GUILHERME AUGUSTO SANTOS BUENO

Marcha de mulheres idosas e risco de quedas: influência do histórico de queda e medo de cair

Brasília
2019

Termo de Autorização para Disponibilização de Teses e Dissertações Eletrônicas no Repositório Institucional da UnB

1 IDENTIFICAÇÃO

Autor: Guilherme Augusto Santos Bueno		
RG: 5326497	**CPF: 041.960.111-28**	**Telefone: 62 991189225**
E-mail: bueno.guilhermeaugusto@gmail.com		**Seu e-mail pode ser disponibilizado na página?** **(x) Sim ( ) Não**
Afiliação (Instituição de vínculo empregatício):		
Orientador: Ruth Losada de Menezes		
Coorientador: Flávia Martins Gervásio		
Título do Trabalho: Marcha de mulheres idosas e risco de quedas: influência do histórico de queda e medo de cair		
Data de Defesa: 03/07/2019	**Área do Conhecimento: Ciências da Saúde**	
Palavras-Chave: Envelhecimento; Percepção; Habilidade Motora; Acidentes por quedas; Marcha; Tecnologia Biomédica.		
Programa/Curso: Programa de Pós-Graduação em Ciências e Tecnologias em Saúde		
Titulação: Mestrado	**Agência de Fomento:** Coordenação de Aperfeiçoamento de Pessoal de Nível Superior	
Tipo de material: ( ) Tese (x) Dissertação		

2 INFORMAÇÃO DE ACESSO AO DOCUMENTO

Liberação para disponibilização: (x)Total ( )Parcial[1,2,3,4,5]

Em caso de disponibilização parcial, especifique os capítulos a serem retidos:

Observações:

1 É imprescindível o envio do arquivo em formato digital do trabalho completo, mesmo em se tratando de disponibilização parcial.

2 A solicitação de disponibilização parcial deve ser feita mediante justificativa lícita e assinada pelo **autor do trabalho**, que deve ser entregue juntamente com o termo de autorização e documentos que comprovem a necessidade da restrição da parte do conteúdo do trabalho.

3 A restrição poderá ser mantida por até um ano a partir da data de autorização da disponibilização.

4 A extensão deste prazo suscita justificativa formal junto à Biblioteca Central (BCE e ao Decanato de Pós-Graduação (DPG) . 5 O resumo e os metadados ficarão sempre disponibilizados.

3 LICENÇA DE PERMISSÃO DE USO

Na qualidade de titular dos direitos de autor da publicação, autorizo a Universidade de Brasília e o IBICT a disponibilizar por meio dos sites www.unb.br, bdtd.ibict.br, www.ndltd.org, em ressarcimento dos direitos autorais, de acordo com a Lei nº 9610/98, o texto integral da obra supracitada, conforme permissões assinaladas, para fins de leitura, impressão e/ou download, a título de divulgação da produção científica brasileira, a partir desta data.

Brasília , 03/ 07/ 2019
Local Data

_______________________ Assinatura do Autor

GUILHERME AUGUSTO SANTOS BUENO

Marcha de mulheres idosas e risco de quedas: influência do histórico de queda e medo de cair

Dissertação de Mestrado apresentada ao Programa de Pós-Graduação em Ciências e Tecnologias em Saúde (PPGCTS) da Faculdade de Ceilândia (FCE), campus da Universidade de Brasília (UnB), para obtenção do Título de Mestre em Ciências e Tecnologias em Saúde.

Área de concentração: Promoção, Prevenção e Intervenção em Saúde.

Linha de pesquisa: Saúde, funcionalidade, ocupação e cuidado

Temática: Ativação cerebral, biomecânica da marcha e medo de queda em idosas

Orientadora: Profa. Dra. Ruth Losada de Menezes

Co-orientadora: Profa. Dra. Flávia Martins Gervásio

Brasília
2019

Ficha catalográfica elaborada automaticamente,
com os dados fornecidos pelo(a) autor(a)

BB928m

Bueno, Guilherme Augusto Santos
Marcha de mulheres idosas e risco de quedas: influência do histórico de queda e medo de cair / Guilherme Augusto Santos Bueno; orientador Ruth Losada de Menezes; co orientador Flávia Martins Gervásio. -- Brasília, 2019.
147 p.

Dissertação (Mestrado - Mestrado em Ciências e Tecnologias em Saúde) -- Universidade de Brasília, 2019.

1. Envelhecimento. 2. Marcha. 3. Habilidade Motora. 4. Acidente por quedas. 5. Tecnologia Biomédica. I. de Menezes, Ruth Losada, orient. II. Gervásio, Flávia Martins, co-orient. III. Título.

Programa de Pós-Graduação em Ciências e Tecnologias em Saúde da Universidade de Brasília

BANCA EXAMINADORA DA DISSERTAÇÃO DE MESTRADO

Aluno: Guilherme Augusto Santos Bueno

Membros titulares:

1. Profa. Dra. Ruth Losada de Menezes – Orientadora e Presidente da banca examinadora

2. Profa. Dra. Ana Cristina de David –Membro não vinculado ao PPGCTS e professora da Faculdade de Educação Física/UNB e FCE/UnB

3. Prof. Dr. Leonardo Petrus da Silva Paz – Membro vinculado ao PPGCTS e professor da FCE/UnB

Membro suplente:

4. Prof. Dr. Hudson Azevedo Pinheiro – Membro não vinculado ao PPGCTS e professor do Instituto Euro-Americano

Data: 03/07/2019

Dedico este trabalho aos meus avôs, José Mauro dos Santos e Ita Malglacia de Oliveira Santos. Obrigado, aos ensinamentos que vocês me proporcionaram até aqui, título algum conseguirá ser maior. À minha mãe, minha grande guerreira, agradeço cada abdicação de suas conquistas pessoais para se realizar nas minhas e dos meus irmãos. Ao meu pai (in Memoriam), obrigado pelo exemplo de força, garra e determinação.

AGRADECIMENTOS

Primeiramente agradeço a Deus, todas as portas que se abriram para que chegasse até aqui Ele que abriu. Por tantos instrumentos que colocou em meu caminho, para me auxiliar, andar do lado, me impulsionar, colocar no caminho, fui muito agraciado neste tempo. Agradeço por tudo o que visivelmente vi a tua mão agindo, mas principalmente sou grato por tudo o que fez no silencio para que este dia chegasse.

Agradeço a minha família, minha base, meus maiores incentivadores, torcedores, aqueles que compram as minhas lutas, vencendo comigo em cada vitória.

Agradeço a minha namorada Tauana Callais por toda a parceria ao longo deste período, você deixou a jornada mais leve, me ouvindo e aconselhando em cada momento. Obrigado por estar comigo, por entender e apoiar em cada sonho particular, ainda que um destes sonhos nós deixou distantes, separados pelo Atlântico, mas você com os seus jeitinhos sempre se fez presente.

A minha orientadora Ruth Losada de Menezes pela confiança, me oportunizando o mestrado. Ao longo deste período posso dizer que eu tive mais que uma orientadora acadêmica, em vários momentos com valiosos conselhos me orientou para a vida. Obrigado pelo conhecimento transmitido, pelos conselhos ofertados, pela confiança depositada e por acreditar em mim. Sou grato porque até estes momentos, os dois dos maiores sonhos que já imaginei realizando um dia, a senhora foi instrumento para a realização deles. Que Deus possa estar sempre cobrindo e abençoando a senhora e toda sua família.

A minha co-orientadora Flávia Martins Gervásio por mostrar o caminho desde a graduação e por transmitir a tua confiança em mim, para a professora Ruth. A senhora me oportunizou desde o primeiro período da graduação, caminhar contigo, me colocando ao lado, me ensinando, transmitindo pouco a pouco aquilo que se tornou fundamental na determinação da minha jornada acadêmica. Obrigado por sempre enxergar em mim, muito além do que eu mesmo consigo ver em vários momentos, por vibrar comigo nestas conquistas que em muitas das vezes já havia falado que chegaria.

Neste processo de aprendizado desde à graduação não posso deixar de agradecer ao hoje então colega Darlan Martins Ribeiro, uma amizade iniciada pela admiração em ensinar. Sou grato, pois você e a professora Flávia me oportunizaram grande conhecimento e crescimento no Laboratório do Movimento Dr. Cláudio de Almeida Borges, que Deus abençoe muito.

Aproveitando ao falar do LAMOV, local onde grandes risadas, estudos, as grandes memórias eu levarei sempre comigo. Não posso deixar de agradecer a toda equipe que ali me auxiliou, Hadassa, Geovana Pontes, Juliane, Mariane, Barbarah, Tauana Callais, obrigado pela dedicação e amor que colocaram ali.

Agradeço a professora Anabela, minha tutora do College of Health Technology of Coimbra. Obrigado por me receber tão bem nos meses que aí estive, pelo ensinamento profissional, cultural e pessoal. Foi um período bem *fixe* do meu mestrado.

Agradeço ao Programa de Pós-Graduação em Ciências e Tecnologias em Saúde da Faculdade de Ceilândia – Universidade de Brasília, para todo o corpo docente, que contribuiu para o meu crescimento acadêmico e pessoal. Assim à coordenação na pessoa da Profa. Dra. Silvana, à secretaria nas pessoas da Núbia e Rafaela, sou muito grato por todos os esclarecimentos, por irem em busca dos tramites e burocracias necessárias para que eu chegasse até aqui com um intercâmbio no exterior durante o mestrado.

Agradeço ainda as agências de fomento que contribuíram para o meu primeiro congresso mundial, sendo financiado pela Fundação de Apoio a Pesquisa do Distrito Federal – FAPDF. Como também a Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES, que me sustentou no Brasil e no exterior com a bolsa de demanda social. Muito obrigado.

Por fim, mas de extrema importância e valor agradeço aos amigos que independente do tempo, distância ou momento foram fontes de apoio em toda essa caminhada, em especial José Roberto, Edgar Henrique, João Carto. Obrigado por cada oração, torcida e apoio de sempre, que Deus abençoe grandiosamente a vida de vocês.

Sou grato a cada idosa que acreditaram no estudo, contribuindo para a melhor compreensão dos aspectos envolvidos no evento queda.

SUMÁRIO

8. APÊNDICES

TABELAS, FIGURAS, APÊNDICES E ANEXOS

SÍMBOLOS, SIGLAS E ABREVIATURAS

%	Percentage
º	Degrees
ω	effect size
Ankle Dors/Plan	ankle dorsi/plantarflexion
BMI	Body Mass Index
CAPES	Coordenação de Aperfeiçoamento de Pessoal de Nível Superior
CI	Confidence Interval for Mean
CONSORT	Consolidated Standards of Reporting Trials
Eq	Equation
F	F-test
Fall-HFOF	Group faller with high FOF
Fall-LFOF	Group faller with low FOF
FDF	fictional disturbing factor
FES-I	Falls Efficacy Scale-International
FOF	Fear of falling
FootProg	foot progression angle
GDI	Gait Deviation Index
GGI	Gillette Gait Index

GPS	Gait Profile Score
GVS	Gait Variable Score
HipAbd/Add	hip adduction/abduction
HipFlex/Ext	hip flexion/extension
HipRot	hip rotation
ICC	Intraclass correlation coefficient
ICTRP	International Clinical Trials Registry Platform
Kg	kilogram
kg/m²	kilogram/square meters
KneeFlex/Ext	knee flexion/extension
m	Meters
MAP	Movement Analysis Profile
MDC	Minimum Detectable Change
MMSE	Mini-Mental State Examination
MVIC	Maximum voluntary isometric contraction
n	sample size
NonFall-HFOF	Group nonfaller with high FOF
NonFall-LFOF	Group nonfaller with low FOF
p	p value
PelvicObl	pelvic obliquity
PelvicRot	pelvic rotation

PelvicTil	pelvic tilt
r	correlation coefficient ou effect size
ReBEC	Registro Brasileiro de Ensaios Clínicos
SD	Standard Deviation
SEM	Standard Measurement Error
SPSS	Statistical Package for the Social Sciences

RESUMO

Introdução: fatores preditivos e protetores do risco de queda, na marcha geriátrica, sofrem influência de alterações neuromusculares, como o histórico de quedas, e fatores psicogênicos, os quais causam na marcha uma ação motora cautelosa, como o medo de cair. **Objetivo:** avaliar o perfil da marcha de idosas hígidas e a influência do histórico de queda e o medo de cair, enquanto preditores do risco de queda. **Métodos:** a dissertação divide-se em dois artigos: o primeiro trata de uma investigação transversal, que analisou a confiabilidade do Gait Profile Score (GPS) em mulheres idosas. A amostra, com 49 participantes, (72,34±6,44 anos) foi estratificada segundo o auto relato do histórico de queda, nos últimos doze meses, em idosas não caidoras, caidoras e caidoras recorrentes. A análise tridimensional da marcha utilizou dados cinemáticos da pelve, quadril, joelho e tornozelo para compor o cálculo do GPS e do Gait Variable Score (GVS). O segundo artigo caracterizou-se por um ensaio clínico não randomizado, no qual as idosas foram alocadas em quatro grupos, segundo o histórico e medo de quedas. A intervenção consistiu em aplicar uma perturbação fictícia durante à análise tridimensional da marcha, a fim de isolar os efeitos do histórico e do medo de cair, as variáveis idade, gênero, índice de massa corporal, nível cognitivo e força muscular foram considerados como fatores confundidores. **Resultados:** o GPS revelou ser um índice de alta confiabilidade para aplicação nos estudos da marcha geriátrica. As comparações do perfil de marcha pelo GPS não demonstraram diferenças significativas entre as idosas do estudo. A intervenção constatou que o medo de cair, após a perturbação, causa pior qualidade de marcha em comparação ao histórico de quedas. Esses fatores associados potencializam o risco de queda. **Conclusão**: o GPS aplicado às idosas permitiu evidenciar a qualidade de um perfil de marcha, caracterizado por uma análise ampla, uma vez que associa todos os planos de movimento das principais articulações do membro inferior. Ao mesmo tempo que é objetivo, ele agrupa as análises cinemáticas angulares. O histórico de queda de forma isolada não foi capaz, portanto, de identificar diferenças no perfil de marcha em idosas. O medo de cair produziu um padrão de marcha cauteloso, que modificou as medidas espaço-temporais e aumentou o GVS das articulações do quadril e do joelho. Esse padrão cauteloso de deslocamento piorou a qualidade de marcha, contribuindo para o aumento do risco de queda.

PALAVRAS-CHAVE: Envelhecimento; Percepção; Habilidade Motora; Acidentes por quedas; Marcha; Tecnologia Biomédica.

ABSTRACT

Background: predictive factors and protectors form the risk of falling, in geriatric gait, are influenced by neuromuscular alterations, like the history of falls, and psychogenic influences. They cause in the gait a cautious motor action, with the fear of falling. **Objective:** evaluate the gait profile of healthy elderly women and the influence of the history and fear of falling as predictors of the risk of falling. **Methods:** the dissertation is divided in two articles. The first consists of a cross-sectional investigation which analyzed the reliability of the Gait Profile Score (GPS) in elderly women. The sample with 49 subjects (72,34±6,44 years) was stratified accordicng to a self-report on history of falls, in the last twelve months, from: nonfaller, faller and recurrent faller. The three-dimensional analysis of the gait used kinematic data from the pelvis, hip, knee and ankle to build the Gait Variable Score (GVS) and GPS calculations. The second article was characterized by a non-randomized clinical trial, in which the women were divided into four groups, according to their history and fear of falling. The intervention consisted in applying a fake disturbance after the subjects were submitted to three-dimensional analysis of the gait. In order to isolate the effects of both the history and fear of falling, the age, gender, body mass index, cognitive level and muscle strength variables were considered confusing factors. **Results:** the GPS revealed itself as a very reliable index to apply in studies regarding the geriatric gait. The profile comparisons through the GPS did not show significant differences between the elderly women who participated in the study. The intervention demonstrated that the fear of falling, after a disturbance, results in worse quality of the gait, in juxtaposition with the history of falls. When associated, this factors potentialize the risk of falling. **Conclusion:** the GPS applied to elder individuals allowed to evidence the quality of the gait profile. This is characterized by an extended analysis, once it associates all the movement planes of the main lower limbs's articulations. At the same time that it is objective, as it groups the angular kinematics's analysis. The history of falls, in isolation, was not able to identify the differences between the subjects's gait profile. The fear of falling resulted in a cautious gait pattern, that modified the space-time measures and increased the hips and knees articulations's GVS. This cautious movement pattern worsened the gait quality, contributing to the elevation of the risk of falling.

KEYWORDS: Aging; Perception; Motor Skills; Accidental Falls; Gait; Biomedical Technology.

1 INTRODUÇÃO GERAL

A queda é caracterizada como um evento inesperado, em que o sujeito vai ao chão, altura intermediária ou nível inferior à sua estatura [1,2]. As quedas não fazem parte do processo natural de envelhecimento. Pelo contrário, são reflexos de fatores predisponentes tais como o déficit no controle e planejamento motor, força muscular, nível cognitivo, equilíbrio postural e percepção de saúde. Os fatores precipitantes, também, devem ser considerados como aqueles promovidos pelo meio ambiente, condições de acessibilidade e a iatrogenia própria do processo de orientação ao risco de queda [3–5].

No público idoso, a queda tornou-se objeto de investigação de diversos autores nos últimos anos, com o objetivo de identificar fatores preditores desse evento e propor meios de prevenção [4,6–8]. Para tal investigação, estratégias efetivas exigem uma abordagem clínica multifatorial, como a avaliação da marcha, do equilíbrio postural, da força muscular e dos fatores ambientais e pessoais [8].

Em relação aos fatores pessoais, destaca-se o medo de cair, orginalmente denominado de “ptofobia”. Discutido, inicialmente, em 1982, esse fator foi definido como uma associação de sintomas psicocomportamentais, como a ansiedade e o medo de cair recorrentes, que conduzem a uma locomoção insegura [9]. Atualmente, o medo e o histórico de queda são descritos como um fenômeno multidimensional, com diferentes determinantes físicos, psicológicos, sociais e funcionais [10].

Kabeshova e colaboradores [7] realizaram um estudo com 1.760 participantes, divididos em idosos com quedas isoladas e aqueles com quedas recorrentes. Eles analisaram, além de fatores físicos, condições de saúde, fatores pessoais e sociais, com o objetivo de identificar, dentre estes, quais os maiores preditores do risco de queda. Em ambos os grupos do estudo, estes autores observaram que o medo de queda se apresentou como o primeiro preditor, fortemente associado a quedas recorrentes [7]. Lachman e colaboradores [11] já destacavam esse fator desde 1998.

O medo de cair é uma variável complexa e sem associação direta com o histórico de queda, uma vez que se faz presente em idosos que ainda não sofreram nenhum evento dessa natureza [12].

A determinação dos fatores preditores do risco de queda ainda é divergente na literatura. O histórico de queda, a força muscular e a qualidade de marcha são referidos como fortes preditores do risco de queda [13]. A alteração do equilíbrio postural e da marcha, o medo de cair e o histórico de queda foram descritos, nessa sequência, como os mais influentes na predição do risco de queda [7,14].

Os distúrbios da marcha e do equilíbrio postural estão entre os principais determinantes da queda. A partir desse evento, é possível ocorrerem lesões neuromusculoesqueléticas que podem gerar incapacidades, influenciando na independência física e na qualidade de vida [15]. Os episódios de queda são observados, geralmente, no início ou durante o deslocamento do idoso [16].

A partir desse contexto, as adaptações na marcha do idoso podem ser observadas em diferentes estratégias motoras. Essa população adota redução da velocidade, passo curto, diminuição dos desvios da pelve, redução da aceleração do membro inferior durante o contato inicial, aumento da contribuição do quadril para evitar o tropeço, e também, uma marcha cautelosa [17–19]. Em relação aos idosos caidores, estes apresentam lentificação do movimento durante a marcha e busca de estabilização [20]. O próprio histórico de quedas influencia a marcha [21].

O medo de cair é uma variável psicossocial, pouco caracterizada na literatura, apesar de não ser recente a sua relação com o risco de queda. Lempert e colaboradores, em 1991 [21], ressaltaram a influência do medo de cair sobre a marcha como uma das variáveis que podem levar a um distúrbio psicogênico. Assim, eles demonstraram seis características da marcha de pacientes com distúrbio psicogênico: (1) flutuações momentâneas da postura e da marcha, em sua maioria em resposta a uma perturbação; (2) lentidão excessiva ou hesitação de locomoção, sem relação com doença neurológica; (3) aumento da oscilação após uma perturbação e melhora com uma distração; (4) posturas não econômicas, gerando sobrecarga de energia muscular; (5) *walking in ice*, caracterizado por passos curtos e cautelosos, rigidez ou limitação de amplitude de movimento de tornozelo; (6) súbita flexão dos joelhos, geralmente sem quedas.

Como exposto acima, muito se estuda sobre o evento de quedas e seus fatores preditores, com destaque à influência destes fatores nas modificações em movimentos amplos, dinâmicos e funcionais como a marcha. Porém, não existe ainda um consenso sobre a influência do histórico de quedas e medo de cair na marcha. Ronthal e colaboradores [22] ressaltam que ofertar um diagnóstico de distúrbios da marcha não é algo simples, pelo contrário, o idoso é acometido de múltiplas causas, dando origem a uma condição denominada pelos autores de "distúrbio multifatorial de macha".

A avaliação de marcha é, pois, um método capaz de determinar o risco de queda [22–24], por isso escolher corretamente a ferramenta para a avaliação do risco de queda determina o sucesso da avaliação [25]. Esse viés analitico instigou o estudo da marcha por meio da análise tridimensional. É necessário, todavia, associar fatores intrínsecos e extrínsecos para melhor entendimento sobre as adaptações protetivas ou potenciais de queda. Como apontadas as adaptações de marcha por Lempert e colaboradores [21], a hipótese dessa investigação é que, entre mulheres idosas, o medo de cair produz um perfil de marcha com potencialidade maior para quedas do que, propriamente, o histórico de quedas.

2 OBJETIVOS

2.1 OBJETIVO GERAL

Avaliar o perfil de marcha de idosas hígidas e a influência do histórico de queda e medo de cair enquanto preditores do risco de queda.

2.2 OBJETIVOS ESPECÍFICOS

Avaliar a confiabilidade e mínimo valor clínico detectável do Gait Profile Score (GPS) em mulheres idosas. De forma secundária, analisar se o GPS detecta mudanças na qualidade da marcha observada por dados cinemáticos entre idosas não caidoras, caidoras e caidoras recorrentes. (ARTIGO 1)

Investigar o padrão de marcha de idosas com e sem histórico de queda, com alto e baixo medo de cair, quando expostas a um fator perturbador. (ARTIGO 2)

3 PUBLICAÇÃO

ARTIGO 1 – PUBLICADO

GAIT PROFILE SCORE IDENTIFIES CHANGES IN GAIT KINEMATICS IN NONFALLER, FALLER AND RECURRENT FALLER ELDERLY WOMEN

Autores:

Guilherme Augusto Santos Bueno, Darlan Martins Ribeiro, Flavia Martins Gervásio, Anabela Correia Martins, Ruth Losada de Menezes

Revista: Gait & Posture
Qualis: A2 Interdisciplinar e A1 Educação Física
Fator de Impacto (Journal Citation Report): 2.273

Dados da publicação:
Volume 72;
Julho de 2019;
Páginas 76-81
doi: 10.1016/j.gaitpost.2019.05.029

GAIT PROFILE SCORE IDENTIFIES CHANGES IN GAIT KINEMATICS IN NONFALLER, FALLER AND RECURRENT FALLER ELDERLY WOMEN

Guilherme Augusto Santos Bueno[a,b]; Darlan Martins Ribeiro[a,b]; Flavia Martins Gervásio[b]; Anabela Martins Correia[c]; Ruth Losada de Menezes[a]

AUTHOR AFFILIATIONS:

a - Postgraduate Program in Health Sciences and Technologies, University of Brasília, Federal District, DF, Brazil.

b - Movement Laboratory Dr. Cláudio A. Borges, College of Sport, State University of Goiás, Goiânia - Goiás, Brazil.

c - Physiotherapy Department, Polytechnic Institute of Coimbra ESTeSC - Coimbra Health School, Coimbra, Portugal

1. ABSTRACT

Background: Quantification of differences in gait kinematics between young and older adults provides insight on age-related gait changes and can contribute to the investigation of risk of falls. Gait Profile Score (GPS) is an index that indicates gait quality, using kinematic gait data, but so far it has not been used in an elderly population without neurological conditions. **Research question**: Is the Gait Profile Score (GPS) an index that shows reliability for use in old adults? Does this index detect changes in gait quality observed by kinematic data between nonfaller, faller and recurrent faller older adults? **Methods**: Forty-nine women (mean age 72,43 ± 6,44; 27 faller and 22 nonfaller) were included in the study. Intra-session reliability was obtained from the intraclass correlation coefficient (ICC) between the five strides of each session. **Results**: Overall value of GPS shows no difference between nonfaller (6.65 ± 1.59º), faller (6.67 ± 2.05º) and recurrent faller (6.62 ± 0.86º) older adult. In all groups larger values of Gait

Variable Scores (GVS) were observed in the hip and knee joints. Intra-session ICC values the GVS and GPS presented high stability, ranging from 0.80 to 0.99. MDC lower values in GPS were observed in the faller (0.39; ICC - 0.97) and recurrent faller (0.69; ICC – 0.90). **Significance**: Due to the high reliability, GPS has proven to be a valid method to analyze the gait quality of faller and nonfaller older woman. The most sensitive indexes (GPS and GVS) are the gear changes in fallers and recurrent fallers.
KEYWORDS: Fall in the Elderly; Age Effects; Gait; Gait Profile Score; Reliability

2. INTRODUCTION

Gait kinematic assessment may be an important clinical tool to screen older adults with increased risk of fall [1]. However, a large amount of data is offered by kinematic gait analysis, and there is a difficulty of rapid and direct clinical interpretation [2]. In order to compare global gait scores for clinical populations to control populations, methods have been developed by incorporating a number of different kinematic parameters that would allow to quantify and compare kinematic gait characteristics in a more direct and simple way. Some popular kinematic indexes are the Gillette Gait Index (GGI) [3], the Gait Deviation Index (GDI) [4] and the Gait Profile Score (GPS) [5].

Quantification of differences in gait kinematics between young and older adults provides insight to how gait changes according to physiological changes [6]. Despite sizable interest in determining how age changes the walking mechanics, varied outcome measures have precluded a comprehensive understanding of the impact of age on lower extremity joint kinematics and kinetics [6,7]. The investigation of the influence of age on gait kinematics generates discussions about the changes that may predict future falls. In a recent study that took spatio-temporal parameters as kinematic variables, stance time variability, swing time, and stride length had sensitivity of 70% or higher to predict falls [8]. Precise differences in angular kinematic parameters between fallers and nonfallers old adults are observed [9]. Analyzing joint kinematic characteristics, Kerrigan [10] pointed a reduction in hip extension was the parameter that stood out in the older adults with history of fall. Gait parameters in older women are more related to the risk of falling, than the same analysis performed in men [11]. The need to concentrate the interpretation on the changes of the kinematic parameters of gait generated by the age and fall is what justifies the investigation of an index that adds kinematic parameters of gait in the three planes of movement, obtaining in the end a general measurement.

The GPS has been validated as an effective measure of gait quality [12]. Initially GPS was created to evaluate the gait of children with cerebral palsy [5]. However, some studies have used it in other populations persons with such as Parkinson's disease [13], post-stroke [2], Achondroplasia [14], and multiple sclerosis [15]. Due to the relevance of studying changes in the gait variables pattern across the lifespan, and the relevance of direct and precise measurements for clinical purposes, we believe that this index might be relevant for this population.

Authors pointed out that for GPS values to establish their clinical utility, there is a need for a prior reliability investigation [2,12,16]. To ensure the reliability of kinematic gait data, it is recommended to include absolute measures of measurement error and the minimum detectable change (MDC) [17]. The reliability analysis of gait kinematic parameters in elderly and adult participants is present in studies such as de Kesar and collaborators [16], where they found excellent test-retest reliability for all gait variables tested (Intraclass Correlation Coefficients = 0.799-0.986) in post-stroke. Devetak and collaborators [2], analyzed the reliability of gait kinematic parameters also in post-stroke adults, but using GPS and GVS and also found high reliability (Intraclass Correlation Coefficients between 0.81 and 0.93). Other authors have reported reliability data and GPS MDC for children with cerebral palsy [12] and individuals with spinal cord injury [18]. However, we did not find studies that used GPS in the elderly without neurological conditions, nor did they investigate the reliability and MDC in this population.

The objectives of this work are to analyze the reliability of GPS, to present the MDC values for older adult women, and to identify if the GPS is an index that differentiates a profile of the kinematic parameters of gait between nonfaller.

3. METHODS

3.1 Study design

This study was approved by the Research Ethics Committee of the University of Brasília (n. 2.109.807). All participants provided written informed consent.

3.2 Sample

A priori the sample calculation was carried out with data from the pilot study, composed of five faller and five nonfaller older adults, using G.Power 3.1 software (Franz Faul, Universitat Kiel, Germany). For this calculation, the Gait Profile Score Overall deviations were used in the fallers (7.95 ± 0.29) and non-falers (7.76 ± 0.21). Using the T Test (Student's T-Test), considering a power of 0.80, α = 0.05, and having effect size (d Cohen) of 0.89. Considering a lost of 10% of the data, the total sample size required was 47.

Inclusion criteria as follows: (i) woman; (ii) age 65 or over; (iii) independent walking without aids; (iv) absence of previous surgeries in the lower limbs, pelvis or spine; (v) body mass index (BMI) < 30 kg/m2; (vi) preserved cognition (Mini-Mental State Examination (MMSE) >14 [19]; (vii) have no medical diagnosis of rheumatoid arthritis, neuromuscular or neurodegenerative disease, including diabetes mellitus; (viii) no visual impairment; (ix) declare that she has not ingested alcoholic beverages within 24 hours prior to data collection.

3.3 Procedure

Participants were classified according a history of falling, answering the question: During the past 12 months, have you had any falls? Yes/No. If yes, participant was further asked on number of falls. Faller was defined as an individual who had at least one fall in the past 12 months. Recurrent faller was defined as an individual who had ≥2 falls in the past 12 months. It was considered fall as an unexpected event, in which the participant comes to rest on the ground, floor, or lower level.

The Falls Efficacy Scale-International, with its transcultural validation to the Brazilian population [20], was applied to interpret the fear of falling (FOF).
All participants underwent gait assessment. The data were captured at a frequency of 120 Hz by five Bonita B10 cameras (Vicon Motion Systems Ltd®, Oxford Metrics Group, Oxford, UK) and two cameras, model Vero v1.3x (Vicon Motion Systems Ltd®, Oxford Metrics Group, Oxford, UK). Participants were instructed to walk barefoot at a self-selected speed, on a 9 meters path. Kinematic data were collected from the 3 meters in the middle of the path. Data were processed by 4th order digital Butterworth filter with cut-off frequency of 10Hz [9].

3.4 GPS and MAP calculation

The generated kinematic data graphs were normalised to a percentage of the gait cycle, using 51 time-normalized samples for each stride. The averaged values of five consistent trials from each limb were analysed. The GPS and the nine GVS domains were calculated using the spreadsheet available in [21], according to the method reported by Baker and collaborators [5]. In this study, the normal group consisted of 15 adults women with an average age of 24.8 ± 6.8 years old. The data set contained five trials from each subject, resulting in 75 cycles on each lower limb.

The GPS is a single index outcome measure that summarizes the overall deviation of a person's kinematic gait data relatively to normative data [5,12]. The GPS can be decomposed to provide GVS index scores for nine key relevant kinematic variables, which are presented alongside the GPS in a simple figure called the Movement Analysis Profile (MAP). Specifically, GVSs were calculated for: pelvic tilt, obliquity and rotation; hip flexion/extension, abduction/adduction and internal/external rotation; knee flexion/extension; ankle plantar/dorsiflexion; foot progression; and, a total GVS for each lower limb. These variables were grouped in the MAP, which was generated for each participant [5]. The parametric Student's T-test was used to compare the faller and nonfaller.

3.5 Data analysis

In order to determine within-session reliability, the intraclass correlation coefficient (ICC) of the GPS values were calculated for five strides within the same session using a two-way mixed model for absolute agreement. Intraclass reliability was estimated by calculating the ICC between the values obtained for each group (faller and nonfaller).

Statistical calculations were performed using IBM SPSS package version 23.0 (IBM, Chicago, USA). Reliability was classified as low, moderate, or excellent, according to the following criteria: an ICC greater than 0.75 was considered excellent, an ICC between 0.40 and 0.75 was moderate, and an ICC lower than 0.40 was classified as low [22].

To calculate the MDC of the GVS and GPS for each group, the standard measurement error (SEM) was estimated using the ICC values between trials, according to Eq. (1) [23]. MDC was then obtained from the SEM according to Eq. (2) [23].

$$SEM = SD \times \sqrt{(1-ICC)} \quad (1)$$

$$MDC = SEM * 1.983 * \sqrt{2} \quad (2)$$

The value of 1.983 corresponds to the Student's T-test distribution for the confidence interval adopted (95%) for this sample size.

4. RESULTS

Forty-nine women (age 72,43 ± 6,44 years; 27 nonfallers, 12 fallers and 10 recurrent fallers) were included in the study. The groups studied were homogeneous for the discriminative variables, FES-I score and walking speed. (Table 1).

The GPS has a reduction in the elderly population, however it is not different between nonfaller, faller and recurrent faller older adults ($p = 0.969$, $\omega = 0.08$). The same finding occurs in the domains of GVS, for each lower limb. However, it is common in all groups that bilaterally hip and knee flexion and extension are the parameters of greater GVS variation (Table 2).

Table 3 shows the ICC, SEM and values between trials for each variable of interest, and individually for each group. In all groups, all variables presented high reliability between trials, with ICC values ranging from 0.80 to 0.99. With the exception of Pelvic Rotation (GVS) with ICC of 0.77 in the faller and recurrent faller groups.

Table 4 shows correlations of age, stride length and walking speed with GPS and GVS, in the total sample and in each subgroup. Age and stride length contributed a lot to the increase of GPS and some GVS variables in nonfaller. Walking speed correlated with increased ankle and knee GPS variation in the faller group, and only in the ankle joint showed correlation in the nonfaller group. Age, stride length and walking speed did not correlate with GPS and GVS of the recurrent faller group.

5. DISCUSSION

The GVS and GPS values show changes in normal gait in both groups. Since larger GVS and GPS values indicate a more abnormal gait pattern, this result suggests that the compensatory mechanisms present in the older adults gait patterns have a strong influence on the GPS and GVS.

No difference was found between nonfaller, faller and recurrent faller. This indicates that the "fall" factor is weak in the investigation of gait adaptations, when studied in isolation. Agreeing with Kerrigan [10] findings, which in the kinematic parameters studied in the sagittal plane, observed only a slight reduction of hip extension, and also with Benson [24], where the same groups were used to compare the kinematic modifications in the gait with obstacles, not observing difference between faller and nonfaller. It is possible to infer that the joint movements that contribute to the greater GPS in the older women are those from hip and knee. These results agree with Boyer [6] in a meta-analysis, emphasizing that with the advancement of age, hip articulation increases his contribution to gait in an attempt to maintain quality. However, none of the studies included in the meta-analysis used GPS.

Regarding intra-session reliability, all GVS and GPS exhibited ICC ranging from 0.80 to 0.99, which are classified as excellent [22]. In general, the ICCs were similar between nonfallers, fallers and recurrent fallers. The reliability found for GPS and GVS in both groups confirms the use of these indices even in a population that is often studied about the variability of gait parameters [6,25,26]. Comparing our results with those reported by Hafer and Boyer [25], it can be concluded that, in general, GPS and GVS are more reliable measures than those proposed by these authors to describe gait quality, and joints involved. Although, as found in our findings, the authors also highlight the contribution of the hip joint in gait variation [25]. Their study was conducted on a treadmill, what should reduce variability in gait performance [25]. In order to reach the final data the authors had to resort to an advanced level of processing their data. This fact may hinder the use of these data by clinical professionals. GPS and GVS are more robust measures compared to those of, as well as being easier to interpret clinically, as well as the ease of calculation that authors have offered [5,21].

The MDC values were found for GPS for the nonfaller, faller and recurrent faller were 0.84°, 0.39° and 0.69°, respectively, which decreased and recurrent declines GPS is more sensitive as changes. The same occurred with the MDV of the GVS, with greater sensitivity of changes for the fallers and recurrent fallers groups. In the study of Baker and collaborators, the MCID of 1.6º was found for the GPS of children with cerebral palsy [12]. Wedege [18] found satisfactory ICC values and an MDC less than 4.7° for the subjects with spinal cord injury, and Devetak [2] found satisfactory values na MDC, less than 1.7º, for the post-stroke patients.

One possible limitation of this study is the lack of other variables related to the ageing process, which contribute to the modification of gait parameters. Indeed, it has been demonstrated that there is no difference between faller and nonfaller. A number of authors have related changes in gait parameters in older adults with factors other than a history of falls, such as reduced muscle strength [27], imbalance [28], poor health perception [28], and even fear of falling [29]. In any case, the authors stated that GPS was a valid measure in the study of gait quality of faller and recurrent faller old adults, since in these participants the MDC of GPS and GVS is smaller, demonstrating greater sensitivity to changes in gait after falls. In the study of fall risk, evaluation tools had to be objective, but with the maximum information of the subject [30].

6. CONCLUSION

The GPS and a MAP of nonfaller, faller and recurrent faller old adults have satisfactory reliability. The MDC of this index in this population, whose average GPS_O was approximately 0.5° in fallers, with higher values for the index subdivisions (GVS), varying from 0.5° to 2.4°. The GPS can be a useful tool in gait analysis of the older adults, as well as in clinical practice to rank the overall quality of walking before and after falls.

7. CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflict of interest

8. REFERENCES

[1] M.L. Callisaya, L. Blizzard, M.D. Schmidt, M.K. L, J.L. Mcginley, L.M. Sanders, V.K. Srikanth, Gait , gait variability and the risk of multiple incident falls in older people : a population-based study, Age Ageing. 40 (2011) 481–487. doi:10.1093/ageing/afr055.

[2] G.F. Devetak, S.K. Martello, J.C. de Almeida, K.P. Correa, D.D. Iucksch, E.F. Manffra, Reliability and minimum detectable change of the gait profile score for post-stroke patients, Gait Posture. 49 (2016) 382–387. doi:10.1016/j.gaitpost.2016.07.149.

[3] L.M. Schutte, U. Narayanan, J.L. Stout, P. Selber, J.R. Gage, An index for quantifying deviations from normal gait, Gait Posture. 11 (2000) 25–31.

[4] M.H. Schwartz, A. Rozumalski, The gait deviation index : A new comprehensive index of gait pathology, Gait Posture. 28 (2008) 351–357.

doi:10.1016/j.gaitpost.2008.05.001.
[5] R. Baker, J.L. Mcginley, M.H. Schwartz, S. Beynon, A. Rozumalski, H.K. Graham, O. Tirosh, The Gait Profile Score and Movement Analysis Profile, Gait Posture. 30 (2009) 265–269. doi:10.1016/j.gaitpost.2009.05.020.
[6] K.A. Boyer, R.T. Johnson, J.J. Banks, C. Jewell, J.F. Hafer, Systematic review and meta-analysis of gait mechanics in young and older adults, Exp. Gerontol. 95 (2017) 63–70. doi:10.1016/j.exger.2017.05.005.
[7] D.M. Ribeiro, G.A.S. Bueno, F.M. Gervásio, R.L. De Menezes, Foot-ground clearance characteristics in women: A comparison across different ages, Gait Posture. 69 (2019) 121–125. doi:S0966636218304831.
[8] N.R. Marques, D.H. Spinoso, B.C. Cardoso, V. Christianini, M. Hiromi, M. Tavella, Is it possible to predict falls in older adults using gait kinematics ?, Clin. Biomech. 59 (2018) 15–18. doi:10.1016/j.clinbiomech.2018.08.006.
[9] Y. Kobayashi, H. Hobara, S. Matsushita, M. Mochimaru, Key joint kinematic characteristics of the gait of fallers identi fi ed by principal component analysis $, J. Biomech. 47 (2014) 2424–2429. doi:10.1016/j.jbiomech.2014.04.011.
[10] D.C. Kerrigan, L.W. Lee, J.J. Collins, P.O. Riley, L.A. Lipsitz, Reduced hip extension during walking: Healthy elderly and fallers versus young adults, Arch. Phys. Med. Rehabil. 82 (2001) 26–30. doi:10.1053/apmr.2001.18584.
[11] J. Johansson, A. Nordström, P. Nordström, Greater Fall Risk in Elderly Women Than in Men Is Associated With Increased Gait Variability During Multitasking, J. Am. Med. Dir. Assoc. 17 (2016) 1–6. doi:10.1016/j.jamda.2016.02.009.
[12] R. Baker, J.L. Mcginley, M. Schwartz, P. Thomason, J. Rodda, H.K. Graham, The minimal clinically important difference for the Gait Profile Score, Gait Posture. 35 (2012) 612–615. doi:10.1016/j.gaitpost.2011.12.008.
[13] D.S. Speciali, E.M. Oliveira, J.R. Cardoso, Gait profile score and movement analysis profile in patients with Parkinson ' s disease during concurrent cognitive load, Brazilian J. Phys. Ther. 18 (2014) 315–322.
[14] D.T. Sims, A. Burden, C. Payton, C.I. Morse, A quantitative description of self-selected walking in adults with Achondroplasia using the gait profile score, Gait Posture. 68 (2019) 150–154. doi:10.1016/j.gaitpost.2018.11.019.
[15] M. Pau, G. Coghe, C. Atzeni, F. Corona, G. Pilloni, M. Giovanna, E. Cocco, M. Galli, Novel characterization of gait impairments in people with multiple sclerosis by means of the gait pro fi le score, J. Neurol. Sci. 345 (2014) 159–163. doi:10.1016/j.jns.2014.07.032.
[16] T.M. Kesar, S.A. Binder-Macleod, G.E. Hicks, D.S. Reisman, Minimal detectable change for gait variables collected during treadmill walking in individuals post-stroke, Gait Posture. 33 (2011) 314–317. doi:10.1158/0008-5472.CAN-10-4002.BONE.
[17] S.M. Haley, M.A. Fragala-pinkham, Interpreting Change Scores of Tests and Measures Used in Physical Therapy, Phys. Ther. 86 (2006) 735–743.
[18] P. Wedege, K. Steffen, V. Strøm, A.I. Opheim, Reliability of three-dimensional kinematic gait data in adults with spinal cord injury, J. Rehabil. Assist. 4 (2017) 1–10. doi:10.1177/2055668317729992.
[19] S.M.D. Brucki, R. Nitrin, P. Caramelli, P.H.F. Bertolucci, I.H. Okamoto, Suggestions for utilization of the mini-mental state examination in Brazil, Arq. Neuropsiquiatr. 61 (2003) 777–781. doi:10.1590/S0004-282X2003000500014.
[20] F.F.O. Camargos, R.C. Dias, J.M.D. Dias, M.T.F. Freire, Cross-cultural

adaptation and evaluation of the psychometric properties of the Falls Efficacy Scale – International Among Elderly Brazilians (FES-I-BRAZIL), Rev. Bras. Fisioter. 14 (2010) 237–243.
[21] wwrichard.net [Internet]. MAP and GDI calculators, (n.d.). http://wwrichardnet/resources/gps-map-and-gdi-calculators/ (accessed November 21, 2018).
[22] J.L. Fleiss, The Design and Analysis of Clinical Experiments, John Wiley & Sons, New York, 1999.
[23] I. Campanini, A. Merlo, Reliabilty, smallest real difference and concurrent validity of indices computed from GRF components in gait of stroke patients, Gait Posture. 30 (2009) 127–131. doi:10.1016/j.gaitpost.2009.03.011.
[24] L.C. Benson, S.C. Cobb, A.S. Hyngstrom, K.G. Keenan, J. Luo, K.M. O'Connor, Identifying trippers and non-trippers based on knee kinematics during obstacle-free walking, Hum. Mov. Sci. 62 (2018) 58–66. doi:10.1016/j.humov.2018.09.009.
[25] J.F. Hafer, K.A. Boyer, Age related differences in segment coordination and its variability during gait, Gait Posture. 62 (2018) 92–98. doi:10.1016/j.gaitpost.2018.02.021.
[26] M. Qiao, J.A. Feld, J.R. Franz, Aging e ff ects on leg joint variability during walking with balance perturbations, Gait Posture. 62 (2018) 27–33. doi:10.1016/j.gaitpost.2018.02.020.
[27] B.D.S. Moreira, R.F. Sampaio, J. Bergamas-, M. Diz, A.D.C. Bastone, E. Ferriolli, L. Neri, R.A. Lourenc, N. Kirkwood, Factors associated with fear of falling in community-dwelling older adults with and without diabetes mellitus: findings from the Frailty in Brazilian Older People Study (FIBRA-BR), Exp. Gerontol. (2017). doi:10.1016/j.exger.2017.01.004.
[28] O.T.T. Hoang, P. Jullamate, N. Piphatvanitcha, E. Rosenberg, Factors related to fear of falling among community-dwelling older adults, J. Clin. Nurs. 26 (2016) 68–76. doi:10.1111/jocn.13337.
[29] T. Asai, S. Misu, R. Sawa, T. Doi, M. Yamada, The association between fear of falling and smoothness of lower trunk oscillation in gait varies according to gait speed in community-dwelling older adults, J. Neuroeng. Rehabil. 14 (2017) 1–9. doi:10.1186/s12984-016-0211-0.
[30] C. Sherrigton, A. Tiedemann, Physiotherapy in the prevention of falls in older people., J. Physiother. 61 (2015) 53–60.

Table 1. Characteristics of nonfaller (n = 27), faller (n = 12) and recurrent faller groups (n = 10).

	Nonfaller		Faller		Recurrent faller		
	Mean (SD)	CI (95%)	Mean (SD)	CI (95%)	Mean (SD)	CI (95%)	p[a] (ω)
Age (years)	72.59 (6.81)	69.90 – 75.26	72.75 (5.67)	69.14 – 76.35	71.00 (6.83)	66.71 – 76.48	0.903 (0.04)
Weight (kg)	59.63 (8.63)	56.21 – 63.04	64.48 (9.42)	58.49 – 69.47	58.52 (9.01)	51.27 – 65.76	0.235 (0.02)
Height (m)	1.54 (0.05)	1.52 – 1.56	1.56 (0.05)	1.53 – 1.60	1.51 (0.07)	1.45 – 1.56	0.083 (0.08)
BMI (kg/m²)	25.07 (3.77)	23.57 – 26.56	26.15 (3.07)	24.20 – 28.10	25.53 (3.65)	22.92 – 28.15	0.683 (0.04)
MMSE (score)	26.74 (2.75)	25.65 – 27.83	25.58 (3.92)	23.06 – 28.10	27.00 (2.16)	25.45 – 28.55	0.460 (0.07)
FES-I (score)	28.96 (7.83)	25.86 – 32.06	24.17 (5.09)	20.93 – 27.40	31.00 (5.16)	27.31 – 34.69	0.053 (0.11)
Cadence (step/min)	108.74 (10.51)	104.58 – 112.89	109.65 (10.84)	102.72 – 116.56	112.63 (7.01)	107.58 – 117.67	0.580 (0.09)
Stride Length (m)	1.02 (0.08)	0.96 – 1.10	1.10 (0.04)	1.04 – 1.16	1.04 (0.05)	0.96 – 1.12	0.326 (0.06)
Walking Speed (m/s)	1.00 (0.15)	0.94 – 1.07	1.02 (0.16)	0.91 – 1.12	0.99 (0.13)	0.89 – 1.09	0.508 (0.02)

Note: SD, standard deviation; CI, Confidence Interval for Mean.; kg, kilogram; m, meters; BMI, Body Mass Index; kg/m2, kilogram/square meters, meters/seconds [a] p value for the comparison by ANOVA one way, ω – effect size.

Table 2. GPS and GVS values obtained for nonfaller (n = 27), faller (n = 12) and recurrent faller groups (n = 10).

		Nonfaller		Faller		Recurrent faller		
		Mean (SD)	CI (95%)	Mean (SD)	CI (95%)	Mean (SD)	CI (95%)	p[a] (ω)
GPS (º)								
	Left	6.27 (1.38)	5.66 - 6.88	6.22 (1.63)	5.19 – 7.26	6.33 (1.11)	5.54 – 7.12	0.985 (0.04)
	Right	6.45 (1.87)	5.63 - 7.28	6.64 (2.45)	5.08 – 8.20	6.23 (0.81)	5.65 – 6.81	0.819 (0.06)
GPS (Overall) (º)		6.65 (1.59)	5.94 - 7.35	6.67 (2.05)	5.36 – 7.97	6.62 (0.86)	6.01 – 7.24	0.969 (0.08)
GVS (º)								
Pelvic Tilt (º)		5.55 (3.92)	3.82 - 7.29	6.28 (4.04)	3.72 – 8.85	4.68 (3.79)	1.97 – 7.39	0.663 (0.01)
Hip Flex/Ext (º)								
	Left	8.15 (3.97)	6.39 - 9.92	8.19 (4.33)	5.44 – 10.94	7.12 (3.73)	5.44 – 10.79	0.989 (0.03)
	Right	7.92 (5.43)	5.52 - 10.33	7.66 (4.37)	5.84 – 10.83	6.63 (4.51)	5.51 – 9.71	0.754 (0.02)
Knee Flex/Ext (º)								
	Left	7.57 (1.94)	6.70 - 8.43	7.12 (1.79)	5.98 – 8.25	8.10 (2.07)	6.62 – 9.58	0.688 (0.06)
	Right	7.90 (2.42)	6.83 - 8.97	7.70 (2.61)	6.04 – 9.36	8.15 (2.29)	6.51 – 9.78	0.804 (0.01)
Ankle Dors/Plan (º)								
	Left	4.52 (2.05)	3.61 - 5.43	4.66 (1.87)	3.92 – 5.40	4.54 (1.74)	3.29 – 5.78	0.969 (0.01)
	Right	4.59 (1.27)	4.02 - 5.15	4.34 (1.40)	3.45 – 5.24	4.88 (1.09)	4.10 – 5.66	0.689 (0.02)
Pelvic Obl (º)		3.16 (1.48)	3.44 - 4.98	2.96 (1.82)	1.80 – 4.11	3.40 (1.00)	2.69 – 4.11	0.388 (0.03)
Hip Add/Abd (º)								
	Left	4.21 (1.74)	2.50 - 3.82	4.67 (1.28)	3.75 – 5.58	5.22 (1.71)	3.99 – 6.45	0.562 (0.03)
	Right	4.82 (2.42)	3.75 - 5.89	4.76 (2.42)	3.22 – 6.30	4.88 (2.54)	3.06 – 6.70	0.840 (0.02)
PelvicRott (º)		4.94 (1.57)	3.40 - 4.79	4.82 (1.68)	3.75 – 5.89	4.29 (0.87)	3.60 – 3.84	0.217 (0.04)
Hip Rot (º)								
	Left	6.60 (1.48)	5.94 - 7.25	6.35 (1.68)	5.29 – 7.42	6.89 (1.23)	6.01 – 7.77	0.639 (0.02)
	Right	6.68 (1.39)	5.69 - 6.92	6.16 (1.49)	5.21 – 7.11	6.48 (1.32)	5.54 – 7.42	0.512 (0.02)
Foot Progression (º)								
	Left	5.97 (2.81)	4.72 - 7.21	5.83 (2.23)	4.41 – 7.24	6.14 (3.50)	3.64 – 8.65	0.617 (0.02)
	Right	7.07 (3.44)	5.54 - 8.59	7.33 (4.02)	4.78 – 9.88	6.76 (2.77)	4.78 – 8.74	0.929 (0.01)

Note: GPS, Gait Profile Score; GVS, Gait Variable Score; PelvicTilt, pelvic tilt; PelvicObl, pelvic obliquity; PelvicRot, pelvic rotation; HipFlex/Ext, hip flexion/extension; KneeFlex/Ext, knee flexion/extension; Ankle Dors/Plan, ankle dorsi/plantarflexion; HipAbd/Add, hip adduction/abduction; HipRot, hip rotation; FootProg, foot progression angle; SD, standard deviation; CI, Confidence Interval for Mean. [a] p value for the comparasion by ANOVA one way, ω – effect size.

Table 3. Values of intrasession ICC, SEM and MDC for each variable of interest at nonfaller (n = 27), faller (n = 12) and recurrent faller groups (n = 10). Continua.

		Nonfaller			Faller			Recurrent faller		
		ICC (CI 95%)	SEM(º)	MDC(º)	ICC (CI 95%)	SEM(º)	MDC(º)	ICC (CI 95%)	SEM(º)	MDC(º)
GPS (º)										
	Left	0.92 (0.86 – 0.96)	0.51	1.34	0.92 (0.81 – 0.97)	0.32	0.83	0.94 (0.84 – 0.98)	0.28	0.72
	Right	0.95 (0.92 – 0.98)	0.35	0.92	0.97 (0.93 – 0.99)	0.15	0.38	0.81 (0.75 – 0.95)	0.35	0.91
GPS (Overall) (º)		0.96 (0.93 – 0.98)	0.32	0.84	0.97 (0.93 -0.99)	0.15	0.39	0.90 (0.76 – 0.97)	0.27	0.69
GVS (º)										
Pelvic Tilt (º)		0.98 (0.97 – 0.99)	0.62	1.61	0.87 (0.74 – 0,95)	1.37	3.57	0.99 (0.99 – 0.99)	0.27	0.70
Hip Flex/Ext (º)										
	Left	0.95 (0.90 – 0.97)	0.59	1.51	0.92 (0.82 – 0.97)	1.04	2.71	0.98 (0.96 – 0.99)	0.50	1.30
	Right	0.99 (0.98 – 0.99)	0.54	1.40	0.99 (0.98 – 0.99)	0.38	0.99	0.98 (0.94 – 0.99)	0.55	1.43
Knee Flex/Ext (º)										
	Left	0.89 (0.80 – 0.92)	0.93	2.43	0.84 (0.71 – 0.92)	0.85	2.13	0.91 (0.78 – 0.98)	0.62	1.61
	Right	0.90 (0.81 – 0.95)	0.89	2.32	0.92 (0.81 – 0.97)	0.65	1.69	0.86 (0.75 – 0.96)	0.85	2.22
Ankle Dors/Plan (º)										
	Left	0.97 (0.95 – 0.99)	0.32	0.84	0.98 (0.96 – 0.99)	0.25	0.64	0.96 (0.90 – 0.99)	0.35	0.92
	Right	0.89 (0.82 – 0.95)	0.42	1.12	0.93 (0.83 – 0.98)	0.30	0.77	0.81 (0.62 – 0.95)	0.48	1.24
Pelvic Obl (º)		0.80 (0.72 – 0.91)	0.45	1.18	0.81 (0.70 – 0.92)	0.76	1.97	0.94 (0.85 – 0.98)	0.43	1.12
Hip Add/Abd (º)										
	Left	0.97 (0.95 – 0.99)	0.35	0.91	0.94 (0.87 – 0.98)	0.42	1.08	0.98 (0.95 – 0.99)	0.24	0.63
	Right	0.95 (0.90 – 0.97)	0.45	1.16	0.91 (0.79 – 0.97)	0.78	2.02	0.99 (0.98 – 0.99)	0.28	0.69
PelvicRot (º)		0.83 (0.79 – 0.92)	0.86	2.24	0.77 (0.69 – 0.93)	0.41	1.08	0.77 (0.67 – 0.94)	0.42	1.08

Table 3. Values of intrasession ICC, SEM and MDC for each variable of interest at nonfaller (n = 27), faller (n = 12) and recurrent faller groups (n = 10). Conclusão.

Hip Rot (º)									
Left	0.85 (0.82 – 0.95)	0.52	1.34	0.82 (0.72 – 0.87)	0.52	1.35	0.85 (0.75 – 0.91)	0.48	1.26
Right	0.88 (0.81 – 0.93)	0.50	1.30	0.81 (0.68 – 0.88)	0.57	1.49	0.83 (0.70 – 0.87)	0.55	1.43
Foot Progression (º)									
Left	0.94 (0.89 – 0.97)	0.69	1.80	0.91 (0.79 – 0.97)	0.65	1.73	0.96 (0.90 – 0.99)	0.69	1.80
Right	0.96 (0.92 – 0.98)	0.69	1.81	0.88 (0.72 – 0.92)	0.50	1.18	0.93 (0.83 – 0.98)	0.73	1.91

Note: ICC, intraclass correlation coefficient; CI, confidence interval; SEM, standard measurement error; MDC, minimal detectable change; Gait Profile Score; GVS, Gait Variable Score; PelvicTilt, pelvic tilt; PelvicObl, pelvic obliquity; PelvicRot, pelvic rotation; HipFlex/Ext, hip flexion/extension; KneeFlex/Ext, knee flexion/extension; Ankle Dors/Plan, ankle dorsi/plantarflexion; HipAbd/Add, hip adduction/abduction; HipRot, hip rotation; FootProg, foot progression angle.

Table 4. Correlation the age, stride length and walking speed for the GPS and GVS values obtained for nonfaller (n = 27), faller (n = 12), recurrent faller groups (n = 10) and total (n = 49). Continua.

	Nonfaller			Faller			Recurrent faller			Total		
	Age	Stride Length	Walking Speed	Age	Stride Length	Walking Speed	Age	Stride Length	Walking Speed	Age	Stride Length	Walking Speed
GPS (º)												
Left	0,639*	-0,542*	-0,339	0,365	-0,093	0,197	0,027	-0,120	-0,066	0,489*	-0,416*	-0,199
Right	0,408*	-0,338*	-0,140	0,508	-0,201	0,054	-0,125	-0,316	-0,150	0,462*	-0,465*	-0,078
GPS (Overall) (º)	0,548*	-0,465*	-0,257	0,450	-0,141	0,142	-0,040	-0,213	-0,128	0,435*	-0,349*	-0,134
GVS (º)												
Pelvic Tilt (º)	0,363	-0,459*	-0,284	0,415	-0,232	-0,091	-0,049	-0,166	0,054	0,301	-0,342*	-0,183
Hip Flex/Ext (º)												
Left	0,469*	-0,478*	-0,291	0,368	-0,155	0,019	-0,468	-0,103	-0,042	0,296*	-0,368*	-0,195
Right	0,372*	-0,442*	-0,024	0,382	-0,189	0,036	-0,439	0,162	0,305	0,274*	-0,158*	0,024
Knee Flex/Ext (º)												
Left	0,455*	-0,439*	-0,337	-0,199	0,514	0,680*	0,278	0,117	0,068	0,280	-0,196	-0,061
Right	0,408*	-0,461*	0,032	0,301	-0,043	0,632*	0,341	0,142	0,227	0,242	-0,0243	0,107
Ankle Dors/Plan (º)												
Left	0,467*	-0,532*	-0,460*	-0,092	0,314	0,573*	-0,220	-0,361	-0,317	0,197	-0,322*	-0,110
Right	0,452*	-0,523*	-0,449*	-0,312	0,484	0,684*	0,083	-0,253	-0,005	0,245	-0,347*	-0,182
Pelvic Obl (º)	0,314	0,083	0,069	0,192	0,015	0,120	-0,112	-0,245	-0,414	0,172	0,0274	0,045
Hip Add/Abd (º)												
Left	0,314	0,083	0,069	0,192	0,015	0,120	-0,112	-0,245	-0,414	0,172	0,0274	0,045
Right	0,207	-0,272	-0,201	0,410	-0,112	-0,057	0,276	-0,373	-0,472	0,262	-0,227	-0,190

Table 4. Correlation the age, stride length and walking speed for the GPS and GVS values obtained for nonfaller (n = 27), faller (n = 12), recurrent faller groups (n = 10) and total (n = 49). Conclusão.

Pelvic Rott (º)	0,409*	-0,093	-0,036	0,171	-0,163	-0,043	0,301	0,228	0,041	0,338*	-0,069	-0,052
Hip Rot (º)												
Left	0,063	0,133	-0,117	-0,135	-0,086	0,030	0,572	0,055	0,081	0,093	-0,098	-0,048
Right	0,068	0,131	0,187	-0,343	0,512	0,573	0,817	-0,276	-0,125	-0,174	0,063	0,167
Foot Progression (º)												
Left	0,389*	0,136	-0,054	0,696*	-0,080	0,139	0,406	0,438	0,395	0,368*	-0,045	0,031
Right	0,327*	0,043	-0,010	0,732*	-0,489	-0,295	0,197	-0,126	-0,286	0,317*	-0,070	-0,112

Note: GPS, Gait Profile Score; GVS, Gait Variable Score; PelvicTilt, pelvic tilt; PelvicObl, pelvic obliquity; PelvicRot, pelvic rotation; HipFlex/Ext, hip flexion/extension; KneeFlex/Ext, knee flexion/extension; Ankle Dors/Plan, ankle dorsi/plantarflexion; HipAbd/Add, hip adduction/abduction; HipRot, hip rotation; FootProg, foot progression angle; * correlation is significative at the $p \leq 0.05$.

3 PUBLICAÇÃO

ARTIGO 2 - PUBLICADO

FEAR OF FALLING CONTRIBUTING TO CAUTIOUS GAIT PATTERN IN WOMEN EXPOSED TO A FICTIONAL DISTURBING FACTOR: A NON-RANDOMIZED CLINICAL TRIAL

Autores:

Guilherme Augusto Santos Bueno, Flavia Martins Gervásio, Darlan Martins Ribeiro, Anabela Martins Correia, Thiago Vilela Lemos, Ruth Losada de Menezes

Revista: Frontiers in Neurology (Publicado em 26-03-2019)
Qualis: A1 Interdisciplinar e A1 Educação Física
Fator de Impacto (Journal Citation Report): 3.508

Dados da publicação:

Volume 10;
Março de 2019;
Páginas 1-11
doi: 10.3389/fneur.2019.00283

FEAR OF FALLING CONTRIBUTING TO CAUTIOUS GAIT PATTERN IN WOMEN EXPOSED TO A FICTIONAL DISTURBING FACTOR: A NON-RANDOMIZED CLINICAL TRIAL

Guilherme Augusto Santos Bueno[1,2]; Flávia Martins Gervásio[2]; Darlan Martins Ribeiro[2]; Anabela Correia Martins[3]; Thiago Vilela Lemos[2]; Ruth Losada de Menezes[1]

1. Postgraduate Program in Health Sciences and Technologies, University of Brasília, Federal District, DF, Brazil.
2. Movement Laboratory Dr. Cláudio A. Borges, College of Sport, State University of Goiás, Goiânia - Goiás, Brazil.
3. Physiotherapy Department, Polytechnic Institute of Coimbra ESTeSC - Coimbra Health School, Coimbra, Portugal

Corresponding author:
Guilherme Augusto Santos Bueno
bueno.guilherme@aluno.unb.br

Fear of Falling Contributing to Cautious Gait Pattern in Women Exposed to a Fictional Disturbing Factor: A Non-randomized Clinical Trial

1. ABSTRACT

Objective: This study aimed to investigate the gait pattern of elderly women with and without fall-history, with high and low fear of falling, when exposed to a disturbing factor.

Materials and Methods: Forty-nine elderly women without cognitive impairment agreed to participate. Participants were divided into four groups, considering the history of falls and fear of falling. Three-dimensional gait analysis was performed to assess gait kinematics before and after exposure to the fictional disturbing factor (psychological and non-motor agent).

Results: After being exposed to the perturbation, all showed shorter step length, stride length and slower walking speed. Those without fall-history and with high fear of falling showed greater changes and lower Gait Profile Score.

Conclusion: The gait changes shown in the presence of a fear-of-falling causing agent led to a cautious gait pattern in an attempt to increase protection. However, those changes increased fall-risk, boosted by fear of falling**.**

KEYWORDS: Aging; Accidental Falls; Perception; Motor Skills; Biomechanical Phenomena

2. INTRODUCTION

The study of falls and their predictors amongst the elderly has become increasingly important as the consequences of these events lead to traumatic repercussions both physically and psychologically, contributing to changes in mobility and leading to mortality (Khow and Visvanathan 2017; Kannus et al. 2018). When it does not reach fatal consequences, the fall may bring reduction in both mobility and social participation due to fear, a condition called "post-fall syndrome" (Vellas et al. 1997). As a result, a vicious and dangerous cycle is generated because fear significantly reduces physical activities to protect itself from the conditions that can cause the fall, but this condition leads to increased comorbidities that promote an increased risk of falls (Jefferis et al. 2014).

The fear of falling (FOF) is reported as one of the main predictors of falls (Moreira et al. 2018; Chang, Chen, and Chou 2017; Allali et al. 2017; Whipple, Hamel, and Talley 2018). It is as important as impaired balance (Landers et al. 2015) or, even more important than the history of falls, since it is present even in the older adults who never fell (Hadjistavropoulos, Delbaere, and Fitzgerald 2011). Applying cognitive theory in the study of fear, it is observed that the subject, when exposed to challenging situations, should not only present necessary skills, but believe that they can deal with them (Bandura 1977). Thus, the study of FOF is based on the concept of self-efficacy, establishing itself by the combination of abilities, motivation, and confidence (Bandura 1982).

As well as fall-risk, the fear of falling is a multidimensional phenomenon, influenced by physical, psychological, social and functional factors (Vellas et al. 1997). Several characteristics are related to fear: being female (Gazibara et al. 2017; Hoang et al. 2016; Lim 2016) , older (Lim 2016), having poor perception of health (Hoang et al. 2016), higher dependence in the activities of daily living (Hoang et al. 2016; Lim 2016), reduced muscle strength (Moreira et al. 2017; Lim 2016), impaired balance (Kirkwood et al. 2011; Hoang et al. 2016; Lim 2016) and previous history of falls (Moreira et al. 2017; Hoang et al. 2016; Lim 2016).

In dynamic activities the fear of falling is presented with the adoption of a cautious gait pattern, with significant reductions in different parameters, in particular the walking speed (Moreira et al. 2017; Asai et al. 2017; Kim et al. 2016). The spatiotemporal and kinematic parameters have been reported as critical clinical tools for assessing the risk of falls in the older adults (Avin et al. 2015; Gervásio et al. 2016; Herssens et al. 2018; Ribeiro et al. 2019). However, the lack of investigations of the extrinsic interferences in gait behaviour in older adults, makes the ability of these parameters to predict falls in the elderly population not be clear (Marques et al. 2018).

The mechanisms underlying the relationship between FOF and falling are not well known, and little attention has been given to the study of their relationship creating a research gap (Grenier et al. 2018). Investigations on gait pattern changes during adverse situations, using obstacles, floor interferences, provoking slippage or footwear modifications have already been done (Schulz 2011; Menant et al. 2009; Caetano et al. 2016; Austin, Garrett, and Bohannon 1999), however no relationship between gait adaptations and FOF were found. One of the possible methods to investigate the influence of FOF without exposing the participant to unnecessary risks is the application of the “affordances” theory. Proposed in 1979 (Gibson 1979, 2015), the “affordances” theory has been applied to neuromotor behavior (Makris, Hadar, and Yarrow 2011), determining that a visual object can potentiate motor responses even in the absence of actual intention or execution of the task proposed by this object (perception drives action) (Wit et al. 2017). In some behavioral experiments applying the theory, studies show that they have shown that actions can be enhanced after seeing an image of an object that offer some kind of action, but do not do it (Symes, Ellis, and Tucker 2007). Findings provide additional support for the notion that the physical properties of objects automatically activate specific motor codes, but also demonstrate that such influence is rapid and relatively short (Makris, Hadar, and Yarrow 2011).

Differently from previous studies investigating gait modifications arising from motor perturbations (McCrum et al. 2017), the main aim of this study is to investigate gait kinematic changes in the elderly women exposed to a fictional disturbing factor, using Theory of Affordances. Our secondary aims are: to analyze the gait pattern after disturbance in the elderly women stratified by fall-history and fear of falling; investigating whether demographic factors, cognition and muscle strength can be associated with gait modifications.

3. MATERIALS AND METHODS

3.1 Study design

This controlled, non-randomized, clinical trial was approved by the Research Ethics Committee of the University of Brasília - College of Ceilândia, decision number 2.109.807 and was conducted in accordance with the Declaration of Helsinki (World Medical Association 2013). The study was registered in the Brazilian Registry of Clinical Trials (ReBEC) with the code RBR-35xhj5, receiving the number U1111-1222-4514 from the International Clinical Trials Registry Platform (ICTRP) and followed the recommendations of CONSORT (Consolidated Standards of Reporting Trials) (Schulz et al. 2010).

3.2 Participants

Participants were invited to participate in the study which was conducted at the Dr. Cláudio de Almeida Borges Movement Laboratory of the State University of Goiás, Goiânia, Brazil, from August to November 2017. The inclusion criteria were: (i) woman; (ii) age 65 or over; (iii) independent walking without aids; (iv) body mass index (BMI) < 30 kg/m2 (WHO 1995); (v) preserved cognition (Mini-Mental State Examination >24) (Folstein, Folstein, and McHugh 1975) and >14 points considering the participants the educational level, with illiterate participants (Brucki et al. 2003); (vi) declare that she has not ingested alcoholic beverages within 24 hours prior to data collection; (vii) has no prior contact with any gait analysis lab or equipment. The exclusion criteria were: (i) previous surgeries in the lower limbs, pelvis or spine; (ii) have medical diagnosis of rheumatoid arthritis, neuromuscular or neurodegenerative disease, including diabetes mellitus; (iii) visual impairment; (iv) inclusion in other trials. All eligible participants were informed and signed the consent form.

The sample size was determined using G*Power software 3.1.9.2 (Franz Faul, Universitat Kiel, Germany) (Faul et al. 2009), considering one-way variance (ANOVA) of the GPS (Overall) index obtained after perturbation. Thus, the sample required to detect a significant and clinically relevant difference from FOF exposure was N = 40 (n = 10, per group), effect size (ω^2) = 0.82, $p < 0.05$, power 0.99.

3.3 Experimental setup

The participants answered a fall-history questionnaire reporting fall events over the last 12 months. A fall was defined as an "unexpected event in which the participant finds herself on a lower level" (Lamb, Ellen, and Hauer 2005). To assess FOF, we used the Falls Efficacy Scale-International in its validated version to the Brazilian population (Camargos et al. 2010). It provides information on level of concern about falls for a range of daily activities through 16 questions, each scoring from 1 (not concerned at all) to 4 (very concerned). The final score ranges from 16 to 64. Scores under 27 reveal low concern and over that point, high concern (Gomez et al. 2017). Participants were then assigned into four groups: Faller with low FOF (Fall-LFOF), faller with high FOF (Fall-HFOF), non-faller with low FOF (NonFall-LFOF) and non-faller with high FOF (NonFall-HFOF).

3.4 Data collection

To perform 3D gait analysis we used the Vicon System (Vicon Motion Systems Ltd®, Oxford Metrics Group, Oxford, UK) and the Conventional Gait Model for biomechanical modelling. All data were sampled at 120Hz and processed using a fourth-order Butterwoth filter with 10Hz cut-off frequency (Kobayashi et al. 2014).
Each volunteer walked barefoot over a 9 meters walkway at a self-selected speed. Two fixed squared metal plates were added at midpoint over the course (Supplement A – Figure 1). Prior to data collection they went through the walkway five times for familiarization.

After 5 undisturbed gait trials, the participants were warned that the fixed squared objects on the floor could strongly vibrate or deliver electrical discharges when stepped over, introducing a fictional disturbing factor (FDF) to create FOF. Only 2 more trials were collected after introducing FDF to keep participants from getting used to the fictional stimuli (Makris, Hadar, and Yarrow 2011).

Maximum voluntary isometric contraction (MVIC) was assessed using a manual dynamometer (Laffayete Instrument® Evaluation, Ohio, USA) testing the following muscle groups: hip flexors, extensors, adductors and abductors; knee extensors and flexors; ankle dorsiflexors and plantarflexors. Each muscle group was tested 3 times for 5 seconds with 1-minute rest in between. The highest value was used for analysis. The subject was positioned as standardized by others (Kendall et al. 2007). Right and left side´s recordings were averaged and normalized by BMI (Piva, Goodnite, and Childs 2005). MVIC was collected after gait trials to avoid muscular fatigue effect on gait pattern (Toebes et al. 2015).

3.5 Data processing

All kinematic data were normalized by the gait cycle using 51 time-normalized samples for each stride. The averaged gait data pre and post-FDF for right and left sides and for each of the four study groups were analysed.

The Gait Profile Score (GPS) were used to calculate the quality of gait kinematic parameters (Baker et al. 2009). The GPS consists of nine gait variable scores (GVS) representing the pelvis, hip, knee and ankle kinematic data, presented in degrees. GVS scores can indicate which joint movement abnormalities tend to contribute to a high (worse) GPS. Both scores were calculated as recommended by Baker and colleagues (Baker et al. 2009, 2012). In this study, the normal group to calculate GPS consisted of 15 women adults with an average age of 24.8 ± 6.8 years old. The data set contained five trials from each subject, resulting in 75 cycles on each lower limb.

3.6 Confounders

Confounders such as age, gender, body weight, body height, BMI were controlled, as well as others that are known to be associated with both fall and FOF repercussions: cognitive level (Hoang et al. 2016); muscle strength (Lim

2016; Moreira et al. 2017); and historical fall (Hoang et al. 2016; Moreira et al. 2017; Lim 2016).

3.7 Statistical analysis

Statistical analysis was performed with SPSS Statistics version 23.0 (IBM, Chicago, USA). To assess the normal distribution the Shapiro-Wilk test was used. Tukey's post-hoc analysis of variance (ANOVA) was used to analyze the differences between the four groups in the two moments of the study, considering the effect size for the variance (ω) and post-hoc comparison. The effect of exposure to FOF agent was analyzed by applying the paired t-test, considering the effect size. In order to evaluate the relationship between discriminative variables, muscle strength and temporal space parameters with GPS, the Pearson product correlation was calculated. Correlation of $r \leq 0.3$ was considered 'weak', 0.31 to 0.69 'substantial' and ≥ 0.7 'strong' (Aday and Cornelius 2006). The standard level of significance used was 0.05.

4. RESULTS

4.1 Demographic characteristics

During the study period, 91 senior women were eligible to participate in the study. Of these, 52 signed the consent form and participated in the previous evaluation for allocation of the groups. At the end of the study, however, 49 participants remained, being NonFall-LFOF (n = 12); NonFall-HFOF (n = 15); Fall-LFOF (n = 12); FallHFOF (n = 10), according to the conditions presented in the flowchart (Figure 1). The results discard the absence of interference of confounders such as age, weight, BMI, as homogeneity was found between groups ($p<0.05$) (Table 1).

4.2 Intergroup comparison of gait parameters and MIVM

The step length, stride length, and walking speed showed significant differences between the groups ($p<0.05$). However, the paired comparison highlighted the

NonFall-HFOF group (r> 0.40), with reduced walking speed and shorter length in spatial variables pre-FDF. After FDF, only the stride length was different between groups, being lower in the NonFall-HFOF group (Supplement A - Table 1).

The GPS was not different between the groups, pre-FDF. Three parameters of GVS (Left Ankle Dor/Plan; Left Hip Int/Ext; Right Hip Int/Ext) presented differences between groups ($p<0.05$) (Supplement A - Table 2).

