

The Influence of External Versus Internal Instructions on Vertical Jump in Elite Youth Soccer Players

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Abstract:

Coaches instructions can have either a positive or negative impact on the performance of their athletes by the effect it has on their focus. Considering this, coaches may still use the incorrect type of instructions to get the most out of their athletes. Despite the research into attentional focus no research has been completed on elite youth soccer players. For these reasons, this research aimed to investigate the influence of internal instructions versus external instructions on elite youth soccer players using an instructional framework. The research questions were, how does an internal focus of attention (IFA) impact vertical jump height in elite youth soccer players. How does an external focus of attention (EFA) effect vertical jump height. Which has the greatest impact on performance overall and is there a difference in impact of attentional focus on performance based on age and maturity. Vertical jump height data was collected via a ChronoJump jump apparatus and Software. Fifty-three youth participants were recruited from a professional football academy in the south east of Ireland. Results showed that an IFA had a significant impact on vertical jump height performance as well as the EFA. An EFA had the greatest improvement from baseline and the u13 age group had the most significant improvement with an EFA based on age and maturity. In conclusion, an external focus of attention is superior to an external focus of attention in vertical jump height testing in elite youth soccer players. As a result, coaches should consider the type of instructions they use with their athletes.

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Introduction:

What coaches say to their athletes before and during performance has been shown to have a direct impact on the performance outcome (Keller, Lauber, Gottschalk & Taube, 2015). Despite this, it has been documented that some coaches still use the wrong terms, instructions and language when coaching their athletes to get the best out of them (Wulf, McNevin & Shea, 2001). Some types of instructions have even been found to negatively impact an athlete's performance (Porter, Ostrowski, Nolan, & Wu, 2010). This is often explained by a phenomenon called the constrained action hypothesis (McNevin, Shea & Wulf 2003). The different types of instructions include internal instructions and external instructions. Internal instructions are verbal directions that refer to the athlete's body (Porter et al., 2010), while external instructions are verbal directions that refer to the surrounding environment (Keller et al., 2015). These instructions are thought to illicit the changes in focus often resulting in the athlete obtaining an internal focus of attention or external focus of attention. An internal focus of attention is when the athlete focuses internally on the bodily processes. Where an external focus of attention is when the athlete focuses externally away from his or her body on the effects the movements have on the environment (Wulf, Hob & Prinz, 1998).

If a simple change in the language a coach uses can have either a positive or negative impact on their athlete, then this is worth researching. One of the most significant discussions in sports coaching has been the effects of different types of focus of attention and how to illicit these to our athletes through the words we say. The term focus is often referred to as attention in the literature. Haff and Triplett (2015) define attention as the processing of both external and internal cues that come to mind. As a result of the increase in attentional focus papers in the last twenty years on different sports, it has become increasingly difficult to ignore the wealth of research into it and the impact it has on performance (Wulf & Dufek 2009; Wulf, Dufek, Lozano & Pettigrew, 2010; Wulf, Zachry, Granados & Dufek, 2007). However, there has not been a significant amount of data in attentional focus affects in football (Wulf, McConnel, Gärtner & Schwarz, 2002). Football is defined as an intermittent, high-intensity sport which is interspersed with maximal effort activities like jumping, kicking, tackling and turning (Turner &

Stewart, 2014). Interestingly, different types of focus have been found to have an impact on these activities. Therefore, with small changes to an approach in coaching, significant changes may occur. The more knowledge coaches have on the effects of attention on performance, the greater influence they can have on their athlete's success in football. This increased awareness can then help coaches and teams win more games through better physical performance.

Despite the wealth of research in attentional focus, very little is completed on youth athletes (Becker & Smith, 2013). Secondly, whether youth athletes of varying ages have the same effects from the same types of attentional focus is not known. Thirdly, the methods used in attentional focus research may not have protected against bias or been consistent with the delivery of the methods for all participants, this will be explored in greater detail later. The final point in these flaws are that recently, a new method of using instructions and cues in coaching has been reported in the literature called the three-d's which were first mentioned and explained by Winkelman (2017) which has not yet been tested within the research of attentional focus. Considering these gaps in the research, it is the aim of this research study to examine the influence of internal instructions versus external instructions in elite youth soccer players on vertical jump height using an instructional framework. From the findings of this research, it can then add to the little research of attentional focus in youth soccer. Practically, these findings can educate coaches on the most appropriate types of instructions to use which each individual athlete to get the most out of them. Specifically, this study will investigate how different types of psychological states through different foci affect the physiological outcome by analysing vertical jump performance. Therefore, it is important to research the attentional focus effects on vertical jump height performance in youth soccer players. The following section of this document will yield a review of the literature around the area of attentional focus including, the theoretical basis of such impacts on performance, internal and external focus, the impacts of attentional focus on sports performance, coaching instructions and cue types and the maturity effects of attentional focus. The overall aim of the study is to research the influence that internal instructions versus external instructions have on vertical jump performance in elite youth soccer players, using an instructional framework.

Literature Review:

Psycho-Physiological Connection:

Psychophysiology is the study of the connection between the body and the brain to optimise human performance. It uses biofeedback and neurofeedback technology to assess the changes in physiology based on psychological states and vice versa (Hatfield & Landers, 1983; Hatfield & Landers, 1987; Shad, 2014; Zaichkowsky, 2012). Psychophysiology research has also been used to identify the mechanisms behind flow states which are periods of effortless intense engagement and enjoyment in sport (Csikszentmihalyi, 1975; De Manzano, Theorell, Harmat & Ullén, 2010). This research study acknowledges the psychophysiological connection and how they are interlinked and that verbal instructions also affect an athlete's focus which in turn affects his/her performance outcome. Merchant (2011) and Wulf (2013) also support this by explaining the impact instructions have on an athlete's focus of attention.

As mentioned in the above section, attentional focus impacts sports performance through the psychophysiological connection. The direction of an athlete's attention is impacted by whether the athlete is utilising an internal or external focus of attention. To fully explore the theoretical reason for this variation in performance, it is important to understand the effect that attentional focus has on motor learning and skill execution. This is related to an athlete being able to attend to only the most relevant stimuli facing him or her.

