The influence of external focus instruction characteristics on children's motor performance

Running Head: Focus of attention and children's jump performance

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Abstract

Purpose: Research demonstrates that verbal instructions directing attention externally (i.e., toward the effect of the movement) significantly enhances motor skill performance, and that this effect is enhanced when the distance of the external focus relative to the body is increased. However, few studies have investigated this distance of focus effect in children. The present study aimed to examine the effect of increasing the distance of an external focus on children's motor performance in two experiments. Method: In experiment 1, children performed standing long jumps under three instructional conditions (control, internal attentional focus, and external attentional focus). In experiment 2, children performed standing long jumps under four instructional conditions (control, internal, proximal external attentional focus and distal external attentional focus). Results: In experiment 1, results revealed a statistically significant jump distance advantage for the external focus condition. In experiment 2, a statistically significant jump distance advantage for the distal external focus condition was found. However, instructional and task characteristics beyond distance of focus may have been influential. Conclusions: External focus instructions benefit children's jump performance, but specifically when they are supported by a concrete movement goal reflecting relevant performance criteria. The findings highlight the importance of examining the content of instructions and relevant task characteristics provided to children beyond attentional focus to consider their motivational characteristics.

Keywords: External Focus, Motor Control, Jumping

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Motor performance and learning have been shown to be improved when verbal instruction or feedback induces an external focus of attention (i.e., directed towards the movement effect or outcome) compared to internal focus instructions (i.e., directing attention towards movement actions themselves) (see Wulf, 2013). These findings extend across different types of tasks, skill levels, and age groups, but there is limited research examining childhood motor instruction using this conceptualization. Children's fundamental motor skill (FMS) proficiency is better supported through appropriate practice, encouragement, feedback and instruction (Gallahue, Ozmun, & Goodway, 2012). However, Riethmuller, Jones, and Okely (2009) highlighted the limited quality and quantity of research examining interventions for children's FMS development. Performance of jumping tasks (e.g., standing long jump and vertical jump) is enhanced in adults when instructions direct attention externally rather than internally. For example, Porter, Ostrowski, Nolan, and Wu (2010) found external focus (e.g., jump as far past the start line as possible) instructions enhanced standing long-jump performance compared with internal focus instructions (e.g., "extending your knees as rapidly as possible"). Further replication suggested that this improvement was associated with a more effective jump projection angle (Ducharme, Wu, Lim, Porter, & Geraldo, 2016). Maximum vertical jump and reach height was also improved when directing attention externally (e.g., object being reached for) compared to when internal focus (e.g., focus on reaching with fingers) instructions are provided (Wulf, Zachry, Granados, & Dufek, 2007). This increased jump height has subsequently been associated with greater force production, more efficient lower-limb joint movements (Wulf & Dufek, 2009) and enhanced neuromuscular coordination (Wulf, Dufek, Lozano, & Pettigrew, 2010). Therefore, in adult populations it

appears that the focus of attention emphasized through verbal instruction can influence fundamental jumping skills.

In explanation of these effects, the constrained action hypothesis proposes that an internal focus on body movements results in conscious control attempts, which interferes with efficient movement execution. This has been evidenced through inefficient or elevated muscular activity (e.g., Lohse & Sherwood, 2012). In contrast, adopting an external focus results in promotion of the motor system's self-organizing and automatic capacities (e.g., Lohse, Sherwood, & Healy, 2014) evidenced through efficient muscular activation and movement coordination.

A distance of focus effect has also been observed with the benefits associated with an external focus movement instruction. McNevin, Shea and Wulf (2003) first demonstrated that instructions emphasizing a greater distance from the body increased the external focus performance benefits on a stabilometer balance task. When participants were instructed to keep markers placed on an unstable platform horizontal, learning was enhanced when the markers were at a greater distance from participants' feet compared to when the markers were directly in front of the feet. Relatively few studies have addressed this phenomenon further, but those that have appear to support the finding (e.g., in golf chipping, Bell & Hardy, 2009 and dart throwing, McKay & Wulf, 2012). Pertinent to the present study, jumping tasks have been shown to be sensitive to the "distance-of-focus" effect in adults. Porter, Anton, and Wu (2012) found that a distal-external focus (e.g., "jump as close to the cone as possible") benefited jump performance compared to proximal (e.g., "jump as far past the start line as possible") and control instructions. The proximal focus also resulted in greater jump distance compared to attempts completed in a control condition. Additionally, Porter, Anton, Wikoff, and Ostrowksi (2013) replicated these findings with a population of trained athletes completing the standing long jump task. These findings provide compelling evidence that

instructions increasing the distance of an external focus benefit standing long jump performance. Proposed theoretical explanations for the distance of focus effect suggest that it may be due to an increased distinction between action effects and bodily movements (e.g., McNevin et al.), emphasis of higher 'hierarchical' movement goals (Wulf, 2013), as well as potential motivational influences (e.g., Coker, 2016). However, there is also evidence that novices benefit from instructions emphasizing a more proximal external focus (Wulf, McNevin, Fuchs, Ritter, & Toole, 2000) whilst experts benefit from a more distal external focus (Bell & Hardy, 2009). To date this effect has been observed in adult participants, and so it is unclear how this notion of increasing the distance of an external focus of attention relates to children's execution of fundamental movement skills such as jumping.