After the FOF perturbation, the GPS (Left) and GPS (Overall) presented differences with significant effect between the groups, and the post hoc comparison showed only difference between NonFall-HFOF / Fall-LFOF groups, where again NonFall-HFOF presented higher degree of variation in both parameters (Supplement A - Table 2).

The difference in MVIC was observed only in the muscular group of the plantiflexors between study groups (F (3.45 = 2.809), $p = 0.050$, $\omega = 0.13$), but did not present significant values in the comparison between the pairs (Supplement A - Table 3).

4.3 Intra-group comparison of pre and post-exposure gait parameters

After the FDF the modifications of the spatiotemporal parameters were similar between NotFall-LFOF and NotFall-HFOF groups. The opposit foot off and the foot off were late, there was increase of the double support, and reductions were observed in the stride length, walking speed, and the step length reduced only in the NotFall-HFOF group ($p <0.05$) (Table 2). The Fall-LFOF and Fall-HFOF groups presented reduction of the same variables, being the stride length, step length and walking speed ($p <0.05$) (Table 3).

The parameters of the GPS (Left, Right and Overall) did not increase after FDF only in the Fall-HFOF group, however this group already had GPS higher than the other pre-FDF groups (Table 4, 5). The GVS data show that pre-FDF in all groups the major contributing joints in the GPS range were hip and knee. After the FDF, these joints increased their variations in all groups, remaining as the main responsible for the GPS modification (Table 4, 5).

4.4 Intra-group correlations between confounding variables and gait parameters pre and post-exposure to the FOF agent

The correlation between muscle strength and GPS, showed that the reduction of muscle strength of hip extensors and flexors, and knee flexors contributes to worsening post-FDF gait quality in the NotFall-LFOF group ($r>0.6$; $p<0.05$). A similar relationship was found for knee flexors in the Fall-LFOF group (Supplement B).

In the spatiotemporal parameters, correlations were found with the variation of the GPS with the late opposit foot off, late foot off, and increase of the double support. In the NotFall-HFOF group these correlations were observed pre-FDF, and post-FDF increased ($r>0.6$; $p<0.05$). Already in the Fall-LFOF group this correlation appeared only post-FDF. And in the Fall-HFOF group, pre-and post-FDF, the correlation was found only between the increase of the double support and the late foot off (Supplement B).

5. DISCUSSION

This study aimed to examine the gait pattern adopted by older women exposed to FOF perturbation, and how this factor affects faller and non-faller, with low and high FOF, reflecting in worsening or not the spatiotemporal parameters, GPS and GVS. Significant results pointed to different gait patterns pre and post-FDF. After exposure, all groups presented a reduction in stride length, step length and walking speed, assuming a "cautious" pattern.

Results showed that non-fallers with high FOF change their gait pattern to a cautious gait more than fallers do. The decrease of spatiotemporal variables contrasts with studies that highlight more significant decreases amongst elderly fallers (Macaulay et al. 2015; Commandeur et al. 2018). The fact that changes were higher in the presence of FOF than with history of falls agrees with another investigation (Toebes et al. 2015). The introduction of a FOF perturbation during gait resulted in a reduction of the stride length, more significantly in subjects with FOF without fall-history. However, the caution observed by the modifications of other spatiotemporal parameters was similar between groups. This same behaviour may be due to declines in the attention process in dynamic or disturbed motor activities, generated by the aging process, where motor slowing are required so that attention on the proposed object remains high (Macaulay et al. 2015).

Investigation of FOF effect on the nervous system shows that there is no relation with cognitive decline (Peeters et al. 2018), so the understanding generated by the information offered in the experiment does not differentiate the participants by cognitive interference. The FOF tends to generate an illusory motor image in these older adults, where they feel more agile (Time Up and Go test) than they actually are (Grenier et al. 2018). Thus assuming a motor pattern that does not match the necessary modifications, not preparing for a motor perturbation that they may suffer.

The sum of the two clinical conditions "to have FOF" and "to have fallen", together potentiate a gait pattern with opposite and unconscious protection effect. This fact may justify how history of fall and FOF are great predictors of falls (Gomez et al. 2017) since they lead to a pattern of locomotion that predisposes to fall and does not avoid it. The same is observed by other studies that point to the increase in the risk of falls due to the slowing of walking speed (Callisaya et al. 2011; Kyrdalen and Ormstad 2018; Studenski et al. 2011), increased double support (Callisaya et al. 2011; Marques et al. 2018) and stride length shortening (Marques et al. 2018). Also, falls prevention is linked to clinical interventions that seek to increase walking speed (Cho et al. 2015).

The use of "caution", potentiated by FOF, causes gait perturbation, with changes in the kinematic parameters (Sawa et al. 2014), and the slowing of locomotion will corroborate the loss of gait quality (Huijben et al. 2018). These same adaptations and consequent worsening of gait quality observed with higher intensity in our sample of elderly women who presented high FOF and no fall history.

Compensations in kinematics to avoid the reduction of gait quality are noted by all groups, where they prolong the timing of opposite foot off (Ihlen et al. 2012), and foot off (Qiao, Feld, and Franz 2018), occurring due to weight transfer and foot release being the less stable periods of the gait cycle (Ihlen et al. 2012; Qiao, Feld, and Franz 2018).

The adjustments to try to maintain the gait quality seem to be inefficient since it was observed that the larger joints such as hip and knee are the greatest responsible for gait abnormality in this sample. A meta-analysis shows that to maintain gait quality with advancing age the hip increases its contribution, but they do not explain to what extent this increase in contribution is good or not to reduce the risk of falls (Boyer et al. 2017). Our data show that the joints of the hip and knee were in all groups the joints that contributed the most to the variation of normal gait measured by the GPS, after perturbation. Studies have indicated that these joints are the ones with the most variations in segmental coordination in periods of gait instability (Hafer and Boyer 2018; Qiao, Feld, and Franz 2018; Boyer et al. 2017). Moreover, the motor variation of these joints is more considerable in the presence of FOF (Roos and Dingwell 2010; Chiu and Chou 2013) and intensified by the need for an organization to an unexpected perturbation or obstacle during walking (Roos and Dingwell 2010).

Because of that, the strategy to reduce the spatiotemporal parameters of gait is an attempt to promote greater time adjustment, in the dynamic segmental coordination, promoting caution, when going through the disturbing factor. In situations where older adults need to maintain a gait pattern and ensure attention to a stimulus, they end up prioritizing the maintenance of a "cautious" gait pattern in order to reduce the risk of falling (Janouch et al. 2018). It is known that in older adults with fall-risk, gait adaptability in situations that demand attention and adjustment is weakened, and the lack of adaptability increases the risk of falling (Caetano et al. 2018), seek in "caution", to reduce them with a slower gait when approaching targets or obstacles to locomotion (Caetano et al. 2018). However, in the presence of FOF, the adjustments in gait pattern predispose an increase in the risk of falling and do not have the expected protective effect (Ayoubi et al. 2015; Janouch et al. 2018; Marques et al. 2018), worsening the quality of gait.

FOF produces anxiety in an attempt to predict the effects of a threatening stimuli that can compromise a task, leading to a memory block of usual motor tasks (Young and Mark Williams 2015; Souza et al. 2015), causing them to adopt a more energetic dynamic posture to try to avoid the loss of balance during threatening situations (Asai et al. 2017; Kim et al. 2016). However, this changes compromise performance in dynamic and demanding functional tasks such as walking, leading to the inadequate acquisition of sensory information necessary to plan and execute postural adjustments in these threatening situations (Young and Mark Williams 2015). When a target is given or alerted to a stimulus evoking FOF, the older person attempts to focus on the target visually, but when close to it, tends to look away from the target, resulting in worse accuracy to hit the target (Young, Wing, and Hollands 2012). In the anticipated state that the anxiety generated by the FOF promotes, it increases the risk of falling because it produces a step and an inaccurate displacement (Young and Mark Williams 2015; Souza et al. 2015).

Our findings on the influence of confounders on the interpretation of the effects obtained by the exposition to the disturbing factor highlighted that only the muscular strength of large muscle groups acting on the large joints such as hip and knee presented interferences. This relationship was only observed in those who fell and did not fall with low FOF, corroborating that there is no association between muscle strength and FOF (Toebes et al. 2015). However, exposure to a perturbation of fall showed that the needs of gait adjustments is not conditioned to muscle strength. Thus, we pointed out that the FOF contributes more than fall-history, cognitive level and muscle strength, on the modifications of walking parameters after exposure to a fear agent. Our findings agree with another investigation (Weijer et al. 2018) showing that fall-risk increases only when there are high FOF and poor gait quality.

In the past, the combination of motor skills, motivation, and trust was the most important concept of self-efficacy (Bandura 1982, 1977). The subject needs to overcome the FOF in challenging situations, promoting adjustment skills, but also believing that he or she can cope with them (Tinetti and Powell 1993; Tinetti, Richman, and Powell 1990). It is reasonable to hypothesize that interventions to fall-prevention need to incorporate conditions beyond what is observed in the musculoskeletal system and its functions. The complexity of this is what should move future research addressing the relationship between structure/function of the body and psychological factors.

The findings of this study should also be regarded with some limitations. First, this study was limited by its small sample size, although we followed the values indicated in the sample calculation and considered the homogeneity of demographic variables in the study of aging. A second limitation is that this study was restricted to a group of elderly women, and the findings may differ from elderly men. What is emphasized here is that in the future more external relations may be incorporated in studies of the motor modifications of the elderly population, and thus contributing to prevention and reduction of the risk of falling, with a greater understanding of its complexity and better interpretation for the clinical practice.

6. FUNDING

"This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001”

7. AUTHOR CONTRIBUTIONS

GB: Analysis and interpretation of the data, study concept, wrote the manuscript. DR, AC, TL: Analysis of data, critical revision of the manuscript for important intellectual content. FG, RM: Study concept and design, study supervision, critical revisions of the manuscript for important intellectual content.

8. CONFLICT OF INTEREST STATEMENT

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

9. ACKNOWLEDGMENTS

We acknowledge and thank the support of the researchers from the Dr. Cláudio de Almeida Borges Movement Laboratory of the State University of Goiás.

10. SUPPLEMENTARY MATERIAL

10.1. Supplement A – Figures and statistics of intergroup comparisons

10.2. Supplement B – Correlations of confounders, spatiotemporal parameters, and GPS / GVS.

11. REFERENCES

Aday, Lu Ann, and Llewellyn J Cornelius. 2006. *Designing and Conducting Health Surveys: A Comprehensive Guide*. 3ª. San Francisco: Jossey-Bass.

Allali, Gilles, Emmeline I Ayers, Roee Holtzer, and Joe Verghese. 2017. "The Role of Postural Instability / Gait Difficulty and Fear of Falling in Predicting Falls in Non-Demented Older Adults." *Archives of Gerontology and Geriatrics* 69. Elsevier Ireland Ltd: 15–20. https://doi.org/10.1016/j.archger.2016.09.008.

Asai, Tsuyoshi, Shogo Misu, Ryuichi Sawa, Takehiko Doi, and Minoru Yamada. 2017. "The Association between Fear of Falling and Smoothness of Lower Trunk Oscillation in Gait Varies According to Gait Speed in Community-Dwelling Older Adults." *Journal of NeuroEngineering and Rehabilitation* 14 (5). Journal of NeuroEngineering and Rehabilitation: 1–9. https://doi.org/10.1186/s12984-016-0211-0.

Austin, Gary P, Gladys E Garrett, and Richard W Bohannon. 1999. "Kinematic Analysis of Obstacle Clearance during Locomotion." *Gait and Posture* 10: 109–20.

Avin, K. G., T. A. Hanke, N. Kirk-Sanchez, C. M. McDonough, T. E. Shubert, J. Hardage, and G. Hartley. 2015. "Management of Falls in Community-Dwelling Older Adults: Clinical Guidance Statement From the Academy of Geriatric Physical Therapy of the American Physical Therapy Association." *Physical Therapy* 95 (6): 815–34. https://doi.org/10.2522/ptj.20140415.

Ayoubi, Farah, Cyrille P Launay, Cédric Annweiler, and Olivier Beauchet. 2015. "Fear of Falling and Gait Variability in Older Adults: A Systematic Review and Meta-Analysis." *Journal of the American Medical Directors Association* 16 (1). Elsevier: 14–19. https://doi.org/10.1016/j.jamda.2014.06.020.

Baker, Richard, Jennifer L Mcginley, Michael H Schwartz, Sarah Beynon, Adam Rozumalski, H Kerr Graham, and Oren Tirosh. 2009. "The Gait Profile Score and Movement Analysis Profile." *Gait & Posture* 30: 265–69. https://doi.org/10.1016/j.gaitpost.2009.05.020.

Baker, Richard, Jennifer L Mcginley, Mike Schwartz, Pam Thomason, Jill Rodda, and H Kerr Graham. 2012. "The Minimal Clinically Important Difference for the Gait Profile Score." *Gait & Posture* 35 (4). Elsevier B.V.: 612–15.

https://doi.org/10.1016/j.gaitpost.2011.12.008.
Bandura, Albert. 1977. “Self-Efficacy : Toward a Unifying Theory of Behavioral Change.” *Psychological Review* 84 (2): 191–215.
———. 1982. “The Assessment and Predictive Generality of Self-Percepts of Efficacy.” *Journal of Behavior Therapy and Experimental Psychiatry* 13 (3): 195–99.
Boyer, Katherine A, Russell T Johnson, Jacob J Banks, Carl Jewell, and Jocelyn F Hafer. 2017. “Systematic Review and Meta-Analysis of Gait Mechanics in Young and Older Adults.” *Experimental Gerontology* 95. Elsevier Inc.: 63–70. https://doi.org/10.1016/j.exger.2017.05.005.
Brucki, Sonia M D, Ricardo Nitrin, Paulo Caramelli, Paulo H F Bertolucci, and Ivan H. Okamoto. 2003. “Suggestions for Utilization of the Mini-Mental State Examination in Brazil.” *Arquivos de Neuro-Psiquiatria* 61 (3 B): 777–81. https://doi.org/10.1590/S0004-282X2003000500014.
Caetano, Maria Joana D, Stephen R Lord, Matthew A Brodie, Daniel Schoene, Paulo H S Pelicioni, Daina L Sturnieks, and Jasmine C Menant. 2018. “Executive Functioning , Concern about Falling and Quadriceps Strength Mediate the Relationship between Impaired Gait Adaptability and Fall Risk in Older People.” *Gait & Posture* 59. Elsevier: 188–92. https://doi.org/10.1016/j.gaitpost.2017.10.017.
Caetano, Maria Joana D, Stephen R Lord, Daniel Schoene, Paulo H S Pelicioni, Daina L Sturnieks, and Jasmine C Menant. 2016. “Age-Related Changes in Gait Adaptability in Response to Unpredictable Obstacles and Stepping Targets.” *Gait & Posture* 46. Elsevier B.V.: 35–41. https://doi.org/10.1016/j.gaitpost.2016.02.003.
Callisaya, Michele. L, Leigh Blizzard, Michael D Schmidt, Martin Kara L, Jennifer L Mcginley, Lauren M Sanders, and Velandai K Srikanth. 2011. “Gait , Gait Variability and the Risk of Multiple Incident Falls in Older People : A Population-Based Study.” *Age and Ageing* 40: 481–87. https://doi.org/10.1093/ageing/afr055.
Camargos, Flávia F O, Rosangela C Dias, João M D Dias, and Maria T F Freire. 2010. “Cross-Cultural Adaptation and Evaluation of the Psychometric Properties of the Falls Efficacy Scale – International Among Elderly Brazilians (FES-I-BRAZIL).” *Revista Brasileira de Fisioterapia* 14 (June): 237–43.
Chang, Hsiao-ting, Hsi-chung Chen, and Pesus Chou. 2017. “Fear of Falling and Mortality among Community-Dwelling Older Adults in the Shih-Pai Study in Taiwan : A Longitudinal Follow-up Study.” *Geriatrics and Gerontology International*, 1–8. https://doi.org/10.1111/ggi.12968.
Chiu, Shiu-ling, and Li-shan Chou. 2013. “Variability in Inter-Joint Coordination during Walking of Elderly Adults and Its Association with Clinical Balance Measures.” *Clinical Biomechanics* 28 (4). Elsevier Ltd: 454–58. https://doi.org/10.1016/j.clinbiomech.2013.03.001.
Cho, Jinmyoung, Matthew Lee Smith, Tiffany E Shubert, Luohua Jiang, Sangnam Ahn, and Marcia G Ory. 2015. “Gait Speed among Older Participants Enrolled in an Evidence-Based Fall Risk Reduction Program: A Subgroup Analysis.” *Frontiers in Public Health* 3 (April): 1–7. https://doi.org/10.3389/fpubh.2015.00026.
Commandeur, D, M D Klimstra, S Macdonald, K Inouye, M Cox, D Chan, and S R Hundiza. 2018. “Difference Scores between Single-Task and Dual-Task Gait

Measures Are Better than Clinical Measures for Detection of Fall-Risk in Community-Dwelling Older Adults." *Gait & Posture* 66. Elsevier: 155–59. https://doi.org/10.1016/j.gaitpost.2018.08.020.

Faul, Franz, Edgar Erdfelder, Axel Buchner, and Albert-Georg Lang. 2009. "Statistical Power Analyses Using G*Power 3.1: Tests for Correlation and Regression Analyses." *Behavior Research Methods* 41 (4): 1149–60. https://doi.org/10.3758/BRM.41.4.1149.

Folstein, Marshal F., Susan E. Folstein, and Paul R. McHugh. 1975. "'Mini-Mental State'. A Practical Method for Grading the Cognitive State of Patients for the Clinician." *Journal of Psychiatric Research* 12 (3): 189–98. https://doi.org/10.1016/0022-3956(75)90026-6.

Gazibara, Tatjana, Ilma Kurtagic, Darija Kisic-tepavcevic, and Selmina Nurkovic. 2017. "Falls , Risk Factors and Fear of Falling among Persons Older than 65 Years of Age." *PSYCHOGERIATRICS*, 1–9. https://doi.org/10.1111/psyg.12217.

Gervásio, Flávia Martins, Guilherme Augusto Santos, Darlan Martins Ribeiro, and Ruth Losada de Menezes. 2016. "Falls Risk Detection Based on Spatiotemporal Parameters of Three-Dimensional Gait Analysis in Healthy Adult Women from 50 to 70 Years Old." *Fisioterapia e Pesquisa* 23 (4): 358–64. https://doi.org/10.1590/1809-2950/15661923042016.

Gibson, James J. 1979. *The Ecological Approach to Visual Perception*. Houghton M. Michigan.

———. 2015. *THE ECOLOGICAL APPROACH TO VISUAL Classic Edition*. Classic Ed. New York: Psychology Press.

Gomez, Fernando, Yan Yan, Wu Ma, Mohammad Auais Pt, Afshin Vafaei, and Maria-victoria Zunzunegui. 2017. "A Simple Algorithm to Predict Falls in Primary Care Patients Aged 65 to 74 Years : The International Mobility in Aging Study." *Journal of the American Medical Directors Association* 18 (9). Elsevier Inc.: 774–79. https://doi.org/10.1016/j.jamda.2017.03.021.

Grenier, Sébastien, Stéphane Richard-devantoy, Alexandra Nadeau, Marie-christine Payette, Fethia Benyebdri, Marie-michelle B Duhaime, Bruno Gunther, and Olivier Beauchet. 2018. "The Association between Fear of Falling and Motor Imagery Abilities in Older Community-Dwelling Individuals." *Maturitas* 110 (December 2017). Elsevier: 18–20. https://doi.org/10.1016/j.maturitas.2018.01.001.

Hadjistavropoulos, Thomas, Kim Delbaere, and Theresa Dever Fitzgerald. 2011. "Reconceptualizing the Role of Fear of Falling and Balance Confidence in Fall Risk." *Journal of Aging and Health* 23 (1): 3–23. https://doi.org/10.1177/0898264310378039.

Hafer, Jocelyn F, and Katherine A Boyer. 2018. "Age Related Differences in Segment Coordination and Its Variability during Gait." *Gait & Posture* 62 (July 2017). Elsevier: 92–98. https://doi.org/10.1016/j.gaitpost.2018.02.021.

Herssens, Nolan, Evi Verbecque, Ann Hallemans, Luc Vereeck, Vincent Van Rompaey, and Wim Saeys. 2018. "Do Spatiotemporal Parameters and Gait Variability Di Ff Er across the Lifespan of Healthy Adults? A Systematic Review." *Gait & Posture* 64 (November 2017). Elsevier: 181–90. https://doi.org/10.1016/j.gaitpost.2018.06.012.

Hoang, Oanh Tran Thi, Pornchai Jullamate, Naiyana Piphatvanitcha, and Edwin Rosenberg. 2016. "Factors Related to Fear of Falling among Community-Dwelling Older Adults." *Journal of Clinical Nursing* 26: 68–76.

https://doi.org/10.1111/jocn.13337.
Huijben, B, K S Van Schooten, J H Van Dieën, and M Pijnappels. 2018. “The Effect of Walking Speed on Quality of Gait in Older Adults.” *Gait & Posture* 65 (July 2017). Elsevier: 112–16. https://doi.org/10.1016/j.gaitpost.2018.07.004.
Ihlen, Espen A F, Olav Sletvold, Tobias Goihl, Per B Wik, and Beatrix Vereijken. 2012. “Older Adults Have Unstable Gait Kinematics during Weight Transfer.” *Journal of Biomechanics* 45 (9). Elsevier: 1559–65. https://doi.org/10.1016/j.jbiomech.2012.04.021.
Janouch, Christin, Uwe Drescher, Konstantin Wechsler, Mathias Haeger, Otmar Bock, and Claudia Voelcker-rehage. 2018. “Cognitive — Motor Interference in an Ecologically Valid Street Crossing Scenario.” *Frontiers in Psychology* 9 (May): 1–12. https://doi.org/10.3389/fpsyg.2018.00602.
Jefferis, Barbara J, Steve Iliffe, Denise Kendrick, Ngaire Kerse, Stewart Trost, Lucy T Lennon, Sarah Ash, et al. 2014. “How Are Falls and Fear of Falling Associated with Objectively Measured Physical Activity in a Cohort of Community-Dwelling Older Men ?” *BMC Geriatrics* 14 (114): 1–9.
Kannus, Pekka, Seppo Niemi, Harri Sievänen, and Jari Parkkari. 2018. “Declining Incidence in Fall-Induced Deaths of Older Adults : Finnish Statistics during 1971 – 2015.” *Aging Clinical and Experimental Research* 30 (9). Springer International Publishing: 1111–15. https://doi.org/10.1007/s40520-018-0898-9.
Kendall, Florence Peterson, Elizabeth Kendall McCreary, Patricia Geise Provance, Mary McIntyre Rodgers, and William Anthony Romani. 2007. *Muscles Tests and Funcions with Posture and Pain*. Barueri: Manole.
Khow, Kareeann S F, and Renuka Visvanathan. 2017. “Falls in the Aging Population.” *Clinics in Geriatric Medicine* 33 (3). Elsevier Inc: 357–68. https://doi.org/10.1016/j.cger.2017.03.002.
Kim, Myung, Seung-kil Lim, Sohee Shin, and Jae-hyun Lee. 2016. “The Effects of Objectively Measured Physical Activity and Fitness on Fear of Falling among Korean Older Women.” *Journal of Exercise Rehabilitation* 12 (5): 489–93.
Kirkwood, Renata Noce, Bruno de Souza Moreira, Márcia L. D. C. Vallone, Sueli Aparecida Mingoti, Rosângela Corrêa Dias, and Rosana Ferreira Sampaio. 2011. “Step Length Appears to Be a Strong Discriminant Gait Parameter for Elderly Females Highly Concerned about Falls : A Cross-Sectional Observational Study.” *Physiotherapy* 97 (2). The Chartered Society of Physiotherapy: 126–31. https://doi.org/10.1016/j.physio.2010.08.007.
Kobayashi, Yoshiyuki, Hiroaki Hobara, Shiho Matsushita, and Masaaki Mochimaru. 2014. “Key Joint Kinematic Characteristics of the Gait of Fallers Identi Fi Ed by Principal Component Analysis $.” *Journal of Biomechanics* 47 (10). Elsevier: 2424–29. https://doi.org/10.1016/j.jbiomech.2014.04.011.
Kyrdalen, Ingebjørg Lavrantsdatter, and Heidi Ormstad. 2018. “Associations between Gait Speed and Well - Known Fall Risk Factors among Community - Dwelling Older Adults.” *Physicaltherapy Research International*, 1–6. https://doi.org/10.1002/pri.1743.
Lamb, Sarah E, Ã C J Ellen, and Ã Klaus Hauer. 2005. “Development of a Common Outcome Data Set for Fall Injury Prevention Trials: The Prevention of Falls Network Europe Consensus.” *Jornal American Geriatrics Society* 53 (9): 1618–22. https://doi.org/10.1111/j.1532-5415.2005.53455.x.
Landers, Merrill R., Sarrie Oscar, Jessica Sasaoka, and Kyle Vaughn. 2015. “Balance Confidence and Fear of Falling Avoidance Behavior Are Most

Predictive of Falling in Older Adults: Prospective Analysis." *Physical Therapy*, 1–9. https://doi.org/10.2522/ptj.20150184.
Lim, Eunju. 2016. "Original Article Sex Differences in Fear of Falling among Older Adults with Low Grip Strength." *Iram Journal Public Health* 45 (5): 569–77.
Macaulay, Rk, Td Allaire, R M Brouillette, H C Foii, Aj Bruce-Keller, H M Han, Wd Johnson, and Jn Keller. 2015. "Longitudinal Assessment of Neuropsychological and Temporal/Spatial Gait Characteristics of Elderly Fallers: Taking It All in Stride." *Front. Aging Neurosci.* 7. https://doi.org/10.3389/fnagi.2015.00034.
Makris, Stergios, Aviad A Hadar, and Kielan Yarrow. 2011. "Viewing Objects and Planning Actions : On the Potentiation of Grasping Behaviours by Visual Objects." *Brain and Cognition* 77 (2). Elsevier Inc.: 257–64. https://doi.org/10.1016/j.bandc.2011.08.002.
Marques, Nise Ribeiro, Deborah Hebling Spinoso, Bruna Carvalho Cardoso, Vinicius Christianini, Marina Hiromi, and Marcelo Tavella. 2018. "Is It Possible to Predict Falls in Older Adults Using Gait Kinematics ?" *Clinical Biomechanics* 59. Elsevier: 15–18. https://doi.org/10.1016/j.clinbiomech.2018.08.006.
McCrum, Christopher, Marissa H.G. Gerards, Kiros Karamanidis, Wiebren Zijlstra, and Kenneth Meijer. 2017. "A Systematic Review of Gait Perturbation Paradigms for Improving Reactive Stepping Responses and Falls Risk among Healthy Older Adults." *European Review of Aging and Physical Activity* 14 (1). European Review of Aging and Physical Activity: 1–11. https://doi.org/10.1186/s11556-017-0173-7.
Menant, Jasmine C, Julie R Steele, Hylton B Menz, Bridget J Munro, and Stephen R Lord. 2009. "Effects of Walking Surfaces and Footwear on Temporo-Spatial Gait Parameters in Young and Older People." *Gait & Posture* 29: 392–97. https://doi.org/10.1016/j.gaitpost.2008.10.057.
Moreira, Bruno De Souza, Rosana Ferreira Sampaio, Juliano Bergamas-, Mata Diz, Alessandra De Carvalho Bastone, Eduardo Ferriolli, Liberalesso Neri, Roberto Alves Lourenc, and Noce Kirkwood. 2017. "Factors Associated with Fear of Falling in Community-Dwelling Older Adults with and without Diabetes Mellitus: Findings from the Frailty in Brazilian Older People Study (FIBRA-BR)." *Experimental Gerontology*. Elsevier Inc. https://doi.org/10.1016/j.exger.2017.01.004.
Moreira, Natália Boneti, Adre Luiz Feliz Rodacki, Gléber Pereira, and Paulo Cesar Barauce Bento. 2018. "Does Functional Capacity, Fall Risk Awareness and Physical Activity Level Predict Falls in Older Adults in Different Age Groups?" *Archives of Gerontology and Geriatrics* 77. Elsevier: 57–63. https://doi.org/10.1016/j.archger.2018.04.002.
Peeters, Geeske, Siobhan Leahy, Sean Kennelly, and Rose Anne Kenny. 2018. "Is Fear of Falling Associated With Decline in Global Cognitive Functioning in Older Adults : Findings From the Irish Longitudinal Study on Ageing." *Journal of the American Medical Directors Association* 19 (3). Elsevier Inc.: 248–254.e3. https://doi.org/10.1016/j.jamda.2017.09.012.
Piva, Sara R, Edward A Goodnite, and John D Childs. 2005. "Strength Around the Hip and Flexibility of Soft Tissues in Individuals With and Without Patellofemoral Pain Syndrome." *Journal of Orthopaedic & Sports Physical Therapy* 35 (12): 793–801.
Qiao, Mu, Jody A Feld, and Jason R Franz. 2018. "Aging e Ff Ects on Leg Joint Variability during Walking with Balance Perturbations." *Gait & Posture* 62 (June

2017). Elsevier: 27–33. https://doi.org/10.1016/j.gaitpost.2018.02.020.
Ribeiro, Darlan Martins, Guilherme Augusto Santos Bueno, Flavia Martins Gervásio, and Ruth Losada De Menezes. 2019. “Foot-Ground Clearance Characteristics in Women: A Comparison across Different Ages.” *Gait and Posture* 69 (May 2018). Elsevier: 121–25. https://doi.org/S0966636218304831.
Roos, Paulien E, and Jonathan B Dingwell. 2010. “Influence of Simulated Neuromuscular Noise on Movement Variability and Fall Risk in a 3D Dynamic Walking Model.” *Journal of Biomechanics* 43 (15). Elsevier: 2929–35. https://doi.org/10.1016/j.jbiomech.2010.07.008.
Sawa, Ryuichi, Takehiko Doi, Shogo Misu, Kota Tsutsumimoto, Sho Nakakubo, Tsuyoshi Asai, Minoru Yamada, and Rei Ono. 2014. “The Association between Fear of Falling and Gait Variability in Both Leg and Trunk Movements.” *Gait and Posture* 40 (1). Elsevier B.V.: 123–27. https://doi.org/10.1016/j.gaitpost.2014.03.002.
Schulz, Brian W. 2011. “Minimum Toe Clearance Adaptations to Floor Surface Irregularity and Gait Speed.” *Journal of Biomechanics* 44 (7). Elsevier: 1277–84. https://doi.org/10.1016/j.jbiomech.2011.02.010.
Schulz, Kenneth F, Douglas G Altman, David Moher, and Consort Group. 2010. “CONSORT 2010 Statement: Updated Guidelines for Reporting Parallel Group Randomised Trials.” *Research Methods & Reporting* 340 (march). https://doi.org/10.1136/bmj.c332.
Souza, Nélio Silva De, Ana Carolina, Gomes Martins, Dângelo J A Alexandre, Marco Orsini, Victor Hugo, Marco Antônio A Leite, et al. 2015. “The Influence of Fear of Falling on Orthostatic Postural Control : A Systematic Review.” *Neurology International* 7 (6057): 62–65. https://doi.org/10.4081/ni.2015.6057.
Studenski, S, S Pereira, K Patel, and C Rosano. 2011. “Gait Speed and Survival in Older Adults.” *JAMA* 305 (1): 50–58.
Symes, Ed, Rob Ellis, and Mike Tucker. 2007. “Visual Object Affordances: Object Orientation.” *Acta Psychologica* 124 (2): 238–55. https://doi.org/10.1016/j.actpsy.2006.03.005.
Tinetti, Mary E, and Lynda Powell. 1993. “Fear of Falling and Low Self-Efficacy : A Cause of Dependence in Elderly Persons.” *The Journal of Gerontology* 48 (Special Issue): 35–38.
Tinetti, Mary E, Donna Richman, and Lynda Powell. 1990. “Falls Efficacy as a Measure of Fear of Falling.” *Journal of Gerontology* 45 (6): 239–43.
Toebes, Marcel J P, Marco J M Hoozemans, Regula Furrer, and Joost Dekker. 2015. “Associations between Measures of Gait Stability , Leg Strength and Fear of Falling.” *Gait & Posture* 41: 76–80. https://doi.org/10.1016/j.gaitpost.2014.08.015.
Vellas, Bruno J, Sharon J Wayne, Linda J Romero, Richard N Baumgartner, and Phiupj Garry. 1997. “Fear of Falling and Restriction of Mobility in Elderly Fallers.” *Age and Ageing* 26: 189–93.
Weijer, R H A, M J M Hoozemans, J H Van Dieën, and M Pijnappels. 2018. “Self-Perceived Gait Stability Modulates the Effect of Daily Life Gait Quality on Prospective Falls in Older Adults.” *Gait & Posture* 62. Elsevier: 475–79. https://doi.org/10.1016/j.gaitpost.2018.04.002.
Whipple, Mary O, Aimee V Hamel, and Kristine M C Talley. 2018. “Fear of Falling among Community-Dwelling Older Adults : A Scoping Review to Identify Effective Evidence-Based Interventions.” *Geriatric Nursing* 39 (2). Elsevier Inc.:

170–77. https://doi.org/10.1016/j.gerinurse.2017.08.005.
WHO, World Health Organization. 1995. "Physical Status: The Use of and Interpretation of Anthropometry." In *WHO Expert Committee*, 463. Geneva: WHO Library Cataloguing in Publication Data.
Wit, Matthieu M. de, Simon de Vries, John van der Kamp, and Rob Withagen. 2017. "Affordances and Neuroscience: Steps towards a Successful Marriage." *Neuroscience and Biobehavioral Reviews* 80 (February): 622–29. https://doi.org/10.1016/j.neubiorev.2017.07.008.
World Medical Association. 2013. "World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects." *Journal of the American Medical Association* 310 (20): 2013–16.
Young, William R., and A. Mark Williams. 2015. "How Fear of Falling Can Increase Fall-Risk in Older Adults: Applying Psychological Theory to Practical Observations." *Gait & Posture* 41 (1). Elsevier B.V.: 7–12. https://doi.org/10.1016/j.gaitpost.2014.09.006.
Young, William R, Alan M Wing, and Mark A Hollands. 2012. "Influences of State Anxiety on Gaze Behavior and Stepping Accuracy in Older Adults During Adaptive Locomotion." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 67: 43–51. https://doi.org/10.1093/geronb/gbr074.

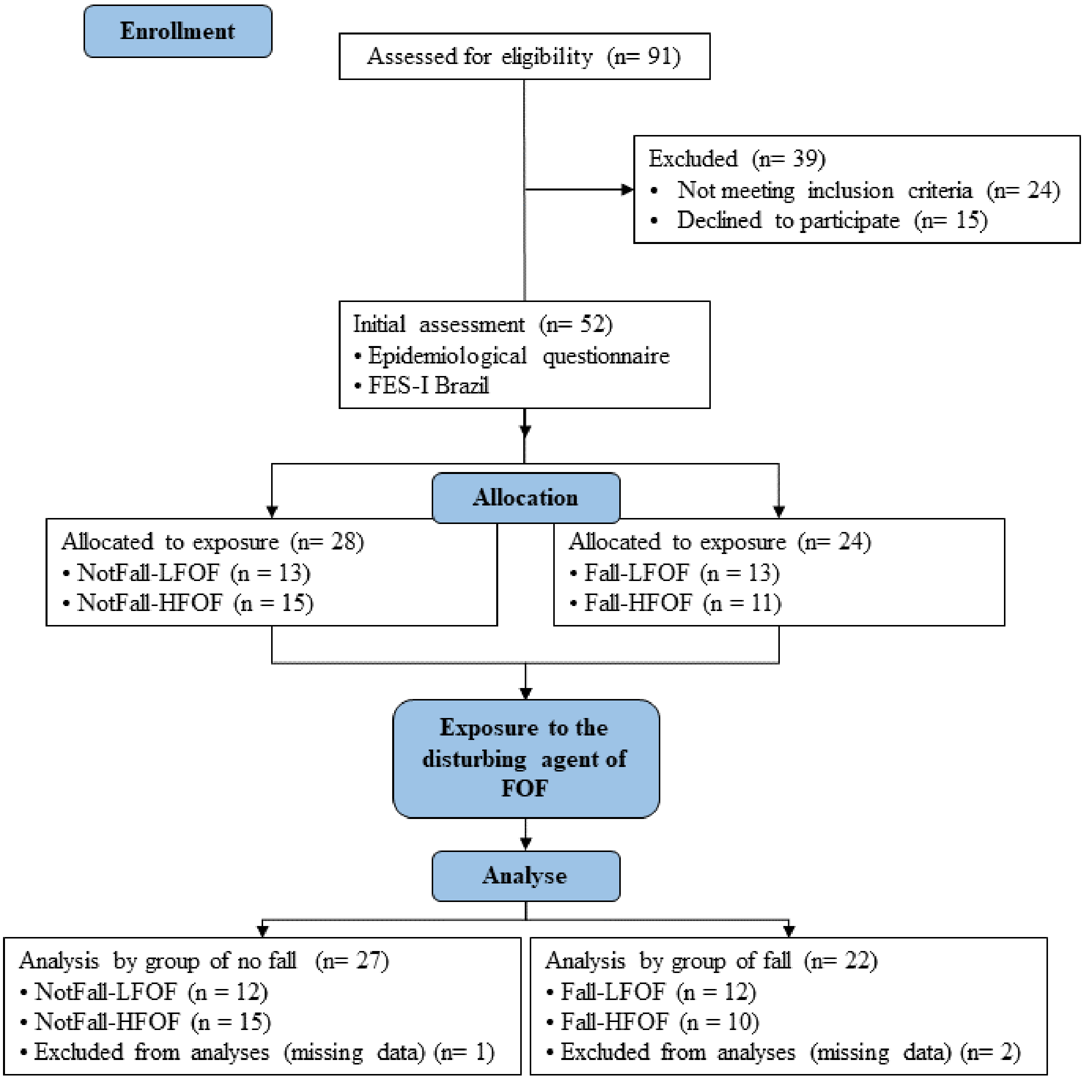


Figure 1 - Study flowchart

Table 1 - Descriptive and comparative data between NonFall-LFOF, NonFall-HFOF, Fall-LFOF and Fall-HFOF groups.

