Relationship between anthropometric and kinematic measures

to practice velocity in elite American 100m sprinters

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Ref.: Ms. No. JCTRes-D-21-00043
Relationship between Anthropometric and Kinematic Measures to Practice Velocity in Elite American 100m Sprinters
Journal of Clinical and Translational Research

Dear Mrs. Murphy,

Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

For your guidance, reviewers' comments are appended below.

If you decide to revise the work, please submit a list of changes or a rebuttal against each point which is being raised when you submit the revised manuscript. Also, please ensure that the track changes function is switched on when implementing the revisions. This enables the reviewers to rapidly verify all changes made.

Your revision is due by Jun 14, 2021.

To submit a revision, go to https://www.editorialmanager.com/jctres/ and log in as an Author. You will see a menu item call Submission Needing Revision. You will find your submission record there.

Yours sincerely

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Reviewers' comments:

Reviewer #1: This article is interesting and useful to me. It is well-written, clear, and concise. I have two main concerns and then a few minor changes to recommend. My main concern is with the journal choice. The purpose of the journal is "The published research is centered on any clearly defined clinical problem, which may comprise a disease or the basis of disease, a form of therapy or intervention, and clinical diagnostics or prognostics." I feel there are many more appropriate choices of journal for the topic.

My second concern is statistical. The statistics using the total population can lead to some misleading conclusions. I thought of this when I looked at the case where backward velocity of the foot was significant for men, very significant for the total population, and non-significant for women. This tells me that men and women are so separated that there are two clusters of data. When there are two clusters of data with different values for x and y that are separated from each other, there will always be significance, but it doesn't really tell anything other than the two clusters are different in the measured variables rather than the variables are of importance. I don't know why this example is coming to me as I try to think of an extreme example to demonstrate, but think of a data set with sweetness and mass of grapes and lemons. Suppose a trend shows up with grapes, but not apples. Now, we do a total population regression and due to the two groups being so different, a significant trend shows up, but it really doesn't mean anything useful. I suggest either removing the total population data or just using those results to say men are different than women in the characteristics, but not discuss any trends observed.

Even though these results are similar to previous studies, the population used makes it valuable and useful.

Specific comments:
Abstract: Change the results according to my concern about the statistics of the total population
Intro page 2 line 14: It's unclear what the parentheses mean. (important, not important and maximum velocity)
Last paragraph of intro line 7: What does maximum upper leg extension angle mean? Segments are not normally described with the terms reserved for joints. Normally, someone would use maximum hip hyper-extension. Since you referenced your positions relative to vertical, you can't use the hip joint, so maybe something like "minimum angle relative to vertical as shown in figure..."
Methods page 2 line 41: "The video was manually digitized by one of three investigators". That was already said at the top of the paragraph.
Methods page 3 line 7: For technical correctness, change horizontal distance to horizontal displacement.
Methods page 3 line 19-36: Same concerns about using clearer terminology for describing segment angles. It seems strange to describe leg peak extension angle since the more extension that occurs, the smaller the angle measure is.

Methods page 3 line 38: Instead of "Vertical velocity" how about "The vertical component of foot velocity"? However, this measure is confusing me. At the instant of contact with the ground, the foot would have a velocity of zero. So, what does this value actually represent? Which part of the foot is being used in this measure?

Methods page 3 line 44: How was center of mass calculated?

Methods page 3 line 56: Should it say "With horizontal velocity as the dependent" instead of "With velocity as..."?

Methods page 3-4 statistical analysis: Why describe cutting it to certain variables through a preliminary analysis, then describe cutting to only three of those. A more concise description of how the selected variables were chosen would be nice.

Methods page 4 line 4: Rephrase as with past recommendations "maximum upper leg extension angle".

Results: Drop total population or just use it to shoe men and women are different.

Results and Discussion: Why are so many variables listed as significantly correlated with practice velocity, but only step length for women and leg length, step length, and backward foot velocity for men are listed in the final model. If the Table 1 data is one variable in a regression at a time, but the full model excludes some, then they are too correlated with each other and should not be described as all of them being significant. I recommend either choosing to take each variable one-by-one and talk about the article as a descriptive study or use the full model which provides a stronger method for predicting practice velocity.