It is widely accepted that cognitive and motor abilities are better developed in adults compared to children (Gallahue et al., 2012). Moreover, when children and adults practice the same motor skill, several researchers have reported that the information processing abilities of children are lower than adults (e.g., Lambert & Bard, 2005). Furthermore, expertise has been shown to be a potentially important moderator of the effects of attentional focusing instructions (e.g., Winkelman, Clark, & Ryan, 2017). This leads to many unanswered questions about how children react to verbal instructions that are designed to affect how attention is allocated during movement. There is limited research that has addressed the influence of attentional focusing instructions on children's motor performance, and findings are mixed in the work to-date. Emanuel, Jarus and Bart (2008) suggested that adults benefited from practicing throwing darts under external focus (e.g., the target, the dart, and the dart's course) conditions, but children appeared to benefit from internal focus instruction (e.g., movements of the shoulder, arm, and fingers). Contrary to this observation, Wulf, Chiviacowsky, Schiller and Ávila (2010) found that children's movement form was enhanced on a soccer throw-in when frequent externally-focused feedback (e.g., produce a "C" at the

beginning of the throw) was provided after every trial (100%) compared to when it was provided after every third trial (33%) or any frequency of internally-focused feedback (100%, 33%) (e.g., The back should be arched at the beginning of the throw) provided during practice. Considering other developmental factors, Chiviacowsky, Wulf, and Ávila (2013) found that children with mild intellectual disabilities learned to toss beanbags more accurately when provided with instructions focusing attention externally (e.g., flight of the beanbag) rather than internally (e.g., movement of their hand). Similarly, Saemi, Porter, Wulf, Ghotbi-Varzaneh, and Bakhtiari (2012) found that children (aged 8 to 11 years) with attention deficit hyperactivity disorder (ADHD) who practiced with external focus instructions demonstrated more effective learning of a ball throwing accuracy task than those provided with internal focus instructions during practice. However, Jarus and colleagues (2015) found that children with developmental coordination disorder (DCD) did not experience the same learning benefits from external focus instruction compared to their typically developing counterparts. Chow, Koh, Davids, Button and Rein (2014) assessed the influence of attentional focusing instructions on children's standing long jump performance. Children receiving external focus instructions during practice achieved greater jump distances and more efficient kinematic (larger joint range of motion) and kinetic (effective horizontal jump impulses) characteristics than when receiving internally focused or control instructions. However, Chow et al. did not provide consistent focus of attention instructions within each of the experimental conditions; rather, participants were provided a different set of instructions prior to each jump attempt. Perreault and French (2015) found that children (9 and 11 years) practicing basketball free-throws with externally-focused feedback had a significant learning advantage and reported less self-evaluative thoughts and greater goal directed thoughts compared with participants who had received internal-focus feedback. However, Perreault and French (2016) did not find any benefit between internal and external focus instructional

conditions for children learning a basketball free-throw task, and manipulation checks revealed that use of attentional focus cues was low. However, analysis of retrospective recall indicated that those performing well during retention reported greater use of externally focused cues, suggesting some benefit to providing externally focused instructions during practice. Recently, Palmer, Matsuyama, Irwin, Porter and Robinson (2017) found that children performed better with externally focused verbal cues on tests of object control FMS (e.g., throwing, kicking and catching) compared to a no attentional focus verbal cue, but not over internally focused cues. Based on the limited and mixed research, it appears that children practicing fundamental movement skills may benefit from adopting an external focus of attention.

The current paper presents two experiments examining the efficacy of focus of attention effects in children performing the standing long jump. In an attempt to better understand how young children respond to attentional focusing instructions, the research methodology utilized replicates protocols used in low (Porter et al., 2010, 2012) and high-skilled (Porter et al., 2013) adult populations. The primary aim of Experiment 1 was to replicate a commonly used methodology in adult populations to see if young children responded to the focus of attention manipulation similarly to adults when completing standing long jumps. The primary aim of Experiment 2 was to investigate the distance of external focus effect previously demonstrated in adults on the same task. Given that there is evidence of skill level interacting with distance of external focus effects (e.g., Wulf et al., 2000), research addressing a developmental perspective is needed to examine the extent of such relationships. The pursuit of these two aims is important for both theoretical and practical reasons considering how little is known about children's responses to attentional focusing instructions on such tasks.