Attentional Focus Effects on Motor Learning

The ability to stop the cognitive responsiveness to some stimuli to focus on relevant stimuli is called selective attention. Selective attention stops task-irrelevant thoughts and allows the athlete to focus on task-relevant thoughts (Haff & Triplett, 2015). The noteworthy principle here is that thinking of task-relevant thoughts allows the athlete to be consistent within concentration and in turn, their performance. This is a trainable skill that may improve through experience using it. Corresponding with Fitts and Posner's (1967) three stages of motor learning, the first staged named the cognitive stage includes conscious attention and effort

to learn the skill while the second phase, named the associative stage where the athlete must still focus on the movement task but not on the details. Within the final stage, named the autonomous stage the athlete would find themselves relaxed and only focusing on task-relevant thoughts while performing the exercise while getting rid of task-irrelevant thoughts. Wulf (2007) supports this notion as she mentions an external focus of attention may increase the speed of the motor learning process and achieve an autonomous stage of motor learning faster. As this is a trainable skill, it may be of interest to coaches to take advantage of such skills to ensure that their athletes reach the autonomous stage of motor learning faster to ensure optimal performance on the football pitch. This process may be helped through the word's coaches say to their athletes when coaching a skill. Considering this, there are four different types of attentional focus.

The Four Quadrants of Attentional Focus:

According to Nideffer (1976) athletes go through (or 'can experience'?) four different types of focus during performance. The four types can be set apart through two dimensions which are direction (internal-external) and width (broad-narrow). These types of focus can overlap each other but have different purposes which create the four quadrants (See figure 1) of attentional focus. The first is a broad external focus where the athlete assesses the overall environment and the variables within it; the second is a broad internal focus where the athlete processes this information and devises a tactic in their mind; the third is a narrow internal focus where the athlete mentally practices the action about to be performed and the fourth is narrow external focus of attention where the athlete focuses on one or two cues in their mind that helps produce the action undisturbed by irrelevant thoughts.

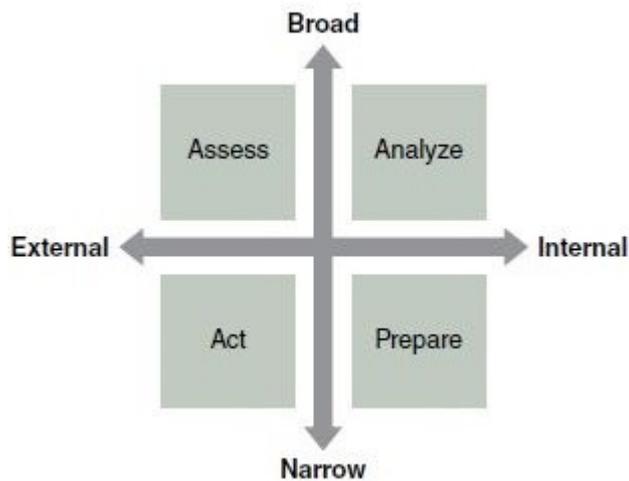


Figure 1: The four quadrants of attentional focus (Haff & Triplett, 2015)

Understanding this model can help coaches to identify which attentional focus quadrant that their athletes usually attend too most often or need to attend more to. With this information a coach can decide how to best coach their athlete to get the most out of their performance and training. As a vertical jump can be tested as a closed skill, this research will be looking to influence the narrow external focus of the subjects within that testing and see if internal cues or external cues cognitively yield best results. Following on from this, research suggests that an external focus of attention improves performance in maximal effort tasks (Wulf, Zachry, Granados & Dufek, 2007), movement efficiency (Wulf et al., 2001), sprinting (Benz, Winkelmann, Porter & Nimphius, 2016) and sport specific skills (Kearney, 2015). Yet, Wulf, et al., (2001) state that coaches still use anatomical terms and internal instructions/cues to coach their athletes, which can hinder their performance instead of optimising it. Contradictory to this, some research has suggested that the optimal type of focus is individual to each athlete based on the success they get from each type of focus (Winkelmann, 2017). The performance decline seen with an internal focus of attention may be explained by the constrained action hypothesis.

Constrained Action hypothesis:

The constrained action hypothesis (CAH) suggests that an internal focus of attention causes disruption and interference to the body’s natural movements

(McNevin, et al., 2003). The constrained action hypothesis suggests that this is caused by paralysis by analysis where the athlete overthinks the performance (task-irrelevant thoughts) which leads to a decrease in task performance that would otherwise be more efficient (McNevin, Shea & Wulf, 2003). McNevin et al. (2003) explain further that the theory proposes the athlete may be intentionally trying to control movements via an internal focus while being unaware this could disrupt the body's natural control of the motor system thus eliciting a performance decrement. To test this hypothesis McNevin et al. (2003) had 40 students perform a balance task on a stabilometer and grouped them into an external near group where the distance of the external focus was close to the body and two separate external far, where the distance of the external focus was far away from the body like an object for example, and an internal focus groups. Results of this study showed that the internal focus groups had significantly worse performance in the retention session.

Wulf, McNevin and Shea, (2001) performed a similar study to test this theory by recruiting 28 subjects to complete a stabilometer exercise followed by a reaction time exercise. Subjects were randomly assigned to an internal focus group and an external focus group to complete both exercises. Results of this study supported that constrained actions may be explained by the process of attention because subjects in the external focus group yielded greater results on the balance and reaction tasks. This may be relevant to jumping in football as balance is required as well as reaction time to be first to jump and win the header against an opponent. Regarding sport performance, more studies that support the constrained action hypothesis include Ducharme, Wu, Lim, Porter and Geraldo's (2016) research who compared internal cues against external cues for standing long jump and found internal cues caused a performance decrement. Another study that supports the constrained action theory include Porter et al. (2010), who found the same outcomes between internal and external cueing on jump performance Further studies showing the results of attentional focus are explained in the following section.

Attentional Focus:

There is a wealth of attentional focus research on numerous sports and a variety of movements (Talpey, Young & Beseler, 2016; Winkelman, Clark, & Ryan, 2017). The different types of focus have been defined differently by separate authors. According to Benz, Winkelman, Porter and Nimphius (2016) attentional focus can be defined as what the athlete focuses on during the performance of a task and it can be simplified into two main types of focus, an internal focus (association) of attention and an external (disassociation) focus of attention. Associative thoughts refer to focusing on body sensations while dissociative thoughts are focusing on blocking out sensations resulting from exercise (Raglin, 2007).

To test these factors against different sports and experience level, Winkelman et al. (2017) compared collegiate level soccer players to high experience sprinters in a ten-meter sprint task. All athletes experienced an internal, external and control condition. This study explained that the sprinters were more experienced at the 10m sprint than the soccer players were due to the nature of their sport. Results of this study showed that the soccer players sprint time improved via the external and control conditions compared to the internal condition. Whereas, for the sprinters results, no significant differences were seen across any of the variables. This may identify the impact attentional focus has on based on the stage of motor learning the athletes are in. Those in the cognitive-verbal stage or associative stage seem to yield improved results via an external focus, like the soccer players. Whereas those in the autonomous stage like the sprinters have a less of an impact via different foci. Winkelman et al. (2017) hypothesised that autonomous stage athletes may already have their preferred focus and refer to it during performance. Experience level may increase with increased exposure to the sport through years of playing it. Therefore, experience level may increase from younger squads to older squads in soccer.

