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Faculteit Revalidatiewetenschappen

master in de revalidatiewetenschappen en de kinesitherapie

Masterthesis

Reliability of patient reported outcomes assessing dual-task difficulties in daily life in persons with Multiple Sclerosis: a multicenter study in Turkey and Belgium

Amber Fostier
Carolien Van Goubergen

Scriptie ingediend tot het behalen van de graad van master in de revalidatiewetenschappen en de kinesitherapie, afstudeerrichting revalidatiewetenschappen en kinesitherapie bij inwendige aandoeningen

PROMOTOR :

Prof. dr. Peter FEYS

BEGELEIDER :

Mevrouw Zuhal ABASIYANIK

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Acknowledgement

This is our thesis "Reliability of patient reported outcomes assessing dual-task difficulties in daily life in persons with Multiple Sclerosis: a multicenter study in Turkey and Belgium". The research on this topic was carried out in Belgium and Turkey. The thesis was written within the program of the rehabilitation sciences and physiotherapy at Hasselt University. The research domain is rehabilitation in neurological disorders. The research ran according to an expected timeframe and proceeded satisfactorily. The administration of the various tests was not time-consuming. After performing various tests, collecting data, entering results, and analysing the results, an answer to the research question could be formed. During the study, the promotor and supervisor could always be counted on. The necessary feedback could also be requested immediately. This meant that the research could be completed without much hindrance.

We would like to thank our supervisors for their fine guidance and cooperation. An important thank you also goes to the MS centers and our participants who have contributed to our research. Without their cooperation, this study would not have been possible. In particular, we would like to thank our colleagues at the MS Center at Dokuz Eylul University for their pleasant collaboration. A lot of research is done at this center, and we are grateful that they shared their feedback and experiences with us. Family and friends also deserve thanks. They gave us wise advice and supported us in every way possible. Their motivating words have ensured that this thesis was brought to a successful conclusion.

We wish you a lot of learning and reading pleasure.

Geraardsbergen, 26/05/2022 A.F.

Vosselaar, 26/05/2022 C.V.G

Reliability of patient reported outcomes assessing dual-task difficulties in daily life in persons with Multiple Sclerosis: a multicenter study in Turkey and Belgium

"What is the reliability of Turkish and Dutch Dual-task impact on daily-living Activities questionnaire (DIDA-Q), Dual Tasking Screening List (DTSL) and Dual Task Questionnaire (DTQ) in people with Multiple Sclerosis?"

- An excellent internal consistency was found for the Turkish and Dutch versions of the DIDA-Q, DTSL and DTQ.
- A very high test-retest reliability was found for the Turkish version of the DIDA-Q, DTSL and DTQ.
- For the Dutch version of DIDA-Q, a high test-retest reliability for the balance and mobility subscale, while the subscales upper extremity and cognition and the total score showed a very high test-retest reliability. An adequate and high test-retest reliability was found for the Dutch version of DTSL and DTQ, respectively.
- For all questionnaires in both languages, no proportional bias was found based on Bland-Altman plots.
- According to the COSMIN guideline, our findings could not reach adequate quality due to the small sample size. The ongoing multicenter international study can confirm our results regarding reliability and add results regarding validity of DIDA-Q, DTSL and DTQ with a larger sample size.

Amber Fostier (1746681) and Carolien Van Goubergen (1745899)

Prof. Peter Feys and Dra. Zuhal Abasiyanik

Context

This master's thesis was conducted by Amber Fostier and Carolien Van Goubergen within the framework of the two-year master program Rehabilitation Sciences and Physiotherapy at the faculty of Rehabilitation Sciences at Hasselt University. This thesis is part of the field of neurological rehabilitation. The study of dual tasking in populations such as multiple sclerosis is one of the focal points of the Rehabilitation Research Center REVAL. In this context, a collaboration between Hasselt University, Belgium (Prof. Peter Feys) and Dokuz Eylül University, Izmir, Turkey (Dra. Zuhal Abasiyanik) is currently active. This partnership contributed to the selection of Amber Fostier and Carolien Van Goubergen by the International Office of Hasselt University for a scientific and clinical internship in Izmir, Turkey for the second part of the thesis.

In the first part of the master's thesis, a review was conducted on the psychometric properties of patient-reported questionnaires on dual tasking in daily life through systematic literature research. The evaluation of patients' perceived difficulty with dual tasking by valid and reliable tests is necessary. These can contribute to a proficient and evidence-based treatment in specific patient populations. For this reason, it is important to validate these questionnaires in different languages and to check their reliability. Research and experimental work in this field is already being conducted by Dra. Zuhal Abasiyanik. In order to check these dual tasking questionnaires in different languages, Dra. Zuhal Abasiyanik and her promoter Prof. Peter Feys have set up a multicenter study with different countries (Belgium, Turkey, Italy, Chile Israel, and Spain). Persons with Multiple Sclerosis (PwMS) will be recruited from the participating rehabilitation-, medical- or university centers.

The second part of our master's thesis is part of this ongoing multicenter study by Dra. Zuhal Abasiyanik within the rehabilitation in Multiple Sclerosis network (RIMS) in Europe. As a result, the research design was determined before the start of the thesis. The recruitment of Belgian Multiple Sclerosis (MS) patients was done independently through flyers and by spreading awareness on the Facebook page 'faculteit revalidatiewetenschappen'. In the MS center Melsbroek, support was given for the recruitment of MS patients by Mieke D'Hooghe, a neuropsychologist of the center. Testings were administered by 1st and 2nd

master students of rehabilitation sciences and physical therapy. A limited number of MS patients were evaluated in Rehabilitation Research Center REVAL and building D of Hasselt University. These participants were assessed in collaboration with 2nd Master students Jessica Thenaers and Anna-Lisa Nulens as well as four 1st Master students. As the Turkish MS patients were known by Dra. Zuhal Abasiyanik, she led the recruitment of Turkish MS patients with the use of scheduled appointments. Data acquisition of Turkish MS participants was accomplished by two 2nd Master students (Amber Fostier and Carolien Van Goubergen) during a scientific internship in the period from March 7th until May 6th 2022, two days a week. The data processing and the academic writing process were carried out independently. Feedback from promotor Prof. Peter Feys and supervisor Zuhal Abasiyanik was sought and implemented.

What is the reliability of Turkish and Dutch Dual-task impact on daily-living Activities questionnaire, Dual Tasking Screening List (DTSL) and Dual Task Questionnaire (DTQ) in people with Multiple Sclerosis?

Amber Fostier (1746681) Carolien Van Goubergen (1745899)

Prof. Peter Feys and Dra. Zuhal Abasiyanik

1. Abstract

Background: Based on lab assessments, persons with Multiple Sclerosis (MS) often demonstrate difficulties with dual-tasking but the relation with own experiences is unknown. Dual-tasking patient reported outcomes (DT PRO) can give valuable information on a person's perceived difficulty with dual-tasking. This can make the treatment more patient-specific.

Objectives: The aim was to investigate the reliability of the Turkish and Dutch versions of Daily-life Activities Questionnaire (DIDA-Q), Dual Tasking Screening List (DTSL), and Dual Task Questionnaire (DTQ).

Participants: 36 Turkish and 27 Dutch MS patients were included in this study. Turkish and Dutch participants were tested in the MS Outpatient Clinic of Dokuz Eylül University and REVAL Faculty of Rehabilitation Sciences at Hasselt University and National MS Center Melsbroek, respectively.

Measurements: Patient characteristics, dual-task performance tasks, patient-reported outcomes, and three DT questionnaires were applied. Internal consistency including standard error of measurement and smallest detectable change and test-retest reliability of DIDA-Q, DTSL and DTQ were investigated.

Results: Both versions of DIDA-Q, DTSL and DTQ showed excellent internal consistency (CAC range 0.91 to 0.96). A very high test-retest reliability was found for all DT PRO in Turkish version (ICC range 0.94 to 0.99). For the Dutch-language versions, test-retest reliability was high to very high for three subscales and the total score of DIDA-Q (ICC range 0.87 to 0.97), as well as adequate for DTSL (ICC 0.75) and high test-retest reliability for DTQ (ICC 0.84). Bland-Altman plots and regression analysis for all DT PROs show no proportional bias.

Discussion and conclusion: Overall, the reliability of the DT PRO was good for both languages. These results should be confirmed with a larger sample. Future research based on COSMIN guidelines is needed and may provide valuable information on the validity and responsiveness of DT PRO.

Keywords: dual-tasking, Multiple Sclerosis, reliability, questionnaires, patient reported outcomes

2. Introduction

Multiple sclerosis (MS) is a disease in which the central nervous system (CNS) is affected by the destruction of myelin, which can cause neurological symptoms. These deficits can be cognitive (e.g., slower cognitive processing, attention, and episodic memory) (Sumowski et. Al., 2018) as well as motor (e.g., loss of muscle strength and balance impairment) (Carling, Forsberg & Nilsagård, 2018). 70% of persons with MS (pwMS) have walking difficulty and agree this is the most demanding aspect of MS (LaRocca, 2011). pwMS across all levels of disability experience a reduced quality in the performance of activities of daily living (Jansa et al., 2022).

Many daily activities include dual-tasks (DT), such as driving while paying attention to traffic, walking while talking, and walking while performing household tasks (Carling et al., 2018). When a motor and cognitive task are combined, it can lead to difficulties or worsening in performance in one or both tasks. This interference can be conceptualized as dual-task interference (DTI) (Baddeley, Sala, Gray, Papagno & Spinnler, 1997). The change in DT performance compared to single-task performance can be quantified as a percentage and is called the dual-task cost (DTC) (Leone, Patti & Feys, 2015). Research shows that DTI is present in healthy controls (HC), and to a greater extent in the elderly and those with neurological disorders (Hausdorff, Schweiger, Herman, Yogev-Seligmann & Giladi, 2008; Camicioli et al., 1997; Penko et al., 2018).

In general, pwMS experience impairments in their ability to DT (Edwards et al., 2020). These patients often experience gait impairment that usually get worse under DT conditions such as gait velocity reduction, changes in step length, impairment in cadence, and an increase in double support duration (Leone et al., 2015). In addition, Wajda, Sandroff, Pula, Motl and Sosnoff (2013) found that DTC of walking velocity and DTC of stride length were low to moderately correlated with falls. Falls are a common occurrence in this patient population (Finlayson & Peterson, 2010) and are usually present while doing daily tasks due to neurological symptoms. In addition, DTC is related to balance and quality of life in pwMS (Castelli et al, 2016). These findings highlight the importance of accurate DTI measurement in pwMS.

Dual tasking is objectively measured in traditional lab-based research by a gait test with an added cognitive task (Leone et al., 2015). Research shows opposing results on whether pwMS show greater deterioration of cognitive-motor interference (CMI) than healthy subjects. Leone et al. (2020) indicates a similar deterioration of CMI regardless of the difficulty of the DT. Learmonth, Ensari and Motl (2017) provides evidence for an overall minimal difference in CMI between pwMS and HC. These differences can be explained by the type of DT, cognitive or motor, used (Postigo-Alonso et al., 2018). Shema-Shiratzky et al. (2020) showed similar gait speed during daily life walking and in laboratory dual tasking. As daily life activities may be influenced by symptoms of MS and external environmental stimuli, it might be useful to investigate the ecological validity of dual task assessment. Patient-reported outcomes (PRO), which are accepted questionnaires as reported by the patient (Valderas et al, 2008), could assist the clinician in detecting rapid changes in disease progression (Brichetto et al, 2020) and obtaining valuable information on patient's difficulties in daily living. This can support caregivers in their decision making. It might cause an increase in the adherence to treatment leading to a greater opportunity for more successful and qualitative treatment (Deshpande, Rajan, Sudeepthi, & Nazir, 2011).