Experiment 1

Method

Participants

Forty-four children (23 male, 21 female; M_{age} = 7.35 years ± 1.7; M_{height} = 1.27 m ± 0.13; M_{weight} = 28.01kg ± 9.24) with no known developmental issues or lower limb injuries were recruited from an elementary school (i.e., grades K-5) in a Midwestern state in the United States of America. Permission was obtained from the administration of the school, parents signed an informed consent and participating children provided their verbal assent after the task had been described. All methods and forms were approved by a University Institutional Review Board.

Design

A three-way within-participant design assessed the influence of different attentional focusing instructions on standing long jump performance. Instructions emphasized the use of a neutral (i.e., no additional instruction), internal (i.e., focus on bodily movement), or external (i.e., focus on the result of the movement) focus of attention. Partial counterbalancing was used in an attempt to control for order effects. The primary outcome measure was distance jumped in cm.

Apparatus and Task

Identical to previous research examining the effects of focus of attention on standing long jump performance in adults (e.g., Porter et al., 2013), participants completed jumps on a black rubber composite jumping mat that included measurement lines in half inch increments out to a distance of 144 inches (i.e., 3.66 m). Data were originally collected in inches and later converted to centimeters for analysis. Prior to each jump, participants stood with their feet approximately shoulder-width apart and with their toes behind a designated white start

line that was painted on the mat. Distance jumped was the distance from the start line to the back of the heel nearest the start line.

Procedures

After a short warm up of moderate intensity walking, participants completed two maximum effort standing long jumps in each of three experimental conditions for a total of six jumps. Testing took place in one day during a regularly scheduled physical education class period within the school. Participants were tested in an isolated part of the gymnasium to ensure privacy. Prior to each jump, participants were read general instructions indicating that they were going to complete a total of six jumps and that the goal was to jump as far as possible on each attempt. Prior to each jump, participants were provided with their specific attentional focusing instruction. Verbal instructions informed by the research of Porter et al., (2012, 2013) were used to direct attention. Pilot testing ensured the prescribed instructions were understandable to the young participants. Control instructions (CON) were, "*jump.*" This instruction was designed to not induce a specific focus of attention. The internal focus instructions were, "*focus on springing your legs as fast as possible when you jump*." The external (EX) instructions were, "*focus on jumping as close to the cone as possible*." A 30 cm tall green cone was placed at a distance of 2 m from the participant and was only visible in this condition. Given that previous research has indicated that children may present lower adherence to the verbal instructions provided in similar studies (e.g., Emanuel et al., 2008), verbal instructions were provided prior to each jump. The same researcher read the prescribed instructions to all participants through the duration of the study, and participants were asked at the start of the testing session if they understood the instructions. To maintain consistency in the dependent measure, the jump distance of each participant was recorded by the same member of the research team who was experienced in the assessment of children's FMS. Participants were not provided with any explicit performance feedback after each jump, and

were provided a short break between each jump to minimize the effects of fatigue. Participants were debriefed and provided with performance feedback once all jumps had been completed.

Results and Discussion

Mean jump distance was calculated for each condition and a one-way repeated measures analysis of variance (ANOVA) was used to determine possible statistically significant differences between the experimental conditions. The ANOVA revealed there was a condition main effect ($F(2,86) = 10.93$, $p = .001$, $\eta p^2 = .20$). Bonferroni post-hoc analysis indicated that participants jumped significantly farther in the external (138.7 ± 22.2 cm) condition compared to trials completed in the internal (132.8 ± 22.9 cm, $\eta p^2 = .26$) and control (133.1 ± 23.8 cm, $\eta p^2 = .24$) conditions, the latter two conditions were not significantly different ($\eta p^2 = .02$). The average jump distances and standard errors for each condition are displayed in Figure 1.