						95% Confidence Interval				*PAIRED COMPARISON*					
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	F	*p* (ω)	*A/B (r)*	*A/C (r)*	*A/D (r)*	*B/C (r)*	*B/D (r)*	*C/D (r)*
Age (years)	NonFall -LFOF	12	72.50	6.04	1.74	68.66	76.34	0.411	0.746 (-0.04)	-	-	-	-	-	-
	NonFall -HFOF	15	72.67	7.59	1.96	68.46	76.87								
	Fall -LFOF	12	70.83	5.59	1.61	67.28	74.38								
	Fall -HFOF	10	73.90	6.56	2.07	69.21	78.59								
	Total	49	72.43	6.44	0.92	70.58	74.28								
Weight (Kg)	NonFall -LFOF	12	61.61	6.37	1.84	57.56	65.66	0.694	0.560 (-0.02)	-	-	-	-	-	-
	NonFall -HFOF	15	58.05	10.03	2.59	52.50	63.61								
	Fall -LFOF	12	60.53	8.73	2.52	54.98	66.07								
	Fall -HFOF	10	63.27	11.62	3.67	54.96	71.58								
	Total	49	60.59	9.23	1.32	57.94	63.24								
Height (meters)	NonFall -LFOF	12	1.55	0.05	0.01	1.52	1.59	0.662	0.580 (-0.02)	-	-	-	-	-	-
	NonFall -HFOF	15	1.54	0.05	0.01	1.51	1.56								
	Fall -LFOF	12	1.56	0.08	0.02	1.51	1.60								
	Fall -HFOF	10	1.53	0.06	0.02	1.48	1.57								
	Total	49	1.54	0.06	0.01	1.53	1.56								
BMI (kg/m²)	NonFall -LFOF	12	25.57	2.65	0.77	23.88	27.25	1.006	0.399 (0.00)	-	-	-	-	-	-
	NonFall -HFOF	15	24.67	4.53	1.17	22.16	27.18								
	Fall -LFOF	12	24.91	2.34	0.67	23.42	26.39								
	Fall -HFOF	10	27.04	3.97	1.25	24.20	29.88								
	Total	49	25.43	3.55	0.51	24.41	26.45								
Mine mental (score)	NonFall -LFOF	12	26.50	3.15	0.91	24.50	28.50	1.736	0.173 (0.04)	-	-	-	-	-	-
	NonFall -HFOF	15	26.93	2.49	0.64	25.55	28.31								
	Fall -LFOF	12	25.00	3.19	0.92	22.97	27.03								
	Fall -HFOF	10	27.70	2.87	0.91	25.65	29.75								
	Total	49	26.51	2.98	0.43	25.65	27.37								
FES-I (score)	NonFall -LFOF	12	22.33	3.87	1.12	19.88	24.79	21.810	<0.001 (0.56)	<0.001 (0.77)	0.972 (0.11)	<0.001 (0.77)	<0.001 (0.75)	0.701 (0.19)	<0.001 (0.75)
	NonFall -HFOF	15	34.27	5.87	1.52	31.01	37.52								
	Fall -LFOF	12	23.17	3.74	1.08	20.79	25.54								
	Fall -HFOF	10	32.20	4.49	1.42	28.99	35.41								
	Total	49	28.20	7.09	1.01	26.17	30.24								

Note: A -NonFall-LFOF; B-NonFall-HFOF; C-Fall-LFOF; D-Fall-HFOF. Comparative analysis performed by ANOVA one way, considering the F ratio, effect size (ω) and significance of α≤0.05. Post Tukey post hoc analysis, considering effect size (r) and significance of α≤0.05.

Table 2 - Comparison of the spatiotemporal parameters between pre and post fictional disturbing factor for each of NonFall-LFOF and NonFall- groups.

		NonFall-LFOF							**NonFall-HFOF**						
		Mean	N	Std. Deviation	Std. Error Mean	t	r	p	Mean	N	Std. Deviation	Std. Error Mean	t	r	p
Cadence (steps/min)	Not Exposed	110.62	12	7.83	2.26	1.95	0.50	0.077	107.24	15	12.30	3.18	1.46	0.36	0.167
	Exposed	104.19	12	11.99	3.46				104.64	15	14.52	3.75			
Stride Time (s)	Not Exposed	1.09	12	0.08	0.02	-1.90	0.50	0.084	1.14	15	0.14	0.03	-2.13	0.49	0.051
	Exposed	1.19	12	0.19	0.06				1.18	15	0.17	0.04			
Opposite Foot Off (%)	Not Exposed	9.60	12	1.83	0.53	-3.87	0.76	0.003	10.97	15	2.92	0.75	-2.26	0.55	0.026
	Exposed	11.81	12	2.26	0.65				14.40	15	6.46	1.67			
Opposite Foot Contact (%)	Not Exposed	50.21	12	0.73	0.21	0.33	0.10	0.745	50.11	15	0.67	0.17	-1.21	0.31	0.244
	Exposed	49.94	12	3.15	0.91				50.98	15	2.55	0.66			
StepTime (s)	Not Exposed	0.54	12	0.04	0.01	-1.60	0.44	0.137	0.57	15	0.07	0.02	-1.07	0.28	0.301
	Exposed	0.61	12	0.15	0.04				0.58	15	0.09	0.02			
Single Support (s)	Not Exposed	0.44	12	0.02	0.01	-0.46	0.14	0.657	0.44	15	0.04	0.01	0.45	0.12	0.663
	Exposed	0.46	12	0.10	0.03				0.43	15	0.07	0.02			
Double Support (s)	Not Exposed	0.22	12	0.04	0.01	-2.20	0.55	0.050	0.27	15	0.09	0.02	-2.47	0.55	0.027
	Exposed	0.32	12	0.14	0.04				0.35	15	0.18	0.05			
Foot off (%)	Not Exposed	61.07	12	1.80	0.52	-2.32	0.57	0.041	62.38	15	3.02	0.78	-2.09	0.51	0.048
	Exposed	63.16	12	2.82	0.81				64.44	15	4.91	1.27			
Stride Length (m)	Not Exposed	1.14	12	0.09	0.03	3.05	0.68	0.011	0.97	15	0.19	0.05	3.39	0.67	0.004
	Exposed	1.02	12	0.13	0.04				0.84	15	0.27	0.07			
Step Length (m)	Not Exposed	0.57	12	0.05	0.01	1.54	0.42	0.153	0.48	15	0.09	0.02	2.25	0.52	0.041
	Exposed	0.53	12	0.09	0.03				0.43	15	0.15	0.04			
Walking Speed (m/s)	Not Exposed	1.05	12	0.14	0.04	3.295	0.70	0.007	0.87	15	0.22	0.06	3.83	0.72	0.002
	Exposed	0.88	12	0.17	0.05				0.74	15	0.29	0.08			

Note: Comparative analysis performed by paired t-test, considering the equation, effect size (r) and significance of α≤0.05.

Table 3 - Comparison of the spatiotemporal parameters between pre and post fictional disturbing factor for each of Fall-LFOF and Fall-HFOF groups.

		Fall-LFOF							Fall-HFOF						
		Mean	N	Std. Deviation	Std. Error Mean	t	r	p	Mean	N	Std. Deviation	Std. Error Mean	t	r	p
Cadence (steps/min)	Not Exposed	111.61	12	8.51	2.46	0.89	0.26	0.394	110.28	10	10.46	3.31	1.15	0.36	0.280
	Exposed	110.01	12	9.76	2.82				105.73	10	12.93	4.09			
Stride Time (s)	Not Exposed	1.08	12	0.09	0.03	-0.89	0.26	0.394	1.10	10	0.11	0.04	-1.05	0.33	0.322
	Exposed	1.10	12	0.10	0.03				1.16	10	0.18	0.06			
Opposite Foot Off (%)	Not Exposed	9.27	12	2.07	0.60	-1.89	0.49	0.086	10.11	10	1.82	0.58	-1.65	0.48	0.134
	Exposed	10.82	12	2.69	0.78				11.69	10	3.13	0.99			
Opposite Foot Contact (%)	Not Exposed	49.92	12	0.63	0.18	0.54	0.16	0.598	50.07	10	0.67	0.21	-0.74	0.24	0.477
	Exposed	49.70	12	1.43	0.41				50.50	10	1.66	0.53			
StepTime (s)	Not Exposed	0.54	12	0.04	0.01	-1.06	0.30	0.312	0.55	10	0.05	0.02	-1.13	0.35	0.287
	Exposed	0.55	12	0.05	0.01				0.57	10	0.08	0.02			
Single Support (s)	Not Exposed	0.44	12	0.03	0.01	1.03	0.30	0.324	0.43	10	0.03	0.01	-0.48	0.16	0.644
	Exposed	0.43	12	0.05	0.01				0.44	10	0.05	0.02			
Double Support (s)	Not Exposed	0.22	12	0.06	0.02	-1.70	0.46	0.117	0.26	10	0.07	0.02	-1.36	0.41	0.207
	Exposed	0.25	12	0.07	0.02				0.30	10	0.11	0.03			
Foot off (%)	Not Exposed	60.59	12	2.44	0.70	-1.55	0.42	0.149	62.65	10	2.28	0.72	-1.40	0.42	0.195
	Exposed	61.71	12	2.87	0.83				63.69	10	2.65	0.84			
Stride Length (m)	Not Exposed	1.12	12	0.11	0.03	3.09	0.68	0.010	1.04	10	0.07	0.02	3.17	0.73	0.011
	Exposed	1.04	12	0.16	0.05				0.95	10	0.11	0.03			
Step Length (m)	Not Exposed	0.56	12	0.06	0.02	3.46	0.72	0.005	0.52	10	0.04	0.01	2.92	0.70	0.017
	Exposed	0.52	12	0.08	0.02				0.48	10	0.05	0.02			
Walking Speed (m/s)	Not Exposed	1.05	12	0.15	0.04	3.54	0.73	0.005	0.96	10	0.15	0.05	2.70	0.67	0.024
	Exposed	0.95	12	0.18	0.05				0.84	10	0.16	0.05			

Note: Comparative analysis performed by paired t-test, considering the equation, effect size (r) and significance of $\alpha \leq 0.05$.

Table 4 - Comparison of GPS and GVS parameters between pre and post fictional disturbing factor for each of NonFall-LFOF and NonFall-HFOF, groups.

		NonFall-LFOF							NonFall-HFOF						
		Mean	N	Std. Deviation	Std. Error Mean	*t*	*r*	p	Mean	N	Std. Deviation	Std. Error Mean	*t*	*r*	p
GPS (degree)															
Left	Not Exposed	7.22	12	2.01	0.58	-4.49	0.80	0.001	8.52	15	2.41	0.62	-5.21	0.81	<0.001
	Exposed	8.88	12	1.51	0.44				10.49	15	2.48	0.64			
Right	Not Exposed	7.09	12	1.70	0.49	-3.57	0.73	0.004	8.43	15	2.31	0.60	-3.42	0.67	0.004
	Exposed	8.51	12	1.61	0.47				9.95	15	2.49	0.64			
Overall	Not Exposed	7.61	12	1.75	0.51	-4.96	0.83	<0.001	8.93	15	2.35	0.61	-5.07	0.80	<0.001
	Exposed	9.33	12	1.29	0.37				10.89	15	2.44	0.63			
GVS (degree)															
Pelvis ant/post	Not Exposed	3.83	12	3.36	0.97	-0.57	0.17	0.578	6.89	15	5.40	1.40	-0.29	0.08	0.777
	Exposed	4.00	12	3.23	0.93				6.97	15	5.60	1.44			
Left Hip flex/ext	Not Exposed	9.30	12	5.34	1.54	-1.49	0.41	0.164	12.30	15	7.77	2.01	-2.55	0.56	0.023
	Exposed	10.28	12	4.06	1.17				13.71	15	7.71	1.99			
Left Knee flex/ext	Not Exposed	11.97	12	3.26	0.94	-4.03	0.77	0.002	13.03	15	4.70	1.21	-2.37	0.53	0.033
	Exposed	15.80	12	4.66	1.35				15.01	15	6.62	1.71			
Left Ankle dor/plan	Not Exposed	4.88	12	1.58	0.46	-3.78	0.75	0.003	7.28	15	2.16	0.56	-1.21	0.31	0.245
	Exposed	6.64	12	1.31	0.38				7.73	15	2.30	0.59			
Pelvic up/dn	Not Exposed	2.29	12	0.53	0.15	-2.56	0.61	0.027	3.17	15	1.12	0.29	-1.94	0.46	0.073
	Exposed	2.68	12	0.67	0.19				3.56	15	1.27	0.33			
Left Hip add/abd	Not Exposed	5.73	12	2.88	0.83	-0.90	0.26	0.385	5.63	15	2.67	0.69	-3.05	0.63	0.099
	Exposed	6.03	12	3.42	0.99				6.05	15	2.41	0.62			
Pelvic int/ext	Not Exposed	5.41	12	3.11	0.90	-0.68	0.20	0.510	4.86	15	1.30	0.34	-2.69	0.58	0.018
	Exposed	5.69	12	2.19	0.63				5.56	15	1.19	0.31			
Left Hip int/ext	Not Exposed	5.72	12	5.18	1.49	-2.28	0.57	0.044	6.35	15	0.67	0.17	-6.38	0.86	<0.001
	Exposed	10.38	12	3.73	1.08				14.61	15	5.20	1.34			
Left Foot int/ext	Not Exposed	6.33	12	2.43	0.70	-0.48	0.14	0.640	6.75	15	3.43	0.88	-1.32	0.33	0.209
	Exposed	6.69	12	3.13	0.90				7.17	15	3.47	0.90			
Right Hip flex/ext	Not Exposed	8.52	12	4.69	1.35	-0.47	0.14	0.646	11.32	15	5.96	1.54	-1.81	0.44	0.092
	Exposed	8.91	12	4.47	1.29				12.93	15	6.06	1.57			
Right Knee flex/ext	Not Exposed	9.53	12	3.70	1.07	-2.86	0.65	0.016	13.28	15	4.59	1.19	-3.47	0.68	0.004
	Exposed	12.59	12	4.80	1.38				16.38	15	5.06	1.31			
Right Ankle dor/plan	Not Exposed	5.51	12	1.45	0.42	-3.50	0.73	0.005	6.61	15	2.47	0.64	-3.59	0.69	0.003
	Exposed	7.01	12	1.70	0.49				7.90	15	3.04	0.79			
Right Hip add/abd	Not Exposed	5.15	12	2.17	0.63	-3.37	0.71	0.006	6.62	15	2.73	0.70	-1.71	0.42	0.110
	Exposed	6.06	12	2.21	0.64				7.10	15	2.64	0.68			
Right Hip int/ext	Not Exposed	6.57	12	4.67	1.35	-3.06	0.68	0.011	7.97	15	3.35	0.86	-5.00	0.80	<0.001
	Exposed	11.89	12	3.18	0.92				12.18	15	3.42	0.88			
Right Foot int/ext	Not Exposed	8.24	12	4.27	1.23	-0.10	0.03	0.924	6.02	15	2.57	0.66	0.41	0.11	0.687
	Exposed	8.28	12	3.91	1.13				5.85	15	1.70	0.44			

Note: Comparative analysis performed by paired t-test, considering the equation, effect size (r) and significance of α≤0.05.

Table 5 - Comparison of GPS and GVS parameters between pre and post fictional disturbing factor for each of Fall-LFOF and Fall-HFOF, groups.

		Fall-LFOF							Fall-HFOF						
		Mean	N	Std. Deviation	Std. Error Mean	*t*	*r*	p	Mean	N	Std. Deviation	Std. Error Mean	*t*	*r*	p
GPS (degree)															
Left	Not Exposed	7.47	12	1.34	0.39	-3.10	0.68	0.010	8.74	10	1.01	0.32	-1.29	0.40	0.228
	Exposed	8.46	12	1.62	0.47				9.15	10	1.13	0.36			
Right	Not Exposed	7.25	12	1.76	0.51	-2.95	0.66	0.013	8.68	10	1.49	0.47	-1.01	0.32	0.339
	Exposed	8.46	12	2.14	0.62				9.18	10	2.05	0.65			
Overall	Not Exposed	7.84	12	1.30	0.38	-3.42	0.72	0.006	9.31	10	1.07	0.34	-1.43	0.43	0.185
	Exposed	9.07	12	1.65	0.48				9.86	10	1.48	0.47			
GVS (degree)															
Pelvis ant/post	Not Exposed	4.44	12	4.09	1.18	-1.33	0.37	0.210	4.46	10	3.33	1.05	-0.14	0.05	0.890
	Exposed	4.84	12	4.46	1.29				4.54	10	2.93	0.93			
Left Hip flex/ext	Not Exposed	7.93	12	3.50	1.01	-0.90	0.26	0.389	10.62	10	4.01	1.27	-1.28	0.39	0.233
	Exposed	8.48	12	3.63	1.05				11.39	10	3.90	1.23			
Left Knee flex/ext	Not Exposed	12.85	12	3.92	1.13	-1.45	0.40	0.175	13.61	10	3.46	1.10	-2.04	0.56	0.047
	Exposed	14.15	12	4.83	1.39				15.42	10	2.95	0.93			
Left Ankle dor/plan	Not Exposed	5.38	12	1.42	0.41	-2.85	0.65	0.016	6.53	10	2.75	0.87	-1.94	0.54	0.085
	Exposed	6.73	12	2.14	0.62				7.52	10	3.08	0.97			
Pelvic up/dn	Not Exposed	2.66	12	1.32	0.38	0.17	0.05	0.868	3.50	10	2.33	0.74	0.26	0.09	0.800
	Exposed	2.62	12	1.36	0.39				3.35	10	1.80	0.57			
Left Hip add/abd	Not Exposed	4.43	12	2.03	0.59	-5.52	0.846	0.076	5.45	10	1.97	0.62	-4.88	0.85	0.001
	Exposed	5.31	12	2.02	0.58				6.23	10	2.32	0.73			
Pelvic int/ext	Not Exposed	4.55	12	1.98	0.57	-1.68	0.45	0.120	5.09	10	2.40	0.76	0.39	0.13	0.708
	Exposed	5.07	12	1.90	0.55				4.86	10	1.62	0.51			
Left Hip int/ext	Not Exposed	8.68	12	2.27	0.66	-3.63	0.74	0.004	13.66	10	0.13	0.04	0.87	0.28	0.405
	Exposed	11.68	12	3.36	0.97				12.59	10	3.79	1.20			
Left Foot int/ext	Not Exposed	7.26	12	3.09	0.89	2.02	0.52	0.068	4.60	10	2.37	0.75	-0.38	0.13	0.713
	Exposed	6.53	12	3.19	0.92				4.70	10	1.88	0.59			
Right Hip flex/ext	Not Exposed	8.52	12	5.23	1.51	-2.39	0.58	0.036	9.36	10	3.47	1.10	-1.39	0.42	0.197
	Exposed	9.36	12	5.37	1.55				10.16	10	3.52	1.11			
Right Knee flex/ext	Not Exposed	11.42	12	3.99	1.15	-1.51	0.42	0.158	12.92	10	4.66	1.47	-2.25	0.60	0.041
	Exposed	12.69	12	4.36	1.26				15.13	10	5.73	1.81			
Right Ankle dor/plan	Not Exposed	5.28	12	1.61	0.46	-2.99	0.67	0.012	7.11	10	1.65	0.52	-1.07	0.34	0.310
	Exposed	6.73	12	1.81	0.52				7.99	10	2.95	0.93			
Right Hip add/abd	Not Exposed	5.39	12	2.45	0.71	-2.88	0.66	0.015	5.50	10	2.44	0.77	-0.76	0.25	0.464
	Exposed	5.88	12	2.64	0.76				5.91	10	1.79	0.57			
Right Hip int/ext	Not Exposed	8.51	12	1.64	0.47	-3.27	0.70	0.007	13.75	10	0.32	0.10	0.63	0.21	0.545
	Exposed	12.14	12	3.34	0.96				13.19	10	2.93	0.93			
Right Foot int/ext	Not Exposed	6.18	12	3.50	1.01	-1.29	0.36	0.223	6.71	10	3.17	1.00	-0.66	0.22	0.525
	Exposed	7.07	12	3.83	1.10				7.02	10	3.88	1.23			

Note: Comparative analysis performed by paired -test, considering the equation, effect size (r) and significance of $\alpha \leq 0.05$.

Supplement A – Figures and statistics of intergroup comparisons

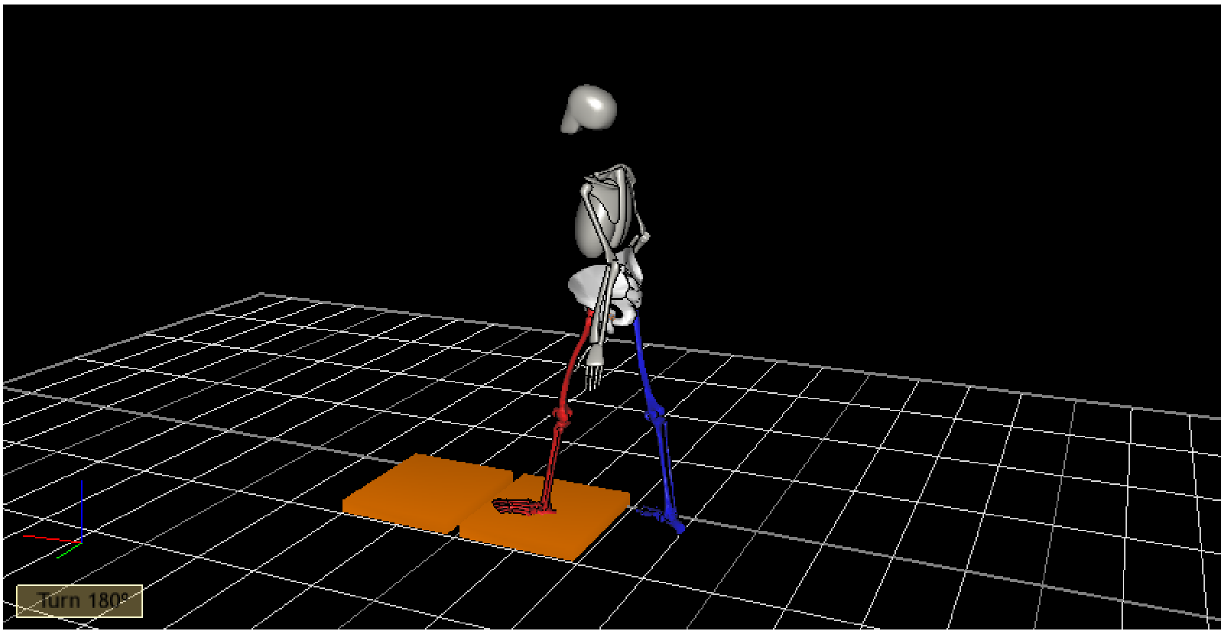


Figure 1. Image extracted from the Vicon Polygon software of one of the participating women. In orange are highlighted the two fixed square metal plates used to generate the fictional disturbing factor following the theory of "affordances".

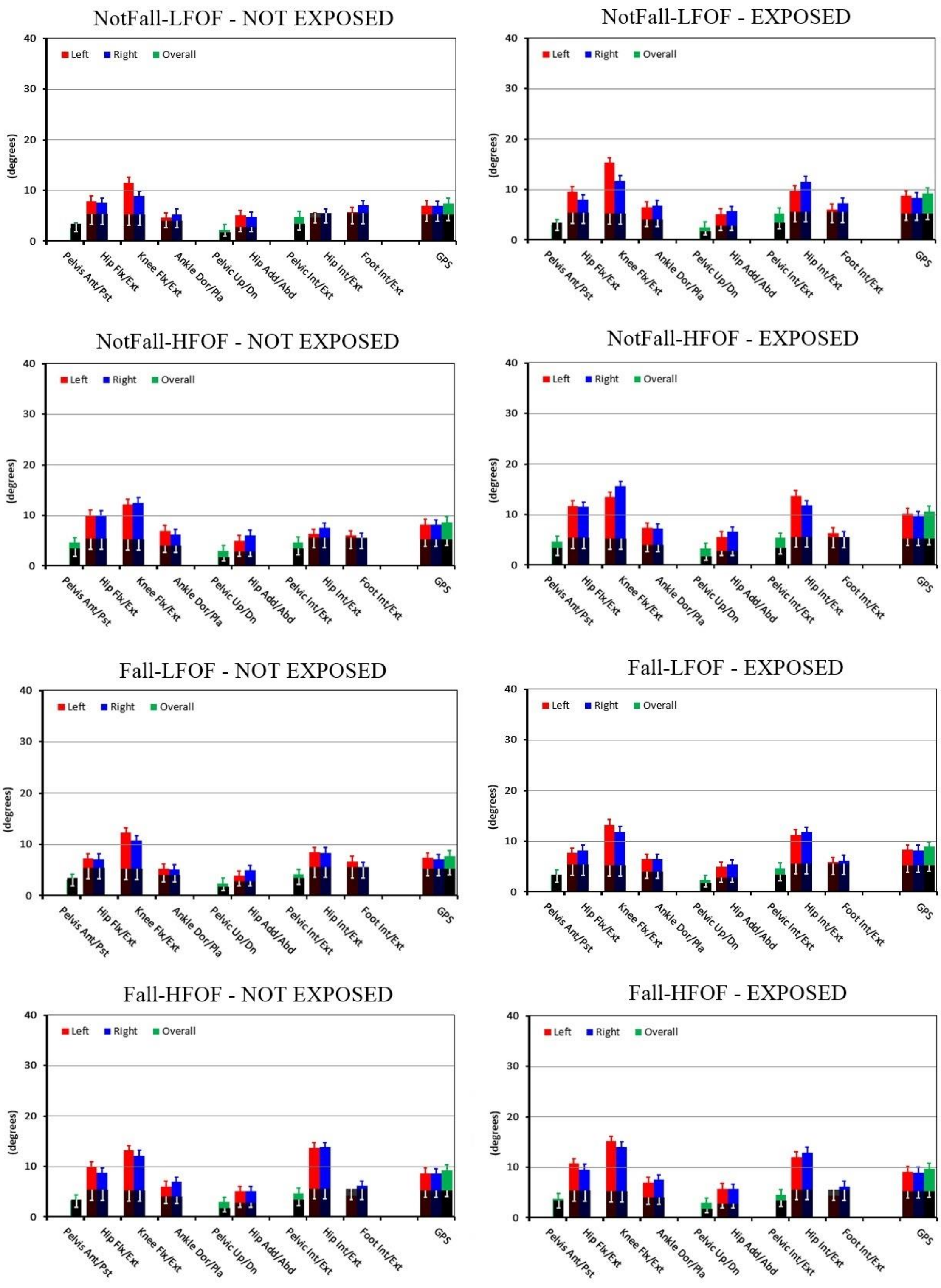


Figure 2 - GVS / MAP groups of NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF pre and post fictional disturbing factor

Table 1 - Description and comparison of the spatiotemporal parameters of gait pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Continua.

						95% Confidence Interval				post hoc					
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	F	*p* valor (ω²)	*A/B (r)*	*A/C (r)*	*A/D (r)*	*B/C (r)*	*B/D (r)*	*C/D (r)*
Data Not Exposed															
Cadence (steps/min)	NotFall-LFOF	12	110.62	7.83	2.26	105.64	115.59	0.485	0.694 (-0.03)	-	-	-	-	-	-
	NotFall-HFOF	15	107.24	12.30	3.18	100.43	114.05								
	Fall-LFOF	12	111.61	8.51	2.46	106.21	117.02								
	Fall-HFOF	10	110.28	10.46	3.31	102.79	117.76								
	Total	49	109.76	9.92	1.42	106.91	112.61								
Stride Time (seconds)	NotFall-LFOF	12	1.09	0.08	0.02	1.04	1.14	0.628	0.601 (-0.02)	-	-	-	-	-	-
	NotFall-HFOF	15	1.14	0.14	0.03	1.06	1.21								
	Fall-LFOF	12	1.08	0.09	0.03	1.03	1.14								
	Fall-HFOF	10	1.10	0.11	0.04	1.02	1.18								
	Total	49	1.11	0.11	0.02	1.07	1.14								
Opposite Foot Off (percent)	NotFall-LFOF	12	9.60	1.83	0.53	8.43	10.76	1.442	0.243 (0.03)	-	-	-	-	-	-
	NotFall-HFOF	15	10.97	2.92	0.75	9.35	12.59								
	Fall-LFOF	12	9.27	2.07	0.60	7.96	10.59								
	Fall-HFOF	10	10.11	1.82	0.58	8.81	11.42								
	Total	49	10.04	2.31	0.33	9.38	10.71								
Opposite Foot Contact (percent)	NotFall-LFOF	12	50.21	0.73	0.21	49.74	50.67	0.390	0.761 (-0.04)	-	-	-	-	-	-
	NotFall-HFOF	15	50.11	0.67	0.17	49.75	50.48								
	Fall-LFOF	12	49.92	0.63	0.18	49.51	50.32								
	Fall-HFOF	10	50.07	0.67	0.21	49.58	50.55								
	Total	49	50.08	0.66	0.09	49.89	50.27								
StepTime (seconds)	NotFall-LFOF	12	0.54	0.04	0.01	0.52	0.57	0.600	0.619 (-0.03)	-	-	-	-	-	-
	NotFall-HFOF	15	0.57	0.07	0.02	0.53	0.60								
	Fall-LFOF	12	0.54	0.04	0.01	0.52	0.57								
	Fall-HFOF	10	0.55	0.05	0.02	0.51	0.58								
	Total	49	0.55	0.05	0.01	0.54	0.57								
Single Support (seconds)	NotFall-LFOF	12	0.44	0.02	0.01	0.43	0.46	0.291	0.832 (-0.05)	-	-	-	-	-	-
	NotFall-HFOF	15	0.44	0.04	0.01	0.42	0.46								
	Fall-LFOF	12	0.44	0.03	0.01	0.42	0.46								
	Fall-HFOF	10	0.43	0.03	0.01	0.41	0.46								
	Total	49	0.44	0.03	0.00	0.43	0.45								
Double Support (seconds)	NotFall-LFOF	12	0.22	0.04	0.01	0.20	0.25	1.602	0.202 (0.04)	-	-	-	-	-	-
	NotFall-HFOF	15	0.27	0.09	0.02	0.22	0.32								
	Fall-LFOF	12	0.22	0.06	0.02	0.18	0.26								
	Fall-HFOF	10	0.26	0.07	0.02	0.21	0.31								
	Total	49	0.24	0.07	0.01	0.22	0.26								
Foot Off (percent)	NotFall-LFOF	12	61.07	1.80	0.52	59.93	62.21	1.936	0.137 (0.05)	-	-	-	-	-	-
	NotFall-HFOF	15	62.38	3.02	0.78	60.71	64.05								
	Fall-LFOF	12	60.59	2.44	0.70	59.04	62.14								
	Fall-HFOF	10	62.65	2.28	0.72	61.02	64.28								
	Total	49	61.67	2.55	0.36	60.94	62.41								

Table 1 - Description and comparison of the spatiotemporal parameters of gait pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Continuação.

Stride Lenght (metres)	NotFall-LFOF	12	1.14	0.09	0.03	1.07	1.20								
	NotFall-HFOF	15	0.97	0.19	0.05	0.86	1.07								
	Fall-LFOF	12	1.12	0.11	0.03	1.05	1.20	5.027	0.004 (0.20)	0.008 (0.50)	0.997 (0.05)	0.331 (0.51)	0.015 (0.46)	0.508 (0.24)	0.432 (0.42)
	Fall-HFOF	10	1.04	0.07	0.02	0.99	1.09								
	Total	49	1.06	0.15	0.02	1.02	1.10								
Step Lenght (metres)	NotFall-LFOF	12	0.57	0.05	0.01	0.54	0.60								
	NotFall-HFOF	15	0.48	0.09	0.02	0.43	0.53								
	Fall-LFOF	12	0.56	0.06	0.02	0.53	0.60	5.119	0.004 (0.20)	0.009 (0.50)	1.000 (0.02)	0.357 (0.48)	0.011 (0.48)	0.492 (0.25)	0.396 (0.42)
	Fall-HFOF	10	0.52	0.04	0.01	0.49	0.55								
	Total	49	0.53	0.07	0.01	0.51	0.55								
Walking Speed (metres per second)	NotFall-LFOF	12	1.05	0.14	0.04	0.96	1.13								
	NotFall-HFOF	15	0.87	0.22	0.06	0.75	0.99								
	Fall-LFOF	12	1.05	0.15	0.04	0.95	1.15	3.378	0.026 (0.13)	0.049 (0.44)	1.000 (0.01)	0.628 (0.31)	0.046 (0.43)	0.582 (0.23)	0.612 (0.30)
	Fall-HFOF	10	0.96	0.15	0.05	0.86	1.06								
	Total	49	0.98	0.18	0.03	0.92	1.03								
Data Exposed															
Cadence (steps/min)	NotFall-LFOF	12	104.19	11.99	3.46	96.57	111.80								
	NotFall-HFOF	15	104.64	14.52	3.75	96.60	112.68								
	Fall-LFOF	12	110.01	9.76	2.82	103.80	116.21	0.551	0.650 (-0.03)	-	-	-	-	-	-
	Fall-HFOF	10	105.73	12.93	4.09	96.48	114.98								
	Total	49	106.07	12.37	1.77	102.51	109.62								
Stride Time (seconds)	NotFall-LFOF	12	1.19	0.19	0.06	1.07	1.31								
	NotFall-HFOF	15	1.18	0.17	0.04	1.08	1.28								
	Fall-LFOF	12	1.10	0.10	0.03	1.04	1.16	0.732	0.538 (-0.02)	-	-	-	-	-	-
	Fall-HFOF	10	1.16	0.18	0.06	1.03	1.29								
	Total	49	1.16	0.16	0.02	1.11	1.21								
Opposite Foot Off (percent)	NotFall-LFOF	12	11.81	2.26	0.65	10.37	13.25								
	NotFall-HFOF	15	14.40	6.46	1.67	10.83	17.98								
	Fall-LFOF	12	10.82	2.69	0.78	9.11	12.53	1.838	0.154 (0.05)	-	-	-	-	-	-
	Fall-HFOF	10	11.69	3.13	0.99	9.45	13.93								
	Total	49	12.34	4.35	0.62	11.09	13.59								
Opposite Foot Contact (percent)	NotFall-LFOF	12	49.94	3.15	0.91	47.94	51.94								
	NotFall-HFOF	15	50.98	2.55	0.66	49.57	52.40								
	Fall-LFOF	12	49.70	1.43	0.41	48.79	50.60	0.807	0.496 (-0.01)	-	-	-	-	-	-
	Fall-HFOF	10	50.50	1.66	0.53	49.31	51.69								
	Total	49	50.31	2.33	0.33	49.64	50.98								
StepTime (seconds)	NotFall-LFOF	12	0.61	0.15	0.04	0.52	0.71								
	NotFall-HFOF	15	0.58	0.09	0.02	0.53	0.63								
	Fall-LFOF	12	0.55	0.05	0.01	0.52	0.59	0.750	0.528 (-0.02)	-	-	-	-	-	-
	Fall-HFOF	10	0.57	0.08	0.02	0.52	0.63								
	Total	49	0.58	0.10	0.01	0.55	0.61								

Table 1 - Description and comparison of the spatiotemporal parameters of gait pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Conclusão.

	NotFall-LFOF	12	0.46	0.10	0.03	0.39	0.52								
	NotFall-HFOF	15	0.43	0.07	0.02	0.39	0.47								
Single Support (seconds)	Fall-LFOF	12	0.43	0.05	0.01	0.40	0.46	0.349	0.790 (-0.04)	-	-	-	-	-	-
	Fall-HFOF	10	0.44	0.05	0.02	0.41	0.48								
	Total	49	0.44	0.07	0.01	0.42	0.46								
	NotFall-LFOF	12	0.32	0.14	0.04	0.23	0.41								
	NotFall-HFOF	15	0.35	0.18	0.05	0.25	0.45								
Double Support (seconds)	Fall-LFOF	12	0.25	0.07	0.02	0.21	0.29	1.248	0.304 (0.01)	-	-	-	-	-	-
	Fall-HFOF	10	0.30	0.11	0.03	0.22	0.37								
	Total	49	0.31	0.14	0.02	0.27	0.35								
	NotFall-LFOF	12	63.16	2.82	0.81	61.37	64.95								
	NotFall-HFOF	15	64.44	4.91	1.27	61.73	67.16								
Foot Off (percent)	Fall-LFOF	12	61.71	2.87	0.83	59.88	63.53	1.343	0.272 (0.02)	-	-	-	-	-	-
	Fall-HFOF	10	63.69	2.65	0.84	61.80	65.59								
	Total	49	63.31	3.62	0.52	62.27	64.35								
	NotFall-LFOF	12	1.02	0.13	0.04	0.93	1.10								
	NotFall-HFOF	15	0.84	0.27	0.07	0.69	0.99								
Stride Lenght (metres)	Fall-LFOF	12	1.04	0.16	0.05	0.94	1.14	3.056	0.038 (0.11)	0.091 (0.38)	0.991 (0.08)	0.862 (0.27)	0.044 (0.41)	0.470 (0.25)	0.712 (0.31)
	Fall-HFOF	10	0.95	0.11	0.03	0.88	1.03								
	Total	49	0.95	0.20	0.03	0.90	1.01								
	NotFall-LFOF	12	0.53	0.09	0.03	0.47	0.58								
	NotFall-HFOF	15	0.43	0.15	0.04	0.35	0.51								
Step Lenght (metres)	Fall-LFOF	12	0.52	0.08	0.02	0.47	0.57	2.511	0.071 (0.08)	-	-	-	-	-	-
	Fall-HFOF	10	0.48	0.05	0.02	0.44	0.52								
	Total	49	0.49	0.11	0.02	0.46	0.52								
	NotFall-LFOF	12	0.88	0.17	0.05	0.77	0.99								
	NotFall-HFOF	15	0.74	0.29	0.08	0.57	0.90								
Walking Speed (metres per second)	Fall-LFOF	12	0.95	0.18	0.05	0.84	1.07	2.334	0.087 (0.08)	-	-	-	-	-	-
	Fall-HFOF	10	0.84	0.16	0.05	0.72	0.96								
	Total	49	0.85	0.23	0.03	0.78	0.91								

Note: A - NotFall-LFOF; B-NotFall-HFOF; C-Fall-LFOF; D - FallHFOF. Data Not Exposed - data obtained before exposure to the fictional disturbing factor; Data Exposed - Data obtained during exposure to the fictional disturbing factor. Comparative analysis performed by ANOVA one way, considering the F ratio, effect size (ω) and significance of α≤0.05. Post Tukey post hoc analysis, considering effect size (r) and significance of α≤0.05.