Internal and External Foci:

Many research studies suggest that an internal focus of attention may cause performance decrements (McNevin et al., 2003; Wulf et al., 2001). Again, this may be explained by the constrained action hypothesis. The wealth of research

that support this hypothesis further include McNevin, Shea and Wulf (2003) along with many other studies completed on various activities (Wulf, et al., 2002; Wulf, McNevin & Shea, 2001). Shafizadeh, McMorri and Sproule (2011) relates an external focus of attention to the perception-action perspective. The perception-action perspective suggests that learning a motor skill is down to the combination of listening to cues that are specific to the movement and then actually performing the movement itself. To take advantage of this, Winkelman (2018) suggests that coaches should use external instructions and cues on the most important part of the motor skill being coached to have the most successful impact. How to best implement this, is explained in detail in subsequent sections. The significant impact that attentional focus has on different sports and tasks should be noted.

Attentional Foci Impact on Sport Performance:

Sport performance can be measured via reliable and valid fitness testing and through changes in performance during competition (Hopkins, Hawley & Burke, 1999). The effect of attentional focus interventions on sport performance is usually measured via fitness tests where a noticeable change in performance is easy to identify by quantitative results. Multiple studies suggest an internal focus of attention may cause performance decrements compared to an external focus in some fitness tests like the vertical jump (Wulf & Dufek 2009; Wulf, et al., 2010; Wulf, et al., 2007), standing broad jump (Porter, Anton & Wu, 2012) with some conflicting evidence found in running and sprinting based on experience level (Winkelman, 2017). Wulf et al. (2004) and Porter et al. (2015) found an increase in performance in the external focus group while Porter and Sims (2013) found no difference between the internal and external focus groups with subjects getting an average of 2.92s in the 20-yard dash test in both groups. Additionally, Porter & Sims (2013) had nine experienced American football players, with a bigger sample size there may have been a difference in groups so these results should be put into context although it also highlights that the more experienced the subject is, they may already have their optimal focus of attention, which could be internal.

To add to this research, Wulf, McConnel, Gartner and Schwarz (2002) tested attentional focus effects on a volleyball accuracy task with novice and

experienced players who were both grouped into an internal and external group to create four groups. Results showed that the external focus improved performance regardless of experience as well as within the retention session. This may identify that an external focus of attention may be the optimal focus for elite youth soccer players as it improves accuracy and retention of a task. This would be of importance especially to players who are still in the cognitive stage or associative stage of motor learning where the retention of a motor skill may allow them to develop skills faster

Some researchers say that the drop in performance like the one seen in the study by Wulf et al., (2002) could be linked to the constrained action theory which hypothesises that an internal focus of attention causes disruption and interference to the body's natural movements. In comparison, other studies suggest an external focus of attention causes performance improvements by producing more force, being more efficient in its muscular recruitment and improving maximal effort tasks like vertical jump (Wulf & Dufek 2009; Wulf, Dufek, Lozano & Pettigrew, 2010; Wulf, Zachry, Granados & Dufek, 2007). To conclude, external focus of attention research suggests that it improves performance on movements that are relevant to football like jumping. Vertical jump performance is important to football as it is a main movement involved in winning aerial duels and for goalkeepers to make saves. Although the above research shows an improvement across different movements relevant to football, it is not known if a similar improvement would be seen using different attentional focus conditions on elite youth soccer players across different maturity levels.

Coaching Instructions/Cue Types:

Wulf, Hob and Prinz (1998) outline that the type of instructions a coach uses (either internal or external) influences the type of focus the athlete assumes (either internal or external) and as a result has an impact on their performance. From the above studies it is suggested that an external focus of attention improves performance in sport. Therefore, it is advantageous for coaches to be aware of this and use external cue's and instructions where appropriate to aid the athletes focus of attention and influence the conditions for optimal performance. To support this further, Merchant (2011) and Wulf (2013) also explain that verbal

instructions have an important role in motor performance and motor learning, whereas altering the type of verbal cue or instruction has shown to have changed effects on motor performance and motor learning.

If the perception-action perspective (Shafizadeh et al., 2011) yields true, it is practical for coaches to learn external cues relevant to the movement being coached while allowing the athlete to attempt the movement with continued feedback during and after the movement. Shafizadeh et al. (2011) applied this learning perspective to subjects in a golf putting task in where the subjects experienced three different conditional cues. The first condition had instructions to focus on a marker behind the ball, another condition had instructions to focus on a trajectory marker in front of the ball (target) while the third condition combined both club swing and target cues. The results showed that the combined group had better retention of the skill, therefore this research suggests that external cues should include the movement action and the environment. Although, the research suggests external cues improve sports performance, internal cues have their place where appropriate.

Internal Instructions:

Internal instructions are verbal directions that refer to the athletes body like the ones used by Porter et al. (2010, p. 1748), “When you are attempting to jump as far as possible, I want you to focus your attention on extending your knees as rapidly as possible”). These are common internal instructions seen across the literature. Research has found that internal instructions and cues can improve hypertrophy affects and during rehab and prehab programs where muscle activation is the goal (Schoenfield, 2018). Additionally, elite athletes who already get success out of an internal focus of attention may be better off receiving internal instructions from their coaches if an internal focus is their preferred focus that the athletes always used and got success from (Winkelman et al., 2017).

External Instructions:

External instructions are verbal directions that refer to the surrounding environment. An example would be like the one mentioned by Keller et al. (2015,

p. 3), “When you are attempting to jump as high as possible, I want you to focus your attention on jumping as close to the ball as you possibly can.”. In this study the ball was located high above the subject’s head which also takes into consideration the distance of the external focus which was shown to produce greater jumps by Porter et al. (2012; 2013). Considering the above research, an external focus of attention seems superior to an internal focus of attention for sports performance. Interestingly, Talpey et al., (2016), were the only researchers out of all the presented papers thus far who provided their instructions via pre-recorded audio. All other researchers provided their instructions via verbal communication. Therefore, verbal and non-verbal communication may not have been standardised across participants within these studies. Characteristics like tone of voice, emphasis, volume, hand gestures, body language and eye contact were not controlled by the researchers across all participants. This may influence the understanding of the message received by the participant and subsequently the intent (Makaruk et al., 2012). For these reasons, this study will use a pre-recorded audio message to ensure message delivery is constant across all participants. Additionally, external instructions were different across each study and they failed to follow an instructional framework, so consistency may be lost when coaches attempt to use external instructions across different tasks.

