



## Correlation of Reaction Time on Athletics Triple Jump in High School Students

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### ABSTRACT

**The purpose of the study.** This research aims to determine the influence of reaction time on triple jump athletics in high school students in Medan City.

**Materials and methods.** This type of research is a qualitative associative approach with path analysis. The sample comprised of 30 extracurricular athletic male students taken using total sampling techniques. The instruments used are a triple jump test and a whole body reaction test. The data was analyzed using product moment analysis, then continued with path analysis via a structural model at = 0.05.

**Results.** The results showed reaction time contributed to triple jump ability ( $r > 0.05$ ). The results of reaction time with triple jump ability showed that there was a contribution ( $r = 0.847$  and  $r^2 = 0.719 = 62.41\%$ )

**Conclusions.** Triple jump athletics is greatly influenced by reaction time and we recommend that in training students the role of reaction time is the influencing factor of physical condition.

**Keywords:** Reaction Time; Athletics Triple Jump; High School Students.

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### INTRODUCTION

Coaching and developing educational sports involves considering students' potential, abilities, interests, and talents, through both curricular and extracurricular activities (Ridini, 1968). Curricular activities take place during school hours, while extracurricular activities occur outside of regular class time. Athletics is a popular and sought-after extracurricular sport among students (Carns et al., 1995).

In athletics, events are generally divided into four categories: walking, running, jumping, and throwing (And & Drom, 1951). To excel in athletics, particularly jumping events, one must improve strength, endurance, and speed (Hughes, 1950). One way to strengthen muscles is through resistance training, commonly known as weight

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training(Fact Sheet for Health Professionals on Physical Activity Guidelines for Adults, 2023). Training load is a combination of volume and intensity, with a progressive increase throughout the program, starting with volume before increasing intensity(Kraemer, 2003). Heavier weights and adjusted repetitions can help increase strength and explosive power, making weight training beneficial for throwers, jumpers, and sprinters(Szymanski, 2012).

Reaction time is the ability to respond quickly to a stimulus(Waller et al., 2014), and it can be divided into single reactions (where the direction and target are known) and compound reactions (where the direction and target are unknown)(Sakamoto et al., 2016). Reaction time, along with speed, are crucial components of athletic skill, as they allow athletes to quickly perceive and respond to changing environmental cues during competition(Beise & Peaseley, 1937).

The relationship between an individual's reaction time and their athletic performance has long been a topic of interest in the field of sports psychology. Specifically, researchers have investigated how reaction time, defined as the interval between the presentation of a stimulus and the initiation of a response, may be correlated with success in various athletic events. (Youngen, 1959). Reaction time has been shown to be a crucial component of athletic skill, as it allows athletes to quickly perceive and respond to changing environmental cues during competition (Youngen, 1959).

In the context of the triple jump, a complex event that requires rapid execution of a series of coordinated movements, reaction time may play a significant role in determining an athlete's performance(Delalija & Babić, 2008)(Tønnessen et al., 2024). This study aims to explore the potential correlation between reaction time and athletic performance in high school triple jumpers.

Existing research has delved deeper into the crucial relationship between reaction time and athletic performance, particularly in track and field events(Youngen, 1959)(Delalija & Babić, 2008)(Tønnessen et al., 2024). For instance, a comprehensive study conducted on NCAA Division 1 American football players revealed that minimal reaction time is a critical component of an athlete's success on the field(Olsen,



1956)(Eckner et al., 2010). Faster reaction times enable these players to quickly respond to the opposing team's movements and strategically position themselves to make crucial plays or prevent potential injuries. (Reid et al., 2020)

Similarly, research on sprinters has shown that reaction time is a key factor in determining the outcome of a race. The first few milliseconds after the starting signal can provide athletes with a significant competitive advantage over their opponents, as a quicker reaction time allows them to explode out of the starting blocks more efficiently. (Delalija & Babić, 2008).

When considering the triple jump specifically, studies have demonstrated that the various phases of the event - the approach, takeoff, flight, and landing - require exceptional coordination and precise timing, which may be significantly influenced by an athlete's reaction time(Eissa, 2014)(Hay, 1992)(Hay, 1993). The ability to quickly perceive and respond to environmental cues during these critical moments could be a decisive factor in determining an individual's triple jump performance(Tønnessen et al., 2024).

While the existing literature provides valuable insights into the pivotal role of reaction time in athletic performance(Atan & Akyol, 2014), there remains a limited focus on the specific correlation between reaction time and triple jump performance among high school athletes(Olsen, 1956). This gap in the research presents an opportunity for further investigation to deepen our understanding of the factors that contribute to success in this complex and dynamic event.

## MATERIALS AND METHODS

### *Study participants*

The population consisted of 30 extracurricular athletic male students taken using total sampling techniques.

### *Study Organization*

The research method or method used in the research is a descriptive research method with correlation techniques which aims to determine whether there is a contribution of leg reaction time to the ability to triple jump. In the research there are two variables, namely: a) The independent variable, namely: Reaction time (X) b. The



dependent variable is: triple jumping ability (Y).

### *Test and measurement procedures*

In this study, we used 2 reaction time ice tests and a triple jump results test (with a measurement of meters). The first test is the foot reaction time test. The foot reaction time in question is the ability of a person's feet to make movements in a short time after a stimulus, so in this study the researcher will use a foot reaction time test (Foot Reaction Test). Next, measure the results of the triple jump: The testee stands behind the starting line, runs towards the jump box, performs a triple jump (stepping up, stepping and jumping) then lands in the jump box.

### RESULTS

In testing the correlation of leg explosive power data, a probability value (P) of 0.000 was obtained, which was smaller than the value  $\alpha$ : 0.05. Thus, it can be stated that has a significant relationship and likewise with the reaction time of the legs, a probability value (P) of 0.000 is obtained which is smaller than the value  $\alpha$ : 0.05. Thus, it can be stated that the reaction time of the legs and the ability to triple jump has a significant relationship. In testing the correlation of the reaction time of the feet on the ability to triple jump ability, the Pearson correlation test value is 0.719. Thus, it can be stated that there is a strong relationship seen from the correlation coefficient value which is greater than the  $\alpha$ : 0.05 value.

*Table 1. Correlation And Regression Analysis Results For The First Hypothesis.*

VARIABLE	N	R	INFORMATION
X-Y	30	0.719	Sig.

Based on the results of regression analysis testing and data correlation between reaction time on the ability to triple jump, a regression value of 0.719 was obtained with a probability level of ( $0.000 < \alpha: 0.05$ ), for an R squared (coefficient of determination) value of 71,90% contribution or contribution of reaction time to the ability to triple jump. From the Anova test or F test, the calculated F is 24,488 with a significance level of 0.000. Because the probability value (0.000) is much smaller than the  $\alpha: 0.05$  value, the regression model can be used to predict the contribution of



reaction time. on the ability triple jump (can be applied to the population from which the sample was taken). Therefore, the probability value (0.000) is much smaller than  $\alpha:0.05$ . So there is a significant contribution to the reaction time of the legs to the ability to triple jump.

Based on the theory that says; Reaction time is the movement made by the body to respond as quickly as possible after receiving a stimulus. Reaction time is a person's ability to respond to a stimulus in a short period of time. Reaction time is the time needed to give a kinetic response after receiving a stimulus. So it can be concluded that reaction time is the speed of responding to stimuli and the speed of moving after stimulation and providing a kinetic response in a short time. The element of reaction time also has an important role in the ability to triple jump ability.

## DISCUSSION

The findings of this study indicate a strong and significant correlation between reaction time and triple jump performance among high school athletes. This relationship can be attributed to the complex and dynamic nature of the triple jump event (Watkins et al., 2020) (Henry et al., 2022), which requires rapid perception and response to various environmental cues during the approach, takeoff, flight, and landing phases (Soyal et al., 2023) (Xu et al., 2023). Athletes with quicker reaction times may be better equipped to anticipate and react to these changing conditions (Dziewiecki et al., 2013), enabling them to execute the necessary coordinated movements with greater precision and efficiency (MacPherson et al., 2009) (Nuri et al., 2012). This aligns with existing research highlighting the importance of reaction time in other track and field events, such as sprinting and hurdling, where the ability to respond quickly to starting signals or obstacles can provide a crucial competitive advantage (Pain & Hibbs, 2006) (Shahshahani et al., 2018). Furthermore, the results of this study reinforce the notion that psychological and cognitive factors (Reigal et al., 2019) (Lipps et al., 2011), in addition to physical attributes, play a pivotal role in athletic performance (Hülsdünker et al., 2018). Reaction time, as a measure of an individual's ability to perceive and respond to stimuli, reflects the complex interplay between



sensory processing, decision-making, and motor control (Hülsdünker et al., 2018). To further elucidate the relationship between reaction time and triple jump performance (Sex Differences in Simple Visual Reaction Time A Historical Meta-Analysis (Sports Events), 2023)(Jain et al., 2023), future research could investigate the specific mechanisms by which reaction time influences technical execution and overall outcomes. Examining the potential mediating or moderating effects of other physiological and biomechanical variables, such as leg explosive power or kinematic patterns, could provide deeper insights into the multifaceted factors that contribute to successful triple jump performance (Hooren et al., 2024)(Llanos-Lagos et al., 2024).

The findings of this study have practical implications for coaches and athletes in the development of targeted training programs aimed at improving reaction time and, in turn, enhancing triple jump outcomes. By understanding the critical role of reaction time in this complex event, coaches can implement specialized drills and exercises to help high school athletes refine their perceptual-cognitive skills and improve their responsiveness to the dynamic conditions encountered during competition.

## CONCLUSION

This study's findings underscore the pivotal role of reaction time as a critical determinant of triple jump performance among high school athletes. The strong and statistically significant correlation between reaction time and triple jump ability highlights the need for a comprehensive, multifaceted approach to athlete development - one that considers not only physical attributes but also the pivotal cognitive and perceptual-motor factors.

By incorporating targeted, evidence-based training to enhance reaction time, coaches and athletes can work in tandem to optimize performance in this challenging and dynamic track and field event. Future research should delve deeper into the specific mechanisms underlying this relationship, exploring the potential interactions and synergies between reaction time and other physiological, biomechanical, and even psychological variables that may influence triple jump outcomes.



The insights gained from this study can serve as a valuable foundation to guide the development of more effective, holistic training strategies. Ultimately, these findings can contribute to the ongoing pursuit of excellence in high school athletics, empowering coaches and athletes to unlock the full potential of their physical and cognitive abilities.

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## APPENDIX

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