According to Abasiyanik, Veldkamp, Fostier, Van Goubergen & Feys (in preparation), few dual-task PROs are currently known in clinic and research and the use is sparse. The Dual-Task-Impact on Daily-life Activities Questionnaire (DIDA-Q), developed for pwMS, demonstrated good reliability and validity in Italian (Pedulla. et al., 2020). Dual-Task Screening-List (DTSL) and Dual-Tasking Questionnaire (DTQ) were developed for Parkinson's Disease (Strouwen et al., 2017) and stroke and traumatic brain injury (Evans et al., 2009), respectively. These questionnaires were used as screening (DTSL) and outcome measures (DTQ) in pwMS. The latter two DT PRO are available in Dutch and Hebrew, yet no psychometric properties have been evaluated.

Due to these findings, research into the psychometric properties of these DT PROs is necessary to ensure accurate measurement of perceived DT difficulties (Yang et al., 2017). Therefore, the aims of this study are to investigate internal consistency including Standard Error of Measurement (SEM) and Smallest Detectable Change (SDC), test-retest reliability of DTQ, DTSL and DIDA-Q and comparing them between the Turkish and Dutch languages.

3. Method

3.1 Participants

This study is part of a multicenter study including the Italian Multiple Sclerosis Foundation in Italy, Hospital Doctor Sótero del Río and Pontificia Universidad Católica de Chile in Chile, the Sheba Medical Center, Tel-hashomer in Israel, and Multiple Sclerosis Center of Catalonia in Spain. In Turkey, participants were recruited from the MS Outpatient Clinic of the Dokuz Eylül University Hospital. In Belgium, participants were recruited from the Faculty of Rehabilitation Sciences Hasselt University and National MS Center Melsbroek. All participants needed to give their consent to participate in this study through written informed consent.

Inclusion criteria for this study were; (1) age between 18-65 years; (2) confirmed diagnosis of Multiple Sclerosis based on McDonald criteria; (3) no occurrence of relapse during the past 30 days; and (4) the ability to understand the Dutch or Turkish language. Participants were excluded from this study when one or more of the following criteria were present: (1) EDSS score of 7 or above which means that there is an inability to walk (2) a cognitive impairment leading to the inability to understand the questions in the questionnaires; (3) other neurological comorbidities comprising the ability to dual-task.

3.2 Procedure

3.2.1 Experimental DT-PRO data of pwMS in Belgium and Turkey

The experimental outcome measures of this study are three dual-task questionnaires; Dual-task Impact on Daily-life Activities Questionnaire (DIDA-Q), Dual-task Screening List (DTSL), and Dual-Task Questionnaire (DTQ). DTSL and DTQ were already available in the Dutch language. The DIDA-Q was translated into Dutch and the DTSL into Turkish by experts according to guidelines for forward and backward translations published by Beaton et al. (2000).

Dual-task Impact on Daily-life Activities Questionnaire (DIDA-Q) is a questionnaire developed by Pedulla. et al. (2020). The DIDA-Q aims to assess the impact of dual-tasks on daily life in pwMS. The original DIDA-Q was established in Italian and contains 19 items. The DIDA-Q consists of three subscales, namely balance & mobility with 20 points, cognition

with 32 points, and upper-limb tasks with 24 points. There were no Turkish or Dutch versions of DIDA-Q available at the time of the study. Translations were done according to Beaton et al. (2000) from English into Turkish and Dutch. Pedulla et al. (2020) investigated the reliability of the original Italian version of DIDA-Q in pwMS. The internal consistency of all subscales was high with Cronbach's alpha values of 0.93, 0.90, and 0.90, respectively. In addition, the test-retest reliability was adequate with Intraclass Correlation Coefficients of 0.89, 0.76, and 0.81, respectively.

Dual-task Screening List (DTSL) is a screening list developed by Strouwen et al. (2017) for the assessment of the presence of dual-task interference in Parkinson's patients. It consists of 13 questions with three possible responses; yes (having difficulty), no (not having difficulty) or not applicable. The DTSL was not yet available in Turkish at the time of the study and was therefore translated into Turkish from English. The Dutch version of this questionnaire was already available and used in previous studies (Strouwen et al., 2014; Veldkamp et al., 2019a). The psychometric properties of this questionnaire have not yet been assessed in any language.

Dual-task Questionnaire (DTQ) is a questionnaire developed by Evans et al. (2009). It includes 10 items investigating the patient's difficulties with dual-tasking in daily life. All items are scored on a 5-point scale ranging from 0 (never) to 4 (very often). Originally, the DTQ was developed for the assessment of patients with traumatic brain injury and stroke. The test-retest correlation was 0.69. No investigation has been done of the psychometric properties of DTQ in pwMS. The DTQ had already been translated into Turkish, and the validity and reliability were examined in older adults in a recent study by Sertel et al. (2021). No study has yet been carried out on these psychometric properties in pwMS. The intra-rater reliability was high, with values of 0.90 on all 10 items. The intra-class correlation coefficient (ICC), so test-retest reliability, was very high (ICC=0.991; r=0.982). The CAC with a value of 0.695 indicates an inadequate internal consistency. For the Belgian part of the study, the DTQ was available in Dutch.

3.2.2 Descriptive outcome measures

Patient characteristics were collected. This information consisted of age, sex, the type of MS, duration of disease, level of education, and EDSS score.

Single motor task is a test whereby participants are asked to walk as fast as possible for 30 seconds. The single motor task was administered in a corridor with a length of 15 meters. The distance travelled was recorded in the study.

Dual-task performance test is a combination of the single motor task together with a verbal fluency dual-task. Participants had to walk for 30 seconds in a corridor of 15 meters. Using word list generation, participants were asked to name as many words as possible that are part of the category 'fruit' during the 30-second walk. The distance travelled and the number of correct answers were recorded. The dual-task cost (DTC) of the walking distance was calculated with the formula:

$$DTC(\%) = \frac{(\text{single task performance} - \text{dual task performance})}{\text{single task performance}} x\ 100$$

Timed 25 Foot Walk Test (T25WT) is a measuring tool to evaluate mobility, leg function, and maximal walking speed. The participants were asked to walk as fast as possible for 25 foot (7,62 meters). Each participant carried out two consecutive trials. Participants who use a walking aid in daily life were permitted to use it during this test. T25WT has high reliability (Motl et al., 2017), concurrent validity, and responsiveness in pwMS (Manago, M. & Hebert, J., 2013).

Multiple Sclerosis Walking Scale (MSWS-12) is a 12-item questionnaire investigating the impact of MS on the ability to walk in pwMS. This self-reported measuring instrument was developed by Hobart et. al. (2001). The original English version has been shown to have an excellent test-retest reliability with ICC=0.94 and excellent internal consistency with Cronbach's alpha = 0.94-0.97 (Hobart et al., 2003). The Dutch version of the MSWS-12 was shown to have a good quality and reliability (Mokkink, Galindo-Garre & Uitdehaag, 2016). The validity and reliability of the Turkish version of the MSWS-12 were confirmed by Dib, Tamam, Terzi & Hobart (2014).

The Modified Fatigue Impact Scale (MFIS) is a self-reported measuring tool that investigates the perceived impact of fatigue as measured in three subscales. The subscales are cognitive with 10 items, psychosocial with two items, and physical functioning with nine items. Both the Dutch version (Kos et al., 2003) and Turkish version (Armutlu, K., 2007) of the MFIS is valid and reliable in pwMS.

Nine-Hole Peg Test (NHPT) is a measuring tool used for the assessment of manual dexterity. It measures the agility in fine motor movements. This measuring instrument consists of nine pegs as well as a board with nine holes in it. Firstly, the patient was asked if they were right- or lefthanded. The test started with the dominant hand, their writing hand. The board was placed with the pegs on dominant side and the holes on the non-dominant side. The patient was asked to perform the test twice with the dominant hand and twice with the non-dominant hand. The time was measured in seconds. The NHPT is the most used outcome measure for the assessment of the upper limb activity domain of the International Classification of Functioning, Disability and Health in pwMS (Lamers et. al., 2014).

Symbol Digit Modality Test (SDMT) is a measuring tool that evaluates the information processing speed and working memory in the cognitive domain. The test comprises of a row of nine symbols and nine numbers ranging from one to nine. Each symbol matches up with one number as pairs. At the start of the test, there is a trial in which the patient can practice matching 10 numbers with the given row of symbols. After these 10 pairs, the test starts. The patient is asked to match as many pairs as possible in 90 seconds. As the loss of fine motor movements, decrease in writing ability (Çelik R., 2018) and a high percentage of bilateral hand dexterity deficits (Cattaneo et. al., 2017) is present in pwMS, the SDMT was performed orally by all participants to avoid possible bias. The number of correct pairs was documented. The reliability and validity have been shown in pwMS (Benedict, R. H., 2017).

The fall history is the amount of falls a person has experienced in the past 6 months. A fall is defined as “an unexpected event in which the participants come to rest on the ground, floor, or lower level” (Lamb, Jørstad-Stein, Hauer & Becker, 2005).

The 7-item Falls Efficacy Scale International (FES-I) is a measuring tool that assesses the patients fear of falling. The 7-item FES-I assesses the person's fear of falling during performance of activities of daily living and social activities. It consists of seven items. A high score corresponds to a higher fear of falling.

3.2.3 Protocol

The protocol of this study consists of three parts; getting permission from the ethical committee, translating the questionnaires and collecting data of the participants. The study was approved by the Ethical Committee of Hasselt University on 10 January 2022 with code B1152021000023 and by the Ethical Committee of Dokuz Eylül University on 19 January 2022 with code 2022/03-04. These approvals can be found in the appendices.

PwMS were asked to participate in two sessions. During the first session, demographic and disease-related information was collected by means of age, sex, the type of MS, duration of disease, fall history, level of education, and EDSS score. In addition, dual-task performance assessment (single motor task and dual cognitive-motor task), physical assessments (T25WT, 9HPT), cognitive performance assessment (SDMT), patient-reported outcomes for fatigue, walking, and fear of falling (MFIS, MSWS, 7-items FES-I, fall history in the past six months), and dual-task questionnaires (DTQ, DTSL, DIDA-Q) were performed. If the 9HPT and/or SDMT had already been carried out within the last 6 months, this routinely used data was collected to avoid practice effect. The second session was conducted within 7-14 days and consisted of the assessment of the dual-task questionnaires (DTQ, DTSL, DIDA-Q). The duration of the first session was ± 30 minutes and the duration of the second session was ± 15 minutes. At exactly two weeks, a reminder was sent to the patient to complete the dual-task questionnaires.

3.3 Data analysis

The analysis was performed by using the statistical computer programme Statistical Package for the Social Sciences (SPSS) (Version 28.0. Armonk, NY: IBM Corp.). The analysis was done of the internal consistency and test-retest reliability. In both analyses, a significance level set at $p<0.05$ was used.

Internal consistency can be described as the amount of interaction between items and thus the amount to which the (sub)scales measure the identical concept (Terwee et al., 2007). It was measured by the calculation of Cronbach's alpha coefficients (CAC). A high correlation between the different items of the dual-task PRO corresponds to a high CAC. The CAC values was reported as inadequate, <0.70; adequate 0.70-0.79; and excellent, >0.80 (Andresen, 2000; Terwee et. al., 2007).

Test-retest reliability assumes that the actual score measured is the same over a short-term interval (Shou, Sellbom & Chen, 2022). It was evaluated for continuous scores by the calculation of the Intraclass Correlation Coefficient (ICC). According to Lippincott & Wilkins (2005), the ICC values was calculated and reported as very low ≤0.25, low=0.26–0.49, moderate=0.50–0.69, high=0.70–0.89, and very high ≥0.90. For the absolute test-retest reliability, a 95% confidence interval of the mean difference was used to determine systematic bias by means of the Bland-Altman plot. This 95% limits of agreement (LoA) were determined as 1.96 X standard deviation (SD) lower and higher than the mean difference. When zero was in the confidence interval, no systematic bias had occurred. The measurement error was investigated by calculating the Standard Error of Measurement (SEM) and Smallest Detectable Change (SDC). The SEM can be calculated by SEM = SD × √(1−R) with R reliability coefficient of the test. For the SDS, the next formula was used SDS= SEM ×1.96 × √2 with 95% confidence interval.