To combat this, the proposed research will use the ‘Three-D’s’ (focus description, focus direction and focus distance) (See Figure 2) external instructions framework which was first explained by Winkelman (2018). Focus descriptions can be made by action verbs like “push, pull, snap, whip and explode”, focus direction can be towards or away something while focus distance can be close or far away from a fixed point. An example could be, “jump explosively towards the ceiling” where explosively, towards and ceiling are the focus description, direction and distance characteristics. The mention of this framework has not been seen or put to the test in the literature so it will be implemented in the use of the external instructions used in the proposed study. This differs to the examples used in other studies as it not only instructs the athlete to focus outside of the body, but it gives three specific things to focus on, a description of the desired movement, the desired direction of the application of force of the desired focus distance. The use of the pre-recorded audio and the instructional framework makes the delivery of instructions in this study consistent across all subjects.

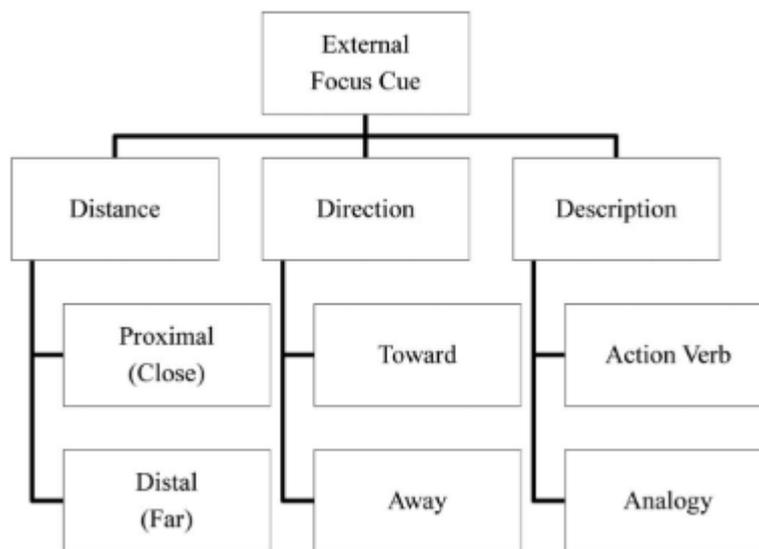


Figure 2: Focus cue characteristics distance, direction and description (Winkelman, 2018)

Age and Maturity Effects on Attentional Focus:

The little research available on age differences in attentional focus effects shows no difference between ages of subjects but research completed by Becker and Smith (2013) found some differences across genders with males showing the biggest improvements. Becker and Smith (2013) recruited 48 primary school children between the ages of 8 and 10 (24 boys & 24 girls), also including 48 college students between the ages of 19 and 26 (24 men & 24 women), all of which were untrained. These participants performed a Double Pedalo task across internal and external conditions where time was measured. A Double Pedalo is a locomotor apparatus where the person must stand on two platforms that are connected to it and push themselves forward in a cyclical motion like a bike. Improvements were seen through reduced times in the external focus groups in males, where females responded better to an internal focus, this was regardless of age.

Contradictory to the above findings, Emanuel, Jarus and Bart (2008) recruited children aged 8.4 – 9.8 and adults over 18 years old to attempt a dart throwing task under internal and external focus of attention conditions. In the practice and

retention attempts there were no changes in improvements under each condition, but in a transfer throwing task which involved the subjects throwing from a greater distance, the external focus of attention yielded greater results for adults but not children compared to the internal focus condition. Considering these contradictions, elite youth footballers will be recruited across varying ages to see if age influences the impact of attentional focus on a vertical jump task. This information can then help coaches understand which types of instructions are appropriate to use based on the goal of the task, age of the athlete and experience of the athlete.

Summary:

In conclusion, the literature suggests that an external focus of attention improves the performance of maximum effort activities like vertical jumps, which is a key movement skill in football but, conflicting evidence is found across different ages. It is hypothesised that the language a coach uses with their athletes has a direct impact on an athlete's performance and could be the difference between success or failure of a skill or the speed at which their motor learning develops.

Rationale:

Although research suggests that vertical jump height is improved with an external focus of attention it is not known if this improvement will be seen across elite youth soccer players of different ages. Secondly, only a small amount of research has been completed in this field on subjects across varying ages. Therefore, research into attentional focus in elite youth football across different ages and experience level is warranted. It is currently not known if different types of instructions would cause a performance change in jump height in elite youth footballers. Most of the research uses a within-subject design with small sample sizes over the ages of eighteen, so the proposed research will have a sample size of 53 elite youth soccer players of varying ages to test the impacts of attentional focus. Finally, the above studies had no control for bias as the instructions were given verbally so tone of voice, body language and emphasis were not controlled and could have been different across all participants. To

combat this, the proposed thesis will use pre-recorded audio instructions so the delivery of the instructions, are constant across all participants to control for bias

Research Questions:

1. How does an internal focus of attention impact vertical jump height in elite youth soccer players?
2. How does an external focus of attention impact jump height in elite youth soccer players?
3. Which has the greatest impact on jump height from baseline overall?
4. Is there a difference in the impact on performance outcomes based on age/maturity level?

Methodology:

Conceptual Framework:

This study used a cross-over study design to ensure all participants experienced the conditions and to reduce the order effects of the conditions like fatigue. Regarding conditions, there was an internal instruction condition, external instruction condition and a control condition. All players experienced the control condition first while the order of the internal and external conditions was counterbalanced to reduce these order effects.

Data Sources:

Fifty-three (n=53) Participants were recruited from Waterford Football Club's Academy. Waterford FC are a professional football club who compete in the League of Ireland Premier Division. Number of players recruited includes twelve (n=12) from the u13 squad, twelve (n=12) from the u15 squad, thirteen (n=13) from the u17 squad and sixteen (n=16) from the u19 squad were recruited to test attentional focus effects across different age groups within elite soccer. In

comparison to the subject numbers mentioned in study's highlighted in the literature review, this is a large sample size for this topic (cf. Becker & Smith, 2013; McNevin et al., 2003; Talpey et al., 2016 Wulf & Dufek, 2009; Wulf et al., 1998; Wulf et al., 2007).

Variables/Concepts:

External focus jump height, internal focus jump height and General focus (Control condition) jump height were measured across all age groups (u13-u19). Secondly, an analysis on the impact of the control condition relative to the internal and external conditions were also completed. Finally, an analysis of the difference in impact of attentional focus effects across the age groups was carried out.