Table 2 - Description and comparison of the GPS and GVS parameters pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Continua.

						95% Confidence Interval				post hoc					
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	F	*p* valor (ω²)	*A/B (r)*	*A/C (r)*	*A/D (r)*	*B/C (r)*	*B/D (r)*	*C/D (r)*
Data Not Exposed															
GPS (Left) (degree)	NotFall-LFOF	12	7.22	2.01	0.58	5.94	8.49	1.97	0.132 (0.06)	-	-	-	-	-	-
	NotFall-HFOF	15	8.52	2.41	0.62	7.18	9.86								
	Fall-LFOF	12	7.47	1.34	0.39	6.62	8.32								
	Fall-HFOF	10	8.74	1.01	0.32	8.02	9.46								
	Total	49	7.99	1.91	0.27	7.44	8.54								
GPS (Right) (degree)	NotFall-LFOF	12	7.09	1.70	0.49	6.01	8.17	2.16	0.106 (0.07)	-	-	-	-	-	-
	NotFall-HFOF	15	8.43	2.31	0.60	7.14	9.71								
	Fall-LFOF	12	7.25	1.76	0.51	6.13	8.37								
	Fall-HFOF	10	8.68	1.49	0.47	7.62	9.74								
	Total	49	7.86	1.96	0.28	7.30	8.43								
GPS (Overall) (degree)	NotFall-LFOF	12	7.61	1.75	0.51	6.49	8.72	2.55	0.067 (0.09)	-	-	-	-	-	-
	NotFall-HFOF	15	8.93	2.35	0.61	7.63	10.23								
	Fall-LFOF	12	7.84	1.30	0.38	7.01	8.67								
	Fall-HFOF	10	9.31	1.07	0.34	8.55	10.07								
	Total	49	8.42	1.85	0.26	7.89	8.95								
LEFT Pelvis Ant/Pst (degree)	NotFall-LFOF	12	3.83	3.36	0.97	1.69	5.96	1.41	0.254 (0.02)	-	-	-	-	-	-
	NotFall-HFOF	15	6.89	5.40	1.40	3.89	9.88								
	Fall-LFOF	12	4.44	4.09	1.18	1.84	7.04								
	Fall-HFOF	10	4.46	3.33	1.05	2.08	6.84								
	Total	49	5.04	4.31	0.62	3.80	6.28								
LEFT Hip Flx/Ext (degree)	NotFall-LFOF	12	9.30	5.34	1.54	5.90	12.70	1.45	0.240 (0.03)	-	-	-	-	-	-
	NotFall-HFOF	15	12.30	7.77	2.01	8.00	16.60								
	Fall-LFOF	12	7.93	3.50	1.01	5.71	10.16								
	Fall-HFOF	10	10.62	4.01	1.27	7.75	13.49								
	Total	49	10.15	5.73	0.82	8.51	11.80								
LEFT Knee Flx/Ext (degree)	NotFall-LFOF	12	11.97	3.26	0.94	9.89	14.04	0.33	0.801 (-0.04)	-	-	-	-	-	-
	NotFall-HFOF	15	13.03	4.70	1.21	10.43	15.63								
	Fall-LFOF	12	12.85	3.92	1.13	10.36	15.34								
	Fall-HFOF	10	13.61	3.46	1.10	11.13	16.09								
	Total	49	12.84	3.87	0.55	11.73	13.96								
LEFT Ankle Dor/Pla (degree)	NotFall-LFOF	12	4.88	1.58	0.46	3.88	5.89	3.84	0.016 (0.15)	0.018 (0.54)	0.932 (0.17)	0.239 (0.37)	0.084 (0.47)	0.799 (0.16)	0.543 (0.27)
	NotFall-HFOF	15	7.28	2.16	0.56	6.09	8.47								
	Fall-LFOF	12	5.38	1.42	0.41	4.48	6.27								
	Fall-HFOF	10	6.53	2.75	0.87	4.57	8.49								
	Total	49	6.07	2.19	0.31	5.45	6.70								

Table 2 - Description and comparison of the GPS and GVS parameters pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Continuação.

	NotFall-LFOF	12	2.29	.53	0.15	1.96	2.63								
	NotFall-HFOF	15	3.17	1.12	0.29	2.55	3.79								
LEFT Pelvic Up/Dn (degree)	Fall-LFOF	12	2.66	1.32	0.38	1.82	3.50	1.66	0.188 (0.04)	-	-	-	-	-	-
	Fall-HFOF	10	3.50	2.33	0.74	1.83	5.17								
	Total	49	2.90	1.43	0.20	2.49	3.31								
	NotFall-LFOF	12	5.73	2.88	0.83	3.90	7.56								
	NotFall-HFOF	15	5.63	2.67	0.69	4.15	7.10								
LEFT Hip Add/Abd (degree)	Fall-LFOF	12	4.43	2.03	0.59	3.14	5.72	0.72	0.543 (-0.02)	-	-	-	-	-	-
	Fall-HFOF	10	5.45	1.97	0.62	4.04	6.86								
	Total	49	5.32	2.43	0.35	4.63	6.02								
	NotFall-LFOF	12	5.41	3.11	0.90	3.43	7.38								
	NotFall-HFOF	15	4.86	1.30	0.34	4.14	5.58								
LEFT Pelvic Int/Ext (degree)	Fall-LFOF	12	4.55	1.98	0.57	3.29	5.81	0.32	0.813 (-0.04)	-	-	-	-	-	-
	Fall-HFOF	10	5.09	2.40	0.76	3.37	6.81								
	Total	49	4.97	2.19	0.31	4.34	5.59								
	NotFall-LFOF	12	5.72	5.18	1.49	2.43	9.01								
	NotFall-HFOF	15	6.35	0.67	0.17	5.98	6.72								
LEFT Hip Int/Ext (degree)	Fall-LFOF	12	8.68	2.27	0.66	7.24	10.13	17.86	0.000 (0.51)	0.939 (0.09)	0.062 (0.36)	0.000 (0.73)	0.157 (0.60)	0.000 (0.99)	0.001 (0.84)
	Fall-HFOF	10	13.66	0.13	0.04	13.57	13.75								
	Total	49	8.26	4.04	0.58	7.10	9.42								
	NotFall-LFOF	12	6.33	2.43	0.70	4.79	7.88								
	NotFall-HFOF	15	6.75	3.43	0.88	4.85	8.64								
LEFT Foot Int/Ext (degree)	Fall-LFOF	12	7.26	3.09	0.89	5.29	9.22	1.67	0.187 (0.04)	-	-	-	-	-	-
	Fall-HFOF	10	4.60	2.37	0.75	2.90	6.30								
	Total	49	6.33	2.99	0.43	5.48	7.19								
	NotFall-LFOF	12	3.83	3.36	0.97	1.69	5.96								
	NotFall-HFOF	15	6.89	5.40	1.40	3.89	9.88								
RIGHT Pelvis Ant/Pst (degree)	Fall-LFOF	12	4.44	4.09	1.18	1.84	7.04	1.41	0.254 (0.02)	-	-	-	-	-	-
	Fall-HFOF	10	4.46	3.33	1.05	2.08	6.84								
	Total	49	5.04	4.31	0.62	3.80	6.28								
	NotFall-LFOF	12	8.52	4.69	1.35	5.54	11.49								
	NotFall-HFOF	15	11.32	5.96	1.54	8.02	14.62								
RIGHT Hip Flx/Ext (degree)	Fall-LFOF	12	8.52	5.23	1.51	5.19	11.84	0.95	0.423 (0.00)	-	-	-	-	-	-
	Fall-HFOF	10	9.36	3.47	1.10	6.88	11.84								
	Total	49	9.55	5.05	0.72	8.10	11.00								
	NotFall-LFOF	12	9.53	3.70	1.07	7.18	11.88								
	NotFall-HFOF	15	13.28	4.59	1.19	10.74	15.82								
RIGHT Knee Flx/Ext (degree)	Fall-LFOF	12	11.42	3.99	1.15	8.88	13.95	2.00	0.128 (0.06)	-	-	-	-	-	-
	Fall-HFOF	10	12.92	4.66	1.47	9.59	16.25								
	Total	49	11.83	4.39	0.63	10.57	13.09								

Table 2 - Description and comparison of the GPS and GVS parameters pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Continuação.

	NotFall-LFOF	12	5.51	1.45	0.42	4.59	6.43								
	NotFall-HFOF	15	6.61	2.47	0.64	5.24	7.98								
RIGHT Ankle Dor/Pla (degree)	Fall-LFOF	12	5.28	1.61	0.46	4.25	6.30	2.45	0.076 (0.08)	-	-	-	-	-	-
	Fall-HFOF	10	7.11	1.65	0.52	5.93	8.29								
	Total	49	6.11	1.98	0.28	5.55	6.68								
	NotFall-LFOF	12	2.29	0.53	0.15	1.96	2.63								
	NotFall-HFOF	15	3.17	1.12	0.29	2.55	3.79								
RIGHT Pelvic Up/Dn (degree)	Fall-LFOF	12	2.66	1.32	0.38	1.82	3.50	1.66	0.188 (0.04)	-	-	-	-	-	-
	Fall-HFOF	10	3.50	2.33	0.74	1.83	5.17								
	Total	49	2.90	1.43	0.20	2.49	3.31								
	NotFall-LFOF	12	5.15	2.17	0.63	3.77	6.53								
	NotFall-HFOF	15	6.62	2.73	0.70	5.11	8.13								
RIGHT Hip Add/Abd (degree)	Fall-LFOF	12	5.39	2.45	0.71	3.84	6.95	0.97	0.416 (0.00)	-	-	-	-	-	-
	Fall-HFOF	10	5.50	2.44	0.77	3.75	7.25								
	Total	49	5.73	2.47	0.35	5.02	6.44								
	NotFall-LFOF	12	5.41	3.11	0.90	3.43	7.38								
	NotFall-HFOF	15	4.86	1.30	0.34	4.14	5.58								
RIGHT Pelvic Int/Ext (degree)	Fall-LFOF	12	4.55	1.98	0.57	3.29	5.81	0.32	0.813 (-0.04)	-	-	-	-	-	-
	Fall-HFOF	10	5.09	2.40	0.76	3.37	6.81								
	Total	49	4.97	2.19	0.31	4.34	5.59								
	NotFall-LFOF	12	6.57	4.67	1.35	3.60	9.54								
	NotFall-HFOF	15	7.97	3.35	0.86	6.11	9.82								
RIGHT Hip Int/Ext (degree)	Fall-LFOF	12	8.51	1.64	0.47	7.47	9.55	11.06	0.000 (0.38)	0.647 (0.26)	0.421 (0.00)	0.000 (0.10)	0.969 (0.25)	0.000 (0.19)	0.001 (0.10)
	Fall-HFOF	10	13.75	0.32	0.10	13.52	13.98								
	Total	49	8.94	3.93	0.56	7.81	10.07								
	NotFall-LFOF	12	8.24	4.27	1.23	5.53	10.95								
	NotFall-HFOF	15	6.02	2.57	0.66	4.60	7.44								
RIGHT Foot Int/Ext (degree)	Fall-LFOF	12	6.18	3.50	1.01	3.96	8.41	1.12	0.353 (0.01)	-	-	-	-	-	-
	Fall-HFOF	10	6.71	3.17	1.00	4.44	8.98								
	Total	49	6.74	3.41	0.49	5.77	7.72								
Data Exposed															
	NotFall-LFOF	12	8.88	1.51	0.44	7.92	9.83								
	NotFall-HFOF	15	10.49	2.48	0.64	9.11	11.86								
GPS (Left) (degree)	Fall-LFOF	12	8.46	1.62	0.47	7.43	9.49	3.17	0.033 (0.12)	0.121 (0.37)	0.944 (0.14)	0.985 (0.11)	0.032 (0.44)	0.294 (0.31)	0.815 (0.25)
	Fall-HFOF	10	9.15	1.13	0.36	8.34	9.96								
	Total	49	9.32	1.96	0.28	8.76	9.88								
	NotFall-LFOF	12	8.51	1.61	0.47	7.48	9.53								
	NotFall-HFOF	15	9.95	2.49	0.64	8.57	11.33								
GPS (Right) (degree)	Fall-LFOF	12	8.46	2.14	0.62	7.10	9.82	1.47	0.237 (0.03)	-	-	-	-	-	-
	Fall-HFOF	10	9.18	2.05	0.65	7.71	10.65								
	Total	49	9.07	2.16	0.31	8.45	9.69								

Table 2 - Description and comparison of the GPS and GVS parameters pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Continuação.

GPS (Overall) (degree)	NotFall-LFOF	12	9.33	1.29	0.37	8.51	10.16	2.67	0.044 (0.10)	0.139 (0.37)	0.984 (0.09)	0.907 (0.20)	0.042 (0.41)	0.517 (0.24)	0.744 (0.25
	NotFall-HFOF	15	10.89	2.44	0.63	9.54	12.24								
	Fall-LFOF	12	9.07	1.65	0.48	8.02	10.11								
	Fall-HFOF	10	9.86	1.48	0.47	8.80	10.92								
	Total	49	9.85	1.93	0.28	9.30	10.41								
LEFT Pelvis Ant/Pst (degree)	NotFall-LFOF	12	4.00	3.23	0.93	1.95	6.05	1.23	0.308 (0.01)	-	-	-	-	-	-
	NotFall-HFOF	15	6.97	5.60	1.44	3.87	10.07								
	Fall-LFOF	12	4.84	4.46	1.29	2.01	7.68								
	Fall-HFOF	10	4.54	2.93	0.93	2.44	6.64								
	Total	49	5.22	4.38	0.63	3.97	6.48								
LEFT Hip Flx/Ext (degree)	NotFall-LFOF	12	10.28	4.06	1.17	7.70	12.86	2.24	0.097 (0.07)	-	-	-	-	-	-
	NotFall-HFOF	15	13.71	7.71	1.99	9.44	17.99								
	Fall-LFOF	12	8.48	3.63	1.05	6.18	10.79								
	Fall-HFOF	10	11.39	3.90	1.23	8.60	14.18								
	Total	49	11.12	5.57	0.80	9.52	12.72								
LEFT Knee Flx/Ext (degree)	NotFall-LFOF	12	15.80	4.66	1.35	12.84	18.76	0.23	0.878 (-0.05)	-	-	-	-	-	-
	NotFall-HFOF	15	15.01	6.62	1.71	11.34	18.67								
	Fall-LFOF	12	14.15	4.83	1.39	11.08	17.22								
	Fall-HFOF	10	15.42	2.95	0.93	13.31	17.53								
	Total	49	15.08	5.01	0.72	13.64	16.51								
LEFT Ankle Dor/Pla (degree)	NotFall-LFOF	12	6.64	1.31	0.38	5.81	7.47	0.76	0.521 (-0.01)	-	-	-	-	-	-
	NotFall-HFOF	15	7.73	2.30	0.59	6.46	9.00								
	Fall-LFOF	12	6.73	2.14	0.62	5.37	8.08								
	Fall-HFOF	10	7.52	3.08	0.97	5.32	9.72								
	Total	49	7.17	2.24	0.32	6.53	7.82								
LEFT Pelvic Up/Dn (degree)	NotFall-LFOF	12	2.68	0.67	0.19	2.26	3.11	1.69	0.183 (0.04)	-	-	-	-	-	-
	NotFall-HFOF	15	3.56	1.27	0.33	2.86	4.26								
	Fall-LFOF	12	2.62	1.36	0.39	1.75	3.48								
	Fall-HFOF	10	3.35	1.80	0.57	2.06	4.64								
	Total	49	3.07	1.33	0.19	2.69	3.45								
LEFT Hip Add/Abd (degree)	NotFall-LFOF	12	6.03	3.42	0.99	3.86	8.21	0.29	0.834 (-0.05)	-	-	-	-	-	-
	NotFall-HFOF	15	6.05	2.41	0.62	4.71	7.38								
	Fall-LFOF	12	5.31	2.02	0.58	4.03	6.59								
	Fall-HFOF	10	6.23	2.32	0.73	4.57	7.89								
	Total	49	5.90	2.54	0.36	5.17	6.63								
LEFT Pelvic Int/Ext (degree)	NotFall-LFOF	12	5.69	2.19	0.63	4.30	7.08	0.60	0.621 (-0.03)	-	-	-	-	-	-
	NotFall-HFOF	15	5.56	1.19	0.31	4.90	6.22								
	Fall-LFOF	12	5.07	1.90	0.55	3.86	6.28								
	Fall-HFOF	10	4.86	1.62	0.51	3.70	6.02								
	Total	49	5.33	1.72	0.25	4.84	5.82								

Table 2 - Description and comparison of the GPS and GVS parameters pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Continuação

	NotFall-LFOF	12	10.38	3.73	1.08	8.01	12.74								
	NotFall-HFOF	15	14.61	5.20	1.34	11.74	17.49								
LEFT Hip Int/Ext (degree)	Fall-LFOF	12	11.68	3.36	0.97	9.55	13.82	2.47	0.074 (0.08)	-	-	-	-	-	-
	Fall-HFOF	10	12.59	3.79	1.20	9.88	15.30								
	Total	49	12.44	4.36	0.62	11.19	13.70								
	NotFall-LFOF	12	6.69	3.13	0.90	4.70	8.68								
	NotFall-HFOF	15	7.17	3.47	0.90	5.24	9.09								
LEFT Foot Int/Ext (degree)	Fall-LFOF	12	6.53	3.19	0.92	4.51	8.56	1.39	0.258 (0.02)	-	-	-	-	-	-
	Fall-HFOF	10	4.70	1.88	0.59	3.36	6.04								
	Total	49	6.39	3.09	0.44	5.50	7.28								
	NotFall-LFOF	12	4.00	3.23	0.93	1.95	6.05								
	NotFall-HFOF	15	6.97	5.60	1.44	3.87	10.07								
RIGHT Pelvis Ant/Pst (degree)	Fall-LFOF	12	4.84	4.46	1.29	2.01	7.68	1.23	0.308 (0.01)	-	-	-	-	-	-
	Fall-HFOF	10	4.54	2.93	0.93	2.44	6.64								
	Total	49	5.22	4.38	0.63	3.97	6.48								
	NotFall-LFOF	12	8.91	4.47	1.29	6.07	11.75								
	NotFall-HFOF	15	12.93	6.06	1.57	9.58	16.29								
RIGHT Hip Flx/Ext (degree)	Fall-LFOF	12	9.36	5.37	1.55	5.95	12.77	1.75	0.170 (0.04)	-	-	-	-	-	-
	Fall-HFOF	10	10.16	3.52	1.11	7.64	12.68								
	Total	49	10.51	5.20	0.74	9.01	12.00								
	NotFall-LFOF	12	12.59	4.80	1.38	9.54	15.64								
	NotFall-HFOF	15	16.38	5.06	1.31	13.58	19.18								
RIGHT Knee Flx/Ext (degree)	Fall-LFOF	12	12.69	4.36	1.26	9.92	15.46	1.85	0.151 (0.05)	-	-	-	-	-	-
	Fall-HFOF	10	15.13	5.73	1.81	11.03	19.23								
	Total	49	14.29	5.11	0.73	12.83	15.76								
	NotFall-LFOF	12	7.01	1.70	0.49	5.93	8.09								
	NotFall-HFOF	15	7.90	3.04	0.79	6.21	9.59								
RIGHT Ankle Dor/Pla (degree)	Fall-LFOF	12	6.73	1.81	0.52	5.57	7.88	0.79	0.506 (-0.01)	-	-	-	-	-	-
	Fall-HFOF	10	7.99	2.95	0.93	5.88	10.10								
	Total	49	7.41	2.46	0.35	6.71	8.12								
	NotFall-LFOF	12	2.68	0.67	0.19	2.26	3.11								
	NotFall-HFOF	15	3.56	1.27	0.33	2.86	4.26								
RIGHT Pelvic Up/Dn (degree)	Fall-LFOF	12	2.62	1.36	0.39	1.75	3.48	1.69	0.183 (0.04)	-	-	-	-	-	-
	Fall-HFOF	10	3.35	1.80	0.57	2.06	4.64								
	Total	49	3.07	1.33	0.19	2.69	3.45								
	NotFall-LFOF	12	6.06	2.21	0.64	4.65	7.46								
	NotFall-HFOF	15	7.10	2.64	0.68	5.64	8.56								
RIGHT Hip Add/Abd (degree)	Fall-LFOF	12	5.88	2.64	0.76	4.19	7.56	0.82	0.491 (-0.01)	-	-	-	-	-	-
	Fall-HFOF	10	5.91	1.79	0.57	4.63	7.19								
	Total	49	6.30	2.38	0.34	5.62	6.98								
	NotFall-LFOF	12	5.69	2.19	0.63	4.30	7.08								
	NotFall-HFOF	15	5.56	1.19	0.31	4.90	6.22								
RIGHT Pelvic Int/Ext (degree)	Fall-LFOF	12	5.07	1.90	0.55	3.86	6.28	0.60	0.621 (-0.02)	-	-	-	-	-	-
	Fall-HFOF	10	4.86	1.62	0.51	3.70	6.02								
	Total	49	5.33	1.72	0.25	4.84	5.82								

Table 2 - Description and comparison of the GPS and GVS parameters pre and post fictional disturbing factor between NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups. Conclusão

RIGHT Hip Int/Ext (degree)	NotFall-LFOF	12	11.89	3.18	0.92	9.87	13.91								
	NotFall-HFOF	15	12.18	3.42	0.88	10.29	14.07								
	Fall-LFOF	12	12.14	3.34	0.96	10.02	14.26	0.33	0.803 (-0.04)	-	-	-	-	-	-
	Fall-HFOF	10	13.19	2.93	0.93	11.10	15.28								
	Total	49	12.31	3.18	0.45	11.39	13.22								
RIGHT Foot Int/Ext (degree)	NotFall-LFOF	12	8.28	3.91	1.13	5.80	10.77								
	NotFall-HFOF	15	5.85	1.70	0.44	4.91	6.80								
	Fall-LFOF	12	7.07	3.83	1.10	4.64	9.50	1.17	0.330 (0.01)	-	-	-	-	-	-
	Fall-HFOF	10	7.02	3.88	1.23	4.24	9.80								
	Total	49	6.98	3.37	0.48	6.02	7.95								

Note: A - NotFall-LFOF; B-NotFall-HFOF; C-Fall-LFOF; D - FallHFOF. Data Not Exposed - data obtained before exposure to the fictional disturbing factor; Data Exposed - Data obtained during exposure to the fictional disturbing factor. Comparative analysis performed by ANOVA one way, considering the F ratio, effect size (ω) and significance of α≤0.05. Post Tukey post hoc analysis, considering effect size (r) and significance of α≤0.05.

Table 3 - Description and comparison of the maximum muscle strength of the lower limb muscle groups between the NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups.Continua.

						95% Confidence Interval for Mean				*post hoc*					
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	F	*p* valor (ω²)	*A/B (r)*	*A/C (r)*	*A/D (r)*	*B/C (r)*	*B/D (r)*	*C/D (r)*
Hip abductors	NotFall-LFOF	12	11.38	2.82	0.81	9.59	13.17	1.931	0.138 (0.05)	-	-	-	-	-	-
	NotFall-HFOF	15	10.55	2.49	0.64	9.17	11.93								
	Fall-LFOF	12	11.72	2.47	0.71	10.16	13.29								
	Fall-HFOF	10	9.45	1.41	0.44	8.44	10.46								
	Total	49	10.82	2.47	0.35	10.11	11.52								
Hip adductors	NotFall-LFOF	12	10.72	2.15	0.62	9.35	12.08	1.983	0.130 (0.05)	-	-	-	-	-	-
	NotFall-HFOF	15	10.09	2.07	0.53	8.94	11.23								
	Fall-LFOF	12	11.03	2.54	0.73	9.42	12.64								
	Fall-HFOF	10	8.91	1.89	0.60	7.56	10.26								
	Total	49	10.23	2.24	0.32	9.59	10.87								
Hip extensors	NotFall-LFOF	12	16.77	3.82	1.10	14.35	19.20	2.636	0.061 (0.12)	-	-	-	-	-	-
	NotFall-HFOF	15	13.99	4.84	1.25	11.31	16.66								
	Fall-LFOF	12	19.04	6.83	1.97	14.70	23.38								
	Fall-HFOF	10	14.23	4.65	1.47	10.91	17.56								
	Total	49	15.96	5.41	0.77	14.40	17.51								
Knee flexors	NotFall-LFOF	12	15.04	4.32	1.25	12.30	17.79	1.489	0.230 (0.06)	-	-	-	-	-	-
	NotFall-HFOF	15	13.72	3.26	0.84	11.92	15.53								
	Fall-LFOF	12	16.95	4.15	1.20	14.32	19.59								
	Fall-HFOF	10	14.54	4.54	1.43	11.30	17.79								
	Total	49	15.00	4.08	0.58	13.83	16.18								
Plantiflexores	NotFall-LFOF	12	17.87	3.69	1.06	15.53	20.21	2.809	0.050 (0.13)	0.154 (0.27)	0.948 (0.20)	0.088 (0.50)	0.154 (0.33)	0.401 (0.12)	0.242 (0.36)
	NotFall-HFOF	15	14.31	4.08	1.05	12.05	16.57								
	Fall-LFOF	12	16.93	4.62	1.33	13.99	19.86								
	Fall-HFOF	10	13.44	4.79	1.52	10.01	16.87								
	Total	49	15.64	4.52	0.65	14.35	16.94								
Dorsiflexores	NotFall-LFOF	12	12.78	5.47	1.58	9.30	16.26	0.475	0.701 (-0.05)	-	-	-	-	-	-
	NotFall-HFOF	15	13.97	2.85	0.74	12.39	15.55								
	Fall-LFOF	12	15.10	5.69	1.64	11.48	18.72								
	Fall-HFOF	10	14.18	5.13	1.62	10.52	17.85								
	Total	49	14.00	4.72	0.67	12.64	15.35								
Hip flexors	NotFall-LFOF	12	14.07	3.05	0.88	12.14	16.00	2.490	0.072 (0.10)	-	-	-	-	-	-
	NotFall-HFOF	15	13.70	4.22	1.09	11.36	16.03								
	Fall-LFOF	12	17.31	4.66	1.35	14.34	20.27								
	Fall-HFOF	10	13.64	3.11	0.98	11.42	15.87								
	Total	49	14.66	4.06	0.58	13.50	15.83								
Knee extensors	NotFall-LFOF	12	21.00	4.96	1.43	17.85	24.15	2.765	0.053 (0.10)	-	-	-	-	-	-
	NotFall-HFOF	15	18.95	5.17	1.34	16.08	21.81								
	Fall-LFOF	12	25.36	8.30	2.40	20.09	30.63								
	Fall-HFOF	10	20.39	4.37	1.38	17.27	23.52								
	Total	49	21.32	6.23	0.89	19.53	23.11								

Table 3 - Description and comparison of the maximum muscle strength of the lower limb muscle groups between the NotFall-LFOF, NotFall-HFOF, Fall-LFOF and Fall-HFOF groups.Conclusão.

	NotFall-LFOF	12	14.08	3.48	1.00	11.87	16.29								
	NotFall-HFOF	15	13.18	4.06	1.05	10.93	15.43								
Medial hip rotators	Fall-LFOF	12	13.48	3.29	0.95	11.39	15.57	1.705	0.180 (0.10)	-	-	-	-	-	-
	Fall-HFOF	10	10.74	3.61	1.14	8.16	13.32								
	Total	49	12.97	3.73	0.53	11.90	14.05								
	NotFall-LFOF	12	12.05	2.37	0.68	10.54	13.55								
	NotFall-HFOF	15	10.52	3.03	0.78	8.84	12.20								
Lateral hip rotators	Fall-LFOF	12	11.79	2.49	0.72	10.21	13.38	1.315	0.281 (0.11)	-	-	-	-	-	-
	Fall-HFOF	10	10.45	1.87	0.59	9.12	11.79								
	Total	49	11.19	2.56	0.37	10.45	11.93								

Note: A - NotFall-LFOF; B-NotFall-HFOF; C-Fall-LFOF; D-Fall-HFOF. Normalized muscle strength (kg force / kg body weight) x 100 (Piva, et al., 2005). Comparative analysis performed by ANOVA one way, considering the F ratio, effect size (ω) and significance of $\alpha \leq 0.05$. Post Tukey post hoc analysis, considering effect size (r) and significance of $\alpha \leq 0.05$.

Supplement B – Correlations of confounders, spatiotemporal parameters, and GPS / GVS.

Table 1. Correlations of confounders, spatiotemporal parameters, and GPS / GVS. Continua.

		GROUP - NotFall-LFOF		GROUP - NotFall-HFOF		GROUP - Fall-LFOF		GROUP - NotFall-LFOF	
		GPS (Overall)		GPS (Overall)		GPS (Overall)		GPS (Overall)	
		Not Exposed	Exposed	Not Exposed	Exposed	Not Exposed	Exposed	Not Exposed	Exposed
Age (years)	value of *r*	0,086	-0,153	-0,199	0,027	0,016	-0,165	0,194	0,199
	value of *p*	0,790	0,634	0,477	0,924	0,961	0,609	0,592	0,581
	N	12	12	15	15	12	12	10	10
Weight (Kg)	value of *r*	-0,208	-0,081	0,443	0,436	-0,058	-0,079	0,255	-0,135
	value of *p*	0,516	0,802	0,098	0,104	0,858	0,078	0,476	0,710
	N	12	12	15	15	12	12	10	10
Height (meters)	value of *r*	-0,171	0,031	0,147	0,217	0,087	-0,383	0,322	-0,234
	value of *p*	0,596	0,924	0,600	0,437	0,787	0,219	0,365	0,515
	N	12	12	15	15	12	12	10	10
BMI (kg / m²)	value of *r*	-0,059	-0,048	0,349	0,325	-0,197	-0,246	0,130	-0,099
	value of *p*	0,855	0,883	0,202	0,237	0,539	0,464	0,721	0,787
	N	12	12	15	15	12	12	10	10
Mini Mental State Examination (score)	value of *r*	0,091	0,056	-0,003	0,174	0,099	0,009	-0,242	-0,027
	value of *p*	0,777	0,863	0,991	0,535	0,761	0,979	0,501	0,942
	N	12	12	15	15	12	12	10	10
FES-I (score)	value of *r*	-0,026	-0,106	-0,145	-0,061	-0,396	0,047	0,013	-0,198
	value of *p*	0,936	0,743	0,607	0,828	0,203	0,885	0,971	0,584
	N	12	12	15	15	12	12	10	10
Stride Lenght - NOT EXPOSED	value of *r*	-0,106	-0,314	-,609*	-,610*	-0,554	-,593*	-0,460	-0,287
	value of *p*	0,743	0,319	0,016	0,016	0,062	0,042	0,182	0,421
	N	12	12	15	15	12	12	10	10

Table 1. Correlations of confounders, spatiotemporal parameters, and GPS / GVS. Continuação.

Step Lenght - NOT EXPOSED	value of *r*	-0,154	-0,342	-,632*	-,621*	-0,566	-,588*	-0,429	-0,179
	value of *p*	0,633	0,277	0,011	0,014	0,055	0,044	0,216	0,620
	N	12	12	15	15	12	12	10	10
Opposite Foot Off - NOT EXPOSED	value of *r*	0,396	0,510	,600*	0,510	0,380	0,206	0,532	0,306
	value of *p*	0,202	0,090	0,018	0,052	0,224	0,522	0,113	0,390
	N	12	12	15	15	12	12	10	10
Double Support - NOT EXPOSED	value of *r*	0,361	0,517	,543*	,552*	0,438	0,289	,714*	0,363
	value of *p*	0,249	0,085	0,036	0,033	0,154	0,363	0,020	0,302
	N	12	12	15	15	12	12	10	10
Foot Off - NOT EXPOSED	value of *r*	0,432	0,521	,645**	,634*	0,453	0,327	,681*	0,408
	value of *p*	0,161	0,082	0,009	0,011	0,140	0,300	0,030	0,242
	N	12	12	15	15	12	12	10	10
Walking Speed - NOT EXPOSED	value of *r*	-0,136	-0,259	-,519*	-,567*	-0,483	-0,536	-0,582	-0,193
	value of *p*	0,674	0,416	0,047	0,028	0,112	0,073	0,077	0,592
	N	12	12	15	15	12	12	10	10
Stride Lenght - EXPOSED	value of *r*	-0,147	-0,083	-0,388	-,576*	-0,490	-,809**	0,197	0,046
	value of *p*	0,649	0,797	0,153	0,025	0,106	0,001	0,586	0,900
	N	12	12	15	15	12	12	10	10
Step Length - EXPOSED	value of *r*	-0,248	0,124	-0,392	-,526*	-0,431	-,754**	0,178	0,066
	value of *p*	0,437	0,701	0,148	0,044	0,162	0,005	0,622	0,855
	N	12	12	15	15	12	12	10	10
Opposite Foot Off - EXPOSED	value of *r*	0,377	0,223	0,315	,600*	0,523	,678*	-0,217	0,467
	value of *p*	0,227	0,487	0,253	0,018	0,081	0,015	0,548	0,174
	N	12	12	15	15	12	12	10	10
Double Support - EXPOSED	value of *r*	-0,211	0,291	0,387	,699**	,590*	,715**	0,212	,674*
	value of *p*	0,511	0,359	0,154	0,004	0,043	0,009	0,557	0,033
	N	12	12	15	15	12	12	10	10

Table 1. Correlations of confounders, spatiotemporal parameters, and GPS / GVS. Continuação.

Foot Off - EXPOSED	value of *r*	-0,220	0,329	0,443	,718**	0,483	,665*	0,187	,649*
	value of *p*	0,492	0,296	0,098	0,003	0,111	0,018	0,606	0,042
	N	12	12	15	15	12	12	10	10
Walking Speed - EXPOSED	value of *r*	-0,079	-0,234	-0,380	-,609*	-0,519	-,774**	-0,119	-0,472
	value of *p*	0,806	0,464	0,162	0,016	0,084	0,003	0,743	0,169
	N	12	12	15	15	12	12	10	10
Hip - abductors	value of *r*	0,093	0,258	-0,332	-0,386	-0,196	-0,005	0,375	0,484
	value of *p*	0,775	0,418	0,227	0,156	0,542	0,987	0,285	0,156
	N	12	12	15	15	12	12	10	10
Hip - aductors	value of *r*	0,133	0,230	-0,269	-0,369	-0,354	0,007	0,297	0,358
	value of *p*	0,681	0,472	0,332	0,176	0,258	0,983	0,405	0,309
	N	12	12	15	15	12	12	10	10
Hip - extensors	value of *r*	-0,353	-,601*	0,113	0,053	0,180	0,346	-0,186	0,438
	value of *p*	0,261	0,039	0,687	0,852	0,575	0,271	0,607	0,206
	N	12	12	15	15	12	12	10	10
Knee - flexors	value of *r*	-0,306	-,653*	-0,017	0,030	0,473	-,593*	0,266	0,619
	value of *p*	0,333	0,021	0,953	0,915	0,120	0,042	0,457	0,057
	N	12	12	15	15	12	12	10	10
Ankle - Plantar flexors	value of *r*	-0,478	-0,574	0,036	-0,138	0,144	0,560	-0,325	0,509
	value of *p*	0,116	0,051	0,899	0,624	0,656	0,058	0,360	0,133
	N	12	12	15	15	12	12	10	10
Ankle - Dorsiflexors	value of *r*	-0,370	-0,522	0,114	0,161	-0,087	0,370	-0,241	0,242
	value of *p*	0,237	0,082	0,685	0,567	0,788	0,236	0,502	0,500
	N	12	12	15	15	12	12	10	10
Hip - flexors	value of *r*	-0,273	-,646*	0,025	0,068	0,057	0,396	-0,208	0,365
	value of *p*	0,391	0,023	0,928	0,809	0,861	0,202	0,565	0,299
	N	12	12	15	15	12	12	10	10

Table 1. Correlations of confounders, spatiotemporal parameters, and GPS / GVS. Conclusão.

	value of *r*	-0,321	-0,397	0,279	0,240	0,247	0,388	0,092	0,385
Knee - Flexors	value of *p*	0,310	0,201	0,314	0,389	0,438	0,212	0,800	0,272
	N	12	12	15	15	12	12	10	10
	value of *r*	-0,476	-0,388	0,128	-0,020	0,259	0,359	-0,341	0,271
Hip - Lateral rotators	value of *p*	0,118	0,213	0,651	0,945	0,417	0,477	0,336	0,448
	N	12	12	15	15	12	12	10	10
	value of *r*	-0,349	-0,276	0,098	-0,052	0,056	0,564	-0,443	0,096
Hip - Medial rotators	value of *p*	0,266	0,385	0,729	0,855	0,863	0,056	0,200	0,791
	N	12	12	15	15	12	12	10	10

**. Correlation is significant at the 0.01 level (value of *p*).

*. Correlation is significant at the 0.05 level (value of *p*).

