

Physical characteristics and performance on long & short oil patterns



In this installment of Slowinski at-large, I present an analysis of the relationship between physiological characteristics of bowlers and their performance on short and long oil lane patterns. The sample size is small, but the findings reveal some strong correlations for elite national bowlers that will get you thinking. Moreover, it is a contribution in an area that has seen little previous analysis.

It is often stated that all physical body types can succeed in bowling. And, certainly, there are examples to illustrate and confirm such a statement. Yet, are there any particular physical characteristics that allow a bowler to succeed more? For example, is wrist flexibility or grip strength related to better performance on a specific lane condition?

As a full-time professional bowling coach, I make an effort to constantly reflect on the truths of bowling. Taking this responsibility seriously, I want to constantly test my own beliefs by analyzing data that is available to me and share this with the bowling world. And, working internationally has afforded me the opportunity to access data that is not available frequently in bowling circles. Consequently, I feel compelled to share this information in an effort to educate as well as foster some reflection on our sport. As I have articulated frequently, as a sport, we need to embrace sport science to learn the truths that are linked to maximizing performance. So, with this in mind, what relationships do physical characteristics of bowlers

have with performance on short or long oil patterns?

For such an analysis, both physical characteristics of bowlers, as well as scoring performance on different lane conditions in international events is needed. Since Asian countries treat bowling more as a sport, players and coaches have access to sport medicine and fitness staff. Accordingly, data is tracked on injuries as well as the physical characteristics of individual athletes. Such data provides a perfect opportunity to explore potential relationships between physical parameters and performance.

As an international coach, I was granted permission to review and analyze the records of individual bowlers on the Malaysian national team as they prepared for

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the Asian Games. These physiological parameters included: beep test performance, grip test on dominant bowling hand, body fat percentage, BMI, height, max crunch, max pull-ups, as well as sit and reach flexibility. An analysis of this data provides insight into any existing relationships associated with physical parameters and bowling performance.

Data analysis and procedure

In an effort to determine any correlation between physical characteristics of bowlers and performance on specific lane conditions, I used both scoring data and physical characteristics data of individual bowlers on the national team. And, to further reveal any relationships, I disaggregated scoring performance by lane condition pattern length: short and long.

With a lead-up to the Asian Games, I was granted official access to the Asian Games preparation training documentation of a specific Asian country, for all sports which contained the physical characteristics of each bowler on the national team. This data included: beep test performance, grip test on dominant bowling hand, body fat percentage, BMI, height, max crunch, max pull-ups as well as sit and reach flexibility data. The wide array of physiological characteristics provides an opportunity to explore any potential relationship between body type, strength, flexibility as well as fitness on scoring.

Scoring data was collected from the official Asian Games website and disaggregated based on the oil pattern length, short (35 feet) or long (45 feet). This allowed an analysis exploring any potential relationship between physical characteristic of the individual bowler and their individual

performance on both short and long oil individually.