4. Results

4.1 General results

A total of 63 participants were included in this study. 27 MS patients in Belgium were evaluated, among whom 13 completed a retest. For Turkey, 36 participants were tested, and 32 of them completed a retest. The internal consistency of the three included patient-reported outcomes was carried out on the total population of each country. The test-retest analysis was done in the subset of the population that completed a retest in each country. For the Turkish data, missing data was reported on the EDSS score for one participant and no retest of DT PRO for four participants. For the Belgium data, missing data was reported for time since diagnosis, EDSS score, and type of MS each for one participant, SDMT score for three participants and retest of DT PRO for 14 participants.

Normality of the data was checked for the descriptive characteristics of the Belgian and Turkish participants. In the case of age, single motor task, dual-task performance test, SDMT total score, MSWS total score, MFIS total score and time since diagnosis, data was normally distributed in the Dutch and Turkish populations whereby p-values were calculated by means of independent sample T-test. As a result, significant differences were noted between both populations for age ($p < 0.001$), single motor task ($p = 0.021$), dual-task performance test ($p = 0.002$), MSWS-12 ($p < 0.001$), and time since diagnosis ($p < 0.001$). For EDSS score, T25FW, DTC, FES-I, number of falls, NHPT dominant hand and NHPT non-dominant hand, data of one or both the Dutch and Turkish populations were not normally distributed. Using the Mann-Whitney U Test (i.e. Rank sum test), significant p-values were noted for EDSS score ($p < 0.001$), and T25FW ($p < 0.001$). Pearson's Chi squared tests were performed for the nominal data; gender, type of MS and fall status. No significant differences were found between the countries for these characteristics.

An overview of the descriptive characteristics can be found in Table 1. A summary of internal consistency of DT PRO in total sample, Belgium and Turkey is shown in Table 2. In addition, the test-retest reliability, standard error measurement and smallest detectable change of DT PRO in total sample, Belgium and Turkey is presented in Table 3. The ICC values of each item of each dual tasking patient reported outcome was analysed. This is shown in the appendices in Table 4 for DIDA-Q, in Table 5 for DTSL, and in Table 6 for DTQ.

Table 1

Descriptive data of pwMS in total sample, Belgium and Turkey

	Total (n=63)	**Belgium** (n = 27)	**Turkey** (n = 36)	**Difference between countries (p-value)**
Age (years)	45,89 ± 12,97	54,96 ± 9,57	39,08 ± 10,90	<0,001*
EDSS (0-10)	3,53 ± 2,00	4,96 ± 1,53	2,46 ± 1,60	<0,001*
Time since diagnosis (years)	13,68 ± 9,33	18,58 ± 10,82	10,14 ± 6,12	<0,001*
Gender, n (%)				0,589
Female	42 (66,7)	19 (70,4)	23 (63,9)	
Male	21 (33,3)	8 (26,9)	13 (36,1)	
Education level (years)	14,17 ± 2,98	14,44 ± 2,04	13,97 ± 3,54	0,337
Type of MS, n (%)				0,098
Relapsing Remitting, n (%)	47 (74,6)	16 (59,3)	31 (86,1)	
Secondary Progressive, n (%)	9 (14,3)	6 (22,2)	3 (8,3)	
Primary Progressive, n (%)	6 (9,5)	4 (14,8)	2 (5,6)	
Walking aid				<0,001*
Yes, n (%)	20 (31,7)	19 (70,4)	1 (2,8)	
No, n (%)	43 (68,3)	8 (29,6)	35 (97,2)	
Number of falls	3,27 ± 8,63	3,69 ± 10,24	1,75 ± 0,44	0,127

Table 1 (continued)

Descriptive data of pwMS in in total sample, Belgium and Turkey

	Total (n=63)	**Belgium** (n = 27)	**Turkey** (n = 36)	**Difference between sample (p-value)**
Fall status				0,037*
Yes	23 (36,5)	14 (51,9)	9 (25,0)	
No	40 (63,5)	13 (48,1)	27 (75,0)	
NHPT (s)				
Dominant	23,17 ± 6,76	24,80 ± 7,95	21,98 ± 5,56	0,117
Nondominant	25,85 ± 8,49	27,32 ± 9,56	24,74 ± 7,55	0,261
T25FW (s)	6,77 ± 3,78	8,53 ± 4,91	5,45 ± 1,81	<0,001*
SMT (m)	37,68 ± 12,09	33,67 ± 14,47	40,69 ± 9,04	0,021*
DTPT (m)	33,01 ± 10,66	28,33 ± 11,43	36,51 ± 8,66	0,002*
DTC (%)	10,89 ± 12,50	11,47 ± 17,87	10,45 ± 6,23	0,637
FES-I (16-64)	12,84 ± 4,31	13,93 ± 4,62	12,03 ± 3,94	0,093
MSWS-12 (12-60)	34,43 ± 13,95	41,59 ± 13,97	29,06 ± 11,42	<0,001*
SDMT (0-110)	49,36 ± 12,54	47,33 ± 13,26	50,74 ± 12,01	0,309
MFIS total (0-84)	38,14 ± 21,66	42,70 ± 20,99	34,72 ± 21,81	0,149

Abbreviations: EDSS = Expanded Disability Status Scale; MS = multiple sclerosis; pwMS = people with multiple sclerosis; NHPT = nine-hole peg test; T25FW = timed 25-foot walk; SMT = single motor task; DTPT = dual task performance test; FES-I Falls Efficacy Scale International; MSWS-12 = Twelve Item MS Walking Scale; SDMT = single digit modality test; MFIS = Modified Fatigue Impact Scale; * <0.05

Table 2

Experimental DT-PRO data of pwMS in total sample, Belgium and Turkey

	Total (n=63)	**Belgium** (n = 27)	**Turkey** (n = 36)	**Difference between sample (p-value)**
DTQ	15.97 ± 9.85	19.78 ± 10.29	13.11 ± 8.57	0.007*
DTSL	20.56 ± 4.45	18.37 ± 4.55	22.19 ± 3.64	0.001*
DIDA-Q total score	23.22 ± 17.44	29.59 ± 17.74	18.44 ± 15.82	0.014*
DIDA-Q mobility &balance	7.35 ± 5.84	8.74 ± 6.11	6.31 ± 5.49	0.097
DIDA-Q upper extremity	9.62 ±7.13	12.67 ± 6.84	7.33 ± 6.54	0.002*
DIDA-Q cognition	6.25 ± 6.17	8.19 ± 7.10	4.81± 4.94	0.082

Abbreviations: EDSS = Expanded Disability Status Scale; MS = multiple sclerosis; pwMS = people with multiple sclerosis; NHPT = nine-hole peg test; T25FW = timed 25-foot walk; SMT = single motor task; DTPT = dual task performance test; FES-I Falls Efficacy Scale International; MSWS-12 = Twelve Item MS Walking Scale; SDMT = single digit modality test; MFIS = Modified Fatigue Impact Scale; * <0.05

Table 3

Internal consistency of dual tasking patient reported outcomes in total sample, Belgium, and Turkey

Dual tasking PRO	**Total sample** (n=63)	**Belgium** (n=27)	**Turkey** (n = 36)
	CAC	CAC	CAC
DTQ	0,96	0,92	0,94
DTSL	0,91	0,91	0,94
DIDA-Q total score	0,92	0,95	0,99
DIDA-Q mobility &balance	0,94	0,92	0,98
DIDA-Q upper extremity	0,93	0,91	0,98
DIDA-Q cognition	0,91	0,91	0,93

Abbreviations: PRO = patient reported outcomes; CAC = Cronbach's alpha coefficients; DTQ = Dual Task Questionnaire; DTSL = Dual-task Screening List; DIDA-Q = Dual-task Impact on Daily-life Activities Questionnaire

Table 4

Test-retest reliability, standard error of measurement and smallest detectable change of DT PRO in total sample, Belgium, and Turkey

Dual tasking PRO	**Total sample** (n=45)			**Belgium** (n=13)			**Turkey** (n = 32)		
	ICC [95% CI]	**SEM**	**SDC**	**ICC [95% CI]**	**SEM**	**SDC**	**ICC [95% CI]**	**SEM**	**SDC**
DTQ	0,93 [0.88, 0.96]	1,20	1,70	0,84 [0.50, 0.95]	3,34	4,73	0,95 [0.89, 0.97]	1,85	2,62
DTSL	0,91 [0.83, 0.95]	0,65	0,92	0,75 [0.20, 0.92]	1,86	2,63	0,94 [0.87, 0.97]	0,90	1,27
DIDA-Q total score	0,98 [0.97, 0.99]	1,13	1,60	0,96 [0.87, 0.99]	2,75	3,89	0,99 [0.97, 0.99]	1,85	2,61
DIDA-Q mobility &balance	0,96 [0.92, 0.98]	0,57	0,80	0,87 [0.59, 0.96]	1,71	2,42	0,98 [0.95, 0.99]	0,80	1,13
DIDA-Q upper extremity	0,97 [0.95, 0.98]	0,59	0,84	0,91 [0.72, 0.97]	1,73	2,45	0,98 [0.97, 0.99]	0,78	1,11
DIDA-Q cognition	0,95 [0.91, 0.97]	0,64	0,90	0,97 [0.90, 0.99]	1,01	1,43	0,93 [0.86, 0.97]	1,25	1,77

Abbreviations: PRO = patient reported outcomes; ICC = Intraclass Correlation Coefficient; SEM = standard error of measurement; SDC = smallest detectable change; DTQ = Dual Task Questionnaire; DTSL = Dual-task Screening List; DIDA-Q = Dual-task Impact on Daily-life Activities Questionnaire

4.2 Turkish version of Dual Tasking PROs

For the patient-reported outcome measure DIDA-Q, a CAC of 0.99 was found for all items. The CAC value for the three subscales was 0.98 for mobility & balance, 0.98 for upper extremity, and 0.93 for cognition. Thus, the internal consistency for the Turkish version of the DIDA-Q for the total scale and the subscales is excellent. Furthermore, the test-retest reliability, analysed with ICC, showed a value of 0.99 for the total scale. The ICC was 0.98 for the mobility & balance subscale, 0.98 for the upper extremity subscale, and 0.93 for the cognition subscale. The ICC values were reported as very high for the three subscales and for the total score. In addition, a SEM and SDC of 1.85 and 2.61, respectively, were presented. Figure 1 shows the Bland-Altman plot for the DIDA-Q. The 95% limits of agreement was ± 7.25%. Based on the regression analysis, there is no proportional bias ($p = 0.622$).

For the DTSL questionnaire, an internal consistency of 0.94 CAC was found for the total scale. Thus, the internal consistency for the Turkish version of the DTSL is excellent. The test-retest reliability was very high with an ICC value of 0.94. The SEM and SDC values were 0.90 and 1.27, respectively. Figure 1 shows the Bland-Altman plot for the questionnaire mentioned above with a LoA of ±3.34%. Based on the regression analysis, there is no proportional bias ($p = 0.029$).

For the Turkish version of the DTQ, a CAC value of 0.94 showed excellent internal consistency. An ICC value of 0.94 was found, suggesting a very high test-retest reliability. In addition, a SEM and SDC with 1.85 and 2.62, respectively, were also found. Figure 1 shows the Bland-Altman plot for the DTQ with the 95% limits of agreement of ±7.17%. Based on the regression analysis, there is no proportional bias ($p = 0.317$).

