

Round 1

Reviewers' comments:

Reviewer #1:

Dear reviewers,

Thank you for your good comments and suggestions. The main corrections in the paper and the responds to the reviewer's comments are as follows:

Reviewer 1:

● Major 1. If the authors aim to provide analyzed data in this study as “reference” values, the participants should be selected more strictly. For example, “healthy” and “mature gait pattern” should be defined more exactly. Inclusion and exclusion criteria in Table 1 seems to be inadequate obtain reference values.

Response:

'Healthy' refers to the maturity of gait patterns and adherence to the World Health Organization's normal weight criteria, excluding underweight and overweight populations.

'Mature gait pattern' typically emerges at the age of 7 in individuals¹. However, after the age of 40, certain gait parameters, such as walking speed, tend to decline². This study primarily focuses on university students whose age falls within the range associated with a mature gait pattern.

We have selected three assessment tools to evaluate participants' physical activity functionality:

1.The development of the Foot and Ankle Ability Measure (FAAM) aims to fulfill the need for a self-report assessment tool that comprehensively evaluates the muscular and musculoskeletal function of the lower extremities, feet, and ankle joints³.

2.The Lysholm knee score, invented by Lysholm J, Gillquist J, and others in 1982, was initially used to assess joint functionality after knee ligament surgery⁴. A systematic review study concerning 41 knee scoring tools indicated that the Lysholm knee score is the most suitable evaluation instrument for general knee joint conditions and functionality⁵.

3. The Harris Hip Score (HHS) was developed to assess postoperative conditions after hip surgery and to evaluate different hip disorders in the adult population. It includes evaluations of pain, function, deformity, and mobility. The functional domain encompasses activities of daily living (using stairs, public transportation, sitting/standing, and putting on/taking off shoes and socks) and

gait (limping, requiring support, and walking distance). The deformity domain observes hip flexion, adduction, internal rotation, and limb length discrepancy, while the mobility domain assesses hip range of motion⁶. Therefore, the Harris Hip Score (HHS) is one of the most widely used measures for assessing health-related quality of life in hip pathology⁷. The aforementioned three assessment tools have all been validated as responsive, reliable, and effective evaluation instruments, thereby supporting the definition of **healthy** and **mature gait pattern**.

Meanwhile, we have consulted previous research on gait reference values for inclusion and exclusion criteria^{2,8}. Therefore, we consider the inclusion and exclusion criteria for this study to be reasonable.

●And how gait speed of each individual was controlled during data collection?

Response: We have added details about participants' familiarity with the walking procedure: During the data collection process, we ensure that participants are familiar with the walking procedure. This process includes practicing walking at the preferred walking speed within a range of 2 meters in front of and behind the Kistler force plate recording area. Participants will perform this practice walking for a total of 3 rounds to minimize the impact of acceleration and deceleration.

●Major 2. It seems that difference in spatiotemporal parameters between males and females might partially depends on the difference in height, amount of muscle mass, and lower extremity morphology/alignment etc. To discuss the sex difference, match of height between males and females could be necessary at least.

Response:

We have incorporated the height-adjusted data, which is now located in Table 3, and made corresponding adjustments to Table 3. Descriptions and explanations have also been provided in the "Abstract," " Materials and methods," "Results," and "Discussion" sections.

Table 3 spatiotemporal parameters

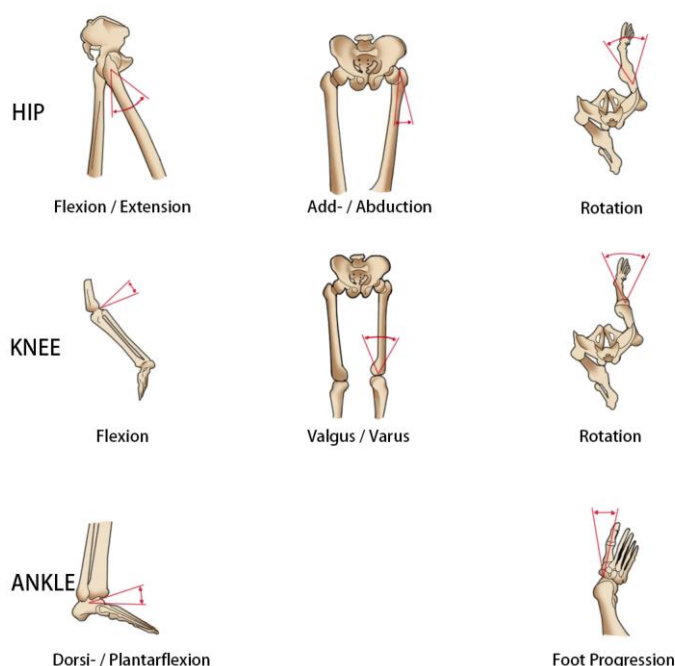
Variables	Mean (SD)		p value
	Men	Female	