4 DISCUSSÃO GERAL

Esse estudo teve por objetivo, inicialmente, (Artigo 1) avaliar a confiabilidade e o mínimo valor clínico detectável do índice Gait Profile Score, como um discriminador do perfil geral de marcha. Tal índice está pautado, sobretudo, nos movimentos dos três planos cinemáticos das articulações dos membros inferiores, em que se observa a capacidade de detectar perfis diferentes entre idosas não caidoras, caidoras e caidoras recorrentes.

O Gait Profile Score e suas sub descrições pelo Gait Variable Score apresentaram alta confiabilidade e mínimos valores clínicos detectáveis consideráveis em adultos (Tabela 3, Artigo 1), conforme evidenciados por outros autores [26–29]. No entanto, todos estes estudos abordavam patologias neurológicas.

Nesse estudo, os índices GPS e o GVS apresentaram alta confiabilidade, no público idoso hígido, sem desordens neurológicas. Essa vertente contribui com um índice geral que incorpora a cinemática dos três planos, com dados de cada articulação a cada 2% do ciclo de marcha [30]. Sendo, portanto, esses índices, facilitadores para o diagnóstico dos distúrbios de marcha em idosos hígidos, considerando a complexidade desta analise [22].

Posteriormente, encontrou-se um score mais elevado no GPS e GVS em todas as idosas, refletindo em uma qualidade de marcha deficitária em comparação às mulheres jovens.

A hipótese desse estudo, buscou identificar diferenças entre o grupo controle composto por mulheres jovens, e o grupo estudo, composto por idosas estratificadas de acordo com o histórico de quedas. Não obstante, os resultados apresentados no artigo 1 refutaram essa hipótese de diferenças desse perfil em função do histórico de quedas. A análise quanto ao perfil de marcha entre idosas que nunca caíram, que caíram uma única vez, nos últimos doze meses, e aquelas com quedas recorrentes, não identificou diferenças no perfil geral e, tampouco, para cada descrição do GVS (Tabela 2, Artigo 1). Curiosamente, nos três grupos de idosas, a articulação do quadril foi a que mais corroborou na piora do perfil de marcha; fato este, também, encontrado por Hafer and Boyer [31] por metodologias diferentes.

As influências de variáveis de risco de queda como a idade [32], comprimento da passada [33] e velocidade de marcha [34–36] sobre o perfil de marcha, apresentaram-se diferentes em cada um dos grupos. Destaca-se que, na comparação entre os grupos de idosas, aquelas não caidoras foram as que mais sofreram influência dessas variáveis, em comparação às caidoras recorrentes, as quais não apresentaram nenhuma correlação significativa em função das mesmas condições supracitadas(Tabela 4, Artigo 1). Os achados destacaram ainda, que o distúrbio multifatorial da marcha [22], nas quais outras variáveis, como as psicogênicas[21], tem relação explicáveis para este perfil.

Os resultados do artigo 1 conduziram os questionamentos que determinaram a investigação exposta no artigo 2.

O artigo 2 realizou, um ensaio clínico não randomizado, cujo objetivo foi investigar o padrão de marcha de idosas com e sem histórico de queda, associado ao alto e baixo medo de cair, quando expostas a um fator perturbador.

Nesse artigo, a análise da marcha pré-perturbação apresentou nas idosas não caidoras e com alto medo de cair (NonFall-HFOF) menores valores do comprimento do passo, passada e velocidade de marcha. No entanto, após essa perturbação, a diferença permaneceu apenas no comprimento da passada (Tabela 1, Suplemento A, Artigo 2). A partir desse contexto, não houve diferença entre o perfil de marcha nos grupos pré-exposição. Porém, depois dessa exposição, o grupo NonFall-HFOF, novamente, foi o que apresentou maior grau de variação (Tabela 2, Suplemento A, Artigo 2).

A análise dos parâmetros espaço-temporais intragrupo pré e pós perturbação observou modificações que corroboraram com outros estudos [37,38], quanto à adoção de um padrão cauteloso promovido pelo medo de cair [18,39].

Passada a perturbação, observou-se que houve um aumento da variação, principalmente, nas articulações de quadril e joelho em todos os grupos (Tabelas 3 e 4, Artigo 2), sendo estas as que mais contribuíram para a piora da qualidade de marcha na comparação entre os momentos pré e pós perturbação. Achados similares da variação angular dessas articulações estão relacionados ao medo de cair [40,41], devido à necessidade de se adaptarem a uma perturbação ou obstáculo iminente [40]. O medo de cair potencializa tanto em idosos caidores quanto não caidores, um padrão postural antecipatório a perturbações [42], ao mesmo tempo , o medo produz uma sensação ilusória de capacidade motora nos idosos [43].

Ao analisar a influência de outros fatores preditores do risco de queda sobre a qualidade de marcha pré e pós exposição, a única relação encontrada foi com a força muscular de flexores e de extensores de quadril, e com os músculos flexores de joelho (mensurada na CVIM, pelo dinamometro Laffayete Instrument ®). Entretanto, tal relação só foi observada nos grupos com baixo medo de queda, reforçando os achados de Toebes e colaboradores [39], nos quais não há relação entre a força muscular e o medo de cair.

Os resultados pós perturbação chamam a atenção para dois grupos em especial: primeiramente idosas que nunca vivenciaram a queda, porém possuem alto medo de cair, adotaram um padrão de cautela e pioraram a qualidade de marcha tanto quanto as idosas caidoras com medo de caírem. Em uma segunda análise, idosas que já caíram e, ainda, possuem alto medo de caírem e apresentam um padrão de cautela e redução da qualidade de marcha, independente da exposição ou não a um agente perturbador.

Novos estudos como de Scheffers-Barnhoorn [44] buscam utilizar intervenções sobre o medo de cair, almejando resultados melhores de funcionalidade, porém, ainda sem grande sucesso. Os achados dessa dissertação, expressos nos artigos 1 e 2, despertam, ainda, a importância de estudos sobre as estratégias de intervenção para a redução do risco de quedas em idosos.

A associação do medo de cair, com o histórico de quedas, permitiu compreender uma adaptação neuromotora com o intuito de proteger o indivíduo à queda. Porém, os resultados mostraram que não há sucesso nessa estratégia. O padrão de cautela promovido pelo medo de cair é um fator de proteção ilusório para os idosos. Outros estudos evidenciam que a cautela, apresentada por na marcha por meio da redução da velocidade [34,36,45], aumento do período de estabilidade na fase de apoio [33,34], redução do comprimento da passada [33], na verdade são potencializadores do aumento do risco de queda. Com o fito de reduzir o risco de queda, através de intervenções sobre a marcha, o objetivo deve ser aumentar a velocidade [46].

A partir dos achados de ambos os artigos trabalhados nessa temática, a pesquisa buscará avançar analisando o comportamento cortical em situações de perturbação e a relação com o histórico de queda e medo de cair. Assim, primeiramente, buscar-se-á levantar dados do comportamento neuromotor. Posteriormente, a partir da junção dos achados neuromotores e musculoesqueléticos, investigar-se-á as intervenções terapêuticas que contribuirão na prevenção do risco de queda, considerando o medo de cair em suas aplicações.

5 CONCLUSÕES

- O Gait Profile Score apresenta alta confiabilidade intra-sessão em mulheres idosas.
- Qualidade de marcha mensurada pelo GPS e variações do GVS não são diferentes entre idosas não caidoras, caidoras e caidoras recorrentes.
- As articulações do quadril e joelho são as principais responsáveis na piora da qualidade de marcha pré e pós perturbação.
- A soma do histórico de queda e medo de cair durante perturbação revela um perfil de marcha "cauteloso", que promove potencialização do risco de queda.
- O medo de cair produz adaptações do perfil de marcha em mulheres idosas, sem inter-relações com outros preditores de queda como idade, IMC, nível cognitivo, força muscular e histórico de queda.

REFERÊNCIAS

1. Hauer K, Lamb SE, Jorstad EC, Todd C, Becker C. Systematic review of definitions and methods of measuring falls in randomised controlled fall prevention trials. Age Ageing. 2006;35(1):5–10.

2. Kellogg International Work Group. The prevention of falls in later life. A report of the Kellogg International Work Group on the prevention of falls by the elderly. Dan Med Bull. 1987;34(Supl 4):1–24.

3. Kenny RA, Romero-Ortuno R, Kumar P. Falls in older adults. Medicine (Baltimore). 2017;45(1):28–33.

4. Penzer F, Duchateau J, Baudry S. Effects of short-term training combining strength and balance exercises on maximal strength and upright standing steadiness in elderly adults. Exp Gerontol. 2015;61:38–46.

5. Macaulay R, Allaire T, Brouillette RM, Foii HC, Bruce-Kelle A, Han H. Longitudinal assessment of neuropsychological and temporal/spatial gait characteristics of elderly fallers: taking it all in stride. Front Aging Neurosci. 2015;7:1–7.

6. Prata MG, Scheicher ME. Effects of strength and balance training on the mobility, fear of falling and grip strength of elderly female fallers. J Bodyw Mov Ther. 2014;1–5.

7. Kabeshova A, Annweiler C, Fantino B, Philip T, Gromov VA, Launay CP, et al. A regression tree for identifying combinations of fall risk factors associated to recurrent falling: A cross-sectional elderly population-based study. Aging Clin Exp Res. 2014;26(3):331–6.

8. Cuevas-Trisan R. Balance Problems and Fall Risks in the Elderly. Clin Geriatr Med. 2019;35(2):173–83.

9. Bhala RP, O'Donnell J, Thoppil E. Ptophobia: Phobic fear of falling and its clinical management. Phys Ther. 1982;62(2):187–90.

10. Malini FM, Lopes CS, Lourenço RA. Medo de quedas em idosos: uma revisão

da literatura. Rev HUPE. 2014;13(2):38–44.

11. Lachman ME, Howland J, Tennstedt S, Jette A, Assmann S, Peterson EW. Fear of Falling and Activity Restriction: The Survey of Activities and Fear of Falling in the Elderly (SAFE). Journals Gerontol Ser B Psychol Sci Soc Sci. 1998;53B(1):P43–50.

12. Hadjistavropoulos T, Delbaere K, Fitzgerald TD. Reconceptualizing the Role of Fear of Falling and Balance Confidence in Fall Risk. J Aging Health. 2011;23(1):3–23.

13. Schooten KS Van, Pijnappels M, Rispens SM, Elders PJM. Daily-Life Gait Quality as Predictor of Falls in Older People : A 1-Year Prospective Cohort Study. PLoS One. 2016;11(7):1–13.

14. Landers MR, Oscar S, Sasaoka J, Vaughn K. Balance Confidence and Fear of Falling Avoidance Behavior Are Most Predictive of Falling in Older Adults: Prospective Analysis. Phys Ther. 2015;1–9.

15. Richardson JK. Imbalanced: The Confusing Circular Nature of Falls Research.and a Possible Antidote. Am J Phys Med Rehabil. 2017;96(1):55–9.

16. Terrier P, Reynard F. Effect of age on the variability and stability of gait: a cross-sectional treadmill study in healthy individuals between 20 and 69 years of age. Gait Posture. 2015;41(1):170–4.

17. Ribeiro DM, Bueno GAS, Gervásio FM, Menezes RL De. Foot-ground clearance characteristics in women: A comparison across different ages. Gait Posture. 2019;69(May 2018):121–5.

18. Yang F, Kim J, Munoz J. Adaptive Gait Responses To Awareness of an Impending Slip During Treadmill Walking. Gait Posture. 2016;

19. Meurisse GM, Bastien GJ. Effect of speed on the weight transfer between legs during gait in elderly people. Gait Posture. 2016;49:46.

20. Howcroft J, Kofman J, Lemaire ED, McIlroy WE. Analysis of Dual-Task Elderly Gait in Fallers and Non-Fallers using Wearable Sensors. J Biomech. 2016;49(7):992–1001.

21. Lempert T, Brandt T, Dieterich M, Huppert D. How to identify psychogenic disorders of stance and gait. J Neurol. 1991;238:140–6.

22. Ronthal M. Gait Disorders and Falls in the Elderly. Med Clin North Am. 2019;103(2):203–13.

23. Avin KG, Hanke TA, Kirk-Sanchez N, McDonough CM, Shubert TE, Hardage J, et al. Management of Falls in Community-Dwelling Older Adults: Clinical Guidance Statement From the Academy of Geriatric Physical Therapy of the American Physical Therapy Association. Phys Ther. 2015;95(6):815–34.

24. Drootin M. Summary of the updated american geriatrics society/british geriatrics society clinical practice guideline for prevention of falls in older persons. J Am Geriatr Soc. 2011;59:148–57.

25. Sherrigton C, Tiedemann A. Physiotherapy in the prevention of falls in older people. J Physiother. 2015;61(2):53–60.

26. Devetak GF, Martello SK, de Almeida JC, Correa KP, Iucksch DD, Manffra EF. Reliability and minimum detectable change of the gait profile score for post-stroke patients. Gait Posture. 2016;49:382–7.

27. Speciali DS, Oliveira EM, Cardoso JR. Gait profile score and movement analysis profile in patients with Parkinson ' s disease during concurrent cognitive load. Brazilian J Phys Ther. 2014;18(4):315–22.

28. Sims DT, Burden A, Payton C, Morse CI. A quantitative description of self-selected walking in adults with Achondroplasia using the gait profile score. Gait Posture. 2019;68(November 2018):150–4.

29. Pau M, Coghe G, Atzeni C, Corona F, Pilloni G, Giovanna M, et al. Novel characterization of gait impairments in people with multiple sclerosis by means of the gait pro fi le score. J Neurol Sci. 2014;345(1–2):159–63.

30. Baker R, Mcginley JL, Schwartz MH, Beynon S, Rozumalski A, Graham HK, et al. The Gait Profile Score and Movement Analysis Profile. Gait Posture. 2009;30:265–9.

31. Hafer JF, Boyer KA. Age related differences in segment coordination and its

variability during gait. Gait Posture. 2018;62(July 2017):92–8.

32. Lim E. Original Article Sex Differences in Fear of Falling among Older Adults with Low Grip Strength. Iram J Public Heal. 2016;45(5):569–77.

33. Marques NR, Spinoso DH, Cardoso BC, Christianini V, Hiromi M, Tavella M. Is it possible to predict falls in older adults using gait kinematics ? Clin Biomech. 2018;59:15–8.

34. Callisaya ML, Blizzard L, Schmidt MD, L MK, Mcginley JL, Sanders LM, et al. Gait , gait variability and the risk of multiple incident falls in older people : a population-based study. Age Ageing. 2011;40:481–7.

35. Studenski S, Perera S, Patel K, Rosano C, Faulkner K, Inzitari M, et al. Gait speed and survival in older adults. JAMA. 2011;305(1):50–8.

36. Kyrdalen IL, Thingstad P, Sandvik L, Ormstad H. Associations between gait speed and well - known fall risk factors among community - dwelling older adults. Phys Res Int. 2018;24(1):1–6.

37. Moreira BDS, Sampaio RF, Bergamas- J, Diz M, Bastone ADC, Ferriolli E, et al. Factors associated with fear of falling in community-dwelling older adults with and without diabetes mellitus: findings from the Frailty in Brazilian Older People Study (FIBRA-BR). Exp Gerontol. 2017;

38. Asai T, Misu S, Sawa R, Doi T, Yamada M. The association between fear of falling and smoothness of lower trunk oscillation in gait varies according to gait speed in community-dwelling older adults. J Neuroeng Rehabil. 2017;14(5):1–9.

39. Toebes MJP, Hoozemans MJM, Furrer R, Dekker J. Associations between measures of gait stability , leg strength and fear of falling. Gait Posture. 2015;41:76–80.

40. Roos PE, Dingwell JB. Influence of simulated neuromuscular noise on movement variability and fall risk in a 3D dynamic walking model. J Biomech. 2010;43(15):2929–35.

41. Chiu S, Chou L. Variability in inter-joint coordination during walking of elderly

adults and its association with clinical balance measures. Clin Biomech. 2013;28(4):454–8.

42. Le Mouel C, Tisserand R, Robert T, Brette R. Postural adjustments in anticipation of predictable perturbations allow elderly fallers to achieve a balance recovery performance equivalent to elderly non-fallers. Gait Posture. 2019;71(April):131–7.

43. Grenier S, Richard-devantoy S, Nadeau A, Payette M, Benyebdri F, Duhaime MB, et al. The association between fear of falling and motor imagery abilities in older community-dwelling individuals. Maturitas. 2018;110(December 2017):18–20.

44. Scheffers-Barnhoorn MN, van Eijk M, van Haastregt JCM, Schols JMGA, van Balen R, van Geloven N, et al. Effects of the FIT-HIP Intervention for Fear of Falling After Hip Fracture: A Cluster-Randomized Controlled Trial in Geriatric Rehabilitation. J Am Med Dir Assoc. 2019;1–9.

45. Studenski S, Faulkner K, Inzitari M, Brach J, Chandler J, Cawthon P, et al. Gait Speed and Survival in Older Adults. J Am Med Assoc. 2011;305(1):50–8.

46. Cho J, Smith ML, Shubert TE, Jiang L, Ahn S, Ory MG. Gait speed among older participants enrolled in an evidence-based fall risk reduction program: a subgroup analysis. Front Public Heal. 2015;3(April):1–7.

ANEXOS

Anexo 1 – APROVAÇAO DO COMITÉ DE ÉTICA

UNB - FACULDADE DE
CEILÂNDIA DA UNIVERSIDADE
DE BRASÍLIA

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: MAPEAMENTO CEREBRAL E PADRÃO BIOMECÂNICO DA MARCHA DE MULHERES EXPOSTAS AO MEDO DE QUEDA

Pesquisador: Guilherme Augusto Santos

Área Temática:

Versão: 1

CAAE: 67284917.2.0000.8093

Instituição Proponente: PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS E TECNOLOGIAS EM

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 2.083.674

Anexo 2 - Normas de publicação do periódico GAIT & POSTURE

GUIDE FOR AUTHORS

Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details: E-mail address Full postal address

All necessary files have been uploaded:
Manuscript: Include 3-5 keywords Include a structured abstract (see below for format) All figures (include relevant captions) All tables (including titles, description, footnotes) Ensure all figure and table citations in the text match the files provided Indicate clearly if color should be used for any figures in print
Graphical Abstracts / Highlights files (where applicable)
Supplemental files (where applicable)

Further considerations Manuscript has been 'spell checked' and 'grammar checked' All references mentioned in the Reference List are cited in the text, and vice versa Permission has been obtained for use of copyrighted material from other sources (including the Internet) A competing interests statement is provided, even if the authors have no competing interests to declare Journal policies detailed in this guide have been reviewed Referee suggestions and contact details provided, Based on journal requirements For further information, visit our Support Center Support Center.

BEFORE YOU BEGIN

Ethics in publishing

Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Declaration of interest

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/ registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

Submission declaration and verification

Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

Preprints

Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple, redundant or concurrent publication' for more information).

Contributors

Each author is required to declare his or her individual contribution to the article: all authors must have materially participated in the research and/or article preparation, so roles for all authors should be described. The statement that all authors have approved the final article should be true and included in the disclosure.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 4

Authorship

All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Changes to authorship

Authors are expected to consider carefully the list and order of authors **before** submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only **before** the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the **corresponding author**: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.

Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors **after** the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

Clinical trial results

In line with the position of the International Committee of Medical Journal Editors, the journal will not consider results posted in the same clinical trials registry in which primary registration resides to be prior publication if the results posted are presented in the form of a brief structured (less than 500 words) abstract or table. However, divulging results in other circumstances (e.g., investors' meetings) is discouraged and may jeopardise consideration of the manuscript. Authors should fully disclose all posting in registries of results of the same or closely related work.

Article transfer service

This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. More information.

Copyright

Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (more information). Permitted third party reuse of gold open access articles is determined by the author's choice of user license.

Author rights

As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Elsevier supports responsible sharing

Find out how you can share your research published in Elsevier journals.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 5

Role of the funding source

You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.

Funding body agreements and policies

Elsevier has established a number of agreements with funding bodies which allow authors to comply with their funder's open access policies. Some funding bodies will reimburse the author for the gold open access publication fee. Details of existing agreements are available online.
After acceptance, open access papers will be published under a noncommercial license. For authors requiring a commercial CC BY license, you can apply after your manuscript is accepted for publication.

Open access

This journal offers authors a choice in publishing their research:

Subscription

• Articles are made available to subscribers as well as developing countries and patient groups through our universal access programs.
• No open access publication fee payable by authors.
• The Author is entitled to post the accepted manuscript in their institution's repository and make this public after an embargo period (known as green Open Access). The published journal article cannot be shared publicly, for example on ResearchGate or Academia.edu, to ensure the sustainability of peer- reviewed research in journal publications. The embargo period for this journal can be found below. ***Gold open access***

• Articles are freely available to both subscribers and the wider public with permitted reuse.
• A gold open access publication fee is payable by authors or on their behalf, e.g. by their research funder or institution.

Regardless of how you choose to publish your article, the journal will apply the same peer review criteria and acceptance standards.

For gold open access articles, permitted third party (re)use is defined by the following Creative Commons user licenses:

Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)

For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

The gold open access publication fee for this journal is **USD 3500**, excluding taxes. Learn more about Elsevier's pricing policy: https://www.elsevier.com/openaccesspricing.

Green open access

Authors can share their research in a variety of different ways and Elsevier has a number of green open access options available. We recommend authors see our green open access page for further information. Authors can also self-archive their manuscripts immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications. Embargo period: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before an article becomes freely available to the public. This is the embargo period and it begins from the date the article is formally published online in its final and fully citable form. Find out more.

This journal has an embargo period of 12 months.

Elsevier Researcher Academy

Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 6

Language (usage and editing services)

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's WebShop.

Submission

Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

Submit your article

Please submit your article via https://www.evise.com/profile/api/navigate/GAIPOS.

PREPARATION

Peer review

This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. More information on types of peer review.

Introduction

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

1. Article types accepted are: Original Article (Full paper or Short Communication), Review Article, Book Review. Word limits are as follows: Full paper 3,000 words plus no more than 6 figures/tables in total; Short Communication 1,200 words plus no more than 3 figures/tables in total. The word limits are non-inclusive of figures, tables, references, and abstracts. If the Editor feels that a paper submitted as a Full Paper would be more appropriate for the Short Communications section, then a shortened version will be requested. References should be limited to 30 for Full Papers and Reviews and 15 for Short Papers. A structured abstract of no more than 300 words should appear at the beginning of each Article. The recommended word limit for Review Papers is 6,000 words. Authors must state the number of words when submitting.

2. All publications will be in English. Authors whose 'first' language is not English should arrange for their manuscripts to be written in idiomatic English **before** submission. A concise style avoiding jargon is preferred.

3. Authors should supply up to five keywords that may be modified by the Editors.

4. Authors should include a structured abstract of no more than 300 words including the following headings: Background, Research question, Methods, Results and Significance. The scientific and clinical background should be explained in 1-2 sentences. One clear scientifically relevant question should be derived from the background which represents the principle research question of the paper. The Methods section should summarise the core study methodology including the type of study (prospective/retrospective, intervention etc), procedures, number of participants and statistical methods. The Results section should summarise the study's main findings. The Significance section should place the results into context. Furthermore this section should highlight the clinical and/or scientific importance of the work, answering the question "so what?" This section should not simply repeat the study results or conclusions.

5. Acknowledgements should be included in the title page. Include external sources of support.

6. The text should be ready for setting in type and should be carefully checked for errors. Scripts should be typed double-spaced on one side of the paper only. Please do not underline anything, leave wide margins and number every sheet.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 7

7. All illustrations should accompany the typescript, but not be inserted in the text. Refer to photographs, charts, and diagrams as 'figures' and number consecutively in order of appearance in the text. Substantive captions for each figure explaining the major point or points should be typed on a separate sheet.

8. Tables should be presented on separate sheets of paper and labelled consecutively but the captions should accompany the table.

9. Authors should also note that files containing text, figures, tables or multimedia data can be placed in a supplementary data file which will be accessible via ScienceDirect (see later section for further details).

10. When submitting your paper please ensure that you separate any identifying author or institution of origin names and details and place them in the title page (with authors and addresses). Submissions including identifying details in the manuscript text will be returned to the author.

What information to include with the manuscript

Having read the criteria for submissions, authors should specify in their letter of transmittal whether they are submitting their work as an Original Article (Full Paper or Short Communication), Review Article, or Book Review. Emphasis will be placed upon originality of concept and execution. Only papers not previously published will be accepted. Comments regarding articles published in the Journal are solicited and should be sent as "Letter to the Editor". Such Letters are subject to editorial review. They should be brief and succinct. When a published article is subjected to comment or criticism, the authors of that article will be invited to write a letter or reply.

A letter of transmittal must include the statement, "Each of the authors has read and concurs with the content in the final manuscript. The material within has not been and will not be submitted for publication elsewhere except as an abstract." The letter of transmittal must be from all co-authors. All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

All contributors who do not meet the criteria for authorship as defined above should be listed in an acknowledgements section. Examples of those who might be acknowledged include a person who provided purely technical help, writing assistance, or a department chair who provided only general support. Authors should disclose whether they had any writing assistance and identify the entity that paid for this assistance.

Work on human beings that is submitted to *Gait & Posture* should comply with the principles laid down in the Declaration of Helsinki; Recommendations guiding physicians in biomedical research involving human subjects. Adopted by the 18th World Medical Assembly, Helsinki, Finland, June 1964, amended by the 29th World Medical Assembly, Tokyo, Japan, October 1975, the 35th World Medical Assembly, Venice, Italy, October 1983, and the 41st World Medical Assembly, Hong Kong, September 1989. The manuscript should contain a statement that the work has been approved by the appropriate ethical committees related to the institution(s) in which it was performed and that subjects gave informed consent to the work. Studies involving experiments with animals must state that their care was in accordance with institution guidelines. Patients' and volunteers' names, initials, and hospital numbers should not be used.

At the end of the text, under a subheading "Conflict of interest statement" all authors must disclose any financial and personal relationships with other people or organisations that could inappropriately influence (bias) their work. Examples of potential conflicts of interest include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/ registrations, and grants or other funding.

All sources of funding should be declared as an acknowledgement. Authors should declare the role of study sponsors, if any, in the study design, in the collection, analysis and interpretation of data; in the writing of the manuscript; and in the decision to submit the manuscript for publication. If the study sponsors had no such involvement, the authors should so state.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 8

Authors are encouraged to suggest referees although the choice is left to the Editors. If you do, please supply their postal address and email address, if known to you.

Please note that papers are subject to single-blind review whereby authors are blinded to reviewers.

Randomised controlled trials

All randomised controlled trials submitted for publication in *Gait & Posture* should include a completed Consolidated Standards of Reporting Trials (CONSORT) flow chart. Please refer to the CONSORT statement website at http://www.consort-statement.org for more information. The Journal has adopted the proposal from the International Committee of Medical Journal Editors (ICMJE) which require, as a condition of consideration for publication of clinical trials, registration in a public trials registry. Trials must register at or before the onset of patient enrolment. The clinical trial registration number should be included at the end of the abstract of the article. For this purpose, a clinical trial is defined as any research project that prospectively assigns human subjects to intervention or comparison groups to study the cause-and-effect relationship between a medical intervention and a health outcome. Studies designed for other purposes, such as to study pharmacokinetics or major toxicity (e.g. phase I trials) would be exempt. Further information can be found at http://www.icmje.org.

Review and Publication Process

1. You will receive an acknowledgement of receipt of the manuscript by the Editorial Office before the manuscript is sent to referees. Please contact the Editorial Office if you do not receive an acknowledgement.

Following assessment one of the following will happen:

A: The paper will be accepted directly. The corresponding author will be notified of acceptance by e-mail or letter. The Editor will send the accepted paper to Elsevier for publication.

B: The paper will be accepted subject to minor amendments. The corrections should be made and the paper returned to the Editor for checking. Once the paper is accepted it will be sent to production.

C: The paper will be rejected outright as being unsuitable for publication in *Gait and Posture*.
2. By submitting a manuscript, the authors agree that the copyright for their article is transferred to

the publisher if and when the article is accepted for publication. (http://www.elsevier.com/copyright).

3. Page proofs will be sent to the corresponding author for correction, although at this stage any changes should be restricted to typographical errors. Other than these, any substantial alterations may be charged to the authors. Proofs will be sent preferably by e-mail as a PDF file (although they can be sent by overland post) and must be rapidly checked and returned. Please ensure that all corrections are sent back in one communication. Subsequent corrections will not be possible.

4. An order form for reprints will accompany the proofs.

Essential title page information

• ***Title.*** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• ***Author names and affiliations.***Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.

• ***Corresponding author.***Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 9

• ***Present/permanent address.***If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Highlights

Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and make sure to strictly adhere to the following specifications: include 3 to 5 bullet points (maximum 85 characters (not words), including spaces, per bullet point). See http://www.elsevier.com/highlights for examples.

Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Formatting of funding sources

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Artwork

Electronic artwork
*General points*Make sure you use uniform lettering and sizing of your original artwork.Embed the used fonts if the application provides that option. Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.Number the illustrations according to their sequence in the text.Use a logical naming convention for your artwork files. Provide captions to illustrations separately.Size the illustrations close to the desired dimensions of the printed version.Submit each illustration as a separate file.A detailed guide on electronic artwork is available.**You are urged to visit this site; some excerpts from the detailed information are given here.**

Formats

If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format. Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/ halftone combinations given below):

EPS (or PDF): Vector drawings, embed all used fonts.
TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 10

Please do not: Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;Supply files that are too low in resolution;Submit graphics that are disproportionately large for the content;Supply more than 6 figures per manuscript.

References

Indicate references to the literature in the text by superior Arabic numerals that run consecutively through the paper in order of their appearance. Where you cite a reference more than once in the text, use the same number each time. References should take the following form:
1. Amis AA, Dawkins GPC. Functional anatomy of the anterior cruciate ligament. J Bone Joint Surg [Br] 1991; 73B: 260-267

2. Insall JN. Surgery of the Knee. New York: Churchill Livingstone; 1984
3. Shumway-Cook A, Woollacott M. Motor Control: Theory and Practical Applications. Baltimore: Williams and Wilkins; 1995.

Please ensure that references are complete, i.e. that they include, where relevant, author's name, article or book title, volume and issue number, publisher, year and page reference *and* comply with the reference style of *Gait Posture*. Only salient and significant references should be included.

Data references

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

Reference management software

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley and Zotero, as well as EndNote. Using the word processor plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes.

Reference style
Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.
Example: '.....as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result ....'
List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.
Examples:
Reference to a journal publication:
[1] J. van der Geer, J.A.J. Hanraads, R.A. Lupton, The art of writing a scientific article, J. Sci. Commun. 163 (2010) 51–59.
Reference to a book:
[2] W. Strunk Jr., E.B. White, The Elements of Style, fourth ed., Longman, New York, 2000. Reference to a chapter in an edited book:
[3] G.R. Mettam, L.B. Adams, How to prepare an electronic version of your article, in: B.S. Jones, R.Z. Smith (Eds.), Introduction to the Electronic Age, E-Publishing Inc., New York, 2009, pp. 281–304.
Reference to a website:
[4] Cancer Research UK, Cancer statistics reports for the UK. http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/, 2003 (accessed 13 March 2003).
Reference to a dataset:
[dataset] [5] M. Oguro, S. Imahiro, S. Saito, T. Nakashizuka, Mortality data for Japanese oak wilt disease and surrounding forest compositions, Mendeley Data, v1, 2015. https://doi.org/10.17632/xwj98nb39r.1.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 11

AudioSlides

The journal encourages authors to create an AudioSlides presentation with their published article. AudioSlides are brief, webinar-style presentations that are shown next to the online article on ScienceDirect. This gives authors the opportunity to summarize their research in their own words and to help readers understand what the paper is about. More information and examples are available. Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

Data visualization

Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data

This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

Data linking

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Mendeley Data

This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. Before submitting your article, you can deposit the relevant datasets to *Mendeley Data*. Please include the DOI of the deposited dataset(s) in your main manuscript file. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the Mendeley Data for journals page.

AUTHOR INFORMATION PACK 12 May 2018 www.elsevier.com/locate/gaitpost 12

Data statement

To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

AFTER ACCEPTANCE

Online proof correction

Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.

If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.
We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

Offprints

The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier's Webshop. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

AUTHOR INQUIRIES

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.
You can also check the status of your submitted article or find out when your accepted article will be published.

Anexo 3 - Normas de publicação do periódico FRONTIERS IN NEUROLOGY

Manuscript Guidelines

Open access and copyright

All Frontiers articles from July 2012 onwards are published with open access under the CC-BY Creative Commons attribution license (the current version is CC-BY, version 4.0 http://creativecommons.org/licenses/by/4.0/). This means that the author(s) retain copyright, but the content is free to download, distribute and adapt for commercial or non-commercial purposes, given appropriate attribution to the original article.

Upon submission, author(s) grant Frontiers an exclusive license to publish, including to display, store, copy and reuse the content. The CC-BY Creative Commons attribution license enables anyone to use the publication freely, given appropriate attribution to the author(s) and citing Frontiers as the original publisher. The CC-BY Creative Commons attribution license does not apply to third-party materials that display a copyright notice to prohibit copying. Unless the third-party content is also subject to a CC-BY Creative Commons attribution license, or an equally permissive license, the author(s) must comply with any third-party copyright notices.

Preprint Policy

Frontiers' supportive preprint policy encourages full open access at all stages of a research paper, to share and generate the knowledge researchers need to support their work. Authors publishing in Frontiers journals may share their work ahead of submission to a peer-reviewed journal, as well as during the Frontiers review process, on repositories or pre-print servers (such as ArXiv, PeerJ Preprints, OSF and others), provided that the server imposes no restrictions upon the author's full copyright and re-use rights. Also note that any manuscript files shared after submission to Frontiers journals, during the review process, must not contain the Frontiers logo or branding.

Correct attribution of the original source in repositories or pre-print servers must be included on submission, or added at re-submission if the deposition is done during the review process.

If the article is published, authors are then strongly encouraged to link from the preprint server to the Frontiers publication to enable readers to find, access and cite the final peer-reviewed version. Please note that we cannot consider for publication content that has been previously published, or is already under review, within a scientific journal, book or similar entity.

Registration with Frontiers

Please note that the corresponding and all submitting authors MUST register with Frontiers before submitting an article. You must be logged in to your personal Frontiers Account to submit an article.

For any co-author who would like his/her name on the article abstract page and PDF to be linked to a Frontiers profile on the Loop network, please ensure to register before the final publication of the paper.

Manuscript Requirements and Style Guide

General standards

WORD FILES

IF WORKING WITH WORD PLEASE USE FRONTIERS WORD TEMPLATES.

LATEX FILES

If you wish to submit your article as LaTeX, we recommend our Frontiers LaTeX templates. These templates are meant as a guide, you are of course welcome to use any style or formatting and Frontiers journal style will be applied during typesetting.

ARTICLE TYPE

Frontiers requires authors to carefully select the appropriate article type for their manuscript, and to comply with the article-type descriptions defined in the journal's "Article Types", which can be seen from the "For Authors" menu on any Frontiers journal page. Please note that not all articles types are available for all journals/specialties. Please contact us if you have any questions. **Please pay close attention to the word count limits.**

Focused Reviews, Frontiers Commentaries and Grand Challenge articles are invited by the chief editor and cannot be part of any Frontiers Research Topic. Unless you were contacted by the chief editor or the editorial office regarding the submission of a paper selected for tier 2 promotion, do not submit a Focused Review or a Frontiers Commentary - instead, submit a Review or a General Commentary.

Please see Additional Requirements for specific article types including Focused Reviews, General Commentaries, Protocols and Data Reports.

MANUSCRIPT LENGTH

Frontiers encourages its authors to closely follow the article word count lengths given in the Summary Table. The manuscript length includes only the main body of the text, footnotes and all citations within it, and excludes abstract, section titles, figure and table captions, funding statements, acknowledgments and references in the bibliography. Please indicate the number of words and the number of figures included in your manuscript on the first page.

LANGUAGE EDITING

Frontiers requires manuscripts submitted to meet international standards for English language to be considered for publication.

For authors who would like their manuscript to receive language editing or proofing to improve the clarity of the manuscript and help highlight their research, Frontiers recommends the language-editing services provided by the following external partners:

Editage

Frontiers is pleased to recommend language-editing service provided by our external partner Editage to authors who believe their manuscripts would benefit from professional editing. These services may be particularly useful for researchers for whom English is not the primary language. They can help to improve the grammar, syntax and flow of your manuscripts prior to submission. Frontiers authors will receive a 10% discount by visiting the following link: http://editage.com/frontiers/

The Charlesworth Group

Frontiers recommends the Charlesworth Group Author Services, who has a long standing track record in language editing and proofing. This is a third-party service for which Frontiers authors will receive a discount by visiting the following link: http://www.charlesworthauthorservices.com/~Frontiers.

Note that sending your manuscript for language editing does not imply or guarantee that it will be accepted for publication by a Frontiers journal. Editorial decisions on the scientific content of a manuscript are independent of whether it has received language editing or proofing by the partner services, or other services.

LANGUAGE STYLE

The default language style at Frontiers is American English. If you prefer your article to be formatted in British English, please specify this on your manuscript first page. For any questions regarding style Frontiers recommends authors to consult the Chicago Manual of Style.

SEARCH ENGINE OPTIMIZATION (SEO)

There are a few simple ways to maximize your article's discoverability. Follow the steps below to improve search results of your article:

- Include a few of your article's keywords in the title of the article;
- Do not use long article titles;
- Pick 5 to 8 keywords using a mix of generic and more specific terms on the article subject(s);
- Use the maximum amount of keywords in the first 2 sentences of the abstract;
- Use some of the keywords in level 1 headings.