*** Figure 1 near here

The purpose of Experiment 1 was to investigate if young children responded similarly to adults when instructed to focus their attention neutrally, internally or externally when performing a standing long jump. Consistent with findings reported in adult populations (Porter et al., 2010, 2012, 2013), our results demonstrated that young children jumped farther when their attention was focused externally towards reaching a cone that was placed in front of them rather than neutrally or internally towards the springing action of their legs. However, inconsistent with similar studies using adult participants (e.g., Porter et al., 2013), the present findings indicated that the jumping distances between the internal and control conditions were not significantly different. Overall, our results are consistent with the extant literature on focus of attention, and suggests that standing long jump performance in

elementary-aged children also benefits from the use of an external focus of attention. The findings of this study also suggest that instructing young children to focus their attention internally did not have an inhibitory effect on motor performance. It is important to point out that a lack of significant differences between internal and control conditions has been reported in other focus of attention studies, particularly when the participant is performing a power based gross motor skill such as weight lifting (Marchant, Greig, Bullough, & Hitchen, 2011), agility L run (Porter, Nolan, Ostrowski, & Wulf, 2010), and a 20 m sprint (Porter, Wu, Crossley, Knopp, Campbell, 2015). We feel this further illustrates the powerful effect of utilizing verbal instructions and cues that prompt an external focus when communicating in movement assessment settings with participants of all ages.

Based on the results of Experiment 1 it is clear that young children should be instructed to focus on the desired result of the movement when performing a fundamental movement skill such as the standing long jump. Before discussing in greater detail the theoretical and practical contributions of this experiment, it is important to determine if increasing the distance of an external focus of attention has an incremental magnifying effect on motor performance in children.

Experiment 2

Experiment 1 provided initial evidence that instructing children to focus their attention externally enhanced standing long jump performance relative to trials completed following neutral or internal focus instructions. Several studies using adult participants have demonstrated that increasing the distance of an external focus (e.g., a greater distance from the body) magnifies the benefits of adopting an external focus. That is, by instructing participants to plan their movements in terms of their desired 'distant' outcome, motor performance systematically increases. This finding has been observed in continuous balance performance on an unstable surface (McNevin & Wulf, 2003) and in pre-planned jumping

performance (Porter et al., 2012, 2013). However, what is not known is if children also benefit from this form of attentional allocation. Given the complimentary lines of research showing distance of focus benefits in adults and that children can benefit from external focus instructions, the purpose of Experiment 2 was to test the focus of attention distance effect in children. Specifically, we sought to investigate if manipulating the distance of an external focus emphasized in verbal instruction would benefit primary school children's standing long jump performance. In light of the evidence to date on standing long jump tasks, it was hypothesized that a distal external focus would benefit jump performance compared to alternative forms of attention directing instructions.

Method

Participants

Fifty-four children (24 male, 30 female; M_{age}: 8.41 years $\pm$ 0.50; M_{height}: 1.48 m $\pm$ 0.06; M_{weight}: 31.49 kg, $\pm$ 6.71) with no known developmental issues or lower limb injuries were recruited from a primary school in the North West of England. Participants were not novice in jumping, but they had no prior experience of the standing long jump test, and were naïve as to the precise purpose of the experiment. Written informed consent was obtained from the primary school and participants provided verbal assent after the task had been described. The study was approved by a University Ethics Committee.

Design

A 4 way within-subjects design assessed the influence of different attentional focusing instructions on standing long jump performance. Instructions emphasized control (no additional instruction), internal (focus on bodily movement), external-near (jumping away from the start line) and external-far (jump towards a marker) focuses of attention. After

initially completing the control condition, partial counterbalancing was used to control for order effects. The primary outcome measure was distance jumped in cm.

Apparatus and Task

The jumping task and apparatus was the same as used in Experiment 1.

Procedures

Participants initially completed a two-minute warm-up of moderate intensity walking, and subsequently performed four warm-up jumps on the jumping mat. The experimenter demonstrated the jumping movement to each participant, and the jumping task was described in participant-appropriate language, developed with a qualified physical educator. Participants completed three maximum effort standing long jumps in each of the experimental conditions. The general instructions regarding the task goal and jumping motion were the same for all conditions. Prior to each block and before each individual jump the same researcher provided the specific verbal instructions for that condition, and participants were asked if they understood the instructions they had been provided with. Control instructions (CON) were, "*jump to the best of your ability.*" The internal focus instructions were, "*focus on extending your legs as rapidly as possible.*" To advance from Experiment 1, an external focus was manipulated in two conditions to emphasize different distances of external focus. The external-near (EXN) instructions emphasized a proximal movement outcome; "*jump as far past the start line as possible*." Participants stood with their feet at the start line of the jump mat prior to each jump. The external-far (EXF) instructions emphasized a distal movement outcome, "*jump as close to the cone as possible*." The distal movement outcome was greater than that employed in Experiment 1, in that the 5.5 cm high red cone was placed at a distance of 3 m from the participant (as opposed to 2 m), and was again only visible for the EXF condition.