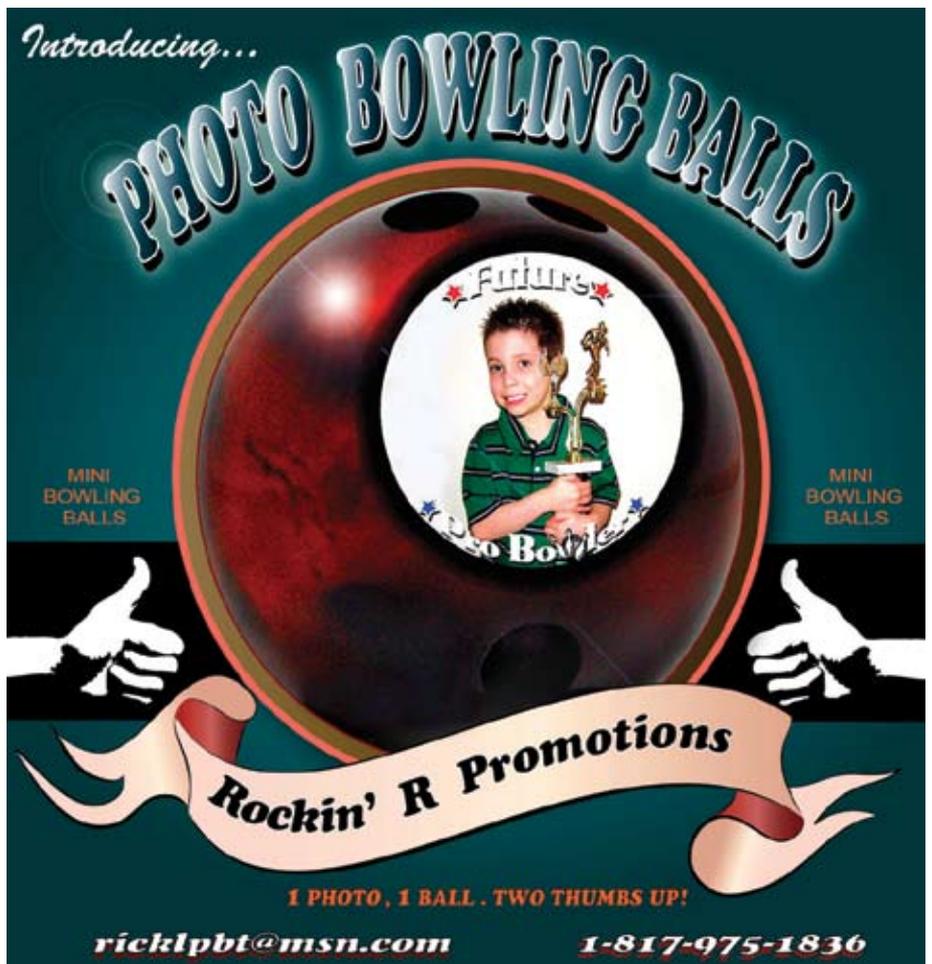
Data was organized into performance on short and long oil to determine exact performance on each. A one-to-one correlation analysis was completed analyzing the following: beep test performance, grip test on dominant bowling hand, body fat percentage, BMI, height, max crunch, max pull-ups and sit and reach flexibility.

Specifically, a correlation analysis explores if a linear relationship exists between two variables. For example, in this article, I wanted to know if a connection existed between a specific physiological parameter and if scoring on a specific lane condition went up or down (e.g., did a relationship exist

between grip strength and scoring?). The correlation coefficient will be between -1 and 1, where 1 would indicate a positive relationship (i.e., as one variable went up, the other went up in the same relative amount). By squaring the correlation coefficient, we learn how much of the variance of one variable is determined by the other. This can be viewed as a percentage contribution to the other variable.

Results

For reference, the Asian Games was held in Doha, Qatar in December 2006 featuring more than 50 countries with more than 20 nations sending athletes in bowling. Here are the overall correlation analysis results for



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each of the physical characteristics and performance on both the short and long patterns. The data is classified by gender as well as each one-on-one analysis domain. Six bowlers competed for each country, 6 men and 6 women.

An analysis of the data revealed two negative correlations between an individual's grip strength and their individual performance on long oil for the men's team. Specifically, handgrip strength and maximum pull-ups correlated negatively with performance. Data analysis revealed a strong