TITLE

The title is written in title case, centred, and in 16 point bold Times New Roman font at the top of page.

The title should be concise, omitting terms that are implicit and, where possible, be a statement of the main result or conclusion presented in the manuscript. Abbreviations should be avoided within the title.

Witty or creative titles are welcome, but only if relevant and within measure. Consider if a title meant to be thought-provoking might be misinterpreted as offensive or alarming. In extreme cases, the editorial office may veto a title and propose an alternative.

Authors should try to avoid, if possible:

- Titles that are a mere question without giving the answer.
- Unambitious titles, for example starting with "Towards", "A description of", "A characterization of", "Preliminary study on".
- Vague titles, for example starting with "Role of...", "Link between...", "Effect of..." that do not specify the role, link, or effect.
- Include terms that are out of place, for example the taxonomic affiliation apart from species name.

For Corrigenda, Book Reviews, General Commentaries and Editorials, the title of your manuscript should have the following format:

- "Corrigendum: Title of original article"
- "Book Review: Title of book"
- General Commentaries
    - "Commentary: Title of original article" (This does not apply to Frontiers Commentaries)

- "Response: Commentary: Title of original article"
- "Editorial: Title of Research Topic"

For article types requiring it, the running title should be a maximum of 5 words in length. (see Summary Table)

AUTHORS AND AFFILIATIONS

All names are listed together and separated by commas. Provide exact and correct author names as these will be indexed in official archives. Affiliations should be keyed to the author's name with superscript numbers and be listed as follows: Laboratory, Institute, Department, Organization, City, State abbreviation (USA, Canada, Australia), and Country (without detailed address information such as city zip codes or street names).

Example: Max Maximus, Department of Excellence, International University of Science, New York, NY, USA.

The Corresponding Author(s) should be marked with an asterisk. Provide the exact contact email address of the corresponding author(s) in a separate section.

Correspondence:

Dr. Max Maximus
maximus@gmail.com

If any authors wish to include a change of address, list the present address(es) below the correspondence details using a unique superscript symbol keyed to the author(s) in the author list.

CONSORTIUM/GROUP AND COLLABORATIVE AUTHORS

Consortium/group authorship should be listed in the manuscript with the other author(s). In cases where authorship is retained by the consortium/group, the consortium/group should be listed as an author separated by "," or "and". Consortium/group members can be listed in a separate section at the end of the manuscript.

Example: John Smith, Barbara Smith and The Collaborative Working Group.

In cases where work is presented by the author(s) on behalf of a consortium/group, it should be included in the manuscript author list separated with the wording "for" or "on behalf of". The consortium/group will not retain authorship.

Example: John Smith and Barbara Smith on behalf of The Collaborative Working Group.

HEADINGS AND SUB-HEADINGS

Except for special names (e.g. GABAergic), capitalize only the first letter of headings and subheadings. Headings and subheadings need to be defined in Times New Roman, 12, bold. You may insert up to 5 heading levels into your manuscript (not more than for example: 3.2.2.1.2 **Heading title**).

ABSTRACT

As a primary goal, the abstract should render the general significance and conceptual advance of the work clearly accessible to a broad readership. In the abstract, minimize the use of abbreviations and do not cite references. The text of the abstract section should be in 12 point normal Times New Roman. See Summary Table for abstract requirement and length according to article type.

For Clinical Trial article types, please include the Unique Identifier and the URL of the publicly accessible website on which the trial is registered.

KEYWORDS

All article types: you may provide up to 8 keywords; at least 5 are mandatory.

TEXT

The entire document should be single-spaced and must contain page and line numbers in order to facilitate the review process. Your manuscript should be written using either LaTeX or MS-Word.

Templates are available (see above)

NOMENCLATURE

- The use of abbreviations should be kept to a minimum. Non-standard abbreviations should be avoided unless they appear at least four times, and defined upon first use in the main text. Consider also giving a list of non-standard abbreviations at the end, immediately before the Acknowledgments.
- Equations should be inserted in editable format from the equation editor.
- Italicize Gene symbols and use the approved gene nomenclature where it is available. For human genes, please refer to the HUGO Gene Nomenclature Committee (HGNC). New gene symbols should be submitted here. Common Alternative gene aliases may also be reported, but should not be used alone in place of the HGNC symbol. Nomenclature committees for other species are listed here. Protein products are not italicized.
- We encourage the use of Standard International Units in all manuscripts.
- Chemical compounds and biomolecules should be referred to using systematic nomenclature, preferably using the recommendations by IUPAC.
- Astronomical objects should be referred to using the nomenclature given by the International Astronomical Union provided here.
- Life Science Identifiers (LSIDs) for ZOOBANK registered names or nomenclatural acts should be listed in the manuscript before the keywords. An LSID is represented as a uniform resource name (URN) with the following format: :::[:]

  For more information on LSIDs please see Inclusion of Zoological Nomenclature section.

SECTIONS

Your manuscript is organized by headings and subheadings. For Original Research Articles, Clinical Trial Articles, and Technology Reports the section headings should be those appropriate for your field and the research itself.

For Original Research Articles, it is recommended to organize your manuscript in the following sections or their equivalents for your field:

Introduction

Succinct, with no subheadings.

Materials and Methods

This section may be divided by subheadings. This section should contain sufficient detail so that when read in conjunction with cited references, all procedures can be repeated. For experiments reporting results on animal or human subject research, an ethics approval statement should be included in this section (for further information, see section Materials and Data Policies)

Results

This section may be divided by subheadings. Footnotes should not be used and have to be transferred into the main text.

Discussion

This section may be divided by subheadings. Discussions should cover the key findings of the study: discuss any prior art related to the subject so to place the novelty of the discovery in the appropriate context; discuss the potential short-comings and limitations on their interpretations; discuss their integration into the current understanding of the problem and how this advances the current views; speculate on the future direction of the research and freely postulate theories that could be tested in the future.

For further information, please see Additional Requirements for specific article types including Focused Reviews, General Commentaries, Case Reports and Data Reports amongst others or you can check the descriptions defined in the journal’s "Article Types", which can be seen from the "For Authors" menu on any Frontiers journal page.

ACKNOWLEDGMENTS

This is a short text to acknowledge the contributions of specific colleagues, institutions, or agencies that aided the efforts of the authors.

AUTHOR CONTRIBUTIONS STATEMENT

The Author Contributions Statement is mandatory and should represent all the authors. It can be up to several sentences long and should briefly describe the tasks of individual authors. Please list only 2 initials for each author, without full stops, but separated by commas (e.g. JC, JS). In the case of two authors with the same initials, please use their middle initial to differentiate between them (e.g. REW, RSW). The Author Contributions Statement should be included at the end of the manuscript before the References.

CONFLICT OF INTEREST STATEMENT

A Conflict of Interest Statement needs to be included at the end of the manuscript before the references. Here, the authors need to declare whether or not the submitted work was carried out in the presence of any personal, professional or financial relationships that could potentially be construed as a conflict of interest. For more information on conflicts of interest, see our Editorial Policies.

CONTRIBUTION TO THE FIELD STATEMENT

When you submit your manuscript, you will be required to briefly summarize in 200 words your manuscript’s contribution to, and position in, the existing literature of your field. This should be written avoiding any technical language or non-standard acronyms. The aim should be to convey the meaning and importance of this research to a non-expert. While Frontiers evaluates articles using objective criteria, rather than impact or novelty, your statement should frame the question(s) you have addressed in your work in the context of the current body of knowledge, providing evidence that the findings - whether positive or negative - contribute to progress in your research discipline. This will assist the Chief Editors to determine whether your manuscript fits within the scope of a specialty as defined in its mission statement; a detailed statement will also facilitate the identification of the Editors and Reviewers most appropriate to evaluate your work, ultimately expediting your manuscript's initial consideration.

Example Statement on: Markram K and Markram H (2010) The Intense World Theory – a unifying theory of the neurobiology of autism. Front. Hum. Neurosci. 4:224. doi: 10.3389/fnhum.2010.00224

Autism spectrum disorders are a group of neurodevelopmental disorders that affect up to 1 in 100 individuals. People with autism display an array of symptoms encompassing emotional processing, sociability, perception and memory, and present as uniquely as the individual. No theory has suggested a single underlying neuropathology to account for these diverse symptoms. The Intense World Theory, proposed here, describes a unifying pathology producing the wide spectrum of manifestations observed in autists. This theory focuses on the neocortex, fundamental for higher cognitive functions, and the limbic system, key for processing emotions and social signals. Drawing on *discoveries in animal models and neuroimaging studies in individuals with autism, we propose how a combination of genetics, toxin exposure and/or environmental stress could produce hyper-reactivity and hyper-plasticity in the microcircuits involved with perception, attention, memory and emotionality. These hyper-functioning circuits will eventually come to dominate their neighbors, leading to hyper-sensitivity to incoming stimuli, over-specialization in tasks and a hyper-preference syndrome. We make the case that this theory of enhanced brain function in autism explains many of the varied past results and resolves conflicting findings and views and makes some testable experimental predictions.*

1.1.1.1 2.3.2. References

All citations in the text, figures or tables must be in the reference list and vice-versa. The references should only include articles that are published or accepted. Data sets that have been deposited to an online repository should be included in the reference list, include the version and unique identifier when available. For accepted but unpublished works use "in press" instead of page numbers. Unpublished data, submitted manuscripts, or personal communications should be cited within the text only, for the article types that allow such inclusions. Personal communications should be documented by a letter of permission. Website urls should be included as footnotes. Any inclusion of verbatim text must be contained in quotation marks and clearly reference the original source. Preprints can be cited as long as a DOI or archive URL is available, and the citation clearly mentions that the contribution is a preprint. If a peer-reviewed journal publication for the same preprint exists, the official journal publication is the preferred source.

The following formatting styles are meant as a guide, as long as the full citation is complete and clear, Frontiers referencing style will be applied during typesetting.

- **SCIENCE, ENGINEERING, and HUMANITIES: For articles submitted in the domains of SCIENCE, ENGINEERING and HUMANITIES please apply Author-Year system for in-text citations.**

Reference list: provide the names of the first six authors followed by et al. and doi when available.

In-text citations should be called according to the surname of the first author, followed by the year. For works by 2 authors include both surnames, followed by the year. For works by more than 2 authors include only the surname of the first author, followed by et al., followed by the year. For Humanities and Social Sciences articles please include page numbers in the in-text citations.

Article in a print journal:

Sondheimer, N., and Lindquist, S. (2000). Rnq1: an epigenetic modifier of protein function in yeast. Mol. Cell. 5, 163-172.

Article in an online journal:

Tahimic, C.G.T., Wang, Y., Bikle, D.D. (2013). Anabolic effects of IGF-1 signaling on the skeleton. Front. Endocrinol. 4:6. doi: 10.3389/fendo.2013.00006

Article or chapter in a book:

Sorenson, P. W., and Caprio, J. C. (1998). "Chemoreception," in The Physiology of Fishes, ed. D. H. Evans (Boca Raton, FL: CRC Press), 375-405.

Book:

Cowan, W. M., Jessell, T. M., and Zipursky, S. L. (1997). Molecular and Cellular Approaches to Neural Development. New York: Oxford University Press.

Abstract:

Hendricks, J., Applebaum, R., and Kunkel, S. (2010). A world apart? Bridging the gap between theory and applied social gerontology. Gerontologist 50, 284-293. Abstract retrieved from Abstracts in Social Gerontology database. (Accession No. 50360869)

Patent:

Marshall, S. P. (2000). Method and apparatus for eye tracking and monitoring pupil dilation to evaluate cognitive activity. U.S. Patent No 6,090,051. Washington, DC: U.S. Patent and Trademark Office.

Data:

Perdiguero P, Venturas M, Cervera MT, Gil L, Collada C. Data from: Massive sequencing of Ulms minor's transcriptome provides new molecular tools for a genus under the constant threat of Dutch elm disease. Dryad Digital Repository. (2015) http://dx.doi.org/10.5061/dryad.ps837

Theses and Dissertations:

Smith, J. (2008) Post-structuralist discourse relative to phenomological pursuits in the deconstructivist arena. [dissertation/master's thesis]. [Chicago (IL)]: University of Chicago

Preprint:

Smith, J. (2008). Title of the document. Preprint repository name [Preprint]. Available at: https://persistent-url (Accessed March 15, 2018).

For examples of citing other documents and general questions regarding reference style, please refer to the Chicago Manual of Style.

Frontiers Science Endnote Style

Frontiers Science, Engineering and Humanities Bibstyle

- **HEALTH, PHYSICS AND MATHEMATICS: For articles submitted in the domain of HEALTH or the journal Frontiers in Physics and Frontiers in Applied Mathematics and Statistics please apply the Vancouver system for in-text citations.**

Reference list: provide the names of the first six authors followed by et al. and doi when available.

In-text citations should be numbered consecutively in order of appearance in the text – identified by Arabic numerals in the parenthesis for Health articles, and in square brackets for Physics and Mathematics articles.

Reference examples

Article in a print journal:

Sondheimer N, Lindquist S. Rnq1: an epigenetic modifier of protein function in yeast. Mol Cell (2000) 5:163-72.

Article in an online journal:

Tahimic CGT, Wang Y, Bikle DD. Anabolic effects of IGF-1 signaling on the skeleton. Front Endocrinol (2013) 4:6. doi: 10.3389/fendo.2013.00006

Article or chapter in a book:

Sorenson PW, Caprio JC. "Chemoreception,". In: Evans DH, editor. The Physiology of Fishes. Boca Raton, FL: CRC Press (1998). p. 375-405.

Book:

Cowan WM, Jessell TM, Zipursky SL. Molecular and Cellular Approaches to Neural Development. New York: Oxford University Press (1997). 345 p.

Abstract:

Christensen S, Oppacher F. An analysis of Koza's computational effort statistic for genetic programming. In: Foster JA, editor. Genetic Programming. EuroGP 2002: Proceedings of the 5th European Conference on Genetic Programming; 2002 Apr 3–5; Kinsdale, Ireland. Berlin: Springer (2002). p. 182–91.

Patent:

Pagedas AC, inventor; Ancel Surgical R&D Inc., assignee. Flexible Endoscopic Grasping and Cutting Device and Positioning Tool Assembly. United States patent US 20020103498 (2002).

Data:

Perdiguero P, Venturas M, Cervera MT, Gil L, Collada C. Data from: Massive sequencing of Ulms minor's transcriptome provides new molecular tools for a genus under the constant threat of Dutch elm disease. Dryad Digital Repository. (2015) http://dx.doi.org/10.5061/dryad.ps837

Theses and Dissertations:

Smith, J. (2008) Post-structuralist discourse relative to phenomological pursuits in the deconstructivist arena. [dissertation/master's thesis]. [Chicago (IL)]: University of Chicago

Preprint:

Smith, J. Title of the document. Preprint repository name [Preprint] (2008). Available at: https://persistent-url (Accessed March 15, 2018).

For examples of citing other documents and general questions regarding reference style, please refer to Citing Medicine.

Frontiers Health Endnote Style

Frontiers Health and Physics Bibstyle

Disclaimer

Any necessary disclaimers which must be included in the published article should be clearly indicated in the manuscript.

Supplementary Material

Frontiers journals do not support pushing important results and information into supplementary sections. However, data that are not of primary importance to the text, or which cannot be included in the article because it is too large or the current format does not permit it (such as movies, raw data traces, power point presentations, etc.) can be uploaded during the submission procedure and will be displayed along with the published article. All supplementary files are deposited to FigShare for permanent storage, during the publication stage of the article, and receive a DOI.

The Supplementary Material can be uploaded as Data Sheet (word, excel, csv, cdx, fasta, pdf or zip files), Presentation (power point, pdf or zip files), Supplementary Image (cdx, eps, jpeg, pdf, png or tif), Supplementary Table (word, excel, csv or pdf), Audio (mp3, wav or wma) or Video (avi, divx, flv, mov, mp4, mpeg, mpg or wmv).

Supplementary material is not typeset so please ensure that all information is clearly presented, the appropriate caption is included in the file and not in the manuscript, and that the style conforms to the rest of the article. To avoid discrepancies between the published article and the supplementary material, please do not add the title, author list, affiliations or correspondence in the supplementary files. For Supplementary Material templates (LaTex and Word) see Supplementary Material for Frontiers.

Suggested Fonts

The title is written in title case, centred, and in 16 point bold Times New Roman font at the top of page.

Headings and subheadings need to be defined in Times New Roman, 12, bold.

The text of the abstract section should be in 12 point normal Times New Roman.

The body text is in 12 point normal Times New Roman.

1.1.1.2 2.3.5. File Requirements

For Latex Files, when submitting your article please ensure to upload all relevant manuscript files including:

- tex file
- PDF
- .bib file (if the bibliography is not already included in the .tex file)

Figures should be included in the provided pdf. In case of acceptance, our Production Office might require high resolution files of the figures included in the manuscript in eps, jpg or tif format. In order to be able to upload more than one figure at a time, save the figures (labeled in order of appearance in the manuscript) in a zip file, and upload them as 'Supplementary Material Presentation'.

To facilitate the review process, please include a Word Count at the beginning of your manuscript, one option is teXcount which also has an online interface.

During the Interactive Review, authors are encouraged to upload versions using 'Track Changes'. Editors and Reviewers can only download the PDF file of the submitted manuscript .

Additional Requirements per article types

CROSSMARK POLICY

CrossMark is a multi-publisher initiative to provide a standard way for readers to locate the current version of a piece of content. By applying the CrossMark logo Frontiers is committing to maintaining the content it publishes and to alerting readers to changes if and when they occur. Clicking on the CrossMark logo will tell you the current status of a document and may also give you additional publication record information about the document.

COMMENTARIES ON ARTICLES

For General Commentaries, the title of your manuscript must have the following format: "Commentary: Title of the original article". At the beginning of your Commentary, please provide the complete citation of the article commented on. Authors commenting on a Frontiers article must submit their commentary for consideration to the same Journal and Specialty as the original article.

Rebuttals may be submitted in response to Commentaries; our limit in place is one commentary and one response. Rebuttals should be submitted as General Commentary articles and the title should have the following format: "Response: Commentary: Title of original article".

Book Reviews

The title of a book review needs to follow the format "Book Review: Title of book". For book Reviews, you must also provide the full book details at the beginning of the article in this format: "Book Review: Full book reference"

Focused Reviews

For Tier 2 invited **Focused Reviews**, to shape the paper on the importance of the research to the field, we recommend structuring the Review to discuss the paper's Introduction, Materials and Methods, Results and Discussion. In addition the authors must submit a short biography of the corresponding author(s). This short biography has a maximum of 600 characters, including spaces

A picture (5 x 5 cm, in *.tif or *.jpg, min 300 dpi) must be submitted along with the biography in the manuscript and separately during figure upload.

Focused Reviews highlight and explain key concepts of your work. Please highlight a minimum of four and a maximum of ten key concepts in bold in your manuscript and provide the definitions/explanations at the end of your manuscript under “Key Concepts”. Each definition has a maximum of 400 characters, including spaces.

Systematic Reviews

For Systematic Reviews, the following article structure applies.

- Title: include systematic review/meta-synthesis/meta-analysis as appropriate in the title

Each of the sections should include specific sub-sections as follows

- Abstract
  - Background
  - Methods
  - Results
  - Conclusions
- Introduction
  - Rationale
  - Objectives
  - Research question
- Methods
  - Study design
  - Participants, interventions, comparators
  - Systematic review protocol
  - Search strategy
  - Data sources, studies sections and data extraction
  - Data analysis
- Results
  - Provide a flow diagram of the studies retrieved for the review
  - Study selection and characteristics
  - Synthesized findings

    - Risk of bias
  - Discussion
    - Summary of main findings
    - Limitations
    - Conclusions

DATA REPORTS

For Data Reports, please make sure to follow these additional specific guidelines.

1. The data sets (defined as a collection of data that contains individual data units organized in a standardized reusable format, including pre-processed or raw data) must be deposited in a public repository for long-term data preservation prior to submission of the Data Report. The data set(s) is to be fixed and made publicly available upon publication of the Data Report.

2. Our data sharing policy also requires that the dataset be made available to the Frontiers editors and reviewers during the review process of the manuscript. Prior to submission of your Data Report manuscript, please ensure that the repository you have selected supports confidential peer-review. If it does not, we recommend that the authors deposit the datasets to figshare or Dryad Digital Repository for the peer-review process. The data set(s) can then be transferred to another relevant repository before final publication, should the article be accepted for publication at Frontiers.

Note that it is the authors' responsibility to maintain the data sets after publication of the Data Report. Any published Frontiers Data Report article will be considered for retraction should the data be removed from the final selected repository after publication or the access become restricted.

The submitted manuscript must include the following details:

- Detailed statement of contribution of the data report to the field
- Name of the data set
- Name of the database/repository where the data set has been submitted
- Link to the data set for confidential peer-review (which can be updated after acceptance, prior to publication once the data is made public)
- Description of how the data was acquired, data collection period
- Filters applied to the data
- Overview of the data files and their formats
- Reference to and/or description of the protocols or methods used to collect the data
- Information on how readers may interpret the data set and reuse the data

All these elements will be peer-reviewed and are required for the publication of the Data Report.

Any future updates to the data set(s) should be deposited as independent versions in a repository and the relevant information may be published as General Commentaries linked on the Frontiers website to the initial Data Report.

Any detailed analyses or new scientific insights relating to the Data Report can be submitted as independent research articles which can also be linked on the Frontiers website to the Data Report article. The protocols and methodology used to collect the data can also be submitted as Methods articles.

CASE REPORTS

Case Reports should include the following:

- Background
- Case Presentation

- For human patients: age, sex and occupation of the patient, presenting symptoms, the patient's history and any relevant family or social history, and relevant clinical findings
- For animal patients: age, sex, and breed of the animal, presenting problems, the animal's history, and relevant clinical findings.
- Description of laboratory investigations and diagnostic tests.
- Discussion of the underlying pathophysiology and the novelty or significance of the case. Authors are required to obtain written informed consent from the patients (or their legal representatives) for the publication.

POLICY & PRACTICE REVIEWS

For Policy and Practice Reviews, the following article structure applies:

- Abstract
- Introduction
- Sections on assessment of policy/guidelines options and implications
- Actionable Recommendations and Conclusions

POLICY BRIEFS

For Policy Briefs, the following article structure applies:

- Abstract (bullet point format)
- Introduction
- Sections on Policy Options and Implications
- Section on Actionable Recommendations
- Conclusions

PROTOCOLS

For Protocols articles, please make sure to follow these additional specific guidelines.

1. The submitted manuscript must include the following sections:

- An Abstract.
- An Introduction outlining the protocol and summarizing its possible applications.
- A Materials and Equipment section providing a list of reagents or other materials and/or equipment required to carry out the protocol. For basic-science protocols, the formulation of any solutions, e.g. buffers, should be clearly indicated in the Materials and Equipment section.
- A Stepwise Procedures section listing, stepwise, the stages of the protocol. The timing of each step or related series of steps should be indicated, as should points at which it is possible to pause or halt the procedure without adversely influencing the outcome. For steps requiring repeated measurements, details of precision and accuracy should be presented. Limits of detection or quantification should also be stipulated where appropriate.
- An Anticipated Results section describing, and illustrating with figures, where possible, the expected outcome of the protocol. Any analytical software or methods should be presented in detail in this section, as should possible pitfalls and artifacts of the procedure and any troubleshooting measures to counteract them. These last may also be described in an optional Notes section.
- Code or training data sets referenced by the protocol and useful in its execution should be hosted in an online repository; their accession numbers or other stable identifiers should be referenced in the Anticipated Results.

2. The significance of the protocol and any advance represented by the method compared with other, similar methods should be presented in the contribution to the field statement accompanying your manuscript.

CODE

The code should be novel and presented in human-readable format, adhere to the standard conventions of the language used (variable names, indentation, style and grammar), be well documented (comments in source), be provided with an example data set to show efficacy, be compilable or executable free of errors (stating configuration of system used).

The code should only call standard (freely accessible) libraries or include required libraries, and include a detailed description of the use-scenarios, expected outcomes from the code and known limitations of the code.

Please therefore make sure to provide access to the following upon submission:

1. Abstract explicitly including the language of code
2. Keywords including the language of the code in the following format:"code:language"" e.g.: "code:matlab"
3. Contribution to the field statement including the utility of the code and its language
4. Main Text including:

    - code description
    - application and utility of the code
    - link to an accessible online code repository where the most recent source code version is stored and curated (with an associated DOI for retrieval after review)
    - access to test data and readme files
    - methods used
    - example of use
    - known issues
    - licensing information (Open Source licenses recommended)

5. Compressed Archive (.zip) of the reviewed version of the code as supplementary material (.zip archives are currently available under the "Presentation" dropdown menu).

REGISTERED REPORT

Registered Reports are empirical research articles outlining a proposed methodology and analyses which are peer-reviewed and pre-registered before data collection. Registered Reports should include an Introduction, Methods and preliminary results from any pilot experiments (if applicable). If the Registered Report is endorsed following peer-review and the research is conducted according to the approved methodology, the manuscript will be given In Principle Acceptance. Following data collection, the authors should submit a complete manuscript containing the peer-reviewed sections included in the Registered Report, as well as the Results and Discussion sections. If the Results include unregistered analysis, these should be indicated separately as 'Exploratory Analysis'. Authors have 1 year after their registered report is accepted to submit a full manuscript. The format is appropriate for any hypothesis-driven research, including both original studies and replications.

Registered Reports have a maximum word count of 3,000 and may include 2 Figures/Tables. Following data collection, the completed version of the manuscript should follow the guidelines for an Original Research article with a maximum word count of 12,000. Registered Reports incur a A-type article fee, charged after the acceptance of the completed manuscript.

Figure and Table Guidelines

All figures, tables, and images will be published under a Creative Commons CC-BY licence and permission must be obtained for use of copyrighted material from other sources (including re-published/adapted/modified/partial figures and images from the internet). It is the responsibility of the authors to acquire the licenses, to follow any citation instructions requested by third-party rights holders, and cover any supplementary charges.

General Style Guidelines for Figures

The maximum number of figures and tables for all article types are shown in the Summary Table. Frontiers requires figures to be submitted individually, in the same order as they are referred to in the manuscript, the figures will then be automatically embedded at the end of the submitted manuscript. Kindly ensure that each table and figure is mentioned in the text and in numerical order.

For graphs, there must be a self-explanatory label (including units) along each axis. For figures with more than one panel, panels should be clearly indicated using labels (A), (B), (C), (D), etc. However, do not embed the part labels over any part of the image, these labels will be added during typesetting according to Frontiers journal style. Please note that figures which are not according to the guidelines will cause substantial delay during the production process.

Permissions may be necessary in the following scenarios:

- Republishing
- Modifying/adapting
- Partial Figures

It is the responsibility of the authors to acquire the licenses, to follow any citation instructions requested by third-party rights holders, and cover any supplementary charges.

General Style Guidelines for Tables

Tables should be inserted at the end of the manuscript. If you use a word processor, build your table in word. If you use a LaTeX processor, build your table in LaTeX. An empty line should be left before and after the table.

Please note that large tables covering several pages cannot be included in the final PDF for formatting reasons. These tables will be published as supplementary material on the online article abstract page at the time of acceptance. The author will notified during the typesetting of the final article if this is the case. A link in the final PDF will direct to the online material.

For additional information, please see our Editorial Policies: 3.5 Image Manipulation.

Figure and Table Requirements

LEGENDS

Legends should be preceded by the appropriate label, for example "Figure 1" or "Table 4". Figure legends should be placed at the end of the manuscript (for supplementary images you must include the caption with the figure, uploaded as a separate file). Table legends must be placed immediately before the table. Please use only a single paragraph for the legend. Figure panels are referred to by bold capital letters in brackets: (A), (B), (C), (D), etc.

IMAGE SIZE

Figure images should be prepared with the PDF layout in mind, individual figures should not be longer than one page and with a width that corresponds to 1 column or 2 columns.

- All articles are prepared using the 2 column layout: **2 column articles can contain images 85 mm or 180 mm wide.**

Format

The following formats are accepted:

TIFF (.tif) TIFF files should be saved using LZW compression or any other non-lossy compression method.
JPEG (.jpg)
EPS (.eps) EPS files can be uploaded upon acceptance

COLOR IMAGE MODE

Images must be submitted in the color mode RGB.

RESOLUTION REQUIREMENTS

All images must be uploaded separately in the submission procedure and have a resolution of **300 dpi at final size**. Check the resolution of your figure by enlarging it to 150%. If the resolution is too low, the image will appear blurry, jagged or have a stair-stepped effect.

Please note saving a figure directly as an image file (JPEG, TIF) can greatly affect the resolution of your image. To avoid this, one option is to export the file as PDF, then convert into TIFF or EPS using a graphics software. EPS files can be uploaded upon acceptance.

CHEMICAL STRUCTURES

Chemical structures should be prepared using ChemDraw or a similar program. If working with ChemDraw please use Frontiers ChemDraw Template, if working with another program please follow the guidelines given below:

Drawing settings: chain angle, 120° bond spacing, 18% of width; fixed length, 14.4 pt; bold width, 2.0 pt; line width, 0.6 pt; margin width 1.6 pt; hash spacing 2.5 pt. Scale 100% Atom Label settings: font, Arial; size, 8 pt.

Assign all chemical compounds a bold, Arabic numeral in the order in which the compounds are presented in the manuscript text. Figures containing chemical structures should be submitted in a size appropriate for incorporation into the manuscript.

LEGIBILITY

Figures must be legible. Check the following:

- The smallest visible text is no less than 8 points in height, when viewed at actual size.
- Solid lines are not broken up.
- Image areas are not pixilated or stair stepped.
- Text is legible and of high quality.
- Any lines in the graphic are no smaller than 2 points width.

Funding disclosure

Details of all funding sources must be provided in the funding section of the manuscript including grant numbers, if applicable. All Frontiers articles are published with open access under the CC-BY Creative Commons attribution license. Articles published with Frontiers automatically fulfil or exceed the requirements for open access mandated by many institutions and funding bodies, including the National Institutes of Health, the Medical Research Council, Research Councils UK, and the Wellcome Trust. Frontiers submits funding data to the Open Funder Registry which is a funder identification service from CrossRef resulting from collaboration between scholarly publishers and funding agencies.

Materials and Data Policies

Frontiers is committed to open science and open data, and we strongly encourage authors to maximize the availability of data included in their articles by making generated data publicly available where possible, and ensuring that published data sets are cited in accordance with our data citation guidelines. We aim to achieve the best community standards regarding data availability, ensuring increased levels of transparency and reproducibility in our published articles.

Our policies on data availability are informed by community-driven standards, which Frontiers endorses, such as the Transparency and Openness (TOP) guidelines, and the joint declaration of data citation principles produced by FORCE 11.

Availability of Materials

Authors are strongly encouraged to make all materials used to conduct their research available to other researchers. Research materials necessary to enable the reproduction of an experiment should be clearly indicated in the Materials and Methods section. Relevant materials such as protocols, analytic methods, and study material should preferably be uploaded to an online repository providing a global persistent link/identifier. If this is not possible, authors are strongly encouraged to make this material available upon request to interested researchers, and this should be stated in the manuscript.

Resource Identification Initiative

Authors wishing to participate in the Resource Identification Initiative should cite antibodies, genetically modified organisms, software tools, data, databases, and services using the corresponding catalog number and RRID in your current manuscript. For more information about the project and for steps on how to search for an RRID, please click here.

Availability of Data

Frontiers requires that authors make all data relevant to the conclusions of the manuscript available to editors and reviewers during peer-review to enable complete and objective evaluation of the work described.

We strongly encourage authors to make the raw data supporting the conclusions of the manuscript available in publicly accessible repositories. To comply with best practice in their field of research, authors are required to make certain types of data available to readers at time of publication in specific stable, community-supported repositories such as those listed below. Authors are encouraged to contact our data availability office at datapolicy@frontiersin.org prior to submission with any queries concerning data reporting.

Data Citation Guidelines

Authors are encouraged to cite all datasets generated or analyzed in the study. Where datasets are cited, they should be included in the references list to maximize future usability. The following format should be used:

[Dataset] Author names. (year) Data Title. Repository name. Version. Persistant identifier

Data Availability Statements

Data availability statements are required for all manuscripts published with Frontiers. During the submission process, authors will be asked to detail the location of the raw data underlying the conclusions made in the manuscript, and whether it will be made available to other researchers following publication. Authors will also be asked for the details of any existing datasets that have been analysed in the manuscript. These datasets should be cited in accordance with our data citation guidelines.

A statement will be automatically generated using the information provided in the submission form; however, manuscripts containing incomplete or incorrect statements will be prevented from entering the review process.

EXAMPLES OF ACCEPTABLE STATEMENTS

1. **Datasets are in a publicly accessible repository:**

   The datasets [GENERATED/ANALYZED] for this study can be found in the [NAME OF REPOSITORY] [LINK]

2. **Datasets are available on request:**

   The raw data supporting the conclusions of this manuscript will be made available by the authors, without undue reservation, to any qualified researcher.

3. **All relevant data is contained within the manuscript:**

   All datasets [GENERATED/ANALYZED] for this study are included in the manuscript and the supplementary files.

4. **Restrictions apply to the datasets:**

   The datasets for this manuscript are not publicly available because: [VALID REASON]. Requests to access the datasets should be directed to [NAME, EMAIL].

5. **Data has been obtained from a third party:**

   The data analyzed in this study was obtained from [SOURCE], the following licenses/restrictions apply [RESTRICTIONS]. Requests to access these datasets should be directed to [NAME, EMAIL].

6. **No datasets were generated for this study**

Inclusion of Zoological Nomenclature

The International Code of Zoological Nomenclature, in a recent 2012 amendment to the 1999 Zoological Code, allows all electronic-only papers, such as those published by the Frontiers journals, to have valid new taxon names and nomenclatural acts. However, these new names or nomenclatural acts must be registered in ZOOBANK and have associated Life Science Identifiers (LSIDs). Registration must be done by the authors before publication. Should your manuscript include any zoological new taxon names and/or nomenclatural acts, please ensure that they are registered prior to final publication.

Inclusion of RNAseq Data

Studies employing RNASeq for comparative transcriptomic analyses must contain at least 3 biological replicates (unless otherwise justified). Each biological replicate should be represented in an independent library, each with a unique barcode if libraries are multiplexed for sequencing. Validation on a number of key transcripts highlighted in the study is also highly recommended.

Full data accompanying these experiments must be made available to reviewers at the time of submission in a freely accessible resource e.g the sequence read archive (SRA) or European Nucleotide Archive (ENA). Depending on the question addressed in a manuscript, de novo assemblies of transcriptomes may also require multiple replicates and assembled sequences together with sequence annotation must be made freely available e.g figshare or dryad.

Inclusion of Proteomics Data

Authors should provide relevant information relating to how peptide/protein matches were undertaken, including methods used to process and analyse data, false discovery rates (FDR) for large-scale studies and threshold or cut-off rates for peptide and protein matches. Further information should include software used, mass spectrometer type, sequence database and version, number of sequences in database, processing methods, mass tolerances used for matching, variable/fixed modifications, allowable missed cleavages, etc.

Authors should provide as supplementary material information used to identify proteins and/or peptides. This should include information such as accession numbers, observed mass (m/z), charge, delta mass, matched mass, peptide/protein scores, peptide modification, miscleavages, peptide sequence, match rank, matched species (for cross-species matching), number of peptide matches, etc. Ambiguous protein/peptide matches should be indicated.

For quantitative proteomics analyses, authors should provide information to justify the statistical significance, including biological replicates, statistical methods, estimates of uncertainty, and the methods used for calculating error.

For peptide matches with biologically relevant post-translational modifications (PTMs) and for any protein match that has occurred using a single mass spectrum, authors should include this information as raw data or annotated spectra, or submit data to an online repository (recommended option; see table below).

Raw or matched data and 2-DE images should be submitted to public proteomics repositories such as those participating in ProteomeXchange. Submission codes and/or links to data should be provided within the manuscript.

Statistics

Frontiers requires that all statements concerning quantitative differences should be based on quantitative data and statistical testing. For example, if a quantitative statement is made regarding the abundance of a certain protein based on a western blot, we request that the blot be scanned and the abundance assessed quantitatively using the correct analytic software (e.g. ImageJ) and statistics in order to support that statement.

Statistics should/must be applied for independent experiments. The number of independent samples and the deviation parameters (e.g. Standard Error of the Mean, Standard Deviation, Confidence Intervals) should be clearly stated in the Methods or the Figure legends. In general, technical replicates within a single experiment are not considered to be independent samples. Where multiple comparisons are employed (e.g. microarray data or Genome-wide association studies), any analysis should correct for false positive results. Descriptions of statistical procedures should include the software and analysis used, and must be sufficiently detailed to be reproduced.

Editorial Policies and Publication Ethics

Frontiers' ethical policies are a fundamental element of our commitment to the scholarly community. These policies apply to all the Frontiers in journal series. Frontiers has been a member of the Committee of Publication Ethics since January 2015 and follows COPE guidelines where applicable.

Authorship and Author Responsibilities

Frontiers follows the International Committee of Medical Journal Editors guidelines which state that, in order to qualify for authorship of a manuscript, the following criteria should be observed:

- Substantial contributions to the conception or design of the work; or the acquisition, analysis or interpretation of data for the work;
- Drafting the work or revising it critically for important intellectual content;
- Provide approval for publication of the content;

- Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Contributors, who do not meet these criteria, but nonetheless provided important contributions to the final manuscript should be included in the acknowledgements section. It is the authors responsibility to get written approval by persons named in the acknowledgement section. In order to provide appropriate credit to all authors, as well as assigning responsibility and accountability for published work, individual contributions should be specified as an Author Contributions statement. This should be included at the end of the manuscript, before the References. The statement should specify the contributions of all authors. You may consult the Frontiers manuscript guidelines for formatting instructions. Please see an example here:

AB, CDE and FG contributed conception and design of the study; AB organized the database; CDE performed the statistical analysis; FG wrote the first draft of the manuscript; HIJ, KL, AB, CDE and FG wrote sections of the manuscript. All authors contributed to manuscript revision, read and approved the submitted version.