To control for potential expectancy effects that could be apparent in experiment 1 (through the use of a non-naïve researcher) distance jumped was assessed by an assistant unaware of the background of the study but who was experienced in children's FMS evaluation. Participants individually completed all jumps in 1 testing session during a scheduled physical education class. Jumps were not observed by their teacher, and other students were completing regular physical education activities away from the jump task to avoid observation effects (e.g., competition, coaction, encouragement). Each block of jumps was separated by approximately 2 minutes rest, and each individual jump was separated by approximately 1 minute. Participants were not provided with any explicit performance feedback after each jump. To promote instruction use, after each condition participants were briefly asked whether they used and understood the allocated instructions. All participants reported using and understanding the instructions for each jump. Once all jumps were completed, participants were debriefed and provided with performance feedback.

Results

A one-way repeated measures ANOVA (Focus condition: CON, IN, ExN, ExF) was used to determine significant differences between the experimental conditions (Jump distance was averaged across the three jumps completed in each condition). Given the evidence informed-hypothesis being tested, planned contrasts were used to examine differences without Type I error rate. There was a significant effect of Focus condition on jump performance $F(3, 159) = 3.21$, $p = .03$, $\eta p^2 = .06$. Mean jump performance in the CON, IN, ExN, ExF conditions were 113.14 cm (SD = 19.21), 113.91 cm (SD = 19.32), 114.19 cm (SD = 21.19) and 116.30 cm (SD = 20.17), respectively. Planned contrasts revealed that jump performance in CON ($F(1,53) = 7.84$, $p = .01$, $\eta p^2 = 0.13$), IN ($F(1,53) = 5.59$, $p = .02$, $\eta p^2 = .10$), and ExN ($F(1,53) = 4.56$, $p = .04$, $\eta p^2 = .08$) was significantly poorer than ExF. CON jump performance was not significantly different than IN ($F(1,53) = 0.54$, $p = .47$, $\eta p^2 = .01$)

or ExN ($F(1,53) = 0.88$, p = .35, $\eta p^2 = .02$). Finally, jump performance using a ExN ($F(1,53) = 0.06$, $p = .80$, $\eta p^2 = .001$) was not significantly different from IN (See Figure 2).

*** Figure 2 near here

Discussion

The current study aimed to determine whether increasing the distance of external focus emphasized in verbal instruction would benefit the standing long jump performance of primary schoolchildren. Research has addressed this distance of focus effect in movement skill (e.g., McNevin, et al., 2003) and jump tasks (e.g., Porter, et al. 2010), yet no research to-date has considered this effect in children. Although the effect sizes were relatively small, the findings of the present study partially replicate the distance of focus effect typically observed in adults with a sample of primary school children. Greater jump distances were achieved with the External Far focus instructions compared to the External Near focus, Internal focus and Control instruction conditions. However, the proximal external focus resulted in no improvements over internal focus or control instructions, which were all similar in performance. These findings are in line with those observed in Experiment 1, confirming that an external focus of attention is important for instructing children's jump performance. The findings support Chow et al.'s (2013) demonstration that instructions emphasizing an external focus assisted children in improving their jumping distance in the standing long jump. In extension of Chow et al., the present findings are partially consistent with those of Porter and colleagues (e.g., Porter et al., 2010), who demonstrated increased jump distances in adults when instructions emphasized a greater distance of external focus. Reviewing the instructions provided in the present study and Porter et al.'s work in comparison to those of Chow et al. (2013) some similarities are apparent. The distal external focus in the present study (jump as close to the cone as possible) appears similar to some of the instructions provided in the Chow et al. study (look at the target line on the mat as you jump). However, additional

instructions provided by Chow et al. do not emphasize this distance of focus characteristic ("Reach out and point to the wall" and "Launch yourself into the air"). As multiple instructions were provided in the Chow et al. study, it is unclear which aspects proved effective in focusing attention. Therefore it is possible that other instructional characteristics in these studies are critical to supporting performance. Characteristics of external focus instructions can further impact their effectiveness and prompt further evaluation of the instructional content provided in the present study.

The findings of the present study indicate that, despite the replication of findings in adult populations, the distance of focus emphasized in a jumping task is not the only critical aspect in instructing children's movement. Post-task interviews indicated that participants used the instruction provided. However, participants reported that the external-near instructions were not useful and were difficult to understand, suggesting that our sampled children found it challenging to adopt this attentional foci during the movement (see also novices in McKay & Wulf, 2012) and casting doubt over whether attentional focus is the sole process promoted by these instructions. Such an observation, in addition to performance differences, necessitates reinterpretation of the instructions provided. It is possible that these distance of focus instructions may not represent greater hierarchical goals of the jumping action in this case (Vallacher, 1993), and do not simply differ in terms of distance of attentional focus as initially proposed. Rather, the distal focus emphasized in the present study (in addition to Porter, et al. 2010) may well represent the most effective external focus instruction from the set provided. They more effectively support the goal-action coupling benefit of an external focus (Wulf & Lewthwaite, 2016) by implicitly emphasizing the task goal through the placement of the cone and explicitly by instructing the participant to focus upon it. In addition, placing the cone into the environment may have also directly impacted motivational processes. For example, the presence of the cone defined a more meaningful and