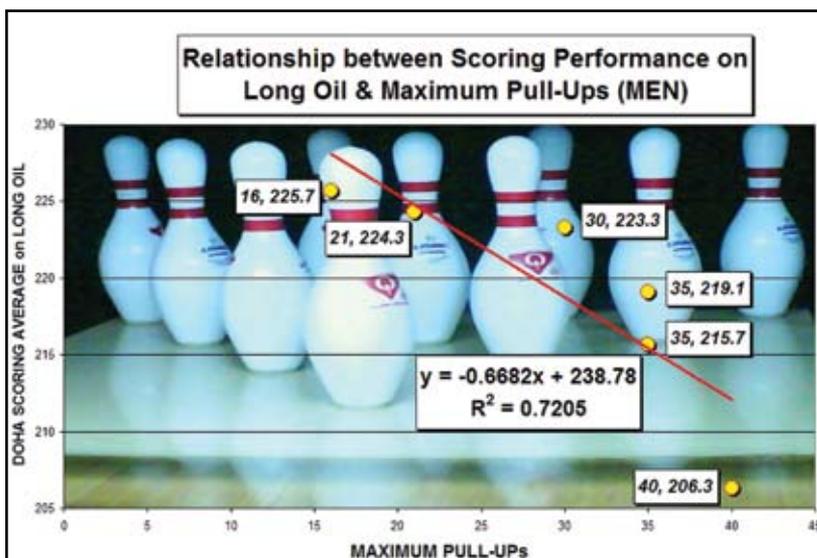
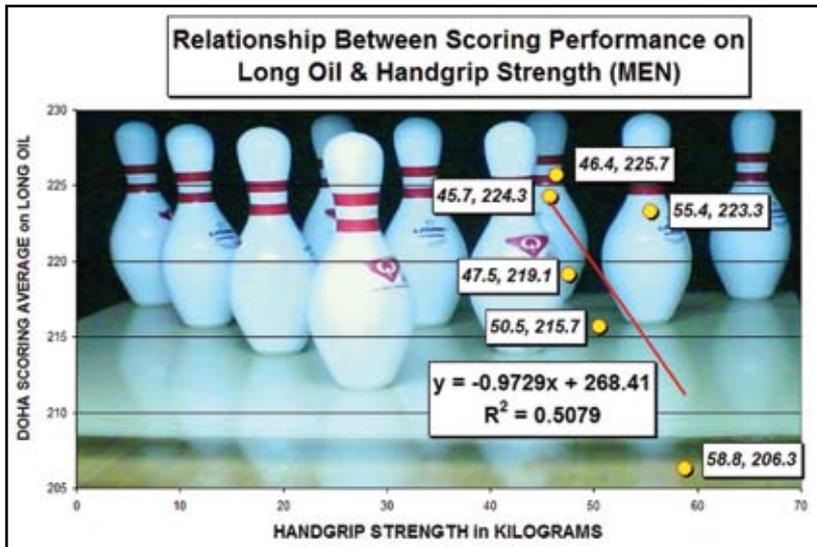
negative correlation (-.85) between maximum pull-ups and long oil performance. Consequently, 72 percent of performance can be explained by this correlation. In addition, the data analysis revealed that there was a strong negative correlation (-.71) between handgrip strength and performance on the long oil. So, 50 percent of performance can be explained with this correlation. Such a strong correlation suggests that these are no random associations, especially with such a small sample of bowlers.

Discussion

Very little research has been completed exploring physical characteristics of bowlers and performance. An earlier study, by the Sports Medicine and Research Center of the Singapore Sports Council, found a relationship between aerobic power and bowling performance in women on the Singapore National Team (Tan, Aziz and Chuan, 2000). The researchers explored the relationship between physical characteristics of the Singapore National Team bowlers and average scores on one lane condition. But, researchers didn't disaggregate performance into specific lane conditions. So, a comparison to these findings was not possible, even though they studied many of the same dimensions including: grip strength, leg strength, flexibility, aerobic power, and body composition.

From my analysis, a negative correlation exists between grip strength and scoring on long oil as well as a negative correlation existing between maximum pull-ups and performance on long oil. Pull-ups are a complex exercise using many muscle groups. But, certainly, hand grip strength is related to both. In other words, bowlers who had a stronger grip or could do more pull-ups performed worse than those with less grip strength. For discussion purposes, I will stay within this area. As a comparison, as the scoring average of the individual bowler increased, on the Asian Games long oil pattern, both maximum pull-ups and grip strength of the individual bowler declined. In short, the bowlers with less grip strength could do maximum pull-ups performed better on the long oil condition.