Table 2: Include units

Reviewer #2: General comments
This study provided characteristics of US elite sprinters and examined the relationships between the performance and kinematic features during sprinting. The concept of this study is interesting and number of athletes is enough to accomplish the purpose of this study. However, there are major problems which make it difficult to publish this study. There are serious methodological issues. The authors investigated sprinting in the 30- to 40-m mark section, but the max speed phase appears around the 60-m mark for elite sprinters. Moreover, the distance between the high speed camera and running lane was only 9.14 m which is too short and can be accompanied by errors due to differences in optical axes. In addition to the methodological issues, many important information regarding the research methods are missing. The current discussion is too descriptive and it is not clear what are the novel findings of this study and why the findings were obtained. Moreover, there is no discussion for the difference between males and females. There was no page number.

Specific comments
Abstract, L40: "P=0.000" cannot happen. "P < 0.001" should be used.

L42 and 52: "upper leg angle at touchdown" is not clear. Please provide the direction and definition of this angle.

Introduction, L6 to 14: These two sentences should be removed as these does not relate to the study.

L22: What "performance"?

Introduction, page 2, L4: The relationship changes with range of performance level. Please amend the explanation appropriately.

L14: What "important, not important" means?

L17 to 24: What is the novel aspect of this study?

L29 to 36: "related to" is ambiguous. Please explain how it was related to. Great angle with high velocity, or small angle with high velocity?

L51: As there is no performance information of the participants in this study, I'm not sure the level is actually international. Were all of them faster than qualifying standard of the world championship or OG? If not, the participants were not international level.

L53: There is no background regarding the anthropometric data in the introduction.

Methods, L46: Why did not the author measure these variables?

L53: What type of shoes was used? What was the surface of the ground?

Methods, page 2, L16: Please provide shutter speed, company location.

L24 and 29: The field of view of camera was 6.7 m but the distance between cones was 8 m?

L34: Where did the authors digitized? What landmark?

L53: How did the authors identify the foot strike and toe off? Using the digitized data?

Methods, page 3, L9: Was the toe location measured using the digitized data?

L12: Why did not the author use the CG velocity? Moreover, for digitized data, did the author filter the data? What was the cut off frequency?

Methods, page 4, L7 to 9: This sentence is ambiguous.

L11: Did the author check multicollinearity?

Results, L26: Body mass and stature are missing. Moreover, in this section, results are repeated.

L41 to 43: This multiple regression analysis is not consistent to what is shown in the methods section (and also in the table 2).

Discussion, L33: The first two sentences can be removed.

L50: What is "practice velocity"?

Discussion, page 2, L9 to 44: This paragraph is too descriptive. Please show what were found

in the current study and what aspects were novel.

L28: I feel the contradiction can be caused by the difference in range of used participants' performance levels.

Discussion, page 3, L14: "The sampling method is the first as it was convenience sampling" What is this mentioning? Please explain in a careful way.

Reviewer #3: General comments
This paper investigated the link between specific kinematic parameters and maximal horizontal sprint velocity in highly trained sprinter. This study is interesting and informative because it is realised with elite men and women sprinter. However some question have to be answered. Provide the best performance of the sprinter in order to give the real level of your population. In the material and method you must detail the kinematic analysis (location of the anatomical points) and evaluate the error induced by the use of such field kinematic analysis (particularly speed and angle). This point should help to discuss your results. In term of results some question remains in the opportunity to correlate velocity and kinematics in the total population.
Specific comments
Introduction
P4 line 55-56: Purpose, why you introduce at this stage gender's differences. Indeed in all your introduction you have never developed gender differences in sprint running. Indeed these differences and their consequences in training are not well described in the literature - Why did you choose to study male and female together? Indeed if there is differences

Methods
P6 line 24: Participants: please give average personal best of men and women sprinter in order to better understand the level of the population.
P7 Line 7: How could you be sure that the sprinter have reached their maximal velocity in the field of the camera, and not before or after?
P7 Line 16: You used an excilim at 300 hz with a field of view of 6.7 m. Did this configuration allow you to have enough details to detect toe off and take off?
P8 line 9: Why did you measure sprint velocity as the product of stride length and rate? Indeed you could track frame by frame the hip of the runner.
P8 line 21 :" The upper leg variables were measured in a reference frame relative
to the vertical (illustrated in Figure 2A) and reported in units of degrees" this sentence is not clear. In the figure 2a what did you measure as angle, the angle between Vertical and thigh? For the measurement of the different angle how did you identify the segments? Did you put markers on hip knee ankle? Please provide some explanation (P7 "manually digitised how did you choose the anatomical location of digitised points?).
P8 Line 39: "and horizontal backward foot velocity at touchdown was determined in a reference frame relative to the runner's center of mass." How did you calculated the velocity? What did you mean by centre of mass? Indeed you did not calculated it?
P9 line 4: You should use abbreviation for the different parameters it will be easier for the reader.
Results
Did you tried to correlate your kinematic parameters why the best performance on 100 m of