4.3 Dutch versions of Dual Tasking PRO

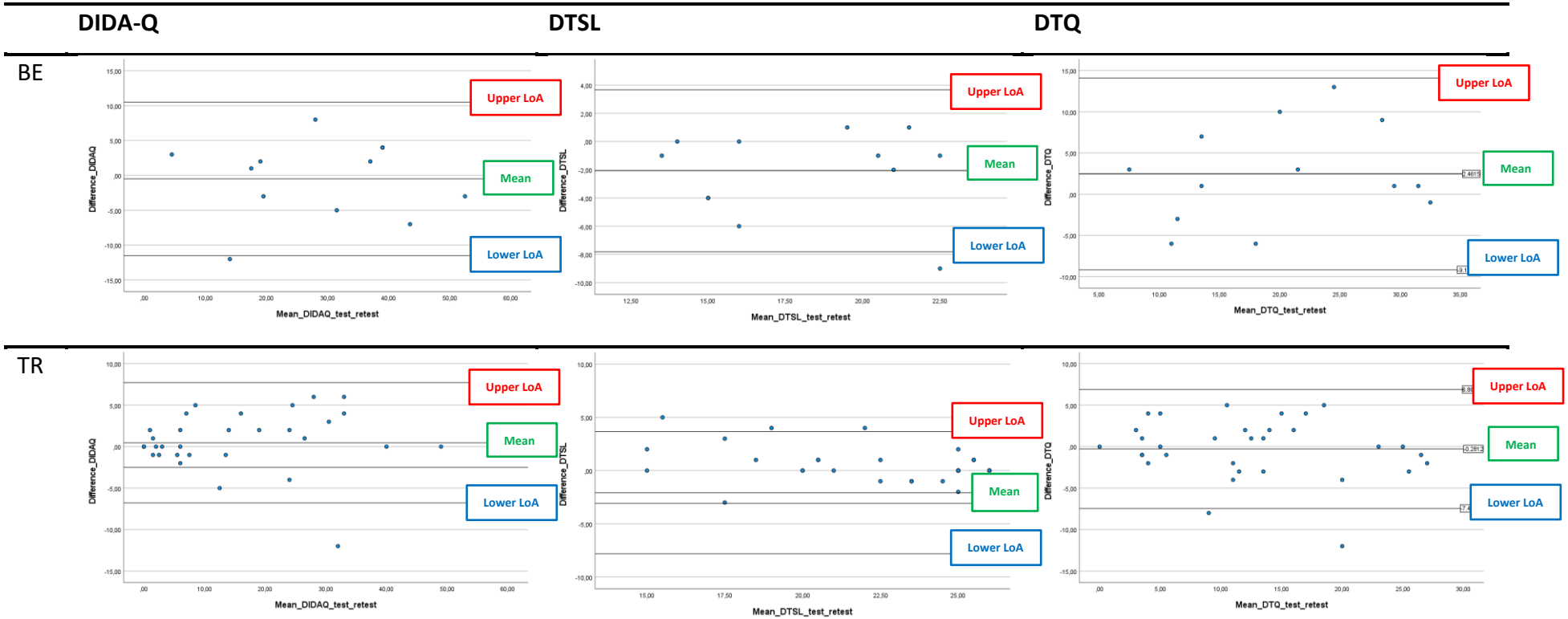
DIDA-Q showed a CAC of 0.95 for all items. The CAC value of the three subscales were 0.92 for mobility & balance, 0.91 for upper extremity and 0.91 for cognition. Thus, the internal consistency for the Dutch version of DIDA-Q for the total scale and subscales is excellent. Furthermore, test-retest reliability, analysed with ICC, showed a value of 0.96 on the total scale. The ICC was 0.87 for the subscale mobility & balance, 0.91 for the subscale upper extremity, and 0.97 for the subscale cognition. The ICC values were reported to be high for the subscale mobility & balance, and very high for the total scale and subscales upper extremity and cognition. In addition, a SEM and SDC of 2.75 and 3.89, respectively, were also reported. Figure 1 shows the Bland-Altman plot for the DIDA-Q with the 95% limits of agreement of ±11.01%. Regression analysis shows no proportional bias (p = 0,984).

For the DTSL, an internal consistency of 0.91 CAC was determined for the total scale. The internal consistency for the Dutch version of DTSL is excellent. The test-retest reliability was adequate with an ICC value of 0.75. The SEM and SDC values were 1.86 and 2.63 respectively. Figure 1 indicate the Bland-Altman plot for the DTSL with a LoA of ±5.74%. Based on the regression analysis, there is no proportional bias (p = 1,000).

The Dutch version of the DTQ shows an excellent internal consistency with a CAC value of 0.92. An ICC value of 0.84 was found indicating a high test-retest reliability. In addition, a SEM and SDC with 3.34 and 4.73, respectively, were also reported. Figure 1 expresses the Bland-Altman plot for the DTQ. The 95% limits of agreement was ± 11.64%. Based on the regression analysis, there is no proportional bias (p = 0.440).

Figure 1

Bland-Altman plot of Dutch and Turkish versions of DIDA-Q, DTSL and DTQ



Abbreviations: DIDA-Q = Dual-task Impact on Daily-life Activities Questionnaire; DTSL = Dual-task Screening List; DTQ = Dual Task Questionnaire; BE = Belgium; TR = Turkey; LoA = limits of agreement

4.4 Dual Tasking PRO in the combined Turkish-Dutch population

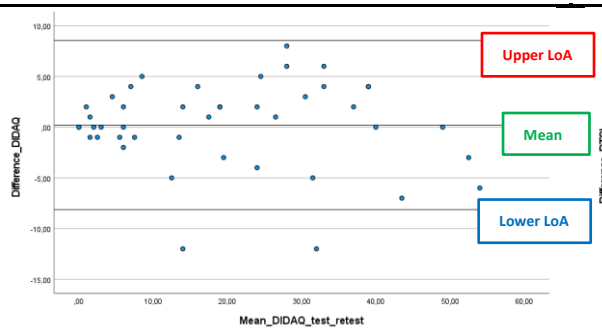
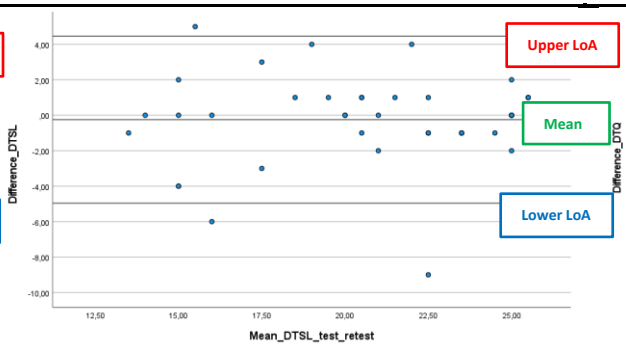
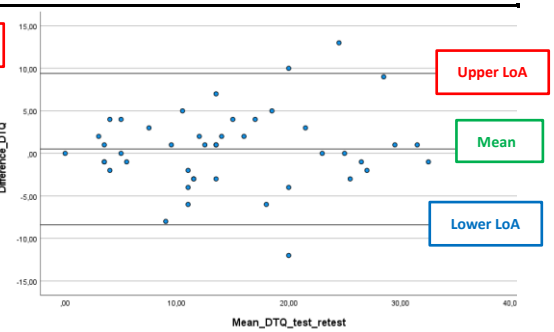
DIDA-Q showed a CAC of 0.92 for all items. The CAC value of the three subscales were 0.94 for mobility & balance, 0.93 for upper extremity and 0.91 for cognition. Thus, the internal consistency for the DIDA-Q for the total scale and subscales is excellent. Furthermore, test-retest reliability, analysed with ICC, showed a value of 0.98 on the total scale. The ICC was 0.96 for the subscale mobility & balance, 0.97 for the subscale upper extremity, and 0.95 for the subscale cognition. The ICC values were reported to be high for the total scale and all subscales. In addition, a SEM and SDC of 1.13 and 1.60, respectively, were also reported. Figure 2 reveals the Bland-Altman plot for the questionnaire mentioned above with a LoA of ±8.34%. The p-value of 0.567 shows that there is no proportional bias.

For DTSL, an internal consistency of 0.91 CAC was determined for the total scale showing an excellent the internal consistency. The test-retest reliability was very high with an ICC value of 0.91. The SEM and SDC values were 0.65 and 0.92 respectively. Figure 2 presents the Bland-Altman plot for the DTSL with the 95% limits of agreement of ±4.71%. Based on the regression analysis, there is no proportional bias (p = 0,768).

An excellent internal consistency was reported for DTQ with a CAC value of 0.96. An ICC value of 0.93 was found indicating a high test-retest reliability. In addition, a SEM and SDC with 1.20 and 1.70, respectively, were also reported. Figure 2 shows the Bland-Altman plot for the questionnaire mentioned above. The 95% limits of agreement was ± 8.90%. Based on the regression analysis, there is no proportional bias (p = 0,497).

Figure 2

Bland-Altman plot of combined Dutch and Turkish versions of DIDA-Q, DTSL and DTQ

	DIDA-Q	DTSL	DTQ
BE-TR			

Abbreviations: DIDA-Q = Dual-task Impact on Daily-life Activities Questionnaire; DTSL = Dual-task Screening List; DTQ = Dual Task Questionnaire; BE = Belgium; TR = Turkey; LoA = limits of agreement

5. Discussion

5.1. Findings related to the research questions

This study aimed to assess the test-retest reliability and internal consistency of the Dutch and Turkish versions of the DIDA-Q, DTSL, and DTQ in pwMS.

In this study, both the Turkish and Belgian versions of the DIDA-Q showed excellent internal consistency for both total and subscales in an MS population. The results found for internal consistency are in line with the results found by Pedulla et al. (2020). When the test-retest reliability is compared with previous research of Pedullà et al. (2020), the ICC value of 0.95 for the total score is similar in total population. Although Pedulla et al. (2020) findings and our results demonstrated good reliability, there is some variation, particularly in the cognition subscale. Pedulla et al. (2020) indicated a lower ICC value on the cognition subscale (ICC = 0.76). However, as an ICC value above 0.70 corresponds to high test-retest reliability, our findings are in line with Pedulla et al. (2020) on the subscale cognition. The population of the previous study (Pedulla et al., 2020) was similar to the Belgian population in this study with the previous study having a mean age of 52.8 ± 11.7 as well as EDSS score of 79,6% EDSS score >3.5. This could be an explanation for the similar results found for the internal consistency. Despite the Turkish population having a different mean EDSS score and average age, similar test-retest reliability results were obtained for the Turkish population and the population studied by Pedulla et al. (2020). Overall, our results of test-retest reliability and internal consistency of DIDA-Q were confirmed with the large sample size (n = 230 pwMS) of Pedulla et al. (2020).

In this study, similar excellent results were found for the internal consistency in the Turkish and Belgian population of DTSL. When test-retest reliability was investigated, a very high and high test-retest reliability was found for the Turkish and Belgian data, respectively. The psychometric properties of the DTSL have not yet been investigated in previous research but only used as a screening measure (Strouwen et al. (2017); Veldkamp et al. (2019a). Future research with an adequate sample size, 50 or more (Terwee et al., 2007), is needed to confirm the results of the internal consistency and test-retest reliability.

For the DTQ, this study found similar results for internal consistency in the Turkish and Belgian populations. When test-retest reliability was examined, very high and high test-

retest reliability was found for the Turkish and Belgian data, respectively. For the DTQ, no rigorous validation was used for psychometric properties in previous research (Evans et al., 2009). In their study, test-retest reliability was assessed before and after an intervention. Since this is not a correct methodology, and suggestive for responsiveness, the results can be questioned (Abasiyanik, Veldkamp, Fostier, Van Goubergen & Feys, in preparation). Therefore, these results cannot be compared between previous research and our findings. Sertel et al. (2021) investigated the test-retest reliability and internal consistency of the Turkish version of DTQ. This was done in 118 healthy older adults living in the community (mean age 70.57 ± 5.83). Similar very high ICC values were found in both studies confirming test-retest reliability in older adults and pwMS. Sertel et al. (2020) found an inadequate CAC of 0.695. This is in contrast to the very high Cronbach's alpha coefficient of our Turkish pwMS population. The DTQ was used as an outcome measure in previous research in MS, ABI or ONI and HC (Butchard-MacDonald et al., 2018; Evans et al., 2009; Raats et al., 2019; Veldkamp et al., 2019a; Veldkamp et al., 2019b; Veldkamp et al., 2021).