visual performance criterion pre-jump (compared to simply jumping away from the start-line "as far as you can"). Wulf and Lewthwaite's (2016) OPTIMAL theory of motor learning suggests that setting performance criteria can enhance expectancies for success, developing self-efficacy, task interest and satisfaction with performance (e.g., Palmer, Chiviacowsky, & Wulf, 2016). Therefore an external focus appears to be only one process that the instructions impacted on to support performance.

In contrast, the external-near focus instructions (distance from the start line) may have been limited in terms of both effective direction of attentional focus and enhancing expectancies for success. The reported difficulties in using these instructions suggest that an inability to effectively focus externally as the intended movement outcome (jump as far as you can) was poorly defined, when compared to the distal external focus condition. In addition, the performance criterion of "jump as far as you can" also lacks the clarity of that provided by the cone in the distal external condition. Therefore, the similar performances between the control, internal and external-near conditions may be explained in terms of poorly defined performance criteria for the task. Finally, these instructions differ not only in terms of attentional focus and performance criteria, but also in terms of movement intention. The external near focus instructions emphasize jumping *away from* whereas the external far instructions emphasize jumping *towards*. Such differences highlight the potential for the motivational effects of the task instructions through the type of goal they emphasize.

In conclusion, despite the benefits observed in the distal external focus condition it remains unclear which factors determine the optimal external attentional focus distance for children's motor performance, or indeed whether external focus distance is the sole critical component of the task instruction.

General Discussion

Although beneficial effects of external focus instruction and feedback have been found for children's motor performance and learning (e.g., Palmer et al. 2017), this has not been consistently observed (e.g., Jarus et al., 2015; Perreault & French, 2016). These findings are in line with the constrained action hypothesis (Wulf, McNevin, & Shea, 2001). Firstly, evidence suggests that an external focus instruction helps promote greater automaticity in movement control compared to an internal focus of attention which actively intervenes and disrupts automatic processes. Furthermore, McNevin et al. (2003) proposed that increasing the distance of external focus results in an attentional focus that is distinguishable from the bodily movements associated with it. In contrast, an external focus closer to the participant becomes more easily associated with the bodily movements producing the effect. Wulf (2013) further proposed that a distal focus of attention may represent a higher "hierarchical" movement goal, which potentially interact with a performer's level of expertise, and support greater automaticity (McNevin et al., 2003). However, the findings from Experiment 2 suggest that instructional characteristics beyond attentional focus also play a critical role. In terms of the distance of focus effect, the greater distance of distal external focus instructions may not only result in an effective external focus, but also provides clearer and more meaningful performance criteria. These instructions therefore also impact upon motivation to engage in a task through influencing expectancies for success. For example, in the present study, the placement of a cone into the environment as an external cue also provided concrete movement goal and performance criteria that was not present in the other conditions.

There is evidence to suggest that a more proximal external focus can benefit novice motor learning of more complex skills such as golf chip (Wulf, McNevin, Fuchs, Ritter, & Toole, 2000). However, Experiment 2 findings question the assumption children would benefit from proximal external focuses as this condition resulted in performance similar to the internal and control conditions. A key finding is that children actually found this

instruction difficult to use, potentially due to motivational and task-goal characteristics not well captured by the instructions.

Also, the benefits of the distal focus over the proximal focus in the present study may be due to greater compatibility with the movement goal. Wulf (2013) suggests that a more distal focus will support the whole action pattern necessary to achieve a desired movement goal through promoting motor control at a superior hierarchical level (e.g., Vallacher, 1993).

In this case, an external focus onto a concrete movement goal appears to have helped keep participants' focus on a task relevant goal, and likely prevented an internal focus onto body movements. As suggested, these benefits may be driven by both attentional (focus on task-goal) and motivational (performance criteria) characteristics of these task-instructions and setup (e.g., cone). It was only in the distal external focus condition that both attentional cues and motivation conditions were optimized. Such an explanation is supported by Coker (2016) who highlighted potential motivational considerations as the effectiveness of externally focused cues is influenced by the perceived attainability of the movement outcomes being promoted. Using a standing long jump task, young adult athletes achieved a greater jump distance when cued to jump towards a cone placed at an attainable and individually tailored distance, compared to a nominal and unattainable distance (Coker, 2016). This effect is explained in terms of goal difficulty (e.g., Locke & Latham, 2002), where the achievable external cue condition fostered greater effort by physically providing (e.g., the cone) and then clearly identifying a specific and challenging task goal. In addition, state self-confidence (e.g., Vealey, 1986) is enhanced through task achievement experiences, which positively influences expectations.

In both experiments presented here, verbal instruction that optimally directed children's attention externally towards a concrete and physically provided task goal (i.e., cone) provided additional benefit over instructions that provide no explicit attentional

direction. As such, children may not automatically adopt a beneficial external focus of attention when executing movements. Given the acute nature of the present intervention, it is clear that simple changes in instructional emphasis and task setup can provide immediate benefits to children's jump performance. Chow et al. (2014) suggested that the task goal of maximal jump distance itself may promote an external focus of attention. Such task-dependent attentional focus effects in control conditions have been observed before (Marchant et al., 2007), however, in the present two experiments such an effect was not observed. The distal-external focus instructions in both experiments provided clear benefits over the control condition. As such, despite the nature of the task promoting an external focus, instructing children to focus on a clear external movement effect that was visually provided in the task setup was most beneficial.

When interpreting the findings presented here, the limitations of the current experiments should be considered. Using a within-subjects approach, the present study is unable to clearly address the role of different attentional focus instructions in the acquisition of skills in childhood, and any long-term impact is unclear. Although the researcher checked for instruction comprehension, further manipulation check efforts would have provided information on how the instructions were used (see Perreault & French, 2016). As discussed, it is quite possible that characteristics of intention, distance and the task goals resulted in the external-far conditions being the most usable instructional-set provided as they were supported by the presence of the cone in the task set up. The additional placement of the cone within this condition means it is possible this manipulation alone supported the observed benefits. Future research should consider both the attentional and motivational characteristics of instructions for children's motor performance and learning. Finally, although these children were novice to this type of jump assessment, it is clear that children are not novice to the act of jumping in this manner. Additionally, the differences in performance observed

between the testing settings in experiment 1 (USA) and 2 (UK) also suggests that these populations may not be comparable in terms of ability.

The present study partially supports the beneficial effects of external focus instruction on children's' performance of standing long jumps, yet our findings raise questions about the role of other instructional and task characteristics beyond attentional focus. Instructions emphasizing a more distal external focus resulted in enhanced jump distance than control, internal and proximal external focus conditions. However, control, internal and proximal external focus conditions did not differ in terms of performance. These conditions not only differed from the distal external focus conditions in terms of instruction, but they also lacked the provision of a clear performance criteria in the form of the cone. This is an important practical consideration as ineffective or inconsistent instructional and task procedures may result in unreliable or unrepresentative performance (See Halperin, Pyne, & Martin, 2015). As such, it appears that children benefit from effective externally focused cues and task manipulations when performing jumping tasks, as well as conditions that effectively support expectancies for success. In conclusion, instructions that emphasize an external focus of attention appear most effective for guiding children's movements, but these findings suggest that task and instruction's motivational characteristics are also additional important considerations. External focus instructions that effectively emphasize relevant external movement outcomes also serve to better enhance expectancies through clearer performance criteria.

What Does This Article Add?

Directing attention through verbal instruction has been shown to be a significant factor in guiding motor performance and learning. Findings demonstrate that directing attention towards movement outcomes appears to be more effective than when instruction emphasizes bodily movement itself. To date the evidence on these effects with children is

limited, and in particular for the distance of focus effect. In two experiments, this study examined the distance of focus effect in children using a common fundamental movement skill; the standing long jump. Performance benefits were observed when a greater distance of movement effect was emphasized. However, it appears likely that motivational characteristics generated through the placement of the cone when manipulating an external focus also played a critical role. Children benefited from verbal instructions that effectively directed attention externally to clearly defined movement effects rather than internally towards bodily movements. External cues that do not provide concrete performance goals appear limited in their ability to direct attention effectively and support task motivation. These findings are important practically for the development of effective instructional and task approaches that guide children's movement. Given the acute sensitivity children demonstrated to the different instructional sets and task manipulations within the present study, those involved in the research and testing of children's movement should at the very least ensure consistently in the instructions provided.

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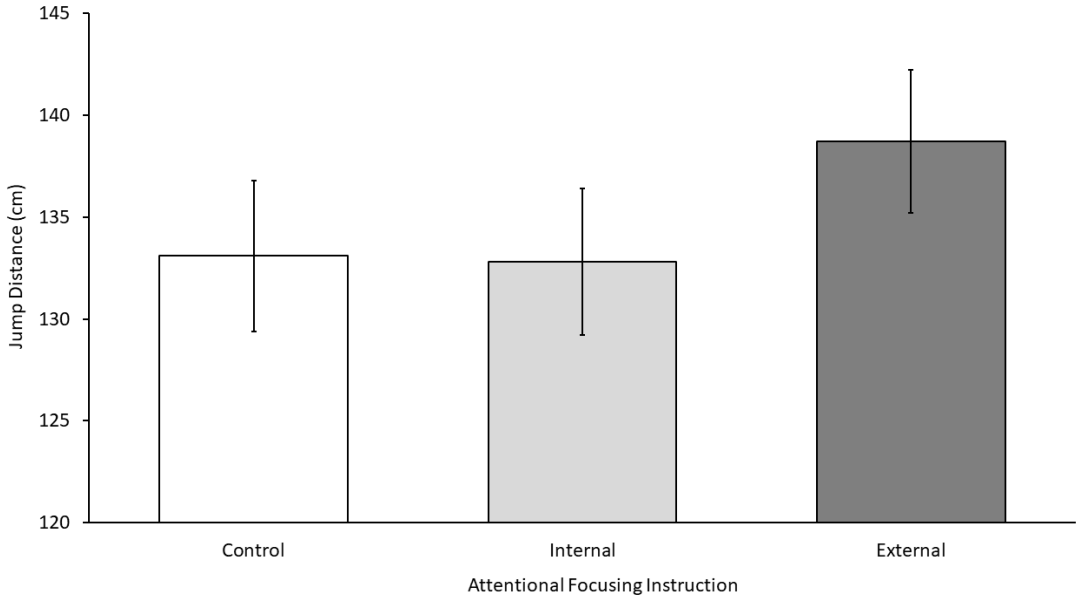
145
140
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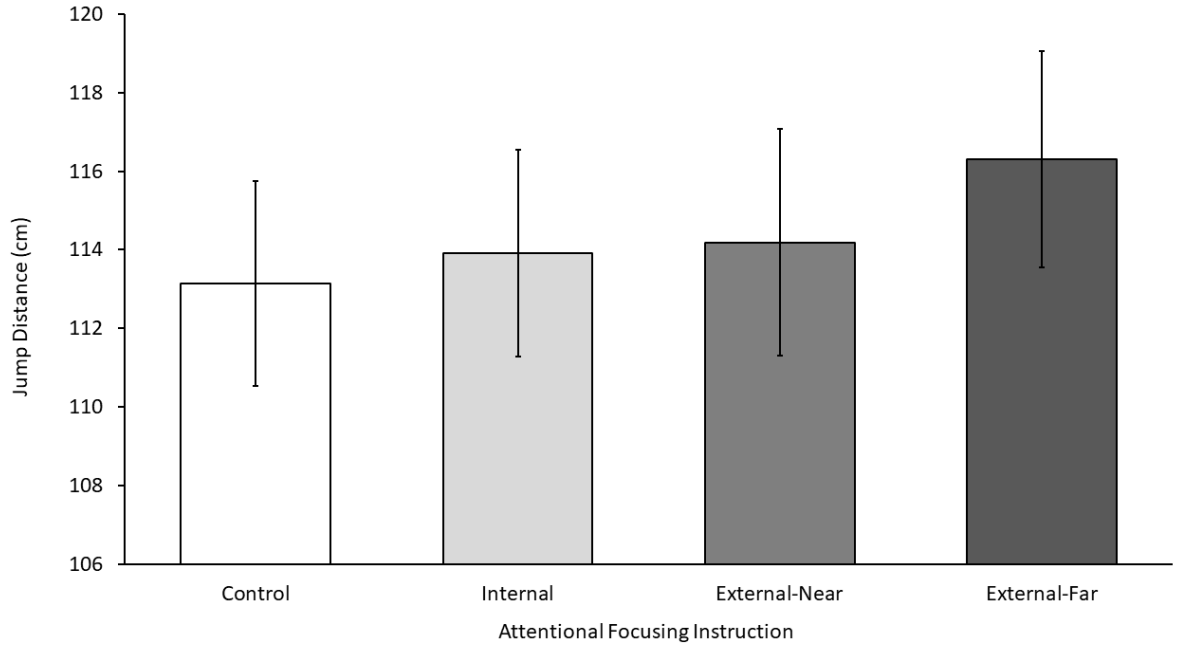
120
Jump Distance (cm)
Control
Internal
External
Attentional Focusing Instruction

Figure 1.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Jump Distance (cm)
Control
Internal
External-Near
External-Far
Attentional Focusing Instruction

Figure 2.