each sprinters?
Total population
P9 line 50: Did you make a graph of your correlation between leg length, step lengh contact time… and maximal velocity? It can appear two group of points, one for men and one for women that make significant your correlation but it is not really a correlation. If it is the case you should delete this part of "total population". If not please give graph of your correlation and not only "r and p"
P10 line 16 : "Contact time (r = -0.424; p = 0.071) was not significantly related to practice velocity in males." Please add "in highly trained sprinter" not only males.

Discussion
P10 line 46 to 51: "The most important findings of this study were that leg length, step length, contact time, upper leg angle at touchdown, and horizontal backward foot velocity at touchdown were significantly correlated with practice velocity in the total population." For the cited parameters please make graph of the correlation to be sure that to group of point appear (due to differences in running velocity). If yes your correlation are not real correlation. In your discussion you could discuss first of the differences between men and women. Why did you not obtain the same correlations in men and women. Did that means that the training of men and women must be different? Second you sould give some practical application for coaches and athletes.

Reviewer #4: Excellent and meaningful work. Please consider a few very minor edits / alterations in your most updated draft, as follows:

ABSTRACT:
Line 60 - needs comma before "which"

INTRODUCTION:
Page 1 - "population" used on lines 21 and 29 reads repetitively ("these athletes" on Line 31 could be changed to "elite sprinter" to enable dropping "in this population" on Line 29). Quick check throughout manuscript for "appropriate use of "population" - For instance: Line 41 first page DISCUSSION, where "entire population" is used... should it not be "entire sample?" Also, recurrent use of a word or phrase (even if correct) can be distracting to reader.

Line 36 - I think this should read "correlated with" not "correlated to." Anyway, you do use "correlated with" on Lines 40/41 first page of DISCUSSION.

METHODS:
Procedures Line 12 - "fastest" top speed is used. Alternatives: "highest" or "greatest" top speed.

DISCUSSION:
2nd Page, Line 51 - what is meant by: "database for this unique sample that coaches...?" Alternative: "database for this elite subset that coaches and athletes can use..." Key sentence here, b/c your statement kind of defines 'translational' in this research.

Line 31 - "velocity-related" or "velocity-based"... either way, requires hyphen.

CONCLUSION:
Line 45: 'Sample' here?
Line 49: "international-level"... needs hyphen.
Line 51: Do terms "spatiotemporal" and "kinematic" basically refer to the same things?
Maybe "spatiotemporal kinematics" (but that might be redundant) or just 'kinematics'... IDK

Nice work overall!

Authors' response

Specific comments:
Abstract: Change the results according to my concern about the statistics of the total population.

- The reviewer has a good point so the results were changed to just males and females separately. Page 2 Lines 12-18

Intro page 2 line 14: It's unclear what the parentheses mean. (important, not important and maximum velocity)

- This was a typo so it was deleted.

Last paragraph of intro line 7: What does maximum upper leg extension angle mean?

- The greatest extension the leg achieves behind the body. Page 5 line 3

Segments are not normally described with the terms reserved for joints. Normally, someone would use maximum hip hyper-extension. Since you referenced your positions relative to vertical, you can't use the hip joint, so maybe something like "minimum angle relative to vertical as shown in figure...".

- Following the reviewer's advice this wording was added to the sentence. Page 5 line 3

Methods page 2 line 41: "The video was manually digitized by one of three investigators". That was already said at the top of the paragraph.

- You are correct in pointing out this mistake, the duplicate phrase was deleted.

Methods page 3 line 7: For technical correctness, change horizontal distance to horizontal displacement.

- We are mindful of the reviewer's comment here and "horizontal distance" was changed to "horizontal displacement" here and throughout. Page 7 Lines 2-3

Methods page 3 line 19-36: Same concerns about using clearer terminology for describing segment angles. It seems strange to describe leg peak extension angle since the more extension that occurs, the smaller the angle measure is.