It is important to note that each item of the DTSL and DIDA-Q includes the motor task 'walking' in combination with another task. The DTQ also questions the combination of two non-motor tasks. Attention should be paid to this information when deciding to administer a DT PRO in a specific patient. In this study, the EDSS scores for the Turkish (2,46 ± 1,60) and Belgian (4,96 ± 1,53) participants are rather low. Since an EDSS score of more than 7 is related to not being able to walk more than five meters unaided and being wheelchair bound, it should be noted that the questionnaires with a motor component including the lower extremity can only be used for MS patients with an EDSS score lower than seven.

In general, the test-retest reliability and internal consistency showed similar findings between the Belgian and Turkish populations in our study. These results were obtained despite the differences in descriptive characteristics between the two populations. Belgian MS participants are significantly older than the Turkish ones, had a significantly higher EDSS score, a longer time since diagnosis and made more use of a walking aid. It was also shown that Belgian MS participants reported falling more often than Turkish participants, Belgian MS patients had a slower T25FW than Turkish MS patients but had a faster single motor task and dual-task performance test. In addition, Belgian MS patients had, on average, a higher

score on the MSWS-12, which may therefore reflect an increased walking impairment. When interpreting the reliability analysis, attention should be paid to these differences in descriptive characteristics as in this study the Belgian population showed to have a general worse disease severity than the Turkish population. It is expected that a more disabled population will show more variability in reporting as they suffer from a wider range of symptoms related to MS (Sumowski et. Al., 2018; Carling et al., 2018; Alschuler, Ehde & Jensen, 2013; Greeke et al., 2017; José, 2008). In addition, for DTQ, DTSL, DIDA-Q total score and DIDA-Q upper extremity significant differences were found between Turkey and Belgium. This indicates lower scores for the Belgian population at the first and second test moment, which suggests a correlation between test-retest. For the DIDA-Q balance-mobility and DIDA-Q cognition no significant differences were found between countries. However, the findings of these subscale were close to the significance level. Lastly, this study recruited a small sample for each country. Previous research (Terwee et al., 2018) suggested a study population of at least 50 participants for an adequate interpretation of reliability. In terms of generalizability, the proportions of women-men, age of diagnosis and type of MS largely correspond to the general MS population (Ghasemi, Razavi, & Nikzad, 2017).

5.2. The strengths and limitations of the study

In terms of *strengths*, this is the first study to evaluate the psychometric properties of DT PRO in Turkish and Dutch in pwMS. New and additional results were found regarding the DTQ, DIDA-Q and DTSL. The results of the previous studies largely coincide with our findings. The fact that in this study both the Turkish and Dutch versions of the DIDA-Q, DTSL and DTQ were investigated, can be seen as a strength. This master's thesis was preceded by a very extensive literature study. The fact that this study was conducted specifically in the MS population can be seen as a strength as it has been shown that this population often experiences difficulties with the performance of dual tasks (Edwards et al., 2020). The inclusion of MS patients with different levels of disability can been seen as an added strength. The participants' testing sessions took up to 20 minutes. Due to the short test duration and the transparent representation of the data collection, this study can very easily and accurately be performed again. This flexibility allowed for a greater acquisition of participants. In addition, this thesis is also part of a multicenter study involving several

research centers around the world. It is coordinated under the supervision of Prof. dr. Peter Feys and Dra. Zuhal Abasiyanik.

In terms of *limitations*, it was difficult to make a comparison with previous research because research on the psychometric properties of PRO on dual tasking in daily life is scarce. Other limitations can be noted in the limited recruitment in Belgium and Turkey. We did not reach the recommended 50 patients at the time of data analysis (Terwee et al., 2018). Belgium provided a small sample. Of these 27 participants, only 13 completed the retest at the time of data analysis. This could influence the results of the test-retest reliability. Regarding the order of testing, it was reported by some participants that performing the Dual-Task Performance Test first might influence the responses to the DT PRO by previous experiences. According to our descriptive data, there is no difference between Belgian and Turkish participants when reporting the number of falls. However, six months is a long period so recall bias can occur. In future studies prospective fall diaries can be used to avoid this bias. Lastly, the data collection for this master thesis ended on 15 May 2022. As the multicenter study is still ongoing to date, not all participants who completed a first test moment had already undergone a second test moment.

5.3. Recommendations for future studies

This is the first study to investigate the psychometric properties of DTSL and DTQ in Turkish and Dutch in pwMS and to further research the results of reliability on DIDA-Q. For this reason, this study can be seen as an added value to the existing scientific literature on dual tasking. This study can complement and enlarge previous research. Previous research has shown that DT PRO can be used as an outcome measure in different populations such as students (Amini et al., 2016), healthy adults (Salthouse & Siedlecki, 2005), adults with MS (Butchard-MacDonald et al., 2018; Pedullà et al., 2020; Veldkamp et al., 2019a; Veldkamp et al., 2019b; Veldkamp et al., 2021; Raats et al., 2019), adults with acquired brain injury (Cock et al., 2013; Evans et. al, 2009), adults with other neurological illness (Evans et al., 2009), adults with spinal cord injury (Tun & Wingfield, 1995; Tun et al., 1997) and adults with Parkinson's disease (Strouwen et al., 2017). Due to the different characteristics of previously mentioned studies, the generalizability is lower. Further research in other populations (orthopedic patients, children with neurological disorders, ...), languages and countries, in

addition to the countries and languages of the multicenter study, are yet to be investigated in accordance with the COSMIN guidelines (Mokkink et al., 2016; Prinsen et al., 2018; Terwee et al., 2018). Since this study was limited to examine the aspects of reliability, it is recommended that further research takes validity into account. This way, it can be determined whether there is any overlap between the DT PRO and an assessment can be made of whether the DT PRO measures the construct(s) it means to measure (Mokkink et al., 2009). No comparison has yet been made between pwMS and HC. However, this is an important component of examining validity and is recommended in future research.

Also, the COSMIN methodology should be further used for the evaluation of psychometric properties (Mokkink et al. (2016), Prinsen et al. (2018) and Terwee et al. (2018)). Future research with a bigger sample size, 50 or more, is recommended to complement past and current research on the psychometric properties of DT PRO (Terwee et al., 2007). The use of DT PRO can be a useful and reliable tool in the assessment of the individual perspective of pwMS in the DT performance in daily living. Therefore, it is recommended for new future experimental studies to include DT PRO as an outcome measure.

6. Conclusion

This study investigated the reliability of three DT PRO, namely DIDA-Q, DTSL, and DTQ. An excellent internal consistency was found for the Turkish and Dutch versions of the DIDA-Q, DTSL, and DTQ. A very high test-retest reliability was found for the Turkish version of the DIDA-Q, DTSL, and DTQ. For the Dutch version of DIDA-Q, a high test-retest reliability for the balance and mobility subscale, while the subscales upper extremity and cognition and the total score showed a very high test-retest reliability. Furthermore, adequate and high test-retest reliability was found for DTSL and DTQ, respectively. For all DT questionnaires in both languages, no proportional bias was found based on Bland-Altman plots and the regression analysis. Moreover, due to the small sample size, the results should be interpreted with caution. Ongoing studies can confirm these results with a larger sample size, according to COSMIN guidelines.

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Appendices

Dutch and Turkish ICC scores of items of DIDA-Q, DTSL and DTQ

Table 4

Test-retest reliability of Turkish and Dutch versions of the items of DIDA-Q

Question	**ICC**	
Please, indicate the difficulty level of the following tasks:	**Belgium**	**Turkey**
1. Walking and carrying a plate filled with food	0,91	0,91
2. Walking and drinking from a bottle or a can	0,70	0,95
3. Walking and remembering the name of a restaurant, the title of a book or of a movie	0,87	0,83
4. Walking and listening to someone who is talking	0,90	0,89
5. Walking and planning a schedule (e.g., preparing a meal)	0,84	0,86
6. Walking and closing the zipper of your jacket	0,89	0,93
7. Talking to someone and walking on curvilinear paths	0,73	0,94
8. Walking and responding quickly to visual stimuli (e.g., stop at the red light, reading road signs)	0,86	0,86
9. Talking to someone and maintaining balance on your feet	0,74	0,95
10. Talking to someone and walking at high speed	0,82	0,93
11. Talking to someone and performing quick changes of your walking direction	0,71	0,92
12. Talking to someone and walking at spontaneous speed	0,69	0,93
13. Walking and paying attention to traffic sounds in the street	0,97	0,82

Table 4 (continued)

Test-retest reliability of Turkish and Dutch version of DIDA-Q

Question	**ICC**	
Please, indicate the difficulty level of the following tasks:	**Belgium**	**Turkey**
14. Walking and getting something out of your pocket	0,79	0,93
15. Walking and performing mental arithmetic (e.g., calculating the shopping change)	0,68	0,94
16. Walking and using your phone (e.g., looking for a contact, sending a text message)	0,88	0,97
17. Going over a step and carrying a bag	0,96	0,93
18. Walking and articulating a speech	0,72	0,93
19. Walking and listening to music on the radio	0,76	0,69

Abbreviations: DIDA-Q = Dual-task Impact on Daily-life Activities Questionnaire; ICC = Intraclass Correlation Coefficient; very low ≤0.25; low=0.26–0.49; moderate=0.50–0.69; high=0.70–0.89; very high ≥0.90

Table 5

Test-retest reliability of Turkish and Belgium versions of the items of DTSL

Question	**ICC**	
Do you experience difficulties with the combination off…	**Belgium**	**Turkey**
1. Walking and talking.	0,83	0,70
2. Walking and phoning.	0,48	0,88
3. Walking and carrying a bag.	0,71	0,79
4. Walking and carrying a plate filled with food.	0,48	0,86
5. Walking and carrying a filled glass.	0,44	0,77
6. Walking and avoiding obstacles.	0,46	0,61
7. Walking and getting something out of your pockets (tissue, money, mobile phone).	0,78	0,87
8. Walking outside and paying attention to traffic.	0,36	0,75
9. Walking and remembering things (phone number, address).	0,71	0,69
10. Walking and thinking about something else.	0,70	0,27
11. Walking and looking for items while shopping.	-0,23	0,69
12. Walking and closing the zipper of your jacket.	0,53	0,76
13. Walking and finding your way in airport or train station.	0,51	0,45

Abbreviations: DTSL = Dual-task Screening List; ICC = Intraclass Correlation Coefficient; very low ≤0.25; low=0.26–0.49; moderate=0.50–0.69; high=0.70–0.89; very high ≥0.90

Table 6

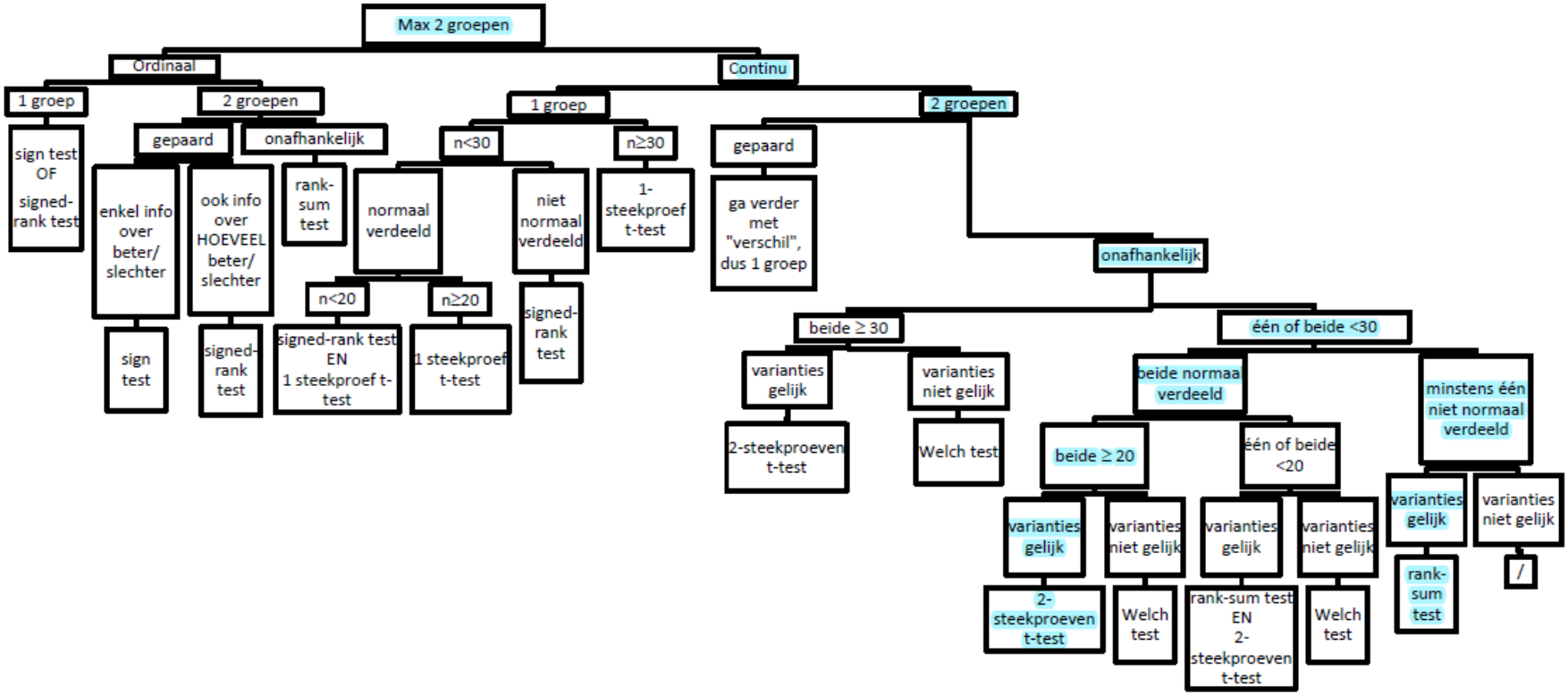
Test-retest reliability of Turkish and Belgium versions of the items of DTQ

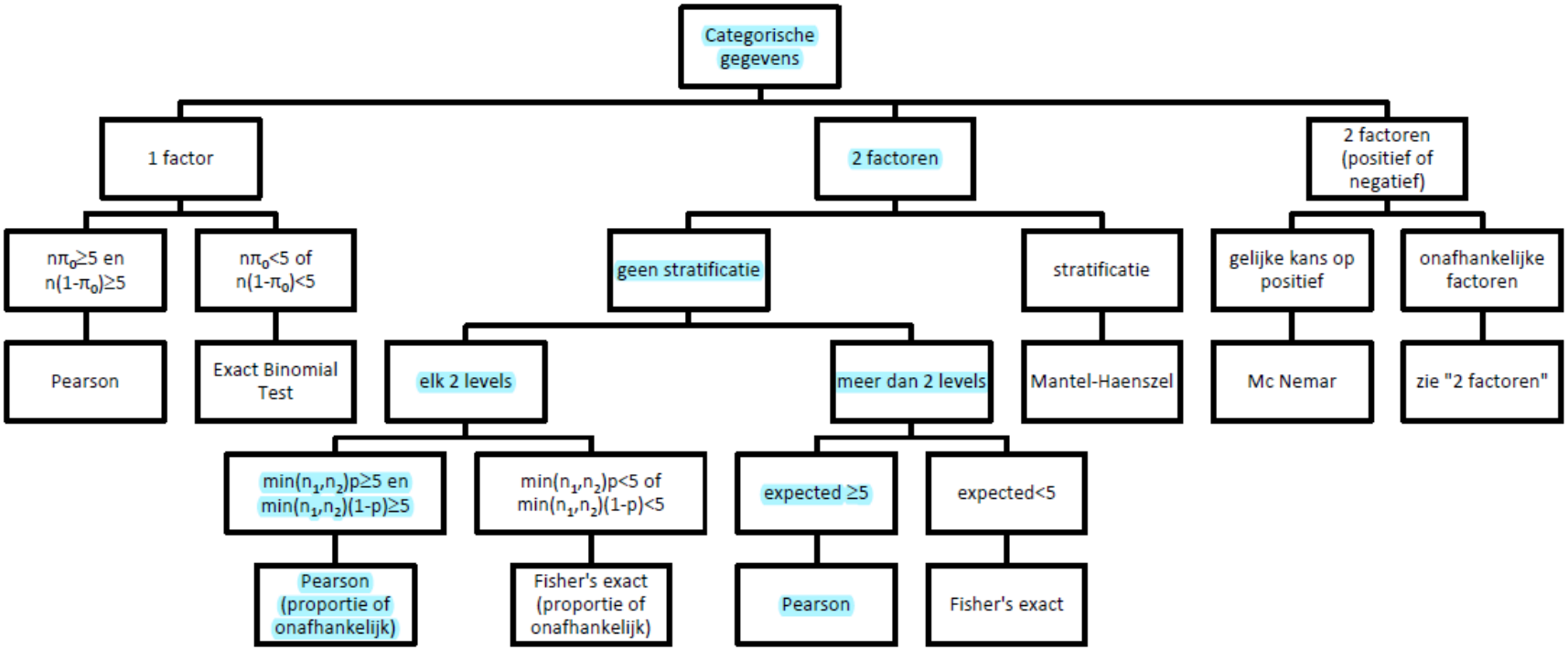
Question	**ICC**	
Do you have any of these difficulties?	**Belgium**	**Turkey**
1. Paying attention to more than one thing at once	0,83	0,76
2. Needing to stop an activity to talk	0,92	0,87
3. Being unaware of others speaking to you when doing another activity	0,74	0,88
4. Following or taking part in a conversation where several people are speaking at once	0,83	0,90
5. Walking deteriorating when you are talking or listening to someone	0,75	0,93
6. Busy thinking your own thoughts, so not noticing what is going on around you	0,87	0,57
7. Spilling a drink when carrying it	0,11	0,96
8. Spilling a drink when carrying it and talking at the same time	0,53	0,94
9. Bumping into people or dropping things if doing something else as well	0,57	0,89
10. Difficulty eating and watching television or listening to the radio at the same time	0,48	0,79

Abbreviations: DTQ = Dual Task Questionnaire; ICC = Intraclass Correlation Coefficient; very low ≤0.25; low=0.26–0.49; moderate=0.50–0.69; high=0.70–0.89; very high ≥0.90

Statistical decision tree

The following statistical analysis trees were used during the analysis of the descriptive data (table 1 and table 2).
The analysis of reliability is not reflected in these decision trees. A detailed description of this approach can be found in the Method section.




Categorische gegevens
1 factor
2 factoren
2 factoren (positief of negatief)
$n\pi_0 \geq 5$ en $n(1-\pi_0) \geq 5$
$n\pi_0 < 5$ of $n(1-\pi_0) < 5$
geen stratificatie
stratificatie
gelijke kans op positief
onafhankelijke factoren
Pearson
Exact Binomial Test
elk 2 levels
meer dan 2 levels
Mantel-Haenszel
Mc Nemar
zie "2 factoren"
$\min(n_1,n_2)p \geq 5$ en $\min(n_1,n_2)(1-p) \geq 5$
$\min(n_1,n_2)p < 5$ of $\min(n_1,n_2)(1-p) < 5$
expected ≥5
expected<5
Pearson (proportie of onafhankelijk)
Fisher's exact (proportie of onafhankelijk)
Pearson
Fisher's exact

Dutch testing documents

Persoonlijke gegevens formulier

In te vullen door deelnemer:

Datum (DD/MM/JJJJ):
Code (in te vullen door onderzoeker):
Geslacht: • Vrouw ☐ • Man ☐ • Andere ☐
Geboortedatum (DD/MM/JJJJ):
Moedertaal:
Educatieniveau: jaar:
Arbeidssituatie/arbeidspositie:

In te vullen door de onderzoeker:

Type MS:
Duur van de ziekte:
EDDS score:
Walking aid: Yes ☐ if yes, specify the type: No ☐

9-HOLE PEG TEST

Dominant hand
Right ☐ Left ☐

Dominant hand

Trial 1 (sec)	
Trial 2 (sec)	

If trial was not completed, specify reason:

Non-dominant hand

Trial 1 (sec)	
Trial 2 (sec)	

If trial was not completed, specify reason:

TIMED-25 FOOT WALK (T25FW)

Instructies: De Timed-25 Foot Walk (T25FW) wordt toegepast om de snelste loopsnelheid te evalueren. De proef wordt uitgevoerd op een vlak pad van 7,62 m lang. De deelnemers krijgen de instructie om zo snel en veilig mogelijk te lopen. De gemiddelde score van de twee proeven zal worden gerapporteerd.

Trial 1 (sec)	
Trial 2 (sec)	

If trial was not completed, specify reason:

DUAL-TASK PERFORMANCE

Single motor task: Walking will be performed on a 15 m, free-of obstacles walkway for 30 s. Firstly, the participants will be asked to walk as far as possible in 30 s. The total distance in meters will be recorded and walking speed will be calculated.

Dual-task: The semantic word list generation (WLG) which is a verbal fluency test will be used as a cognitive task. The participants will be asked to say as many words as possible belonging to a certain category (fruits) in 30 s. Number of correct answers will be recorded. To get information about automatization, responses will be recorded in 15-s blocks. Participants will be instructed to perform both motor and cognitive tasks at their best level to avoid task prioritization. The total distance in meters will be recorded and walking speed will be calculated.

Single task performance [Distance in 30 seconds (m)]	**Dual-task performance**	
	Dual-task [Distance in 30 seconds (m)]	**Cognitive performance (number of correct answers)**
		First 15 s:
		Last 15 s:

FALLS

Een val wordt omschreven als "een gebeurtenis waarbij de deelnemer per ongeluk op de grond of een lager niveau terecht kwam".

"Ben je ooit gevallen in de afgelopen zes maanden?"
Ja ☐ Nee ☐

ga naar vraag 2

"Hoe vaak bent u gevallen?" :

Dual-task Screening List (DTSL)

Vragenlijst Dubbeltaken

Instructies: De volgende vragenlijst gaat na of u problemen ondervindt bij het uitvoeren van een dubbeltaak. Hieronder vindt u enkele situaties waarin er dubbeltaken gebruikt worden. Bedoeling is dat u 'ja' aanduidt indien u moeilijkheden ondervindt bij:

- het stappen: gaat het stappen moeilijker wanneer u tegelijkertijd een taak moet uitvoeren vergeleken met enkel stappen zonder bijkomende taak? Met moeilijker bedoelen we bv. of u dan trager stapt, kleinere passen neemt, enzovoort. EN/OF
- de dubbeltaak: merkt u dat u de taak die u tegelijkertijd uitvoert moeilijker gaat? Met moeilijker bedoelen we vb plots stoppen met een gesprek omdat u moeite heeft om de woorden te vinden, fouten maken die men anders niet zou maken, dingen laten vallen, etc.

Als een situatie niet voor u van toepassing is, duidt u het vakje met 'niet van toepassing' aan. Indien er echter bepaalde situaties zijn die u vermijdt in het dagelijks leven omdat u weet dat deze u moeilijkheden bezorgen bij het stappen of bij het goed uitvoeren van de taak, gelieve dan het vakje 'ja' aan te duiden voor deze situaties.

