

Table 1 Intervention chart

ITEM NO	ITEM DESCRIPTION		
1 BRIEF NAME	Group 1	Group 2	Group 3
	Motor imagery (MI) with music-, metronome- and verbal cueing	MI and gait training with music-, metronome- and verbal cueing	Gait training with music-, metronome- and verbal cueing
	Music accentuated by metronome cues and intermittent concise verbal cueing		
2 WHY	<ul style="list-style-type: none"> - PETTLEP (Physical, Environment, Task, Timing, Learning, Emotion, Perspective) approach to MI (Holmes and Collins 2001)¹ - Rhythmic-auditory stimulation (cueing) for gait training (Thaut 2007)² 		
3 WHAT MATERIALS	<ul style="list-style-type: none"> - Dropbox link including the audio mix and download to smartphone, laptop, tablet or MP3-player, or study CDs in group 1 - 4 sessions in each audiomix, one for each week - Headphones or earphones may be used if desired 		
Audiomix Content	- Kinaesthetic MI instructions	- Kinaesthetic MI and gait training instructions	- Gait training instructions

	<ul style="list-style-type: none"> - Instrumental music in 2/4 or 4/4 metre - Beat-accentuating metronome cues - Intermittent verbal cueing (e.g., “toe-off” or “step-step”) - Weekly change of music titles - Gradual increase in tempo 		
4 WHAT PROCEDURES	- Introduction to cued MI, familiarisation and training	- Introduction to MI and gait training with cueing, familiarisation and training	- Introduction to gait training with cueing, familiarisation and training
	<ul style="list-style-type: none"> - In lay language; description of the concept of MI; its application in sports and neurorehabilitation; MI perspectives (internal and external) and modes (visual, kinaesthetic). - Measurement of actual and imagined walking duration over a 6-metre distance to monitor the mental process - Performance feedback for participants and repeated training if desired 		
		<ul style="list-style-type: none"> - In lay language; description of the concept of cued gait training and sensorimotor interaction; its application in sports and neurorehabilitation; 	

		<p>gait synchronisation with the music/metronome beat; musical tempo modulations.</p> <ul style="list-style-type: none"> - Additional introduction to rhythmic auditory stimulation plus its use in neurorehabilitation - Rhythmic-cued MI familiarisation
	<ul style="list-style-type: none"> - Weekly phone calls for training support, adherence and adverse events reports - Phone calls at 4-week follow-up for feedback 	
PETTLEP Elements		Rhythmic-cued gait training
Position (Physical)	<ul style="list-style-type: none"> - Practise at any time of the day when alert - Seated in an upright body position - Shoulders relaxed - Avoid tightening the muscles or moving - Eyes closed - Normal breathing 	
		<ul style="list-style-type: none"> - Practice at any time of the day when alert - Use of headphones or earplugs if desired - Walking on a hallway (indoors) and/or familiar straight path (outdoors)

		<ul style="list-style-type: none"> - Adjusting one's steps with the music or metronome beat (every second music beat) - Use of walking sticks if required for reasons of safety - Avoid using walking sticks with balance related tasks if safe - Periods of rest as desired
Environment	<ul style="list-style-type: none"> - Practice in a quiet place at home - Imagine walking indoors (e.g., a long hallway) and walking outdoors (on a straight and familiar path) 	
Tasks for all groups	<ul style="list-style-type: none"> - Take long/giant strides - Take extremely slow/small and quick strides - Touch the ground with your heels first - Roll your feet on the ground and feel your body weight on your soles - Toe-off - Raise your knees - Pace elegantly and upright like a queen/king - Place/feel your weight on your feet/legs - - Feel the swinging of your arms while walking/swing your arms during walking 	

	<ul style="list-style-type: none"> - Stamp your feet while walking, walk forcefully and energetically - Walk effortlessly, feeling lightly - Take wide/narrow steps 	
Timing of the MI and gait training	External timing is provided: “imagine yourself walking in time with the music or metronome and verbal cues”	
		External timing is provided: “walk in time with the music or metronome and verbal cues”
	<ul style="list-style-type: none"> - Tempo (cadence) is between 80 and 120 steps/minute - Slow, medium and fast music pieces alternate, with a gradual progression in the tempo over the 4 weeks 	
Learning	<ul style="list-style-type: none"> - See familiarisation - Weekly phone call support is provided 	
Emotion related to the MI and gait training	<ul style="list-style-type: none"> - MI instructions include motivational and arousal enhancing aspects. See instructions under Tasks. - Motivational instrumental music is used with the MI 	
		<ul style="list-style-type: none"> - Gait training instructions include motivational and arousal enhancing aspects. See instructions under Tasks. - Motivational instrumental music is used with the gait training

Perspective	Kinaesthetic MI from an internal, first-person perspective	No MI
5 WHO PROVIDES	<ul style="list-style-type: none"> - The audiomix was created by the lead researcher (BS), an experienced neurological physiotherapist with 11 years of musical training and a PhD in physiotherapy. - The introduction, familiarisation and training is provided by neurological physiotherapists, occupational therapists and psychologists who received a structured and specific training by the lead researcher - All therapist researchers are supervised and supported by the lead researcher - Any intervention related processes are documented by the study team 	
6 HOW – all delivery modes	<ul style="list-style-type: none"> - MI introduction, familiarisation and training: individually - Monitoring of mental process: individually 	
		<ul style="list-style-type: none"> - Cued gait training introduction, familiarisation and training: individually - Monitoring of understanding of gait synchronisation with beat: individually
	<ul style="list-style-type: none"> - Weekly phone calls: individually 	
7 WHERE	<ul style="list-style-type: none"> - MI introduction, familiarisation, training and monitoring of mental process: at Medical University of Innsbruck (Centre 1) or Graz (Centre 3), Clinical Department of Neurology or Rehab Centre Münster (Centre 2), Austria 	

		- Cued gait training introduction, familiarisation and training: at Medical University of Innsbruck (Centre 1) or Graz (Centre 3), Clinical Department of Neurology or Rehab Centre Münster (Centre 2), Austria	
	- Cued MI practice: at participants' homes		
	Cued gait training: at participants' homes		
8 WHEN AND HOW MUCH	30 minutes, 6 times a week, for 4 weeks	15 & 15 minutes, 6 times a week, for 4 weeks	30 minutes, 6 times a week, for 4 weeks
9 TAILORING	Same intervention for all participants	Same intervention for all participants	Same intervention for all participants
10 MODIFICATIONS	No modifications	No modifications	No modifications
11 HOW WELL PLANNED	<ul style="list-style-type: none"> - Intervention adherence is assessed using a participant diary and also during weekly phone calls and at post-intervention - Support to intervention adherence is performed by the researchers who instruct participants (guidance and motivation) - Recording in structured support call logs is performed by the researchers who instruct participants - Recording in excel sheets is performed in excel sheets by the lead researcher 		

12 HOW WELL ACTUAL	This is a study protocol and the adherence rates are not yet available.
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References

1. Holmes PS, Collins DJ. The PETTLEP approach to motor imagery: A functional equivalence model for sport psychologists. *J Appl Sport Psychol* 2001;13(1):60-83.
2. Thaut MH. Rhythm, music and the brain. Scientific foundations and clinical applications. New York: Routledge 2007:272.