Data Collection Methods:

Data was collected using the ChronoJump Contact Platform Kit DIN-A2 and it's 1.8.1-95 Software. This was paired and used with an Asus Windows Laptop. Jump Height data was stored immediately after the tests within the ChronoJump 1.8.1-95 Software and an excel spreadsheet beside the subjects' test number as a backup method. Lab-based data collection methods were used as the tests were completed indoors where environmental conditions were constant across all tests. There was a familiarisation session for all participants before the intervention. On the day of testing, there was a warm up of 2 sets by 4 submaximal jumps with 5 minutes rest in between sets and conditions. For the conditions, all participants performed 2 sets by 4 maximal jumps with one to two seconds between each jump. This volume was previously used by Talpey et al. (2016) and the high number of jumps was deemed as advantageous to get a valuable average across all conditions. All subjects underwent the control condition first where general instructions are given first. This gave a baseline result to compare the intervention conditions against. Next, the order of the internal and external conditions was counterbalanced across participants where the first group experienced the internal first and the external second while the next group experienced the external first and the internal second. This order was constant within each squad.

Intervention:

All participants were split up into two groups within their squads. Within both groups the counterbalanced order took effect. Instructions were given via audio recording on an iPhone 6s through a Bluetooth speaker to standardise instructions the given. The instructions were played between sets within conditions just before each jump and between conditions themselves (cf. Talpey et al., 2016). When the subject walked into the room it was just the tester and the athlete. The first set of introduction instructions were “When you jump, I will be measuring the height of your jump, make sure you follow the instructions and jump for maximum height on each attempt”. This was to ensure no bias was present towards any condition and that the athlete was aware to apply maximum effort on each jump. These instructions were considered general instructions as they neither refer the athlete to think of outside the body to the environment or inside the body. These were followed by the control instructions which were “In this condition, just concentrate on jumping for maximum height”, which are similar general instructions used by Winkelman et al. (2017). The internal instructions were “In this condition, just concentrate on extending your legs as fast as possible, for maximum height”, these are modified instructions that are like those found in the research by Porter et al. (2010). Lastly, the three-D’s instruction/cue framework by Winkelman (2016) was used to create the external instructions given. The external instructions were “In this condition, just concentrate on jumping explosively towards the ceiling, for maximum height.” These instructions are also like Porter et al. (2010) telling the athlete to apply maximum effort but uses the instructional framework to improve the instructions.

Data Analysis:

Internal jump height, external jump height and the control jump height were measured in centimetres and averaged across eight jumps for each condition. Jump height data was stored using Microsoft Excel 16 for windows. All statistic tests were completed using Jasp statistics software for windows. A paired sample T-test was completed to test for significance for the impact of internal and external foci on jump height research questions. Additionally, a Shapiro-Wilk test was

used to test for normality. Finally, an independent sample t-test was used to analyse the difference in the scale of improvement between the u13 and u19 groups.

Ethical Considerations:

Informed consent documents were handed out to each participant before the study while parental informed consent was given to participants under the age of 18 (See Appendix A). All athletes remained anonymous within the study by labelling athlete 1-53 based on order within their group instead of their names. Secondly, their data was only be used for this dissertation and that was highlighted on the informed consent forms. The informed consent form also informed the participant about the purpose of the study, that their involvement was purely voluntary and that they had the right to withdraw from the study without question at any time. This ensured the participants were not forced into the study and that they choose to partake in it. To mitigate against physical risk for participants, a familiarization session and sub-maximal specific warm up occurred before the testing.

Results:

All data was checked for normality using a Shapiro-Wilk test which indicated that the data was normal. Therefore, parametric statistics were used to assess the differences. Illustrated in Table 1 is the breakdown of the numbers of participants in each squad, the vertical jump scores within each squad across the different conditions and the standard deviation of each. Table 2 shows condition effects across all 53 participants an improvement in an internal focus of attention (28.89cm) across all 53 participants relative to the control condition (28cm) but shows a greater improvement with an external focus of attention (30.37cm). Table 3 shows the difference in effects based on age and maturity. The u13s had the greatest difference in performance improvement compared to the u19s when analysing the difference between external and internal foci. Finally, Figure 3 illustrates the difference of attentional focus effects across the ages. Comparing the two different types of attention focus across these different age groups

showed that the u13s had a 2.54cm improvement in an external focus relative to an internal focus while the u19s had a 0.79cm improvement in an external focus relative to an internal focus.

Table 1 Descriptive measures of jump scores between each squad

Group	N	Control		Internal		External	
		Mean(cm)	SD	Mean(cm)	SD	Mean(cm)	SD
U13	12	26.67	6.97	26.36	7.68	29.3	6.12
U15	12	27.96	6.28	28.11	6.95	30.16	5.71
U17	13	27.36	4.27	28.61	4.16	29.28	4.14
U 19	16	29.56	2.94	31.59	2.9	32.21	2.66

Note: N=number of participants; SD = standard deviation;

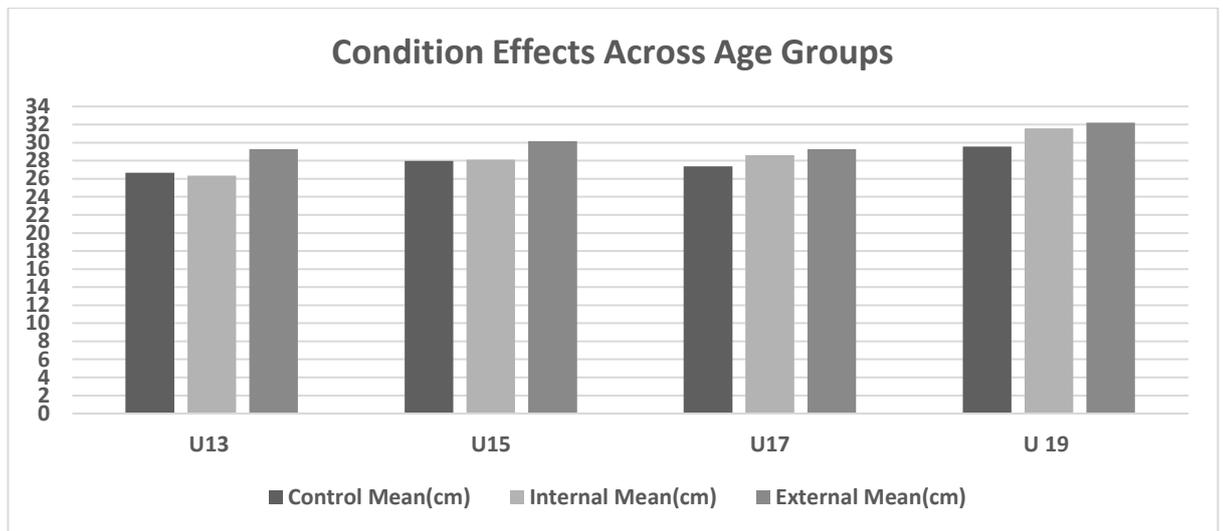


Figure 3. Condition affects across the different age groups in centimetres.