Heeft u een van deze moeilijkheden…	JA	NEE	NVT
1. Heeft u moeite met de combinatie stappen en praten?			
2. Heeft u moeite met de combinatie stappen en telefoneren?			
3. Heeft u moeite met de combinatie van stappen en een boodschappentas dragen?			
4. Heeft u moeite met de combinatie van stappen en het dragen van een bord dat gevuld is met eten?			
5. Heeft u moeite met de combinatie van stappen en het dragen van een gevuld glas/kopje?			
6. Heeft u moeite met de combinatie van stappen en het ontwijken van obstakels (op de grond)?			
7. Heeft u moeite met de combinatie van stappen en het tevoorschijn halen van iets uit je zakken (vb een busabonnement, zakdoek, geld, gsm)?			
8. Heeft u moeite met de combinatie van stappen en het richten van je aandacht op iets anders (vb het verkeer)?			
9. Heeft u moeite met de combinatie van stappen en het onthouden van iets belangrijks (vb een telefoonnummer, een adres)?			
10. Heeft u moeite met de combinatie van stappen en het denken aan andere dingen?			
11. Heeft u moeite om tijdens het winkelen naar koopwaren te zoeken?			
12. Heeft u moeite met de combinatie van stappen en het sluiten van de rits van uw jas?			
13. Heeft u moeite met de combinatie van stappen en het zoeken van uw weg (vb in een station, luchthaven)?			

Dual-tasking Questionnaire (DTQ)

Vragenlijst Dubbeltaken

Instructies: De volgende vragen gaan over problemen die iedereen van tijd tot tijd ervaart, maar waarvan sommige vaker gebeuren dan andere. We willen weten hoe vaak deze dingen bij u zijn gebeurd in de afgelopen weken. Er zijn 5 opties, gaande van 'zeer vaak' tot 'nooit', of 'niet van toepassing'. Gelieve het gepaste vakje aan te vinken.

Heeft u een van deze moeilijkheden…	Zeer vaak	Eerder vaak	Occasioneel	Zeer zelden	Nooit	NVT
	4	3	2	1	0	0
1. Aandacht geven aan meer dan één ding tegelijk?						
2. Nood hebben aan een activiteit te stoppen om te praten?						
3. Praten wanneer je een andere activiteit aan het doen bent?						
4. Volgen of deelnemen in een gesprek waar verscheidene personen tegelijk aan het spreken zijn?						
5. Verslechteren van het stappen wanneer je aan het spreken of luisteren bent naar iemand?						
6. Verdiept zijn in je eigen gedachten, dus zonder op te merken wat er rondom u gebeurd?						
7. Een drankje morsen tijdens het dragen ervan.						
8. Meer morsen indien je op hetzelfde moment spreekt.						
9. Tegen mensen aanbotsen of dingen laten vallen indien je tevens iets anders doet?						
10. Moeilijkheden om te eten en televisie te kijken of te luisteren naar de radio tegelijkertijd.						
Subtotalen						

Totaal:

Vragenlijst Dubbeltaken DIDA-Q

Instructies: In het dagelijks leven voeren we vaak twee taken tegelijk uit, zoals wandelen en een boodschappenlijstje onthouden. Dit kan de moeilijkheid van de taak verhogen, wat kan leiden tot het verminderen van de wandelsnelheid, het stoppen met wandelen, of tot het veranderen van de focus van aandacht. Geef hieronder de moeilijkheidsgraad van elk van de volgende combinaties van taken aan.

Geef de moeilijkheidsgraad van de volgende taken aan:	Niet moeilijk	Beetje moeilijk	Enigszins moeilijk	Erg moeilijk	Extreem moeilijk
	0	1	2	3	4
1. Wandelen en een bord gevuld met eten dragen					
2. Wandelen en drinken uit een flesje of blikje					
3. Wandelen en iets onthouden (bijvoorbeeld de naam van een restaurant of de titel van een boek of film)					
4. Wandelen en luisteren naar iemand die praat					
5. Wandelen en een planning bedenken (bijvoorbeeld een maaltijd bereiden)					
6. Wandelen en de rits van je jas sluiten					
7. Met iemand een gesprek voeren en op een pad met bochten wandelen					
8. Wandelen en snel reageren op visuele prikkels (bijvoorbeeld stoppen voor het rode licht, lezen van verkeersborden)					
9. Met iemand een gesprek voeren en je evenwicht bewaren op je voeten[1]					
10. Met iemand praten en met een hoge snelheid wandelen					
11. Met iemand een gesprek voeren en snel van looprichting veranderen					
12. Met iemand een gesprek voeren en aan een spontane[2] snelheid wandelen					

[1] Rechtopstaand, in stand
[2] Gebruikelijke, gewoonlijke

13. Wandelen en aandacht hebben voor verkeersgeluiden in de straat					
14. Wandelen en iets uit je zak halen					
15. Wandelen en hoofdrekenen (bijv. wisselgeld berekenen)					
16. Wandelen en je telefoon gebruiken (bijvoorbeeld een contact opzoeken, een sms versturen)					
17. Een trap nemen en een zak dragen					
18. Wandelen en spreken					
19. Wandelen en luisteren naar muziek op de radio					

Scores:
Bovenste lidmaat vaardigheid (MMI): ___/24
Cognitie (MCI): ___/32
Balans en mobiliteit (MCI): ___/20
Totaal: ___/76

Fall Efficacy Scale International (FES-I)

Instructies: We willen u graag enkele vragen stellen over hoe bezorgd u bent dat u zou kunnen vallen. Het is de bedoeling dat u bij elke activiteit aangeeft in welke mate u bezorgd bent. U kunt kiezen uit 'helemaal niet bezorgd', 'een beetje bezorgd', 'tamelijk bezorgd' en 'erg bezorgd'.
Het gaat er hierbij om hoe u gewoonlijk deze activiteiten uitvoert. Als u tegenwoordig deze activiteiten niet doet (iemand anders doet voor u de boodschappen) dan willen we graag dat u aangeeft hoe bezorgd u zou zijn ALS u de activiteiten zou doen.

Hoe bezorgd bent u dat u zou kunnen vallen bij…	Helemaal niet bezorgd	Een beetje bezorgd	Tamelijk bezorgd	Erg bezorgd
	1	2	3	4
1. Het aan- of uitkleden				
2. Het nemen van een bad of douche				
3. Het in of uit een stoel komen				
4. Het op- of aflopen van een trap				
5. Het reiken naar iets boven uw hoofd of naar iets op de grond				
6. Het op- of aflopen van een helling				
7. Het bezoeken van een sociale gelegenheid (zoals kerkdienst, familiebijeenkomst of verenigingsactiviteit)				

Modified Fatigue Impact Scale

Vermoeidheid is een gevoel van fysiek moe-zijn en een tekort aan energie dat door veel mensen wordt ervaren. Maar personen met een ziekte zoals MS ervaren deze vermoeidheid vaker en met een grotere invloed dan anderen.

Hier volgt een lijst met vaststellingen die de effecten van vermoeidheid beschrijven. Gelieve elk van deze vaststellingen zorgvuldig te lezen en aan te duiden welk antwoord het best aangeeft hoe vaak vermoeidheid hierop een invloed gehad heeft gedurende de laatste vier weken.
Beantwoord elke vraag (zet een kruisje onder het geschikte antwoord). Als u niet zeker bent van een antwoord, kies dan het antwoord dat het best uw eigen situatie beschrijft.

Omwille van mijn vermoeidheid (gedurende de laatste 4 weken) ...		Nooit	Zelden	Soms	Vaak	Bijna altijd
C 1	ben ik minder aandachtig geweest					
C 2	heb ik moeite gehad om me lange tijd te concentreren					
C 3	ben ik niet in staat geweest om helder te denken					
F 4	ben ik onhandig geweest en had ik coördinatieproblemen					
C 5	ben ik vergeetachtig geweest					
F 6	heb ik mijn fysieke activiteiten trager moeten uitvoeren					
F 7	ben ik minder gemotiveerd geweest om fysieke activiteiten uit te voeren					
P 8	ben ik minder gemotiveerd geweest om aan sociale activiteiten deel te nemen					
P 9	ben ik beperkt geweest in de mogelijkheid om dingen buitenshuis te doen					
F 10	heb ik moeite gehad om fysieke inspanningen voor langere tijd vol te houden					
C 11	heb ik moeite gehad om beslissingen te nemen					
C 12	ben ik minder gemotiveerd geweest om iets te doen waarbij ik moest nadenken					
F 13	voelden mijn spieren zwak aan					
F 14	voelde ik mij fysiek niet goed					
C 15	heb ik moeite gehad om taken af te werken waarbij ik moest nadenken					
C 16	heb ik moeite gehad om mijn gedachten te ordenen bij taken thuis of op het werk					
F 17	ben ik minder in staat geweest om taken af te werken die fysieke inspanning vragen					
C 18	is mijn gedachtengang vertraagd geweest					
C 19	heb ik moeite gehad me te concentreren					
F 20	heb ik mijn fysieke activiteiten beperkt					
F 21	heb ik vaker of langer moeten rusten					

Kos, D., Kerckhofs, E., Nagels, G., D'Hooghe, B. D., Duquet, W., Duportail, M., & Ketelaer, P. (2003). Assessing fatigue in multiple sclerosis: Dutch modified fatigue impact scale. *Acta Neurologica Belgica*, *103*(4), 185–191.

Multiple Sclerosis Walking Scale (MSWS-12)

- De volgende vragen hebben betrekking op **uw beperkingen in het lopen als gevolg van MS gedurende de afgelopen 2 weken.**
- Omcirkel bij elke vraag **het ene nummer dat uw mate van beperking het beste beschrijft.**
- S.V.P. **alle** vragen beantwoorden, **ook al lijken sommige vragen op elkaar of lijken ze niet op u van toepassing.**
- ***Als u helemaal niet kunt lopen*, kruis dan dit vakje aan:** ☐

Gedurende de afgelopen twee weken, in welke mate heeft de MS …..	Helemaal niet	Een beetje	Matig	Tamelijk veel	Heel erg
1. U beperkt in uw mogelijkheid te lopen?	1	2	3	4	5
2. U beperkt in uw mogelijkheden te rennen?	1	2	3	4	5
3. U beperkt in uw mogelijkheden de trap op en af te gaan?	1	2	3	4	5
4. Het u moeilijker gemaakt om te staan terwijl u dingen deed?	1	2	3	4	5
5. U beperkt in uw balans als u stond of liep?	1	2	3	4	5
6. U beperkt in hoe ver u kon lopen?	1	2	3	4	5
7. Ervoor gezorgd dat lopen u meer moeite kostte?	1	2	3	4	5
8. Het noodzakelijk gemaakt dat u steun gebruikte bij het lopen in huis (b.v. vastpakken van meubels of gebruik van een stok, etc)?	1	2	3	4	5
9. Het noodzakelijk gemaakt dat u steun gebruikte bij het lopen buitenshuis (b.v. gebruik van een stok of looprekje, etc)?	1	2	3	4	5
10. Ervoor gezorgd dat u langzamer ging lopen?	1	2	3	4	5
11. Invloed gehad op hoe soepel u liep?	1	2	3	4	5
12. Ervoor gezorgd dat u zich moest concentreren op het lopen?	1	2	3	4	5

Controleert u alstublieft of u bij **ALLE** vragen **ÉÉN** cijfer heeft omcirkeld.

Turkish testing documents

Ek 4. Olgu Rapor Veri Kayıt Formu Örneği - MS

Rumuz		**Doğum tarihiniz/yaş**		
Cinsiyetiniz	Kadın ◻	Erkek ◻		
Boyunuz kaç?	……m	**Kaç kilosunuz?**	……kg	
Eğitim düzeyiniz	İlkokul ◻	Ortaokul ◻	Lise ◻	Yüksekokul/Üniversite ◻
Çalışma durumunuz nedir?	Çalışıyorum ◻	Çalışmıyorum ◻	Emekliyim ◻	Öğrenciyim ◻
Medeni durumunuz nedir?	Evli ◻	Bekar ◻	Boşandım/Eşim öldü ◻	
Sigara kullanıyor musunuz?	Hayır ◻	Evet ◻	Günde……paket, ……..yıldır.	
Alkol kullanıyor musunuz?	Hayır ◻	Evet ◻		
Düzenli egzersiz yapar mısınız?	Hayır ◻	Evet ◻		

Aşağıdaki kısımları doldurmanıza gerek yoktur.