The corresponding author takes primary responsibility for communication with the journal and editorial office during the submission process, throughout peer review and during publication. The corresponding author is also responsible for ensuring that the submission adheres to all journal requirements including, but not exclusive to, details of authorship, study ethics and ethics approval, clinical trial registration documents and conflict of interest declaration. The corresponding author should also be available post-publication to respond to any queries or critiques.

Requests to modify the authors list after submission should be made to the editorial office using the authorship changes form.

Research Integrity

Material submitted to Frontiers must comply with the following policies to ensure ethical publication of academic work:

i. *Original content and duplicate publication:* Frontiers only publishes original content. Authors confirm the submission of original content in the Terms & Conditions upon submission. Manuscripts submitted to Frontiers must not have been previously published or be under consideration for publication elsewhere, either in whole or in part. If an article has been previously submitted for publication elsewhere, Frontiers will only consider publication if the article has been definitively rejected by the other publisher(s) at the point of submission to Frontiers.
ii. *Redundant publication:* Frontiers considers the submission and publication of very similar articles based on the same experiment or study to be unethical.
iii. *Fabrication and falsification:* Frontiers opposes both the fabrication of data or images (i.e. fake or made up data) and the falsification of data or images (i.e. the intentional misrepresentation or deceptive manipulation of data).
iv. *Plagiarism:* Plagiarism occurs when an author attempts to present previously published work as original content. Every manuscript submitted to Frontiers is screened for textual overlap by the software CrossCheck, powered by iThenticate. Manuscripts found to contain textual overlap are not considered for publication by Frontiers. For more details on what constitutes plagiarism, please see here.

We reserve the right to contact the affiliated institutions of authors, who have not acted according to good research and publication practices.

Translations

Frontiers accepts manuscript submissions that are exact translations of previously published work. This should be clearly stated in the manuscript upon submission. Permission from the original publisher and authors needs to be sought and also stated in the manuscript, and the relevant documents should be provided as supplementary data for verification by the Editor and the editorial office. The original work from which the manuscript has been translated should be clearly referenced.

- *"This is a ('language') language translation/reprint of ('insert title here') originally published in ('insert name here'). ('Insert name here') prepared this translation with support from (insert name of funding source, if any). Permission was granted by ('Insert name here')."*

Please note that Frontiers may request copies of related publications if there are any concerns about overlap or possible redundancy.

Plagiarism and Duplication

Frontiers checks all submitted manuscripts for plagiarism and duplication, and publishes only original content. Those manuscripts where plagiarism or duplication is shown to have occurred will not be considered for publication in a Frontiers journal. It is required that all submissions must consist as far as possible of content that has not been published previously. In accordance with COPE guidelines, we expect that "original wording taken directly from publications by other researchers should appear in quotation marks with the appropriate citations." This condition also applies to an author's own work.

For submissions adapted from theses, dissertations, conference abstracts or proceedings papers, please see the following sections for more information.

Theses and Dissertations

Frontiers allows the inclusion of content which first appeared in an author's thesis so long as this is the only form in which it has appeared, is in line with the author's university policy, and can be accessed online. If the thesis is not archived online, it is considered as original unpublished data and thus is subject to the unpublished data restrictions of some of our article types. This inclusion should be noted in the Acknowledgements section of the manuscript and the thesis should be cited and referenced accordingly in the Reference list. For some examples, please check our in Manuscript Requirements and Style Guide at 2.3.1

Conferences, Proceedings and Abstracts

Manuscripts that first appeared as conference papers must be expanded upon if they are to be considered as original work. You are required to add a substantial amount of original content in the form of new raw material (experiments, data) or new treatment of old data sets which lead to original discussion and/or conclusions, providing value that significantly exceeds the original conference version. As a rule of thumb, at least 30% of content must be original. Authors submitting such work are required to:

- Seek permission for reuse of the published conference paper if the author does not hold the copyright (proof of permission should be submitted as supplementary material or sent to editorial.office@frontiersin.org with the manuscript ID upon submission).

- Cite the conference in the Acknowledgements section, or the references section if applicable.

Blogs

Although permissible, extended manuscript content which previously appeared online in non-academic media, e.g. blogs, should be declared at the time of submission in the acknowledgements section of the manuscript.

Image Manipulation

Frontiers takes concerns regarding image manipulation seriously. We request that no individual features within an image are modified (eg. enhanced, obscured, moved, recycled, removed or added).

Image processing methods (e.g. changes to the brightness, contrast or color balance) must be applied to every pixel in the image and the changes should not alter the information illustrated in the figure. Where cropped images of blots are shown in figures, a full scan of the entire original gel(s) must be submitted as part of the supplementary material. Where control images are re-used for illustrative purposes, this must be clearly declared in the figure legend. If any form of image processing is legitimately required for the interpretation of the data, the software and the enhancement technique must be declared in the methods section of the manuscript. Image grouping and splicing must be clearly stated in the manuscript and the figure text. Any concerns raised over undeclared image modifications will be investigated and the authors will be asked to provide the original images.

Conflicts of Interest

A conflict of interest can be anything potentially interfering with, or that could reasonably be perceived as interfering with, full and objective peer review, decision-making or publication of articles submitted to Frontiers. Personal, financial and professional affiliations or relationships can be perceived as conflicts of interest.

All authors and members of Frontiers Editorial Boards are required to disclose any actual and potential conflicts of interest at submission or upon accepting an editorial or review assignment.

The Frontiers review system is designed to guarantee the most transparent and objective editorial and review process, and because handling editor and reviewers' names are made public upon the publication of articles, conflicts of interest will be widely apparent.

Failure to declare competing interests can result in the rejection of a manuscript. If an undisclosed competing interest comes to light after publication, Frontiers will take action in accordance with internal policies and Committee on Publication Ethics guidelines.

What Should I Disclose?

As an author, disclosure of any potential conflicts of interest should be done during the submission process. Consider the following questions and make sure you disclose any positive answers:

1. Did you or your institution at any time receive payment or services from a third party for any aspect of the submitted work?
2. Do you have financial relationships with entities that could be perceived to influence, or that give the appearance of potentially influencing, what you wrote in the submitted work?
3. Do you have any patents and copyrights, whether pending, issued, licensed and/or receiving royalties related to the research?
4. Do you have other relationships or activities that readers could perceive to have influenced, or that give the appearance of potentially influencing, what you wrote in the submitted work?

If you failed to disclose any of the potential conflicts of interest above during submission, or in case of doubt, please contact as soon as possible the Frontiers Editorial Office at editorial.office@frontiersin.org with the details of the potential conflicts.

Example statement: “Author xxx was employed by company xxxx. All other authors declare no competing interests.”

The handling editors and reviewers will be asked to consider the following potential conflicts of interest before accepting any editing or review assignment:

Bioethics

All research submitted to Frontiers for consideration must have been conducted in accordance with Frontiers guidelines on study ethics. In accordance with COPE guidelines, Frontiers reserves the right to reject any manuscript that editors believe does not uphold high ethical standards, even if authors have obtained ethical approval or if ethical approval is not required.

Studies involving animal subjects

All research involving regulated animals (i.e. all live vertebrates and higher invertebrates) must be performed in accordance with relevant institutional and national guidelines and regulations. Frontiers follows International Association of Veterinary Editors guidelines for publication of studies including animal research. Approval of research involving regulated animals must be obtained from the relevant institutional review board or ethics committee prior to commencing the study. Confirmation of this approval is required upon submission of a manuscript to Frontiers; authors must provide a statement identifying the full name of the ethics committee that approved the study. For most article types, this statement should appear in the Materials and Methods section. An example ethics statement:

This study was carried out in accordance with the principles of the Basel Declaration and recommendations of [name of guidelines], [name of committee]. The protocol was approved by the [name of committee].

Should the study be exempt from ethics approval, authors need to clearly state the reasons in the declaration statement and in the manuscript. Studies involving privately owned animals should demonstrate the best practice veterinary care and confirm that informed consent has been granted by the owner/s, or the legal representative of the owner/s. Frontiers supports and encourages authors to follow the ARRIVE guidelines for the design, analysis and reporting of scientific research.

HUMANE ENDPOINTS

All manuscripts describing studies where death is an endpoint will be subject to additional ethical considerations. Frontiers reserves the right to reject any manuscripts lacking in appropriate justification.

Studies involving human subjects

Research involving human subjects is expected to have been conducted in accordance with the World Medical Association's Declaration of Helsinki. Studies involving human participants must be performed in accordance with relevant institutional and national guidelines, with the appropriate institutional ethics committee's prior approval and informed written consent from all human subjects involved in the study including for publication of the results. Conformation of this approval is required upon submission of a manuscript to Frontiers; authors must provide a statement identifying the full name of the ethics committee that approved the work and confirm that study subjects (or when appropriate, parent or guardian) have given written informed consent. For most article types, this statement should appear in the Materials and Methods section. An example ethics statement:

*This study was carried out in accordance with the recommendations of [name of guidelines], [name of committee]. The protocol was approved by the [name of committee]. All subjects gave **written informed consent** in accordance with the Declaration of Helsinki.*

Should the study be exempt from ethics approval, authors need to clearly state the reasons in the declaration statement and in the manuscript. In order to protect subject anonymity, identifying information should not be included in the manuscript unless such information is absolutely necessary for scientific purposes AND explicit approval has been granted by the subjects.

Inclusion of identifiable human data

Frontiers follows the ICMJE recommendations on the protection of research participants, which state that patients have a right to privacy that should not be violated without informed consent. We require non-essential identifiable details to be omitted from all manuscripts, and written informed consent will be required if there is any doubt that anonymity can be maintained.

It is the responsibility of the researchers and authors to ensure that these principles are complied with, including the obtaining of written, informed consent.

Written informed consent can be documented on a form provided by an institution or ethics committee, and it must clearly state how the identifiable data will be used. Frontiers also makes available its own form , which may be used for this purpose, but use of the Frontiers form is not required if a suitable alternative form of consent, meeting the ICMJE recommendations, is used. We consider it to be the author' duty to encourage participants or patients whose consent for publication is required to read and understand the ICMJE guidelines, for their information prior to completing the consent form. Participants should also be encouraged to ask any questions and to ensure they are comfortable before they sign the consent form.

The completed consent forms should be stored by authors or their respective institutions, in accordance with institutional policies. Frontiers does not need to view the completed form, and this should not be included with the submission. The completed form should be made available on request from the editor or editorial office, both during the review process and post-publication.

The determination of what constitutes identifiable data lies with our editors and editorial office staff, and manuscripts may be rejected if the required consent documents cannot be provided. Please note that written informed consent for publication is required for all case report articles where the patient or subject is identified or identifiable.

Clinical Trials

The World Health Organization defines a clinical trial as "any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes." In accordance with the Clinical Trial Registration Statement from the International Committee of Medical Journal Editors (ICMEJ), all clinical trials must be registered in a public trials registry at or before the onset of participant enrolment. This requirement applies to all clinical trials that begin enrolment after July 1, 2005. To meet the requirements of the ICMJE, and Frontiers', clinical trials can be registered with any Primary Registry in the WHO Registry Network or an ICMJE approved registry.

Clinical trial reports should be compliant with the Consolidated Standards of Reporting Trials (CONSORT) both in terms of including a flow diagram presenting the enrolment, intervention allocation, follow-up, and data analysis with number of subjects for each and taking into account the CONSORT Checklist of items to include when reporting a randomized clinical trial.

The information on the clinical trial registration (Unique Identifier and URL) must be included in the abstract.

Corrections

Frontiers recognizes our responsibility to correct errors in previously published articles. If it is necessary to communicate important, scientifically relevant errors or missing information, and compelling evidence can be shown that a major claim of the original article was incorrect, a Correction should be submitted detailing the reason(s) for and location(s) of the change(s) needed using the below template. Corrections can be submitted if a small portion of an otherwise reliable publication proves to be misleading, e.g. an error in a figure that does not alter conclusions OR an error in statistical data not altering conclusions OR mislabeled figures OR wrong slide of microscopy provided, or if the author / contributor list is incorrect when a deserving author has been omitted or somebody who does not meet authorship criteria has been included. The contribution to the field statement should be used to clearly state the reason for the Correction. Please note, a correction is not intended to replace the original manuscript.

The title of the submission should have the following format: "Corrigendum: Title of original article". It is advised to use the corrigendum Word and LaTeX templates.

If the error was introduced during the publishing process, the Frontiers Production Office should be contacted.

Retractions

As a member of the Committee on Publication Ethics (COPE), Frontiers abides by their guidelines and recommendations in cases of potential retraction.

Frontiers also abides by two other key principles, as recommended by COPE:

- Retractions are not about punishing authors.
- Retraction statements should be public and linked to the original, retracted article.

While all potential retractions are subject to an internal investigation and will be judged on their own merits, Frontiers considers the following reasons as giving cause for concern and potential retraction:

- Clear evidence that findings are unreliable, either as a result of misconduct (e.g. data fabrication) or honest error (e.g. miscalculation or experimental error)
- Findings have previously been published elsewhere without proper attribution, permission or justification (i.e. cases of redundant publication)
- Major plagiarism
- The reporting of unethical research, the publication of an article that did not have the required ethics committee approval
- Legal issues pertaining to the content of the article e.g. libellous content
- Major authorship issues i.e. proven or strongly suspected cases of ghostwriting or sold (‘gift’) authorship
- Politically-motivated articles where objectivity is a serious concern
- The singling out of individuals or organizations for attack
- Faith issues (e.g. intelligent design)
- Papers that have made extraordinary claims without concomitant scientific or statistical evidence (e.g. pseudoscience)

Readers who would like to draw the editors' attention to published work that might require retraction should contact the authors of the article and write to the journal, making sure to include copies of all correspondence with authors.

Please find more details on our comments and complaints policy here

Support and Ethical concerns

In our commitment to continuously improve our website, we welcome your feedback, questions and suggestions. Please visit our Help Center to find guidance on our platform or contact us at support@frontiersin.org.

For any ethical concerns, please contact us at editorial.office@frontiersin.org.

Anexo 4 – Mini Exame do Estado Mental (Minimental)

MINI EXAME DO ESTADO MENTAL – MEEM

Orientação Temporal (um ponto para cada resposta correta)
( ) Que dia é hoje?
( ) Em que mês estamos?
( ) Em que ano estamos?
( ) Em que dia da semana estamos?
( ) Qual a hora aproximada?

Orientação Espacial(um ponto para cada resposta correta)
( ) Em que local nós estamos? (consultório, dormitório, sala, não apontando para o chão)
( ) Que local é este aqui? (apontando ao redor num sentido mais amplo: hospital, casa de repouso, própria casa).
( ) Em que bairro nós estamos ou qual o nome de uma rua próxima.
( ) Em que cidade nós estamos?
( ) Em que estado nós estamos?

Memória Imediata
( ) Eu vou dizer três palavras e você irá repetí-las a seguir: carro, vaso, tijolo (dê um ponto para cada palavra repetida corretamente)**.** Use palavras não relacionadas.

Atenção e Cálculo
( ) Peça ao paciente que conte de trás para frente, começando do nº 100, de 7 em 7. Pare depois da 5ª resposta. Considere 1 ponto para cada resultado correto. Se houver erro, corrija-o e prossiga. Considere correto se o examinado espontaneamente se autocorrigir.

Memória
( ) Peça que ele repita as três palavras ditas anteriormente. Dê um ponto para cada resposta correta.

Linguagem
( ) Mostre um lápis e um relógio, peça-lhe que os nomeie (2 pontos).

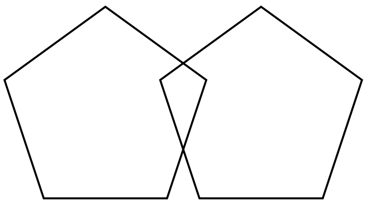
Repetição
( ) Peça que repita o seguinte: “nem sim, nem não, nem porque” (Considere somente se a repetição for perfeita (1 ponto).

Comando
( ) Dê as 3 seguintes ordens: “Pegue este papel com a mão direita (1 ponto), dobre-a ao meio (1 ponto) e coloque-a no chão (1 ponto). Se o sujeito pedir ajuda no meio da tarefa não dê dicas.

Leitura
( ) Mostre a frase escrita :”FECHE OS OLHOS” e peça para o indivíduo fazer o que está sendo mandado. Não auxilie se pedir ajuda ou se só ler a frase sem realizar o comando. (1 ponto)

Frase
( ) Peça ao indivíduo para escrever uma frase. Se não compreender o significado, ajude com: alguma frase que tenha começo, meio e fim; alguma coisa que aconteceu hoje; alguma coisa que queira dizer. Para a correção não são considerados erros gramaticais ou ortográficos (1 ponto).

Cópia do desenho
( ) Mostre o modelo e peça para fazer o melhor possível. Considere apenas se houver 2 pentágonos interseccionados (10 ângulos) formando uma figura de quatro lados ou com dois ângulos (1 ponto)



Escore: (/ 30)

Anexo 5 – ESCALA DE EFICÁCIA DE QUEDAS – INTERNACIONAL (FES-I)

Agora nós gostaríamos de fazer algumas perguntas sobre qual é sua preocupação a respeito da possibilidade de cair. Por favor, responda imaginando como você normalmente faz a atividade. Se você atualmente não faz a atividade (por ex. alguém vai às compras para você), responda de maneira a mostrar como você se sentiria em relação a quedas se você tivesse que fazer essa atividade. Para cada uma das seguintes atividades, por favor marque o quadradinho que mais se aproxima com sua opinião sobre o quão preocupado você fica com a possibilidade de cair, se você fizesse esta atividade.

		Nem um pouco preocupado 1	Um pouco preocupado 2	Muito preocupado 3	Extremamente preocupado 4
1	Limpando a casa (ex: passar pano, aspirar ou tirar a poeira).	1	2	3	4
2	Vestindo ou tirando a roupa.	1	2	3	4
3	Preparando refeições simples.	1	2	3	4
4	Tomando banho.	1	2	3	4
5	Indo às compras.	1	2	3	4
6	Sentando ou levantando de uma cadeira.	1	2	3	4
7	Subindo ou descendo escadas.	1	2	3	4
8	Caminhando pela vizinhança.	1	2	3	4
9	Pegando algo acima de sua cabeça ou do chão.	1	2	3	4
10	Ir atender o telefone antes que pare de tocar.	1	2	3	4
11	Andando sobre superfície escorregadia (ex: chão molhado).	1	2	3	4
12	Visitando um amigo ou parente.	1	2	3	4
13	Andando em lugares cheios de gente.	1	2	3	4
14	Caminhando sobre superfície irregular (com pedras, esburacada).	1	2	3	4
15	Subindo ou descendo uma ladeira.	1	2	3	4
16	Indo a uma atividade social (ex: ato religioso, reunião de família ou encontro no clube).	1	2	3	4

l

NFORMAÇÕES AOS TRADUTORES E ENTREVISTADORES

Ficou claro durante o processo de tradução, que não há termos do questionário que possam ser facilmente traduzidos para a linguagem da Colaboração Européia usando exatamente as mesmas palavras e frases. Portanto, estas informações têm a intenção de auxiliar os tradutores da FES-I a expressar o mesmo significado dos itens, mesmo que eles não tenham usado as mesmas palavras em seus idiomas. Estas orientações podem também auxiliar aqueles entrevistadores que são questionados para clarear o significado dos itens quando a FES-I é administrada por entrevista.

Instruções
Os participantes devem responder os itens pensando como eles habitualmente fazem as atividades, por exemplo, se eles usualmente caminham com auxílio, eles devem responder questões sobre marcha para demonstrar o quão preocupados eles estão com quedas quando estão usando dispositivos de auxílio a marcha. Alguns tradutores podem achar de grande valia esclarecer isto nas instruções. ”As opiniões que vocês podem escolher são: 1- nem um pouco preocupado 2= um pouco preocupado 3= muito preocupado 4= extremamente preocupado” Em alguns idiomas é melhor traduzir a palavra ”opinião”como afirmativa.

Categoria das respostas

A palavra “preocupado” expressa um desconforto racional ou cognitivo a respeito da possibilidade de quedas, mas não expressa o sofrimento emocional ou que seria manifestado por termos tais como “preocupado”, “ansioso ou“apreensivo”. É importante usar um termo similar não emocional, pois os respondentes podem não querer admitir emoções, o que pode ser visto como sinais de fraqueza.

Item 3. Em alguns idiomas da Colaboração Européia, refeições “simples “ podem ser traduzidas por refeições de todos os dias, mas a intenção é se referir a uma refeição que não requer preparação complexa, ao invés daquela que é preparada todos os dias.

Item 5. Este item tende a referir a fazer compras que não são longas ou recreacionais. Em alguns idiomas a melhor tradução é “compras de mercearia”.

Item 7. Este item se refere a qualquer escada, não necessariamente um lance de escadas de sua própria casa.

Item 8. Em alguns idiomas “vizinhança” pode ser difícil de traduzir, portanto “dar uma volta fora” pode ser usado no lugar de “vizinhança”.

Item 12. Em alguns idiomas é necessário adicionar o termo ”acquaintances” à amigos e parentes pois esta é uma categoria mais comum e casual de relacionamento do que amigos.

Item 13. “Multidões” pode ser traduzido por “muitas pessoas” se for necessário. (veja também comentários no itens 12, 13 e 16 abaixo).

Item 14. Achou-se necessário dar exemplos sobre o que é conhecido como solo irregular, mas nenhum exemplo pode ser encontrado que pudesse ser apropriado para todos os países. Consequentemente, tradutores devem ***escolher dois exemplos** a seguir: pedras roliças; piso mal conservado; ****chão com pedras**; superfície não pavimentada.

Itens 12, 13, 16. Estes itens contém um ***maior** elemento de ambigüidade do que muitos dos itens que avaliam capacidade funcional, porque as atividades envolvidas nestes eventos sociais, pode diferir em muito para diferentes respondentes. Entretanto, foi decidido que esta ambigüidade foi aceitável porque é importante avaliar efeitos do medo de cair em atividades sociais.

OBS:

- *estava escrito **devem escolher qualquer um dos dois exemplos.**...
- **estava escrito **chão duro**
- *** estava escrito **grande**

Esses ajustes foram feitos depois da tradução pelo tradutor americano, onde foi possível detectar esses erros.

APÊNDICES

Apêndice 1 – Ficha de coleta de dados

Nº:_________

( ) INCLUÍDA ( ) EXCLUÍDA

FICHA DE TRIAGEM

AVALIADOR:____
DATA:__________________

IDENTIFICAÇÃO
NOME COMPLETO: ____
IDADE: ______ PESO: __________ ALTURA: _________ IMC:__________

CARACTERÍSTICAS SÓCIO-DEMOGRÁFICAS

1. Qual é o seu estado civil?
(1) Casado (a) (3) Divorciado (a) (99) NR
(2) Solteiro (a) (4) Viúvo (a)

2. Qual sua cor ou raça?
(1) Branca (4) Indígena
(2) Preta (5) Amarela/Oriental
(3) Mulata/cabocla/parda (99) NR

3. Trabalha atualmente?
(1) Sim (2) Não (99) NR

Se sim, o que o(a) senhor(a) faz? ____

4. O(a) senhor(a) é aposentado(a)?
(1) Sim (2) Não (99) NR

5. O(a) senhor(a) é pensionista?
(1) Sim (2) Não (99)NR

6. O(a) senhor(a) é alfabetizado(a)?
(1) Sim (2) Não (99) NR

7. Qual seu nível de escolaridade?
(1) Nunca foi à escola
(2) E. F. - 1ª a 4ª série incompleto
(3) E. F. - 1ª a 4ª série completo
(4) E. F. - 5ª a 8ª série incompleto
(5) E. F. - 5ª a 8ª série completo
(6) Ensino Médio incompleto
(7) Ensino Médio completo
(8) Ensino Superior incompleto
(9) Ensino Superior completo
(10) Pós-graduação incompleta
(11) Pós-graduação completa
(99) NR

Total de anos de escolaridade: __________

8. **Quantos filhos o(a) senhor(a) tem?**
(1) Nenhum (2) 1 filho (3) De 2 a 4 filhos
(4) 5 filhos ou mais (99) NR

9. **O(a) senhor(a) mora só?**
(1) Sim (2) Não (99)NR

10. **Quem mora com o(a) senhor(a)?** sim(1) não(2)
( ) Marido/mulher companheiro(a)
( ) Filhos
( ) Bisnetos
( ) Outros parentes
( ) Outros(amigos, empregados, etc.)
( )NR

11. **O(a) senhor(a) é proprietário(a) da sua residência?**
(1) Sim (2) Não (99)NR

12. **O(a) senhor(a) é o(a) principal responsável pelo sustento da família?**
(1) Sim (2) Não (99)NR
Se não, o(a) senhor(a) ajuda nas despesas da casa?
(1) Sim (2) Não (99)NR

13. **Qual a sua renda mensal, proveniente do seu trabalho, da sua aposentadoria ou pensão?**
(1) Até ½ salário mínimo
(2) Mais de ½ a 1 salário mínimo
(3) Mais de 1 a 2 salários mínimos
(4) Mais de 2 a 3 salários mínimos
(5) Mais de 3 a 5 salários mínimos
(6) Mais de 5 a 10 salários mínimos
(7) Mais de 10 a 20 salários mínimos
(8) Mais de 20 salários mínimos
(99) NR

14. **Qual a renda mensal da sua família - incluindo o(a) senhor(a)?**
(1) Até ½ salário mínimo
(2) Mais de ½ a 1 salário mínimo
(3) Mais de 1 a 2 salários mínimos
(4) Mais de 2 a 3 salários mínimos
(5) Mais de 3 a 5 salários mínimos
(6) Mais de 5 a 10 salários mínimos
(7) Mais de 10 a 20 salários mínimos
(8) Mais de 20 salários mínimos
(99)NR

SAÚDE FÍSICA

Doenças crônicas auto-relatadas diagnosticadas por médico no último ano:

1. **Doença do coração, angina, infarto do miocárdio ou ataque cardíaco?**
(1) Sim (2) Não (99)NR

2. **Pressão alta/ hipertensão?**
(1) Sim (2) Não (99)NR

3. **Derrame/AVC/ Isquemia?**
(1) Sim (2) Não (99)NR

4. **Diabetes Mellitus?**
(1) Sim (2) Não (99)NR

5. Tumor maligno/ câncer?
(1) Sim (2) Não (99)NR

6. Artrite ou reumatismo?
(1) Sim (2) Não (99)NR

7. Doença do pulmão (bronquite e enfisema)?
(1) Sim (2) Não (99)NR

8. Depressão?
(1) Sim (2) Não (99)NR

9. Osteoporose?
(1) Sim (2) Não (99)NR

10. Incontinência urinária (ou perda involuntária da urina)?
(1) Sim (2) Não (99)NR

11. Incontinência fecal (ou perda involuntária das fezes)?
(1) Sim (2) Não (99)NR

12. Quantos medicamentos o(a) senhor(a) tem usado de forma regular nos últimos 3 meses, receitados pelo médico ou que o(a) senhor(a) tomou por conta própria?
(1) Nenhum
(2) 1-2
(3) 3-5
(4) >5
(99) NR

AVALIAÇÃO SUBJETIVA DA SAÚDE

1. Em geral, o(a) senhor(a) diria que sua saúde é:
(1) Muito boa (3) Regular (5) Muito ruim
(2) Boa (4) Ruim (99)NR

2. Quando o(a) senhor(a) compara a sua saúde com a de outras pessoas da sua idade, como o(a) senhor(a) avalia sua saúde no momento atual?
(1) Igual (2) Melhor (3) Pior (99)NR

3. Em comparação há 1 ano atrás, o(a) senhor(a) considera sua saúde hoje:
(1) Melhor (2) Pior (3) A mesma (99)NR

4. Em relação ao cuidado com a sua saúde, o(a) senhor(a) diria que ele é, de uma forma geral:
(1) Muito bom (3) Regular (5) Muito ruim
(2) Bom (4) Ruim (99) NR

5. Em comparação há 1 ano atrás, como o(a) senhor(a) diria que está o seu nível de atividade?
(1) Melhor (3) O mesmo
(2) Pior (99) NR

Histórico de quedas

1) Nos últimos 12 meses o senhor (a) sofreu alguma queda? Desequilibrou e teve que se sentar rapidamente no sofá ou na cama?

( ) SIM Quantas?______________
( ) NÃO

Medo de quedas? ( ) SIM ( ) NÃO

ESCALA DE EFICÁCIA DE QUEDAS – INTERNACIONAL (FES-I)

Agora nós gostaríamos de fazer algumas perguntas sobre qual é sua preocupação a respeito da possibilidade de cair. Por favor, responda imaginando como você normalmente faz a atividade. Se você atualmente não faz a atividade (por ex. alguém vai às compras para você), responda de maneira a mostrar como você se sentiria em relação a quedas se você tivesse que fazer essa atividade. Para cada uma das seguintes atividades, por favor marque o quadradinho que mais se aproxima com sua opinião sobre o quão preocupado você fica com a possibilidade de cair, se você fizesse esta atividade.

		Nem um pouco preocupado 1	Um pouco preocupado 2	Muito preocupado 3	Extremamente preocupado 4
1	Limpando a casa (ex: passar pano, aspirar ou tirar a poeira).	1	2	3	4
2	Vestindo ou tirando a roupa.	1	2	3	4
3	Preparando refeições simples.	1	2	3	4
4	Tomando banho.	1	2	3	4
5	Indo às compras.	1	2	3	4
6	Sentando-se ou levantando de uma cadeira.	1	2	3	4
7	Subindo ou descendo escadas.	1	2	3	4
8	Caminhando pela vizinhança.	1	2	3	4
9	Pegando algo acima de sua cabeça ou do chão.	1	2	3	4
10	Ir atender o telefone antes que pare de tocar.	1	2	3	4
11	Andando sobre superfície escorregadia (ex: chão molhado).	1	2	3	4
12	Visitando um amigo ou parente.	1	2	3	4
13	Andando em lugares cheios de gente.	1	2	3	4
14	Caminhando sobre superfície irregular (com pedras, esburacada).	1	2	3	4
15	Subindo ou descendo uma ladeira.	1	2	3	4

16	Indo a uma atividade social (ex: ato religioso, reunião de família ou encontro no clube).	1	2	3	4

DINAMOMETRIA DE MEMBROS INFERIORES										
	MI - DIREITO					MI - ESQUERDO				
Decubito dorsal	FMAX	TEMPFMAX	TT	FM	Nº teste	FMAX	TEMPFMAX	TT	FM	Nº teste
Abdutores de quadril										
Adutores de quadril										
Decubito ventral										
Extensores de quadril										
Flexores de joelho										
Plantiflexores										
Dorsiflexores										
Sentado										
Flexores de quadril										
Extensores de joelho										
Rotadores mediais quadril										
Rotadores laterais de quadril										
NOTA: FMAX (força máxima); TEMPFMAX (tempo para atingir força máxima); TT (tempo total teste); FM (força média)										

Apêndice 2 – Termo de Consentimento Livre e Esclarecido (TCLE)

Convidamos o(a) Senhor(a) a participar do projeto de pesquisa **MAPEAMENTO CEREBRAL E PADRÃO BIOMECÂNICO DA MARCHA DE MULHERES EXPOSTAS AO MEDO DE QUEDA**, sob a responsabilidade do pesquisador Guilherme Augusto Santos e Ruth Losada de Menezes. O projeto busca por meio de tecnologias analisar o comportamento do cérebro e do corpo durante o medo a queda na caminhada e o equilíbrio entre mulheres jovens e idosas.

O objetivo desta pesquisa é verificar como o cérebro e o corpo se comporta quando se sente medo de cair durante o caminhar, assim contribuindo para futuros tratamentos que necessitem dessas informações.

O(a) senhor(a) receberá todos os esclarecimentos necessários antes e no decorrer da pesquisa e lhe asseguramos que seu nome não aparecerá sendo mantido o mais rigoroso sigilo pela omissão total de quaisquer informações que permitam identificá-lo(a).

Você irá participar sendo avaliado em algumas condições, sendo o seu jeito de caminhar, como está o seu equilíbrio andando e quando parado, e também como está o comando do cérebro nessas atividades. As avaliações serão realizadas no Laboratório do Movimento Dr. Cláudio A. Borges da Universidade Estadual de Goiás – Campus Goiânia – ESEFFEGO localizada na Avenida Anhanguera, nº 1420, Setor Vila Nova, CEP: 74705-010. Você terá fixados a pele algumas bolinhas que são marcadores para o computador analisar o seu movimento e colocado na cabeça um pequeno capacete para analisar o seu cérebro em data agendada de acordo com sua disponibilidade, com um tempo estimado de duas horas para sua realização.

Os riscos decorrentes de sua participação na pesquisa são cansaço, vertigem e enjoo, porém poderá descansar e então realizaremos de novo e caso sinta qualquer enjoo ou mal-estar a qualquer momento você poderá desistir do exame. Os benefícios que essa pesquisa poderá oferecer com dados precisos de como funciona o controle do cérebro durante o andar e no equilíbrio, para que para futuramente melhores modelos de tratamento possam ser desenvolvidos para que previnem eventos decorrentes de alterações ao longo do envelhecimento como a queda.

O(a) Senhor(a) pode se recusar a responder (ou participar de qualquer procedimento) qualquer questão que lhe traga constrangimento, podendo desistir de participar da pesquisa em qualquer momento sem nenhum prejuízo para o(a) senhor(a). Sua participação é voluntária, isto é, não há pagamento por sua colaboração.

Todas as despesas que você e seu acompanhante, quando necessário tiverem relacionadas diretamente ao projeto de pesquisa (tais como, passagem para o local da pesquisa, alimentação no local da pesquisa ou exames para realização da pesquisa) serão cobertas pelo pesquisador responsável.

Caso haja algum dano direto ou indireto decorrente de sua participação na pesquisa, você poderá ser indenizado, obedecendo-se as disposições legais vigentes no Brasil.

Os resultados da pesquisa serão divulgados na Universidade Estadual de Goiás – Campus Goiânia – ESEFFEGO e Universidade de Brasília – Faculdade de Ceilândia podendo ser publicados posteriormente. Os dados e materiais serão utilizados somente para esta pesquisa e ficarão sob a guarda do pesquisador por um período de cinco anos, após isso serão destruídos.

Se o(a) Senhor(a) tiver qualquer dúvida em relação à pesquisa, por favor telefone para: Guilherme Augusto Santos, orientado pela Profa. Dra. Ruth Losada de Menezes, na Universidade de Brasília – Faculdade de Ceilândia no telefone (62) 99118-9225 / (62) 3288-2333, disponível inclusive para ligação a cobrar. E também pelo e-mail: fisio.guilhermeaugusto@gmail.com.

Este projeto foi aprovado pelo Comitê de Ética em Pesquisa da Faculdade de Ceilândia (CEP/FCE) da Universidade de Brasília. O CEP é composto por profissionais de diferentes áreas cuja função é defender os interesses dos participantes da pesquisa em sua integridade e dignidade e contribuir no desenvolvimento da pesquisa dentro de padrões éticos. As dúvidas com relação à assinatura do TCLE ou os direitos do participante da pesquisa podem ser esclarecidos pelo telefone (61) 33760437 ou do e-mail cep.fce@gmail.com, horário de atendimento de 14:00hs às 18:00hs, de segunda a sexta-feira. O CEP/FCE se localiza na Faculdade de Ceilândia, Sala AT07/66 – Prédio da Unidade de Ensino e Docência (UED) – Universidade de Brasília - Centro Metropolitano, conjunto A, lote 01, Brasília - DF. CEP: 72220-900.

Caso concorde em participar, pedimos que assine este documento que foi elaborado em duas vias, uma ficará com o pesquisador responsável e a outra com o Senhor(a).

____

Nome / assinatura

____

Pesquisador Responsável
Nome e assinatura

Goiânia, ___ de __________de _________.

Apêndice 3 – Termo de Autorização para utilização de imagem para fins de pesquisa

Eu, ____, autorizo a utilização da minha imagem e som de voz, na qualidade de participante/entrevistado(a) no projeto de pesquisa intitulado **MAPEAMENTO CEREBRAL E PADRÃO BIOMECÂNICO DA MARCHA DE MULHERES EXPOSTAS AO MEDO DE QUEDA**, sob responsabilidade de Guilherme Augusto Santos vinculado(a) ao/à Programa de Pós-Graduação Ciências e Tecnologias da Saúde da Faculdade de Ceilândia da Universidade de Brasília***.***

Minha imagem e som de voz podem ser utilizadas apenas para melhor compreensão por meio da equipe de pesquisa dos dados gerados pela análise tridimensional do movimento. Nas divulgações em congressos, artigos, palestras, atividades educacionais e etc será utilizado apenas a imagem tridimensional do seu movimento, nela existe apenas um esqueleto virtual ao qual não consta seu rosto ou quaisquer partes físicas do seu corpo.

Tenho ciência de que não haverá divulgação da minha imagem nem som de voz por qualquer meio de comunicação, sejam elas televisão, rádio ou internet, exceto nas atividades vinculadas ao ensino e a pesquisa explicitadas anteriormente. Tenho ciência também de que a guarda e demais procedimentos de segurança com relação às imagens e sons de voz são de responsabilidade do pesquisador responsável Guilherme Augusto Santos.

Deste modo, declaro que autorizo, livre e espontaneamente, o uso para fins de pesquisa, nos termos acima descritos, da minha imagem e som de voz.

____

____

Assinatura do (a) participante   Nome e Assinatura do (a) pesquisador (a)

Goiânia, ___ de __________de _________