- We appreciate the reviewer pointing this out and edited the wording to read: "The upper leg variables were measured in a reference frame relative to the vertical counterclockwise to the thigh (illustrated in Figure 2A) and reported in units of degrees. These included upper leg peak extension angle (behind the body), upper leg peak flexion angle (high knee position in front of the body)"
Page 7 Lines 7-11

Methods page 3 line 38: Instead of "Vertical velocity" how about "The vertical component of foot velocity"?

- The reviewer has a good point here and "vertical foot velocity" has been changed to "the vertical component of foot velocity here and throughout the document. Page 7 lines 15-20

However, this measure is confusing me. At the instant of contact with the ground, the foot would have a velocity of zero. So, what does this value actually represent?

- How fast the ankle is moving vertically as it approaches the ground and after it lands. Page 7 lines 15-20

Which part of the foot is being used in this measure?

- The lateral or medial malleolus, Page 7 lines 15-20

Methods page 3 line 44: How was center of mass calculated?

- By digitizing the runner's body at touchdown. This wording was added to address your concerns discussed here. Page 7 line 18

Methods page 3 line 56: Should it say "With horizontal velocity as the dependent" instead of "With velocity as..."?

- Yes thank you, this change was made. Page 8, Line 3

Methods page 3-4 statistical analysis: Why describe cutting it to certain variables through a preliminary analysis, then describe cutting to only three of those. A more concise description of how the selected variables were chosen would be nice. Methods page 4 line 4: Rephrase as with past recommendations "maximum upper leg extension angle".

- We are mindful of the reviewer's comments here so detail was given as to why the variables were narrowed down, the selected variables were more clearly defined and more descriptive language was used for maximum upper leg extension angle. Page 8, Line 3

Results: Drop total population or just use it to shoe men and women are different.

- We appreciate the reviewer's suggestion here and have eliminated the sections on the total population. Page 8, Line 3-11

Results and Discussion: Why are so many variables listed as significantly correlated with practice velocity, but only step length for women and leg length, step length, and backward foot velocity for men are listed in the final model. If the Table 1 data is one variable in a regression at a time, but the full model excludes some, then they are too correlated with each other and should not be described as all of them being significant. I recommend either choosing to take each variable one-by-one and talk about the article as a descriptive study or use the full model which provides a stronger method for predicting practice velocity.

- The reviewer raises a good point here. In response, detailed explanation was given on the elimination of some of the variables, additional multiple regression models were done, and the final model and the tables were revised. Page 9 Lines 1-14, 19-20

Table 2: Include units.

- We appreciate the reviewer pointing this out and in response we added units where they were lacking.

Reviewer #2: General comments
This study provided characteristics of US elite sprinters and examined the relationships between the performance and kinematic features during sprinting. The concept of this study is

interesting and number of athletes is enough to accomplish the purpose of this study. However, there are major problems which make it difficult to publish this study. There are serious methodological issues. The authors investigated sprinting in the 30- to 40-m mark section, but the max speed phase appears around the 60-m mark for elite sprinters. Moreover, the distance between the high speed camera and running lane was only 9.14 m which is too short and can be accompanied by errors due to differences in optical axes. In addition to the methodological issues, many important information regarding the research methods are missing. The current discussion is too descriptive and it is not clear what are the novel findings of this study and why the findings were obtained. Moreover, there is no discussion for the difference between males and females. There was no page number.

Specific comments

Abstract, L40: "P=0.000" cannot happen. "P < 0.001" should be used.
- Thank you for your comment, this section was deleted in response to Reviewer 1's comments.

L42 and 52: "upper leg angle at touchdown" is not clear. Please provide the direction and definition of this angle.
- Thank you for your comment, this section was deleted in response to Reviewer 1's comments.

Introduction, L6 to 14: These two sentences should be removed as these does not relate to the study.
- The reviewer raises a good point here, in response these sentences were deleted.

L22: What "performance"?
- Sprint time has now been included to define performance. Page 4, Line 8

Introduction, page 2, L4: The relationship changes with range of performance level. Please amend the explanation appropriately.
- Thank you for your comment. There is not enough evidence that we have found in the research on elite sprinters in practice for us to indicate this. All of the data cited here were in experimental testing sessions, where we are reporting on practice.

L14: What "important, not important" means?
- This was a typo so it was deleted.