This finding suggests that increased performance on the longer oil pattern was related to a softer hand.



FEMALE BOWLERS			MALE BOWLERS		
LANE CONDITION PERFORMANCE & PHYSIOLOGICAL CHARACTERISTIC TESTED	Correlation Coefficient (R)	R ²	LANE CONDITION PERFORMANCE & PHYSIOLOGICAL CHARACTERISTIC TESTED	Correlation Coefficient (R)	R ²
Short Oil Score & Beep Test	0.28	0.08	Short Oil Score & Beep Test	-0.08	0.01
Long Oil Score & Beep Test	0.25	0.06	Long Oil Score & Beep Test	-0.53	0.28
Short Oil Score & Handgrip	0.44	0.19	Short Oil Score & Handgrip	0.52	0.28
Long Oil Score & Handgrip	0.61	0.37	Long Oil Score & Handgrip	-0.71	0.51
Short Oil Score & Flexibility	-0.26	0.07	Short Oil Score & Flexibility	-0.27	0.07
Long Oil Score & Flexibility	-0.62	0.38	Long Oil Score & Flexibility	-0.16	0.03
Short Oil Score & Body Fat	0.09	0.01	Short Oil Score & Body Fat	0.13	0.02
Long Oil Score & Body Fat	0.67	0.45	Long Oil Score & Body Fat	0.09	0.01
Short Oil Score & BMI	0.03	0.00	Short Oil Score & BMI	-0.10	0.01
Long Oil Score & BMI	0.46	0.21	Long Oil Score & BMI	0.00	0.00
Short Oil Score & Max Crunch	-0.16	0.03	Short Oil Score & Max Crunch	-0.25	0.06
Long Oil Score & Max Crunch	-0.55	0.30	Long Oil Score & Max Crunch	0.30	0.09
Short Oil Score & Max Pull-Ups	-0.46	0.21	Short Oil Score & Max Pull-Ups	0.31	0.09
Long Oil Score & Max Pull-Ups	0.28	0.08	Long Oil Score & Max Pull-Ups	-0.85	0.72

The assumption is that a weaker hand would not have as much grip tension. Clearly, pull-ups require grip strength. In the analysis, as grip strength increased, performance declined. As we know, a bowler who can reduce their grip tension in the bowling ball will be able to create more motion at the release because they are not squeezing as much, allowing the wrist and hand to rotate. From my experience as a coach, stronger individuals have difficulty relaxing as compared to those with less strength. Let's look at this idea as it applied to the PBA Tour and performance on the longest of the patterns, one foot shorter than the Asian Games pattern, Shark (44 feet).

From PBA data, during the 07-08 season, Pete Weber had the highest scoring average on the longest PBA pattern, Shark, with a 222 average. Chris Barnes was second with a 221 average. Both of these bowlers have incredible fluidity at the release, which suggests a reduced grip tension in the

release motion, letting it happen with less resistance. Pete Weber is able to more easily create a high axis rotation than any other bowler in the history of the sport. This requires a smooth and relaxed rotation from under and around the ball. Chris Barnes' release is also one that is extremely relaxed, allowing him to move from a strong cupped position to an un-cupped position while moving around the ball. Watching Chris Barnes' release over-and-over in slow motion video confirms a fluid and smooth motion with little to no resistance.

Providing insights

As I have discussed previously, bowling remains one of the least studied sports in the world. True, in this study, due to the small sample size, this scope is limited. Yet, there were two strong correlations that deserve a closer and more in-depth examination.

Moreover, the findings provide one of the first insights into physical parameters and performance. I hope it will lead to a further investigation of these and other relationships. And, such an effort will further our understanding of bowling from a sport science perspective. 

References

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