

Performance Indicators for the Men's Shot Put in the USA Development System

 © by IAAF
31:3/4; 21-26, 2016

by Don Babbitt and Luke Johnson

ABSTRACT

Unlike most other nations, the USA relies heavily on the sport programmes of its educational institutions for the development of track and field athletes. This is especially true for technical disciplines such as the shot put. The desire of athletes to produce results that justify the university sport scholarships available or attract sponsorship that will enable them to continue their careers after graduation from university is a key element of the system. The authors examine the development of the top 74 male shot putters who came through the system in the period 2012 to 2017, some who have or are likely to go on to international level performances, with the aim of helping American coaches identify talent for their university programmes. Their findings, which suggest that male shot putters between the ages of 19 and 23 years in the American system progress faster than those in other countries, also give coaches insight on expected performance development. However, the study was unable to find a significant correlation between performance with the 5.4kg shot used in high schools and eventual performance with the international implement by the end of the athlete's university career.

AUTHORS

Don Babbitt is the Associate Head Track & Field Coach and throws coach at the University of Georgia, USA, serving in this role for the past 21 years. He has guided 53 athletes who have taken part in major international competitions and won a total 21 medals in across all four throwing events.

Luke Johnson is the throwing coach at Emory University in Atlanta, Georgia, USA. He was an NCAA All-American shot putter in 2016 with a personal best of 19.54m.

Introduction

The athlete development system in the United States is very different from most other top sporting nations around the world. In many countries, clubs or state-operated sport schools play the main role in fostering elite performers whereas in the USA public and private educational institutions are where most athletes between the ages of 14 to 23 years are offered the facilities, coaching, support and competition opportunities required to develop. This is especially true for the technical disciplines such as, for example, the shot put.

Although, the American high school and university sport systems operate independently of one another, they are tied together in some special and unique ways that justify considering them as a single development system. It is with almost 100% certainty that aspiring shot putters will matriculate from high school to university to continue both their education and their sport careers. Top performing high school prospects will be awarded athletic scholarships that pay anywhere from partial to complete costs of university attendance, and training, depending on the university and the performance level of its team.

Coaches at American universities are charged with identifying and evaluating talent from the high schools and then awarding scholarships based on the needs of their respective teams and the potential for high-level performance of the student-athletes they recruit. Therefore, success at the high school level is usually driven by the athlete's desire to perform well enough to earn a place/scholarship at the best university possible for his/her further development. At the university level, success is often defined by how well athletes are able to perform at the NCAA (National Collegiate Athletics Association) championships, and if they can score points for their team. Points are awarded to the top eight finishers in each event on a (10-8-6-5-4-3-2-1 scale), and the team/school with the most points is declared the National Champion.

Success in university-level competition can also be driven by the need to achieve results that are good enough to lead to further support from potential sponsors or grants from the national governing body, USATF (USA Track and Field), which will allow the athlete to continue further development once his/her university eligibility is complete. This form of support is very hard to achieve and is usually only given to the two or three best athletes in each event, each year upon completion of their university career.

The purpose of this study is to understand more thoroughly the performances in the

men's shot put - where the USA has been particularly strong at the international level over the years - that are driven by this process. Our main aim is to help American coaches decide which athletes to recruit in order to meet the needs and expectations of their university programme and to know what to expect in terms of future performance based on the previous results of the athletes.

But our findings could also be useful for coaches, performance support personnel and national federations in other countries seeking a deeper understanding of the athlete development process for male shot putters in this age range and how it can be best supported.

Specifically, we will:

- propose a performance development profile for male shot putters of university age performers over the past six seasons;
- examine any correlation between performance with the 5.4kg shot used by men at the high school level with the senior implement (7.26kg) used at the university and international levels;
- generate a series of performance progressions for male shot putters of university age based on data collected from top collegiate athletes over the past six seasons;
- suggest potential reasons for any differences seen in the performance data with regard to progression in different performance groups.