L17 to 24: What is the novel aspect of this study?
- Thank you for your question, the population of males and females that are US elite level 100m sprinters, the practice setting and the amount of variables collected. Page 10, Line 3

L29 to 36: "related to" is ambiguous. Please explain how it was related to. Great angle with high velocity, or small angle with high velocity?
- Reworded to "Prior research has indicated that larger upper leg angular velocity and smaller upper leg angle at touchdown are related to increased maximal velocity (Clark et al., 2020; Mann & Herman, 1985; Miyashiro et al., 2019)." to address this concern. Page 4 Lines 11-13

L51: As there is no performance information of the participants in this study, I'm not sure the

level is actually international. Were all of them faster than qualifying
standard of the world championship or OG? If not, the participants were not
international level.

- Thank you. As all the participants were finalists or semifinalists in the US National Championships and the nature of the 100 m event that is dominated by the US, they had Olympic Qualifying Standards and added "(Average 100m Race Time: Males: 10.13 ± 0.21s, Females 11.28 ± 0.24s) (Murphy et al., 2021)" in the participant information. Page 5, Lines 13-14

L53: There is no background regarding the anthropometric data in the introduction.

- We appreciate the suggestion, per the comments of Reviewer 1, total population data, hypotheses and results were removed from the manuscript.

Methods, L46: Why did not the author measure these variables?

- Thank you for your question. Many elite athletes are sensitive about their height and weight, and therefore we were encouraged by the USA Track and Field High Performance Program to avoid direct measurement of these variables to ensure it did not become a barrier for this research.

L53: What type of shoes was used?

- Running flats. Page 5 Line 19

What was the surface of the ground?

- The track.
- This information was added to this sentence. Page 5 line 20

Methods, page 2, L16: Please provide shutter speed, company location.

- Thank you this is now included. Page 6, Line 6

L24 and 29: The field of view of camera was 6.7 m but the distance between cones was 8 m?

- The reviewer makes a good point, the figure and wording were revised to show the 6.7 m field of view and that the cones were placed 3m and 5m into the field of view. Page 6, Line 11

L34: Where did the authors digitized? What landmark?

- The authors used the 5m mark as the landmark and digitized the 2 full strides of the athlete. This information is now included Page 6, Line 12

L53: How did the authors identify the foot strike and toe off?

- Visually at 300fps the compression of the foot can be seen and the toe leaving the ground can be seen. This information is now included. Page 6, Line 22 Using the digitized data?

Methods, page 3, L9: Was the toe location measured using the digitized data? Yes

L12: Why did not the author use the CG velocity? Moreover, for digitized data, did the author filter the data? What was the cut off frequency?

- Thank you for your questions. We calculate velocity using step rate (1/(average contact time + average flight time)) * average step length. This measure is more beneficial to the coaches we work with. All the data is raw data except the foot velocities and we use a smoothing program for those only.

The smoothing routine:
QUINTIC SLINE FUNCTION

```
//  THIS ROUTINE FITS LINEAR DISPLACEMENT WITH A QUINTIC SLINE
FUNCTION,
//  PRODUCING SMOOTHED DISPLACEMENT, VELOCITY, AND ACCELERATION
RESULTS
//  FOR STANDARD POSITIONS AS WELL AS THE FULL NUMBER OF POSITIONS
(DIS-
//  PLACEMENT RESULTS ONLY)
//
//  THE VARIABLES USED TO SET THE SMOOTHING LEVEL ARE
//
//         DF    - VECTOR OF LENGTH NX. (INPUT)
//                 DF(I) IS THE RELATIVE WEIGHT OF DATA
//                 POINT I (SEE PARAMETER SM BELOW).
//         SM    - A NON-NEGATIVE NUMBER WHICH CONTROLS THE
//                 EXTENT OF SMOOTHING. (INPUT) THE SPLINE
//                 FUNCTION S IS DETERMINED SUCH THAT THE
//                 SUM FROM 1 TO NX OF
//                 ((S(X(I))-F(I))/DF(I))**2
//                 IS LESS THAN OR EQUAL TO SM,
//                 WHERE EQUALITY HOLDS UNLESS S DESCRIBES
//                 A STRAIGHT LINE.
//
//  THE VARIABLES REFERENCED ABOVE INCLUDE:
//
//  ARGUMENTS
//
//         X     - VECTOR OF LENGTH NX CONTAINING THE ABSCISSAE
//                 OF THE NX DATA POINTS (X(I),F(I)) I=1,...,
//                 NX. (INPUT) X MUST BE ORDERED SO THAT
//                 X(I) .LT. X(I+1).
//         F     - VECTOR OF LENGTH NX CONTAINING THE ORDINATES
//                 (OR FUNCTION VALUES) OF THE NX DATA POINTS.
//
```

Methods, page 4, L7 to 9: This sentence is ambiguous.
- Thank you, it was edited per Reviewer 1's comments.