Internal focus of attention impact on vertical jump height in elite youth soccer players:

A paired sample t-test was conducted to compare and internal focus of attention to the control condition. There was a significant difference in the scores for the control condition (M = 28cm, SD = 5.16) relative to the internal condition (M = 28.9cm, SD=5.7); $t(52) = -6.42, p = .001$. The above results show that an internal focus of attention has a significant impact on vertical jump height compared to a general focus of attention. Specifically, these results suggest that an internal focus of attention may improve vertical jump height in elite youth soccer players relative to a general focus of attention.

External focus of attention impact jump height in elite youth soccer players:

A paired sample t-test was conducted to compare and external focus of attention to the control condition. There was a significant difference in the scores for the control condition (M = 28cm, SD = 5.16) relative to the external condition (M = 30.4cm, SD = 4.73); $t(52) = -15.33, p = .001$. The above results show that an external focus of attention has a significant impact on vertical jump height compared to a general focus of attention. Specifically, these results suggest that an external focus of attention improves vertical jump height in elite youth soccer

players relative to a general focus of attention, and more so compared to an internal focus of attention.

The greatest impact on vertical jump height from baseline overall:

A paired sample t-test was conducted to compare and internal focus of attention to an external focus of attention. There was a significant difference in the scores for the internal condition (M = 28.9cm, SD=5.7) relative to the external condition (M = 30.4cm, SD = 4.73); $t(52) = -6.70$, $p = .001$. The above results show that an external focus of attention has a significant impact on vertical jump height compared to an internal focus of attention. Specifically, these results suggest that an external focus of attention improves vertical jump height in elite youth soccer players overall, greater than an internal focus of attention.

Table 2 Descriptive data of the impact of different attentional foci on performance across all 53 participants.

	N	Mean(cm)	SD	SE
Control Average	53	28.00	5.157	0.708
Internal Average	53	28.89	5.747	0.789
External Average	53	30.37	4.736	0.651

Note: N=number of participants; SD = standard deviation; SE = standard error

The difference in improvement between external and external across different maturity levels:

An external focus of attention had the greatest impact on performance for u13s and u19s but whether the age difference between these squads would have an impact on the scale of the improvement was also of interest with this study. Therefore, an independent samples t-test was conducted to compare the

difference in the impact of attentional focus based on age and maturity. There was a significant difference in the scores for the improvement between external and internal for the u13s (M = 2.5cm, SD = 1.45) relative to the u19s (M = 0.79cm, SD = 1.71); $t(22) = 2.70, p = .013$. This can be seen in table 3. The above results show that an external focus of attention improves vertical jump height significantly in both age groups compared to an internal focus of attention, but it improves the u13s performance significantly more than the u19s improvement. Specifically, these results suggest that an external focus of attention improves vertical jump height in u13 elite youth soccer players more than u19 elite youth soccer players and may have a greater impact on their performance compared to their older players.

Table 3 Descriptive data of the difference in improvement during an external focus of attention compared to an internal focus based on age.

	Group	N	Mean(cm)	SD	SE
Difference	U 13	12	2.541	1.450	0.419
	U 19	12	0.789	1.717	0.496

Note: N=number of participants; SD = standard deviation; SE = standard error

Paired sample t-test for the u15s showed no significant difference between control and internal ($p = 0.689$), control and external ($p = 0.425$) and internal and external ($p = 0.469$). Finally, paired sample t-test for the u17s showed a significant difference between control and internal ($p = 0.002$), control and external ($p = < 0.001$) but no significant difference between internal and external ($p = 0.063$).

Discussion:

The overall aim of this research study was to investigate the influence of external instructions versus internal instructions on vertical jump height performance in elite youth soccer players, using an instructional framework. The

reason for this research was that current studies in the area of attentional focus had smaller sample sizes, may not have controlled for bias with the delivery of their instructions and did not use an instructional framework. Moreover, little research on this topic was completed on youths or elite youth football. This research study found that an internal focus of attention had a significant impact on vertical jump relative to the control condition. Secondly, an external focus of attention was also found to have a significant impact on vertical jump. Of the two conditions, an external focus of attention had the most significant impact on performance while the u13 age group had the biggest improvement of results in an external focus compared to the improvements the u19s had with an external focus.

Internal focus of attention impact on vertical jump height in elite youth soccer players:

Due to the fact a small amount of research was completed on youths and none was completed on elite youth football, it is unknown if an internal focus is advantageous relative to a general focus of attention when assessing the average across all 53 participants. For these reasons, this research question was asked. An internal focus of attention had a significant improvement on vertical jump height compared to the control condition (general focus) when compared across all participants. These results contradict the findings of Talpey et al., (2016) who found their internal instructions yield better worse results relative to their general instructions. The reason for this contradiction may be explained by their participants who were college, recreationally trained students compared to the elite youth soccer players in this research study. Wulf (2013) explains that those who are in the cognitive-verbal stage and autonomous stages of learning seem to benefit most out of external cues. If that is the case, then the subjects of Talpey et al., (2016) may have been in the cognitive verbal stage while the participants in this study would have been across different stages of learning spanning from the associative stage to the autonomous stage because of the variation of their age and experience level.

Finally, it is interesting to note that research by Vas, Spence and Chapman (2015) suggests people may be disregarding the specifics of instructions, come

up with general ideas of the instructions and refer to past experiences and knowledge to come up with their own thought processes. Plus, Corbin, Reyna, Weldon and Brainerd (2015) support this by explaining experienced people may just take the general idea from instructions and not the literal meaning where less experienced people are more likely to take the literal meaning of the instructions on board. This may explain why the subjects of this study improved in an internal focus as they are trained athletes and may be referring to their optimal focus that always gave them success in that task regardless of the instructions given.

external focus of attention impact jump height in elite youth soccer players:

A wealth of research shows a performance improvement with an external focus of attention, but it is unknown if the same improvements would be seen in elite youth soccer. For this reason, this research question was asked. Results of this study suggests an external focus of attention has a significant impact on vertical jump in elite youth soccer players when assessing the average across all 53 participants. These results agree with the constrained action hypothesis (Mcnevin et al., 2003) and the other studies who found the same results with an external focus of attention. As this study supports the constrained action hypothesis, these results may be explained by this phenomenon as it may disrupt the body's natural control of the motor system which would otherwise be more efficient in an external focus of attention (McNevin et al., 2003)

The greatest impact on vertical jump height from baseline overall:

This research question was asked to analyse which focus of attention (either internal or external) had the greatest impact on vertical jump. This research question was particularly useful as both improved performances, but this analysis allowed the researcher to see which has the greatest improvement of the two. Results showed that an external focus of attention had the greatest improvement on vertical jump height across all participants on average. Although some outliers

improved to a greater extent with an internal focus, the majority yielded better results with an external focus. The subjects who improved with an external focus can again be explained by the constrained action hypothesis while those who improved with an internal focus of attention may be explained by their experience level and whether they already get success out of an internal focus of attention (Winkelman, 2017). This comes back to the individuality principle of training (Lambert, Viljoen, Bosch, Pearce & Sayers, 2008), where not all athletes respond the same and each athlete will respond to training differently, in this case different types of attentional focus. Therefore, a coach should experiment and communicate with their athlete to see which focus of attention they get better success out of and which the athlete prefers based on the activity they are doing.

The difference in improvement between external and external across different maturity levels:

The little research that is completed on attentional focus in young people has conflicting findings and no research has been completed on the differential effects of attentional focus across varying ages across the youth athlete population. As a result, this final research question was asked. This study found when comparing the u19s to u13s that they experienced a significant improvement in an external focus compared to the improvement that the u19s had. Interestingly, for the u15s and u17s no significant improvement was found when comparing the improvement from internal to external. This may be explained by the Achievement goal theory (Dweck, 1986) which explains athletes' primary goal is to demonstrate their ability through achievements. The theory suggests two types of goal directed behaviour, task and ego. Task directed behaviour means the athlete believes success comes from the capacity to demonstrate their ability to learn and develop new skills, put in maximum effort and improve their own performance. Conversely, ego directed behaviour is when an athlete believes success occurs when they are compared as superior to their peers and their primary goal is to seem superior in social comparison. This results in the ego athlete believing success is experienced only when they perform better than their peers or when they perform just as well with less effort. This may explain if some athletes were not trying as hard as others, to seem like they don't need to put in as much effort

to achieve similar results. The chance to seem less superior than others would then be reduced. Additionally, the u13s may have improved to a greater extent due to their early exposure to a professional football and may feel the need to make an impression and take instructions literally like the explanation by Corbin et al., (2015) and Winkelman (2017). Where, some of the u19s may already have an internal focus as their preferred type attention. Despite these interesting differences across the age groups, with good coaching, communication and a good coach-athlete relationship an external focus of attention, when properly applied may yield superior results to an internal focus of attention in maximum activity tasks like vertical jump testing.

Limitations:

It was unknown if the players adapted the correct type of focus or not after hearing the instructions before the performance of the jump. A post activity questionnaire could have been handed out afterwards to analysed if this was achieved or not in each player. That way it would be truly known if the player adopted the desired focus of the condition or referred to their preferred focus that always gave them success. This could then may have explained the differences in focus affects across the varying age groups. Secondly, unequal numbers were recruited from each squad with the u19s having the most and the u15s and u13s having the least. This could have slightly affected the accuracy and strength of the averages across the squads compared to the u19 group. Additionally, the researcher was the strength and conditioning coach of the players and would have known most of these players already, this may have impacted on the players performance during the testing based on that players perception of our relationship. Some may have wanted to try hard, when others may not have. Finally, the generalisability of these results may only be limited to that of the youth athletic population and not the untrained youth population.

Conclusion:

In conclusion, an external focus of attention is superior to an internal focus in maximum effort tasks like vertical jump testing. The strength of this study includes

its high sample size, all ages of professional youth football in Ireland and the strength in its delivery of instructions across all participants. On a research level, this yields a strong methodology and is therefore be a worthwhile addition to attentional focus research. On a practical level, it can improve coaching effectiveness, especially that of the coaches in elite youth football in Ireland. Based on the results of this study, coaches should consider the type of instructions they use on their athletes. Where external instructions may be superior. On a practical level, recommendations can be made to coaches to have a verbal script during testing and ensure their instructions be of an external nature in elite youth football and delivery be constant across all athletes. Secondly coaches should be aware of the individual differences of each player and should invest in coach-athlete relationship and good communication to find out what type of focus suits each of his/her players and adapt accordingly to get maximum results. Recommendations for future research is to include a post activity questionnaire to assess the actual type of focus the athlete used to strengthen the results. further research can also be done on whether an external focus of attention improves an open skill like a header during a game of football and whether differences would be seen across the ages there. Finally, future research can study if there would be a significant difference in improvement in an external focus group using external instructions commonly used in research and an external focus group using the three-d's external instruction framework. This future research may then bridge the gap between research and the game itself.

References:

- Becker, K. A., & Smith, P. J. K. (2015). Attentional Focus Effects in Standing Long Jump Performance: Influence of a Broad and Narrow Internal Focus. *Journal of Strength and Conditioning Research*, 29(7), 1780–1783.
- Becker, K., & Smith, P. J. (2013). Age, task complexity, and sex as potential moderators of attentional focus effects. *Perceptual and motor skills*, 117(1), 130-144.
- Benz, A., Winkelmann, N., Porter, J., & Nimphius, S. (2016). Coaching instructions and cues for enhancing sprint performance. *Strength and Conditioning Journal*, 38(1), 1–11.
- Brady, F. (1995). Sports skill classification, gender, and perceptual style. *Perceptual & Motor Skills*, 81(2), 611
- Corbin, J. C., Reyna, V. F., Weldon, R. B., & Brainerd, C. J. (2015). How reasoning, judgment, and decision making are coloured by gist-based intuition: A fuzzy-trace theory approach. *Journal of applied research in memory and cognition*, 4(4), 344-355.
- Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety* (Vol. 721). San Francisco: Jossey-Bass.
- De Manzano, Ö., Theorell, T., Harmat, L., & Ullén, F. (2010). The psychophysiology of flow during piano playing. *Emotion*, 10(3), 301.
- Ducharme, S. W., Wu, W. F. W., Lim, K., Porter, J. M., & Geraldo, F. (2016). Standing Long Jump Performance with an External Focus of Attention Is Improved as a Result of a More Effective Projection Angle. *Journal of Strength and Conditioning Research*, 30(1), 276–281.
- Emanuel, M., Jarus, T., & Bart, O. (2008). Effect of focus of attention and age on motor acquisition, retention, and transfer: a randomized trial. *Physical Therapy*, 88(2), 251-260.
- Fitts, P. M., & Posner, M. I. (1967). *Human performance*. Belmont, CA: Brooks/Cole.

- Haff, G. G., & Triplett, N. T. (Eds.). (2015). *Essentials of strength training and conditioning 4th edition*. Human kinetics.
- Hatfield, B. D., & Landers, D. M. (1983). Psychophysiology—A new direction for sport psychology. *Journal of Sport Psychology*, 5(3), 243-259.
- Hatfield, B. D., & Landers, D. M. (1987). 11 Psychophysiology in Exercise and Sport Research: An Overview. *Exercise and Sport Sciences Reviews*, 15(1), 351-388.
- Kearney, P. E. (2015). A distal focus of attention leads to superior performance on a golf putting task. *International Journal of Sport and Exercise Psychology*, 13(4), 371-381.
- Keller, M., Lauber, B., Gottschalk, M., & Taube, W. (2015). Enhanced jump performance when providing augmented feedback compared to an external or internal focus of attention. *Journal of Sports Sciences*, 33(10), 1067–1075.
- Lambert, M. I., Viljoen, W., Bosch, A., Pearce, A. J., & Sayers, M. (2008). General principles of training. *The Olympic textbook of medicine in sport*, 1-48.
- Lockie, R. G., Moreno, M. R., Orjalo, A. J., Stage, A. A., Liu, T. M., Birmingham-Babauta, S. A., ... & Davis, D. L. (2017). Repeated-Sprint Ability in Division I Collegiate Male Soccer Players: Positional Differences and Relationships with Performance Tests. *Journal of strength and conditioning research*.
- Makaruk, H., Porter, J. M., Czaplicki, A., Sadowski, J., & Sacewicz, T. (2012). The role of attentional focus in plyometric training. *The Journal of sports medicine and physical fitness*, 52, 319-27.
- Marchant, D. C. (2011). Attentional focusing instructions and force production. *Frontiers in psychology*, 1, 210.
- McNevin, N. H., Shea, C. H., & Wulf, G. (2003). Increasing the distance of an external focus of attention enhances learning. *Psychological research*, 67(1), 22-29.
- Nideffer, R. M. (1976). Test of attentional and interpersonal style. *Journal of personality and social psychology*, 34(3), 394.

- Porter, J. M., & Sims, B. (2013). Altering Focus of Attention Influences Elite Athletes Sprinting Performance. *International Journal of Coaching Science*, 7(2).
- Porter, J. M., Anton, P. M., & Wu, W. F. (2012). Increasing the distance of an external focus of attention enhances standing long jump performance. *The Journal of Strength & Conditioning Research*, 26(9), 2389-2393.
- Porter, J. M., Anton, P. M., Wikoff, N. M., & Ostrowski, J. B. (2013). Instructing skilled athletes to focus their attention externally at greater distances enhances jumping performance. *Journal of Strength and Conditioning Research*, 27(8), 2073–2078.
- Porter, J. M., Ostrowski, E. J., Nolan, R. P., & Wu, W. F. (2010). Standing long-jump performance is enhanced when using an external focus of attention. *The Journal of Strength & Conditioning Research*, 24(7), 1746-1750.
- Porter, J. M., Wu, W. F., Crossley, R. M., Knopp, S. W., & Campbell, O. C. (2015). Adopting an external focus of attention improves sprinting performance in low-skilled sprinters. *The Journal of Strength & Conditioning Research*, 29(4), 947-953
- Raglin, J. S. (2007). The psychology of the marathoner. *Sports Medicine*, 37(4-5), 404-407.
- Schoenfeld, B. (2018). *Science and development of muscle hypertrophy*. Human Kinetics.
- Shad, K. F. (2014). What is Psychophysiology? where to Go Next? *Annals of Psychophysiology*, 1(1), 01.
- Shafizadeh, M., McMorri, T., & Sproule, J. (2011). Effect of different external attention of focus instruction on learning of golf putting skill. *Perceptual and motor skills*, 113(2), 662-670.
- Stølen, T., Chamari, K., Castagna, C., & Wisløff, U. (2005). Physiology of soccer. *Sports medicine*, 35(6), 501-536.
- Talpey, S. W., Young, W. B., & Beseler, B. (2016). Effect of instructions on selected jump squat variables. *Journal of Strength and Conditioning Research*, 30(9), 2508–2513.

- Turner, A. N., & Stewart, P. F. (2014). Strength and conditioning for soccer players. *Strength & Conditioning Journal*, 36(4), 1-13.
- Vance, J., Wulf, G., Töllner, T., McNevin, N., & Mercer, J. (2004). EMG activity as a function of the performer's focus of attention. *Journal of motor behaviour*, 36(4), 450-459.
- Vas, A. K., Spence, J., & Chapman, S. B. (2015). Abstracting meaning from complex information (gist reasoning) in adult traumatic brain injury. *Journal of clinical and experimental neuropsychology*, 37(2), 152-161.
- Winkelman, N. C. (2016). Attentional Focus and Cueing for Speed Development. *Strength and Conditioning Journal*, 40(1), 13–25
- Winkelman, N. C., Clark, K. P., & Ryan, L. J. (2017). Experience level influences the effect of attentional focus on sprint performance. *Human movement science*, 52, 84-95.
- Wu, W. F., Porter, J. M., & Brown, L. E. (2012). Effect of attentional focus strategies on peak force and performance in the standing long jump. *The Journal of Strength & Conditioning Research*, 26(5), 1226-1231.
- Wulf, G. (2007). *Attention and motor skill learning*. Human Kinetics.
- Wulf, G. (2013). Attentional focus and motor learning: a review of 15 years. *International Review of sport and Exercise psychology*, 6(1), 77-104.
- Wulf, G., & Dufek, J. (2009). Increased jump height with an external focus due to enhanced lower extremity joint kinetics. *Journal of Motor Behaviour*, 41(5), 401–409.
- Wulf, G., Dufek, J. S., Lozano, L., & Pettigrew, C. (2010). Increased jump height and reduced EMG activity with an external focus. *Human Movement Science*, 29(3), 440–448.
- Wulf, G., Landers, M., Mercer, J., Töllner, T., & Guadagnoli, M. A. (2004). Attentional focus effects on motor performance as a function of level of expertise

Wulf, G., McConnel, N., Gärtner, M., & Schwarz, A. (2002). Enhancing the learning of sport skills through external-focus feedback. *Journal of motor behaviour*, 34(2), 171-182.

Wulf, G., McNevin, N., & Shea, C. H. (2001). The automaticity of complex motor skill learning as a function of attentional focus. *The Quarterly Journal of Experimental Psychology: Section A*, 54(4), 1143-1154.

Wulf, G., Zachry, T., Granados, C., & Dufek, J. S. (2007). Increases in Jump-and-Reach Height through an External Focus of Attention. *International Journal of Sports Science & Coaching*, 2(3), 275–284.

Zaichkowsky, L. (2012). Psychophysiology and neuroscience in sport: introduction to the special issue. *Journal of Clinical Sport Psych*

Appendices:

Appendix A:

Consent/Parental Consent Form

To investigate the influence of external instructions vs internal instructions on vertical jump height performance in elite youth soccer players using an instruction framework

Researcher Contact Details:

David O'Brien

087-352-3820

6 Spring Lawn, Ashley Court, Waterford City, X91 YW1W

Please Initial Box

1. I understand the information taken will only be used for the above study and I have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.
3. I consent/give the consent of my child to take part in this study

Name of Participant

Date

Signature

Name of Guardian

Date

Signature

Name of Researcher

Date

Signature