Methods

Competitive results were compiled for the top 74 graduating male shot putters from NCAA Division I universities who completed their eligibility between 2012-2017. Data was collected from the Track and Field Results Reporting Service (<https://tfrs.org>) and Mile-split Network (www.milesplit.com) websites to generate results for each athlete's best performance in high school (with the 5.4kg shot), as well as his best performances in each of his years of eligibility with the 7.26kg shot (this could be for either four or five years).

The athletes were then divided into performance groups based on their personal best with the 7.26kg shot after the completion of collegiate eligibility as follows:

Group 1	18.50-18.99m
Group 2	19.00-19.49m
Group 3	19.50-19.99m
Group 4	20.00m+

Average bests for each of the groups were compiled for each competitive year from the last year of high school through the completion of university eligibility (Table 1). The results were then plotted on a chart to show performance curves for each of the four groups, which were charted against the average of the minimum performance needed to score at the NCAA Championships over the past four years (Figure 1 and Figure 2).

Table 1: Performances for top American university shot putters from high school through their university years grouped by personal best

Performance Group	N	Range (min/max)	High School Best (avg.)*	University Best (avg.)**	1 st Year (avg.)	2 nd Year (avg.)	3 rd Year (avg.)	4 th Year (avg.)	5 th Year (avg.)
18.50-18.99m	20	14.30/21.83	17.91	18.76	16.93	17.78	18.16	18.65	18.76
19.00-19.49m	19	15.97/20.90	18.57	19.25	17.11	17.99	18.58	19.14	18.87
19.50-19.99m	15	16.90/22.98	18.80	19.75	17.61	18.50	19.37	19.40	19.62
20.00m+	20	14.82/23.54	19.61	20.46	18.30	19.20	19.98	20.17	20.58

*high school marks with the 5.4kg shot

**university marks with the 7.26kg shot

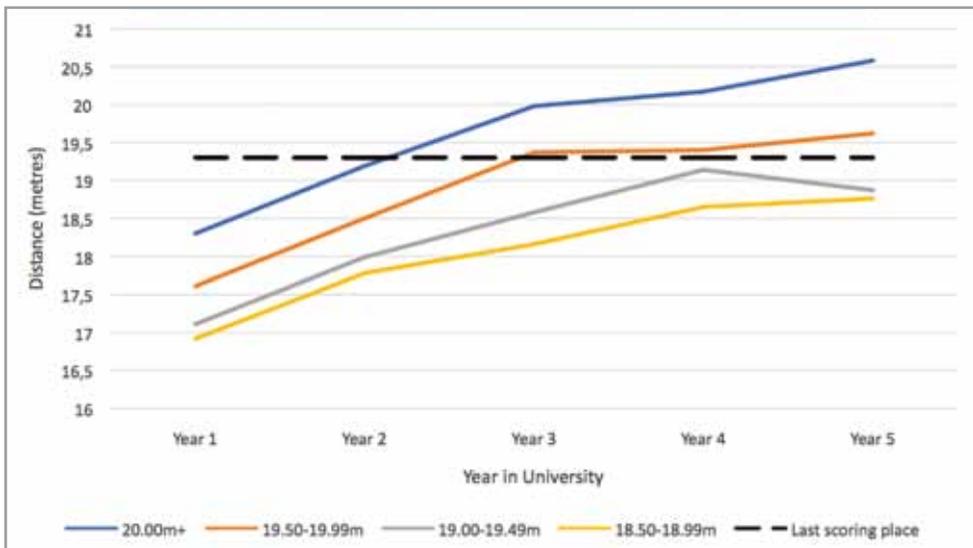


Figure 1: Annual performance for top American university shot putters in each year of university with comparison to the average minimum mark required to score points at the NCAA Championships