L11: Did the author check multicollinearity? Yes

Results, L26: Body mass and stature are missing. Moreover, in this section, results are repeated.
- Body mass and stature were given in the participants section, repeated results were edited out.

L41 to 43: This multiple regression analysis is not consistent to what is shown in the methods section (and also in the table 2).
- Additional multiple regression models were done, and the final model and the tables were revised. Page 9, Lines 1-14

Discussion, L33: The first two sentences can be removed.
- Took one out and reworded the other, thank you.

L50: What is "practice velocity"? Velocity in practice

Discussion, page 2, L9 to 44: This paragraph is too descriptive. Please show what were found in the current study and what aspects were novel.
- Thank you for your feedback, the novel findings were identified, Page 11, Line 3

L28: I feel the contradiction can be caused by the difference in range of used participants' performance levels.
- Now that the athletes are divided by gender, the range is only those who are elite 100m sprinters.

Discussion, page 3, L14: "The sampling method is the first as it was convenience sampling" What is this mentioning? Please explain in a careful way.
- Reworded to "The convenience sampling method is a potential limitation of this study." Page 11, Line 9

Reviewer #3: General comments
This paper investigated the link between specific kinematic parameters and maximal horizontal sprint velocity in highly trained sprinter. This study is interesting and informative because it is realised with elite men and women sprinter. However some question have to be answered. Provide the best performance of the sprinter in order to give the real level of your population. In the material and method you must detail the kinematic analysis (location of the anatomical points) and evaluate the error induced by the use of such field kinematic analysis (particularly speed and angle). This point should help to discuss your results. In term of results some question remains in the opportunity to correlate velocity and kinematics in the total population.
Specific comments
Introduction
P4 line 55-56: Purpose, why you introduce at this stage gender's differences. Indeed in all your introduction you have never developed gender differences in sprint running. Indeed these differences and their consequences in training are not well described in the literature - Why did you choose to study male and female together? Indeed if there is differences.
- Changed this to only males or only females separately per Reviewer 1's comments.

Methods
P6 line 24: Participants: please give average personal best of men and women sprinter in order to better understand the level of the population.
- Added average race time from a separate competition study in the same population. Page 5, Lines 13-14

P7 Line 7: How could you be sure that the sprinter have reached their maximal velocity in the field of the camera, and not before or after?
- The coach would guide the athlete as to how far back to go so they could be at full speed, we just made sure it was at least 30 meters.

P7 Line 16: You used an excilim at 300 hz with a field of view of 6.7 m. Did
this configuration allow you to have enough details to detect toe off and take off?

- Yes, we got at least 2 full strides for all athletes but it was zoomed in enough for us to see the foot compress at touchdown and the toe leave the ground at toe off.

P8 line 9: Why did you measure sprint velocity as the product of stride length and rate?
Indeed you could track frame by frame the hip of the runner.

- Thank you for your question, we calculate the contact times and flight times of the athlete using the frames and take the average of the two (Right and left contact, right to left and left to right flight). Then we get their stride rate (1/(Average contact + average flight). We measure the stride lengths using the 5m scale. We give all this data to the coaches and they use it to craft their training. So not just telling them how fast the athlete is running but also why and how they are generating that velocity.

P8 line 21 :" The upper leg variables were measured in a reference frame relative
to the vertical (illustrated in Figure 2A) and reported in units of degrees" this sentence is not
clear. In the figure 2a what did you measure as angle, the angle between Vertical and thigh?
For the measurement of the different angle how did you identify the segments? Did you put
markers on hip knee ankle? Please provide some explanation (P7 "manually digitised how did
you choose the anatomical location of digitised points?).

- Added detail here. We used video and an angle tool. Sprinters are very lean and it is not difficult to identify their anatomy. Page 7, Lines 6-10

P8 Line 39: "and horizontal backward foot velocity at touchdown was determined in a
reference frame relative to the runner's center of mass." How did you calculated the velocity?
What did you mean by centre of mass? Indeed you did not calculated it?