Cadence (steps/min)	113.35 (11.05)	118(7.63)	< 0.05
Height-adjusted cadence	1503.74(151)	1539.60(80)	< 0.05
Speed(m/s)	1.24(0.17)	1.22(0.11)	0.35
Height-adjusted gait speed (cm/s)	0.70(0.09)	0.76(0.06)	< 0.05
Step length(m)	0.66(0.09)	0.62(0.05)	< 0.05
Height-adjusted Step length(cm)	0.37(0.05)	0.38(0.02)	0.60
Stride length(m)	1.31 (0.13)	1.24 (0.29)	< 0.05
Height-adjusted Stride length(cm)	0.75(0.07)	0.76(0.05)	0.30
Stride width(m)	0.11 (0.03)	0.10 (0.03)	0.07
Height-adjusted Stride width(cm)	0.06(0.01)	0.06(0.01)	0.42
Cycle time(sec)	1.07 (0.09)	1.01 (0.07)	< 0.05
Double limb support time(sec)	0.23 (0.04)	0.21 (0.03)	< 0.05
Stance time(%GC)	0.65 (0.06)	0.61 (0.05)	< 0.05
Swing time(%GC)	0.42 (0.04)	0.40 (0.03)	< 0.05
Statures-per second	0.71 (0.10)	0.77 (0.08)	< 0.05
Stride time(sec)	1.08 (0.08)	1.02 (0.08)	< 0.05
Stride-per minute	55.94 (4.65)	59.72 (3.40)	< 0.05

●Major 3. This reviewer recommends the authors to add drawings that explain kinematics parameters in three joints. This help the readers with various specialties to understand the parameters at a glance.

Response: We have included motion diagrams of the hip, knee, and ankle joints to facilitate a better understanding of gait analysis parameters for readers from various professional backgrounds.

JOINT REFERENCE SHEET



● Minor 1. English is not correct in the following sentence. In Statistical analysis: All parameters a described using means and standard deviations, a→are?

Response: We have revised the sentence according to your suggestion.

● Minor 2. In reference 1, please add latest information for Neurology 2022.

Response: We have improved the information for reference 1 according to your suggestion.

References

1. Hillman SJ, Stansfield BW, Richardson AM, Robb JE. Development of temporal and distance parameters of gait in normal children. *Gait Posture*. 2009;29(1):81-85.
2. Lau LK, Wee SL, Pang WJB, et al. Reference Values of Gait Speed and Gait Spatiotemporal Parameters for a South East Asian Population: The Yishun Study. *Clin Interv Aging*. 2020;15:1753-1765.
3. Martin RL, Irrgang JJ, Burdett RG, Conti SF, Van Swearingen JM. Evidence of validity for the Foot and Ankle Ability Measure (FAAM). *Foot Ankle Int*. 2005;26(11):968-983.
4. Lysholm J, Gillquist J. Evaluation of knee ligament surgery results with special emphasis on use of a scoring scale. *Am J Sports Med*. 1982;10(3):150-154.
5. Chamorro-Moriana G, Perez-Cabezas V, Espuny-Ruiz F, Torres-Enamorado D, Ridao-Fernandez C. Assessing knee functionality: Systematic review of validated

outcome measures. *Ann Phys Rehabil Med*. 2022;65(6):101608.

6. Soderman P, Malchau H, Herberts P. Outcome of total hip replacement: a comparison of different measurement methods. *Clin Orthop Relat Res*. 2001(390):163-172.
7. Lieberman JR, Dorey F, Shekelle P, et al. Outcome after total hip arthroplasty. Comparison of a traditional disease-specific and a quality-of-life measurement of outcome. *J Arthroplasty*. 1997;12(6):639-645.
8. Kawai H, Taniguchi Y, Seino S, et al. Reference values of gait parameters measured with a plantar pressure platform in community-dwelling older Japanese adults. *Clin Interv Aging*. 2019;14:1265-1276.

Round 2

Dear reviewer,

Thank you for your good comments and suggestions. The main corrections in the paper and the responds to the reviewer's comments are as follows:

Reviewer 1: To certify the term "reference" in the title the following corrections are expected to be done by the authors. This reviewer think that the following explanations should be included in the method in the main manuscript including references 1-2. 'Healthy' refers to the maturity of gait patterns and adherence to the World Health Organization's normal weight criteria, excluding underweight and overweight populations. 'Mature gait pattern' typically emerges at the age of 7 in individuals¹. However, after the age of 40, certain gait parameters, such as walking speed, tend to decline². This study primarily focuses on university students whose age falls within the range associated with a mature gait pattern.

Response: According to your suggestion, we have added relevant content to the method section and highlighted the added content.

Reviewer 1: This reviewer think that the following sentences including references also should be added in the discussion after shortening. We have selected three assessment tools to evaluate participants' physical activity functionality: 1.The development of the Foot and Ankle Ability Measure (FAAM) aims to fulfill the need for a self-report assessment tool that comprehensively evaluates the muscular and musculoskeletal function of the lower extremities, feet, and ankle

joints³. 2. The Lysholm knee score, invented by Lysholm J, Gillquist J, and others in 1982, was initially used to assess joint functionality after knee ligament surgery⁴. A systematic review study concerning 41 knee scoring tools indicated that the Lysholm knee score is the most suitable evaluation instrument for general knee joint conditions and functionality⁵. 3. The Harris Hip Score (HHS) was developed to assess postoperative conditions after hip surgery and to evaluate different hip disorders in the adult population. It includes evaluations of pain, function, deformity, and mobility. The functional domain encompasses activities of daily living (using stairs, public transportation, sitting/standing, and putting on/taking off shoes and socks) and gait (limping, requiring support, and walking distance). The deformity domain observes hip flexion, adduction, internal rotation, and limb length discrepancy, while the mobility domain assesses hip range of motion⁶. Therefore, the Harris Hip Score (HHS) is one of the most widely used measures for assessing health-related quality of life in hip pathology⁷. The aforementioned three assessment tools have all been validated as responsive, reliable, and effective evaluation instruments, thereby supporting the definition of healthy and mature gait pattern. Meanwhile, we have consulted previous research on gait reference values for inclusion and exclusion criteria^{2,8}.

Response: According to your suggestion, we have added relevant content to the discussion section and highlighted the added content.