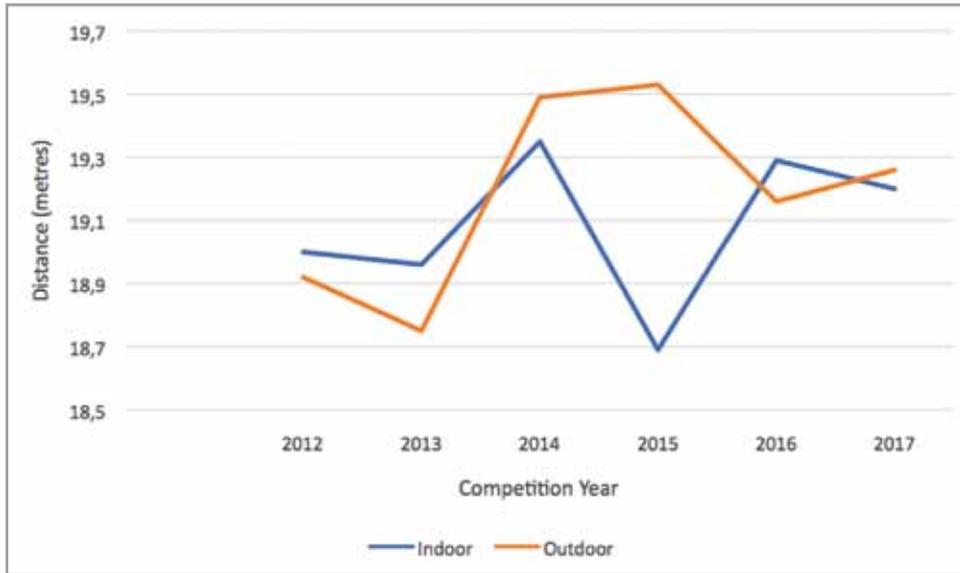


Figure 2: Result of the eighth placer in the men's shot put at the indoor and outdoor NCAA Championships 2012-2017

Results

The performance data in Table 1 shows distinct trends for each of the four performance groups. The range of the high school performances, interestingly enough, shows that the highest performing group (20.00m+) exhibited the greatest range of high school performances before entering university competition (14.82m to 23.54m). Table 1 also reveals that the better the performance average in university competition, the better the high school performance average per that group. Finally, Table 1 shows that the athletes in all four groups tend to match the distance thrown with the high school 5.4kg shot with the 7.26kg after two and a half to three years in the university environment.

Tests for statistical significance for a correlation between high school performance with the 5.4kg shot and later performance with the 7.26kg shot showed that there was no evidence for any of the four groups at $p < .10$. Examination of Figure 1 shows that the rate of development of each of the four performance groups

is almost identical through the first two years of university competition. After the second year within the university system, the development rates seem to taper off to varying degrees, with the top performing group (20.00m+) tapering off the least, while the slope of each of the lower performing groups tapers off earlier into their university career as the performance average is reduced for each group.

Discussion and Conclusions

There are many factors that go into determining performance in any sport, so it is very difficult to pinpoint exact explanations for varying performances between the groups of shot putters discussed here. However, having a relatively large sample size ($n=74$) allows for the examination of general trends, which can help in making performance predictions.

While the main focus of this study was to highlight the nature of performance development with the 7.26kg shot through the university years, there was an attempt to see if there was a correlation between high school

performance and university level success with the international implement. However, no statistically significant correlation was found at any level. This may be due to the scope of this study being based almost exclusively in performance results to create and chart developmental models. It is very likely that the reason no correlation was found between performance with the 5.4kg shot in high school and later performance with the 7.26kg in university competition was due to the wide range of high school performances observed within each of the four groups (Table 1). This suggests that other variables such as training age, quality of coaching, quality of competition, and anthropomorphic measurements varied greatly at the high school level and in turn play a large part in performance development.

Moving on to the study of performance development, it can be seen that there are clear differences in the progressions between the four groups (Figure 1). The top performing group, whose members go on to throw 20.00m+ while in university, show a fairly steady rate of improvement through all five years of potential

competition. It is from this group that many of the United States' top international-level throwers will emerge and the performance development curve we found is similar to that found in previous studies of elite shot putters (see Figure 3). On this point, it is interesting to note that the progression for the 20.00m+ group in this study is almost identical to that found by BABBITT & SAATARA¹ for the top 24 shot putters of all-time, and clearly superior to those world class shot putters who were the subjects of the study by TILINGER et al².

These findings suggest that the shot putters between the ages of 18 and 23 years in the American university system develop at a faster rate than those in other countries. The primary reasons for such a dramatic development of performance could be due to the strong need to 1) produce points for the supporting university as early in one's career as possible, and/or 2) develop to a world-class level by of performance by age 23 in order to secure enough financial support from sponsors to continue one's throwing career.

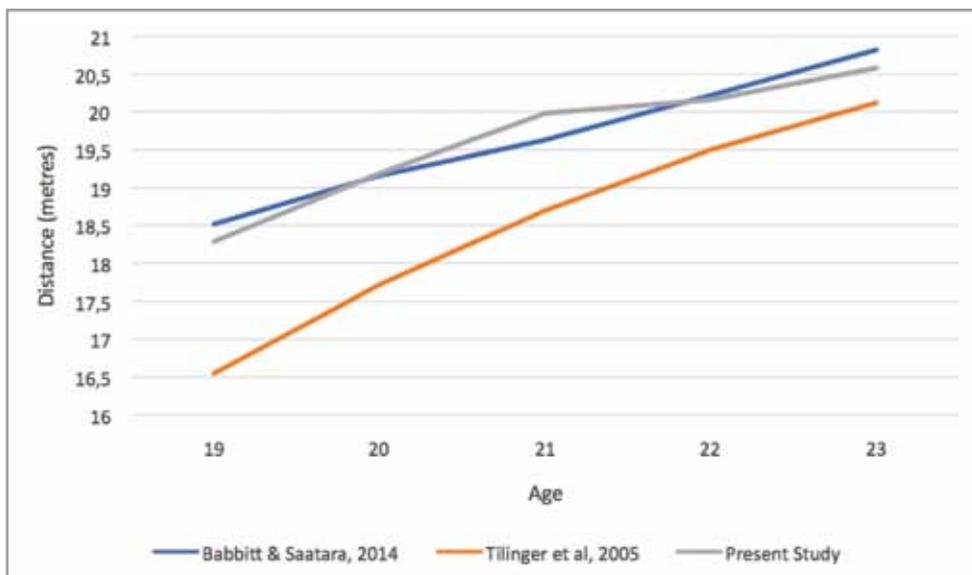


Figure 3: Performance in the men's shot put based on age

Figure 2 shows the minimum threshold of performance to score at the NCAA Championships. In the most recent years the average minimum scoring distance has been about 19.30m. As mentioned above, this threshold line has been inserted into Figure 1 to show that most male shot putters need to be able to throw 19.30m by their third year in university in order to have a chance of scoring at the NCAA Championships. It is this type of performance competition/pressure that likely produces such high performance standards in this age group.

Examination of the three lower performing groups revealed that their results levelled off more severely after year three, than with the highest performing group (see Figure 1). The degree to which the levelling occurring seemed to correlate with the group performance level, with the lower groups levelling off at an earlier point than the higher performing groups. Since it has been well documented that top shot putters reach their best marks in their late 20's or early 30's^{1,2,3} these findings tend to support the notion of the top group maintaining a stronger improvement curve for a longer period of time than for the lower performing groups.

In conclusion, the results from this study appear to confirm the performance curve trends from previous studies for male shot putters that reach an international calibre by age 22 to 23. This study should provide some insight for American coaches, as well as some from other countries, on what to expect in terms of future performance for throwers in this age group as they progress with their development with the 7.26kg shot.

However, this study was unable to find that there is a significant correlation between performance with the 5.4kg shot in high school and eventual performance with the 7.26kg by the end of the university career. We believe that a more comprehensive study that brings into play more variables associated with throwing success (training age, anthropomorphic measures, quality of competition, etc.) is needed to potentially answer this question.

Please send all correspondence to

Don Babbitt

dbabbitt@sports.uga.edu

REFERENCES

1. BABBITT, D. & SATARA, M. (2014). Elite level development rates and age-based performance patterns for the men's throwing events. *New Studies in Athletics*, 29(3): 69-75.
2. TILINGER, P.; KOVAR, K. & HLAVATA, P. (2005) A study on the dynamic progress of performances of prominent world-class athletes in selected track and field events. *Kinesiology*, 37(1): 92-98.
3. BABBITT, D. (2016) Development rates, a comparison for elite performers in the throwing events. *Techniques Magazine*, 10(2): 34-40.