- Explained this more clearly. Page 7, Lines 15-20

P9 line 4: You should use abbreviation for the different parameters it will be easier for the
reader.

- Thank you, we felt that we did not use any one parameter enough to use abbreviations.

Results
Did you tried to correlate your kinematic parameters why the best performance on 100 m of
each sprinters?

- No, for this article we just correlated to fastest practice velocity in the last 5 years if available if not then most recent practice velocity

Total population – Deleted this section
P9 line 50: Did you make a graph of your correlation between leg length, step lengh contact
time… and maximal velocity? It can appear two group of points, one for men and one for
women that make significant your correlation but it is not really a correlation. If it is the case
you should delete this part of "total population". If not please give graph of your correlation
and not only "r and p".

- Completely eliminated reporting on the total population.

P10 line 16 : "Contact time (r = -0.424; p = 0.071) was not significantly related to practice
velocity in males." Please add "in highly trained sprinter" not only males.

- It was adjusted to include this wording. Page 9, Line 1

Discussion
P10 line 46 to 51: "The most important findings of this study were that leg length, step length, contact time, upper leg angle at touchdown, and horizontal backward foot velocity at touchdown were significantly correlated with practice velocity in the total population." For the cited parameters please make graph of the correlation to be sure that to group of point appear (due to differences in running velocity). If yes your correlation are not real correlation.

- This section was completely eliminated based on the feedback from Reviewer 1.

In your discussion you could discuss first of the differences between men and women. Why did you not obtain the same correlations in men and women. Did that means that the training of men and women must be different? Yes

Second you sould give some practical application for coaches and athletes.

- Thank you. In the conclusion we suggest focusing on just step length for females and step length, foot velocity and upper leg position in males

Reviewer #4: Excellent and meaningful work. Please consider a few very minor edits / alterations in your most updated draft, as follows:

ABSTRACT:
Line 60 - needs comma before "which"

- Thank you, this was edited out per prior Reviewers' feedback.

INTRODUCTION:
Page 1 - "population" used on lines 21 and 29 reads repetitively ("these athletes" on Line 31 could be changed to "elite sprinter" to enable dropping "in this population" on Line 29). Quick check throughout manuscript for "appropriate use of "population" - For instance: Line 41 first page DISCUSSION, where "entire population" is used... should it not be "entire sample?" Also, recurrent use of a word or phrase (even if correct) can be distracting to reader.

- Deleted data and discussion of the whole sample data

Line 36 - I think this should read "correlated with" not "correlated to." Anyway, you do use "correlated with" on Lines 40/41 first page of DISCUSSION.

- This was changed to "correlated with". Page 4, Line 14

METHODS:
Procedures Line 12 - "fastest" top speed is used. Alternatives: "highest" or "greatest" top speed.

- Good point, this was changed to highest. Page 6, line 4

DISCUSSION:
2nd Page, Line 51 - what is meant by: "database for this unique sample that coaches...?" Alternative: "database for this elite subset that coaches and athletes can use..." Key sentence here, b/c your statement kind of defines 'translational' in this research.

- Thank you, it was changed to your suggested wording. Page 10, Line 23, Page 11 Line 1

Line 31 - "velocity-related" or "velocity-based"... either way, requires hyphen.

- Made this change here. Page 11, Line 16

CONCLUSION:
Line 45: 'Sample' here?
- This was edited out per prior Reviewers' feedback.

Line 49: "international-level"... needs hyphen.
- Hyphenated, Page 11, Line 20, Page 12, Line 1

Line 51: Do terms "spatiotemporal" and "kinematic" basically refer to the same things? Maybe "spatiotemporal kinematics" (but that might be redundant) or just 'kinematics'... IDK
- Yes, changed to just kinematic, thank you.

2nd Editorial decision
27-Jul-2021

Ref.: Ms. No. JCTRes-D-21-00043R1
Relationship between Anthropometric and Kinematic Measures to Practice Velocity in Elite American 100m Sprinters
Journal of Clinical and Translational Research

Dear authors,

I am pleased to inform you that your manuscript has been accepted for publication in the Journal of Clinical and Translational Research.

You will receive the proofs of your article shortly, which we kindly ask you to thoroughly review for any errors.

Thank you for submitting your work to JCTR.

Kindest regards,

Michal Heger
Editor-in-Chief
Journal of Clinical and Translational Research

Comments from the editors and reviewers: