategies in professional association football, *Journal of Sports Sciences*, 27:13, 1463-1469, DOI: 10.1080/02640410903131681
- Lago-Peñas, C. Lago-Ballesteros, J. (2011) Game Location and Team Quality Effects on Performance Profiles in Professional Soccer. *Journal of Sports Science and Medicine* (10), 465 - 471.
- Legaz-Arrese, A., Moliner-Urdiales, D., & Munguía-Izquierdo, D. (2013). Home advantage and sports performance: evidence, causes and psychological implications. *Universitas Psychologica*, *12*(3), 933-943.
- Lopes Dos Santos, M., Uftring, M., Stahl, C. A., Lockie, R. G., Alvar, B., Mann, J. B., & Dawes, J. J. (2020). Stress in academic and athletic performance in collegiate athletes:
 A narrative review of sources and monitoring strategies. *Frontiers in Sports and Active Living*, 2, 42.

Marchant, D. B., & Morris, T. (2004). Stress and anxiety in sport.

Palacios Huerta, I. (2017). Improving the odds of winning in professional football. *Management with Impact*.

- Petri, H. L., & Govern, J. M. (2012). *Motivation: Theory, research, and application*. Cengage Learning.
- Plessner, H. Haar, T. (2006) Sports performance judgments from a social cognitive perspective. *Psychology of Sport and Exercise*. Volume 7, Issue 6, Pages 555-575, ISSN 1469-0292, https://doi.org/10.1016/j.psychsport.2006.03.007.
- Práxedes, P. Domínguez, A. Albert, G. Rabaz, A. Villar, F. Fernando, A (2018). The effect of small-sided games with different levels of opposition on the tactical behaviour of young footballers with different levels of sport expertise. *PLoS ONE*. 13. 10.1371/journal.pone.0190157.
- Premier League Possession Stats. (2021). FBref.Com. https://fbref.com/en/comps/9/possession/Premier-League-Stats
- Redwood-Brown AJ, O'Donoghue PG, Nevill AM, Saward C, Sunderland C (2019) Effects of playing position, pitch location, opposition ability and team ability on the technical performance of elite soccer players in different score line states. PLOS ONE 14(2
- Suarez-Arrones, L. J., Nuñez, F. J., Portillo, J., & Mendez-Villanueva, A. (2012). Running demands and heart rate responses in men rugby sevens. *The Journal of Strength & Conditioning Research*, 26(11), 3155-3159.
- TalkSPORT (2020, October 4th) Liverpool hit for SEVEN by Aston Villa as Premier League champions suffer heaviest defeat in 57 years and Jurgen Klopp given worst loss of managerial career in stunning upset. TalkSPORT

https://talksport.com/football/769156/liverpool-aston-villa-jurgen-klopp-premier-league/

Umphred, D. A., & Lazaro, R. T. (2012). *Neurological rehabilitation*. Elsevier Health Sciences.

Wikimedia Commons (2019, June 27th) Intervened U. Retrieved from

https://commons.wikimedia.org/wiki/File:Inverted_u.svg



Department: Psychology Telephone: +64 21557610 Email: Ahf28@uclive.ac. nz[Date] HEC Ref: [Enter when approval given for your study]

Perception vs Reality: The Influence Opposition Ability Has On Physical Output InYouth Football and Futsal.

Information Sheet for U13 Blue Parent/Caregiver.

You have been approached to take part in this study because your child plays in the U13 Blue team at St. Albans Shirley football club and you have expressed your interest to have your child participate in this study by replying to the information email that was sent out. I'm Atticus Foulcher, a Psychology Masters student from the University of Canterbury currently completing my thesis. The purpose of this study is to find out if there is a relationship between what a player thinks about the other team's ability and the player'seffort in the game. This will hopefully be answered by having the participants complete a questionnaire before each game. The questionnaire will ask players how good they think the other team is. This information will then be compared with measurements of players' heart rates taken during the game, leaguetable information and video recordings will be used to measure opposition teams time in possession. Then using statistical analysis find out which factor is the most accurate at predicting a change in a player's heart rate. The project is being carried out as a requirement of a Master of Science by Atticus Foulcher under the direct supervision of Brad Miles, who can be contacted at brad.miles@canterbury.ac.nz.

They will be pleased to discuss any concerns you may have about participation in the project.

If you choose for your child to take part in this study, their involvement in this project will involve them wearing heart rate monitors and answering a questionnaire. There are only six heart rate monitors available, if more than six players and their parents/caregiver give their consent to participate then six players will be randomly chosen to participate. Random means the people are chosen by chance, i.e. each person has the same probability of being chosen like picking names out of a hat. Prior to each game beginning the players will wear chest strap heart rate monitors which will be fitted by themselves or their parents. The heart rate monitors will record average and maximum heart rate only for the first 10 minutes of each game, with the data being recorded via a laptop on the sideline. Also, prior to the match beginning each player will complete a 7-point Likert scale questionnaire. The questionnaire is comprised of statements pertaining to the game experience and the player indicates how much they agree or disagree with each statement. The questionnaire itself will take no longer than one minute to complete. The 6 players that will participate in the study will start every game, with a maximum of 16 games being recorded. Each

player on the team willplay at least 75% of each game.

In the performance of the tasks and application of the procedures there are risks. Firstly, with playing football there is always a risk of injury yet participating in this study does not increase the risk of physicalharm. The heart rate monitors may be noticeable when worn throughout the game but will not be uncomfortable.

Participation is voluntary and you or your child has the right to withdraw at any stage without penalty. Youmay ask for your raw data to be returned to you or destroyed at any point. If you withdraw your child, or ifyour child withdraws, I will remove all information relating to your child. However, once analysis of raw data starts on 30th of October, it will become increasingly difficult to remove the influence of your data on the results. If you or your child to wish to withdraw from the study, please be assured that it will not impact the existing relationship with Atticus Foulcher or the existing relationship with St. Albans Shirley FootballClub.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your child's identity will not be made public. To ensure anonymity and confidentiality, no identifiable features about the study will be made public, this includes the club not being named. Your child's identity will be likely be known to the other players and parents present during the games. The heart rate monitors are discreet and worn under playing shirts but are still noticeable, this will mean the children, as a group, may be identified in publication. Due to my role within the club, people maybe able to work out which team was involved in the study. Only Atticus Foulcher as the lead researcher andthe study's supervisors, Katharina Naswall and Brad Miles will have access to the data. All physical data will be stored in a locked cupboard in the School of Health Science and all digital data will be stored on a secure computer in the School of Health Science and all digital data will be stored on a secure computer in the School of Health Science and all digital data will be stored on a secure computer. Five years after the completion of the Master's project all of the data will be securely destroyed. A thesis is a public document and will be available through the UCLibrary.

Please indicate to the researcher on the consent form if you would like to receive a copy of the summary of results of the project. This study may be published or presented in a variety of forms that may include but are not limited to journal article, conference presentation, organizational and club presentations.

The project is being carried out as a requirement of the Master of Science degree by Atticus Foulcher under the supervision of Katharina Naswall and Brad Miles who can be contacted at <u>katharina.naswall@canterbury.ac.nz</u>, <u>brad.miles@canterbury.ac.nz</u>. They will be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (<u>human-ethics@canterbury.ac.nz</u>).

If you agree to participate in the study, you are asked to complete the consent form and return the form toLes Dowdle.

Department: Psychology Telephone: +64 21557610 Email: Ahf28@uclive.ac.nz[Date] HEC Ref: [Enter when approval given for your study]

Perception vs Reality: The Influence Opposition Ability Has On Physical Output In Youth Football and Futsal.

Information Sheet for U16 Futsal Parent/Caregiver.

You have been approached to take part in this study because your child plays in the U16 Futsal team at St. Albans Shirley football club and you have expressed your interest to have your child participate in this study by replying to the information email that was sent out. I'm Atticus Foulcher, a Psychology Masters student from the University of Canterbury currently completing my thesis. The purpose of this study is to find out if there is a relationship between what a player thinks about the other team's ability and the player'seffort in the game. This will hopefully be answered by having the participants complete a questionnaire before each game. The questionnaire will ask players how good they think the other team is. This information will then be compared with measurements of players' heart rates taken during the game, leaguetable information and video recordings will be used to measure opposition teams time in possession. Then using statistical analysis find out which factor is the most accurate at predicting a change in a player's heart rate. The project is being carried out as a requirement of a Master of Science by Atticus Foulcher under the direct supervision of Brad Miles, who can be contacted at brad.miles@canterbury.ac.nz. The project will also be supervised by Katharina Naswall who can be contacted at katharina.naswall@canterbury.ac.nz.

They will be pleased to discuss any concerns you may have about participation in the project.

If you choose for your child to take part in this study, their involvement in this project will involve them wearing heart rate monitors and answering a questionnaire. There are only four outfield players at any given time for futsal, since only the first five minutes are being recorded there is only a need for four players to wear heart rate monitors, if more than four players and their parents/caregiver give their consent to participate then six players will be randomly chosen to participate. Random means the people are chosenby chance, i.e. each person has the same probability of being chosen like picking names out of a hat. Prior to each game beginning the players will wear chest strap heart rate monitors which will be fitted by themselves or their parents. The heart rate monitors will record average and maximum heart rate only for the first 5 minutes of each game, with the data being recorded via a laptop on the sideline. Also, prior to thematch beginning each player will complete a 7-point Likert scale questionnaire. The questionnaire is comprised of statements pertaining to the game experience and the player indicates how much they agree or disagree with each statement. The questionnaire itself will take no longer than one minute to complete. The 4 players that will participate in the study will start every game, with a maximum of 8 games being recorded. Each player on the team will play at least 75% of each game.

In the performance of the tasks and application of the procedures there are risks. Firstly, with playing futsal there is always a risk of injury yet participating in this study does not increase the risk of physicalharm. The heart rate monitors may be noticeable when worn throughout the game but will not be uncomfortable.

Participation is voluntary and you or your child has the right to withdraw at any stage without penalty. Youmay ask for your raw data to be returned to you or destroyed at any point. If you withdraw your child, or if your child withdraws, I will remove all information relating to your child. However, once analysis of raw data starts on 30th of January 2022, it will become increasingly difficult to remove the influence of your data on the results. If you or your child to wish to withdraw from the study, please be assured that it will notimpact the existing relationship with Atticus Foulcher or the existing relationship with St. Albans Shirley Football Club.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your child's identity will not be made public. To ensure anonymity and confidentiality, no identifiable features about the study will be made public, this includes the club not being named. Your child's identity will be likely be known to the other players and parents present during the games. The heart rate monitors are discreet and worn under playing shirts but are still noticeable, this will mean the children, as a group, may be identified in publication. Due to my role within the club, people maybe able to work out which team was involved in the study. Only Atticus Foulcher as the lead researcher andthe study's supervisors, Katharina Naswall and Brad Miles will have access to the data. All physical data will be stored in a locked cupboard in the School of Health Science and all digital data will be stored on a secure computer in the School of Health Science. Once all the data has been transferred digitally the physical copies will be destroyed. Five years after the completion of the Master's project all of the data will be securely destroyed. A thesis is a public document and will be available through the UCLibrary.

Please indicate to the researcher on the consent form if you would like to receive a copy of the summary of results of the project. This study may be published or presented in a variety of forms that may include but are not limited to journal article, conference presentation, organizational and club presentations.

The project is being carried out as a requirement of the Master of Science degree by Atticus Foulcher under the supervision of Katharina Naswall and Brad Miles who can be contacted at <u>katharina.naswall@canterbury.ac.nz</u>, <u>brad.miles@canterbury.ac.nz</u>. They will be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (<u>human-ethics@canterbury.ac.nz</u>).

If you agree to participate in the study, you are asked to complete the consent form and return the form toMick Stephenson.



Department: Psychology Telephone: +64 21557610 Email: ahf28@uclive.ac.nz

Perception vs Reality: The Influence Opposition Ability Has On Exerted Effort In Youth Football and Futsal.

- \Box I have been given a full explanation of this project and have had the opportunity to ask questions.
- □ I understand what is required of my child if I agree for them to take part in the research.
- □ I understand that participation is voluntary and I may withdraw my child at any time without penalty. Withdrawal of participation will also include the withdrawal of any information they have provided should this remain practically achievable. I also understand that at any point my child can withdraw themselves from the project without my permission.
- □ I understand that any information or opinions they provide will be kept confidential to the researcher Atticus Foulcher, Brad Miles and Katharina Naswall and that any published or reported results will not identify the participants.
- □ I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed 5 years after the completion of the project on April 1st 2026.
- □ I understand the risks associated with taking part and how they will be managed.
- □ I understand that I can contact the researcher Atticus Foulcher (<u>atticus.jones@hotmail.com</u>)or supervisors Brad Miles (<u>brad.miles@uclive.ac.nz</u>) and Katharina Naswall (<u>katharina.naswall@uclive.ac.nz</u>) for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (<u>human-ethics@canterbury.ac.nz</u>)
- \Box I would like a summary of the results and a copy of the final thesis.
- □ I consent to my child wearing a heart rate monitor and for their corresponding data to be recorded.
- □ By signing below, I agree for my child to participate in this research project.

Name:	Signed:	Date:
Name of child:		

Email address:

Return of the Consent Form can be done either by email or in physical form. For physical returns pleaseprint off and sign and return to your team manager at trainings or game days. For return by email pleasesend it to ahf28@uclive.ac.nz.

Appendix B player information sheets

U13 Player Information sheet:

Hi, I'm Atticus Foulcher. I'm currently studying my Masters of Psychology at the University of Canterbury. For my study I have to run an experiment. The experiment I have chosen to run is trying to find out what can impact heart rate in youth footballers. To answer this, I would like for you to wear a heart rate monitor and answer a questionnaire during the season.

Before warming up you'll be given a chest strap heart rate monitor, then before the game begins you'll answer a small questionnaire. The questionnairewon't take longer than 1 minute. Only the first 10 minutes of the game will have your heartrate recorded. After the game ends you'll give back the heart rate monitors, and then get them back again before the next game.

There are only 6 heart rate monitors so if there are more than 6 players wanting to be part of the project then 6 players will be randomly chosen. So, there is a chance you won't be part of the project. The 6 players who will be randomly selected will have start every game that is recorded, there will be a maximum of 16 games recorded. Everyone will have equal playing time across the season. I won't treat anyone differently! I will treat everyone the same andcoach you just as I normally do. Every player will play at least 75% of each game. The main thing is about playing in the tournament and doing the best you can! The project won't change anything about the game, it will be just like another tournament.

I have to do a big write up for my Masters which will only start after all the games have been recorded, I won't know any of the heart rate data until allthe games have been recorded. No names of the players or the club will bementioned at all. Only your heart rate and your questionnaire answers will show up.

You can leave the project whenever you want! If you don't want to be part of it anymore you or your parent can let me know, you won't have to do anything you don't want to. Even if its halfway through you can stop whenever you want!

U16 Player Information sheet:

Hi, I'm Atticus Foulcher. I'm currently studying my Masters of Psychology at the
 University of Canterbury. For my study I have to run an experiment. The experiment I have chosen to run is trying to find out what can impact heart rate in youth
 footballers. To answer this, I would like for you to wear a heart rate monitor and answer a questionnaire during the season.

Before warming up you'll be given a chest strap heart rate monitor, then before the game begins you'll answer a small questionnaire. The questionnairewon't take longer than 1 minute. Only the first 5 minutes of the game will have your heartrate recorded. After the game ends you'll give back the heart rate monitors, and then get them back again before the next game.

There are only 4 outfield players on the court at a time for futsal, since only the first 5 minutes are recorded only 4 players will wear heart rate monitors. If there are more than 4 players wanting to be part of the project then 4 players will be randomly chosen. So, there is a chance you won't be part of the project. The 4 players who will be randomly selected will have start every game that is recorded, there will be a maximum of 8 games recorded. Everyone will have equal playing time across the season. I won't treat anyone differently! I will treat everyone the same and coach you just as I normally do. Every player will play at least 75% of each game. The main thing is about playing in the tournament and doing the best you can! The project won't change anything about the game, it will be just like another tournament.

I have to do a big write up for my Masters which will only start after all the games have been recorded, I won't know any of the heart rate data until allthe games have been recorded. No names of the players or the club will bementioned at all. Only your heart rate and your questionnaire answers will show up.

You can leave the project whenever you want! If you don't want to be part of it anymore you or your parent can let me know, you won't have to do anything you don't want to. Even if its halfway through you can stop whenever you want!

Appendix C Child Assent forms



U13 Children's Assent Form

The project that Atticus wants to do about how different things can affect how I play football. The project has been explained to me by Atticus during a mid-week training. I know I don't have to be a part of it if I don't want to. If I have any questions I can ask Atticus or Les.

• I am happy to be part of the project and have my heartrate measured and answer a survey with some of my other teammates. I have coloured in the smiley face to show I am happy to be part of the project.

OR

• I don't want to be part of the project. I don't want my heartrate measured or do a survey. I have coloured in the sad face to show I don't want to be part of the project.





My Name:

Please give this hack to Les once finished

U16 Children's Assent Form



The project that Atticus wants to do about how different things can affect how I play football. The project has been explained to me by Atticus during a mid-week training. I know I don't have to be a part of it if I don't want to. If I have any questions I can ask Atticus or Mick.

- I am happy to be part of the project and have my heartrate measured and answer a survey with some of my other teammates. I have coloured in the smiley face to show I am happy to be part of the project.
- OR
- I don't want to be part of the project. I don't want my heartrate measured or do a survey. I have coloured in the sad face to show I don't want to be part of the project.





My Name:

Please give this hack to Mick once finished

Appendix D Newsletter email

Hi all!

I'm emailing you today to find out whether you would be interested in your child participating in my upcoming research project that will be conducted throughout the season.

As some of you may know I'm currently completing my Masters in psychology at the University of Canterbury. To obtain the qualification I need to conduct a study and write a thesis. My proposed study is about how the opposition's ability can influence player effort in games. The main focus of the study is to try to find out whether a player's perception opposition ability or the objective reality of opposition influences player heart rate more.

The study would entail participants wearing a heart rate monitor during the game and answering a questionnaire prior to kick off.

If you would like your child to participate or if you'd like more information, please email me back expressing your interest and I will reply with an information sheet detailing the study and how it willbe conducted.

Once everyone has indicated whether they would like their child to participate, players will be chosen at random to participate. Regardless of participation in the study everyone will still have equal game time and continued to be coached the same way as every game previously this year.

Once the players have been randomly chosen a confirmation email will be sent out to the corresponding parents/caregivers.

If you have any questions or concerns, please email me and I will answer them the best I can!Sincerely,

Atticus Foulcher.

Appendix E Game Day Questionnaire GAME DAY QUESTIONNAIRE

For each of the questions below please circle the response that you think best describes how youfeel. Where 1=Strongly disagree, 4=Neither agree or disagree, 7=Strongly agree.

	Strongly disagree			Neither agree or disagree			Strongly agree
I am not prepared for the game.	1	2	3	4	5	6	7
Our opponents are really good.	1	2	3	4	5	6	7
The pitch today isnot good.	1	2	3	4	5	6	7
I am really not "up" for this game.	1	2	3	4	5	6	7
I had a really good sleep.	1	2	3	4	5	6	7

Appendix F Ethics Approval



HUMAN ETHICS COMMITTEE

Secretary, Rebecca Robinson Telephone: +64 03 369 4588, Extn 94588Email: <u>human-</u> <u>ethics@canterbury.ac.nz</u>

Ref: HEC 2021/77

Amendment 121 December

2021

Atticus Foulcher School of Psychology, Speech and HearingUNIVERSITY OF CANTERBURY

Dear Atticus

Thank you for your request for an amendment to your research proposal "Perception vs. Reality: The Influence Opposition Ability has on Exerted Effort in Youth Footballers" as outlined in your emails dated 7th and 17th December 2021.

I am pleased to advise that this request has been considered and approved by the HumanEthics Committee.

Yours sincerely

A

Dr Dean Sutherland Chair, Human Ethics Committee