EDSS	**MS tipi**	
T25FW	1. deneme:	2. deneme:
9HPT	Dominant-1. deneme:	2. deneme:
	Non-dominant-1. deneme:	2. deneme:
Tekli yürüme görevi	Süre:	
Dual-task yürüme	Süre:	
	Söylenen kelimeler: İlk 15 s: Son 15 s:	
Son 6 ayda düşme sayısı		
MS başlangıç tarihi		
MS tanı tarihi		
Hastalık süresi		
Tedavi	İmmünomodülatör…… İmmünosupresif ……	
Semptomatik tedavi		

Uyarlama 2, Mart 2006.

MULTİPL SKLEROZ YÜRÜME ÖLÇEĞİ (MSWS-12v2)

Bu sorular **son iki haftada** MS'e bağlı olarak yürüyüşünüzde gelişen kısıtlamalar hakkında sorulmaktadır. Her bir durum için, lütfen kısıtlanma derecenizi en iyi tanımlayan yanıtı daire içine alınız. Lütfen **TÜM** soruları, size birbirine benzer ya da sizinle ilgisiz görünse bile yanıtlayınız.

EĞER HİÇ YÜRÜYEMİYORSANIZ, LÜTFEN BU KUTUYU İŞARETLEYİNİZ VE HİÇ BİR ŞIKKA YANIT VERMEYİNİZ. ☐

Son iki haftada, MS'iniz ne kadar...	**Hiç**	**Bazen**	**Çok**
1. Kapalı mekanda yürürken destek (örneğin bir mobilyaya tutunmak, baston kullanmak vs..) kullanmanızı gerektirdi?	1	2	3
2. Dış mekanda yürürken destek (örneğin baston, yürüteç kullanmak vs..) kullanmanızı gerektirdi?	1	2	3
3. Koşma becerinizi sınırladı?	1	2	3

Son iki haftada, MS'iniz ne kadar...	**Kısıtlamadı**	**Biraz**	**Orta derecede**	**Oldukça fazla**	**Aşırı derecede**
4. Bir şeyler yaparken ayakta durmanızı zorlaştırdı?	1	2	3	4	5
5. Merdivenlerden aşağı inme ve yukarı çıkma becerinizi kısıtladı?	1	2	3	4	5
6. Ayakta dururken ve yürürken dengenizi kısıtladı?	1	2	3	4	5
7. Yürüme becerinizi kısıtladı?	1	2	3	4	5
8. Yürüyebilmek için harcamanız gereken çabayı artırdı?	1	2	3	4	5
9. Düzgün yürüyebilmenizi etkiledi?	1	2	3	4	5
10. Yürüyüşünüze odaklanmanıza neden oldu?	1	2	3	4	5
11. Yürüme mesafenizi kısıtladı?	1	2	3	4	5
12. Yürümenizi yavaşlattı?	1	2	3	4	5

MODİFİYE YORGUNLUK ETKİ ÖLÇEĞİ

Modifiye Yorgunluk Etki Ölçeği, ölçeğin uygulandığı gün de dahil olmak üzere şağıda listelenmiş olan açıklamaları referans alarak **geçen bir ay** içinde ne kadar yorgunluk sorunu yaşadığınızı sormaktadır.

Her soru için uygun yanıtı yuvarlak içine alınız.

Yorgunluğum yüzünden:	**Sorun yok**				**Çok büyük sorun**
1. Kendimi daha az uyanık hissediyorum.	0	1	2	3	4
2. Uzun süre dikkatimi toplamakta zorluk çekiyorum.	0	1	2	3	4
3. Net bir şekilde düşünemediğimi hissediyorum.	0	1	2	3	4
4. Daha sakar ve dağınığım.	0	1	2	3	4
5. Daha fazla unutkan olduğumu hissediyorum.	0	1	2	3	4
6. Fiziksel aktiviteleri düzenlemekte daha dikkatli olmalıyım.	0	1	2	3	4
7. Fiziksel efor gerektiren herhangi bir işi yapmaya daha az istekliyim.	0	1	2	3	4
8. Sosyal etkinliklere katılmak için daha az istek duyuyorum.	0	1	2	3	4
9. Yorgunluk evimin dışında yolculuk yapmamı zorlaştırıyor.	0	1	2	3	4
10. Fiziksel gücümü uzun süre korumakta zorluk çekiyorum.	0	1	2	3	4
11. Karar vermekte güçlük çekiyorum.	0	1	2	3	4
12. Düşünmeyi gerektiren herhangi bir şeyi yapmak için kendimi daha az motive olmuş hissediyorum.	0	1	2	3	4
13. Kaslarım olması gerekenden çok daha zayıf.	0	1	2	3	4
14. Fiziksel rahatsızlığım arttı.	0	1	2	3	4
15. Düşünmeyi gerektiren görevleri tamamlamayı daha az başarıyorum.	0	1	2	3	4
16. Evde veya işte iş yaparken düşüncelerimi organize etmek zor geliyor.	0	1	2	3	4
17. Fiziksel aktivite gerektiren görevleri tamamlamayı daha az becerebiliyorum.	0	1	2	3	4
18. Düşüncemin yavaşladığını hissediyorum.	0	1	2	3	4
19. Konsantre olmakta güçlük çekiyorum.	0	1	2	3	4
20. Fiziksel aktivitelerimi kısıtlamak zorundayım.	0	1	2	3	4
21. Daha sık aralıklarla veya daha uzun süreyle dinlenmek zorunda kalıyorum.	0	1	2	3	4

DÜŞME ETKİNLİK ÖLÇEĞİ

Size düşme ihtimali ile ilgili endişelerinize yönelik sorular soracağım. Aşağıdaki aktiviteler sırasında düşme ihtimali ile endişelerinize yönelik sizi en iyi ifade eden seçeneği işaretleyiniz.

	1 (Hiç endişe duymam)	2 (Biraz endişe duyarım)	3 (Oldukça endişe duyarım)	4 (Çok endişe duyarım)
Giyinmek veya soyunmak				
Banyo yapmak veya duş almak				
Sandalyeye oturmak veya sandalyeden kalkmak				
Merdiven inmek veya çıkmak				
Başınızın üzerindeki bir nesneye uzanmak ya da yerden almak				
Yokuş çıkmak veya inmek				
Sosyal bir etkinlik için dışarı çıkmak (aile toplantısı, dini toplantı, kulüp dernek gibi)				

Günlük Yaşamda İkili Görev Zorluklarının Etkisi Anketi

[Dual-task Impact on Daily-life Activities Questionnaire (DIDA-Q)]

Günlük yaşamda yürürken alışveriş listesini düşünmek gibi aynı anda birden çok aktiviteyi yapmak durumunda kalabiliriz. Lütfen aşağıdaki görevleri gerçekleştirirken ne kadar zorluk yaşadığınızı belirtin.

		Hiç zor değil (0)	Hafif zor (1)	Orta derecede zor (2)	Çok zor (3)	Aşırı zor (4)
1	Yiyecek dolu bir tabakla yürümek					
2	Yürürken şişeden veya kutudan bir şey içmek					
3	Yürürken bir restoranın, filmin ya da kitabın adını hatırlamak					
4	Yürürken konuşan birini dinlemek					
5	Yürürken planlama yapmak (hangi yemeği pişireceğini düşünmek gibi)					
6	Yürürken ceketinizin fermuarını çekmek					
7	Biriyle konuşurken düz olmayan yollarda yürümek					
8	Yürürken görsel bir uyarana hızlıca cevap vermek (yol işaretlerine bakmak, yeşil ışıkta geçmek)					
9	Biriyle konuşurken ayakta dengeyi sağlamak					
10	Biriyle konuşurken yüksek hızda yürümek					
11	Biriyle konuşurken yürüme yönünüzü hızlıca değiştirmek					
12	Biriyle konuşurken normal hızda yürümek					
13	Yürürken sokaktaki trafik seslerine dikkat etmek					
14	Yürürken cebinizden bir şey çıkarmak					
15	Yürürken matematiksel hesap yapmak (alışveriş maliyetini hesaplamak gibi)					
16	Yürürken telefon kullanmak (rehberden birini bulmak, mesaj yazıp göndermek gibi)					
17	Merdiven çıkarken çanta taşımak					
18	Yürürken konuşmak					
19	Yürürken müzik dinlemek					

İkili Görev Tarama Listesi

Bu görevleri birlikte gerçekleştirirken sorun yaşıyor musunuz?	**Evet**	**Hayır**	**Uygulanamaz**
Yürümek ve konuşmak			
Yürümek ve telefon etmek			
Yürümek ve çanta taşımak			
Yürümek ve yiyecekle dolu bir tabak taşımak			
Yürümek ve dolu bir bardak taşımak			
Yürümek ve engel atlamak			
Yürümek ve cebinizden bir şey çıkarmak (mendil, para, cep telefonu gibi)			
Dışarıda yürümek ve trafiğe dikkat etmek			
Yürümek ve bir şeyleri hatırlamak (telefon numarası, adres gibi)			
Yürümek ve bir şey hakkında düşünmek			
Yürümek ve alışverişte alınacakları aramak			
Yürümek ve ceketinizin fermuarını çekmek			
Yürümek ve havaalanında ya da tren garında yolunuzu bulmak			

İkili Görev Anketi

Aşağıdaki sorular, bazıları diğerlerinden daha sık meydana gelen herkesin zaman zaman yaşadığı sorunlarla ilgilidir. Son birkaç haftadır bu sorunları ne sıklıkta yaşadığınızı öğrenmek istiyoruz. Ankette "çok sık" ile "hiçbir zaman" arasında değişen 5 seçenek ve "uygun değil" seçeneği bulunmaktadır. Lütfen size en uygun olanını işaretleyiniz.

	Bu zorluklardan herhangi birini ne sıklıkta yaşıyorsunuz?	Çok sık (4)	Sık (3)	Bazen (2)	Nadiren (1)	Asla (0)	N/A (uygun değil)
1	Aynı anda birden fazla şeye dikkatinizi vermede zorluk						
2	Konuşmak için o anda yapılmakta olan aktiviteyi durdurmaya ihtiyaç duymak						
3	Bir işle meşgulken başkalarının sizinle konuştuğunun farkında olmama						
4	Birkaç kişinin aynı anda konuştuğu bir sohbeti takip edememe veya bu konuşmaya katılamama						
5	Birisiyle konuşurken veya birisini dinlerken yürümenizde kötüleşme						
6	Kendi düşüncelerinizle meşgulken etrafınızda neler olduğunu fark etmeme						
7	Bir içeceği taşırken dökme						
8	Aynı anda hem biriyle konuşup hem de bir içeceği taşırken dökme						
9	Başka bir şey daha yapıyorken, insanlara çarpma veya bir şeyleri düşürme						
10	Aynı anda televizyon seyrederken ya da radyo dinlerken yemek yemekte zorlanmak						

Ethics Committee approval - Belgium

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UHASSELT
KNOWLEDGE IN ACTION

Definitief gunstig advies

Faculteit Geneeskunde en Levenswetenschappen
Comité voor Medische Ethiek
Voorzitter: prof. dr. Ivo Lambrichts
Secretariaat: Marleen Missotten
Tel.: 011 26 85 02
Fax: 011 26 85 99
E-mail: cme@uhasselt.be

ons kenmerk	uw kenmerk	Diepenbeek
CME2021/086		10/01/2021

Titel protocol	**Psychometric properties of patient reported questionnaires assessing dual-task difficulties in daily life in persons with MS: an international multicenter study**
Nummer protocol	
Opdrachtgever	Universiteit Hasselt
Eudractnummer	NVT
Belgisch nummer	B1152021000023
Onderzoeker	*Prof. dr. Peter Feys, dr. Ilse Lamers, drs. Daphne Kos, drs. Zuhal Abasiyanik*

Geachte collega,

Op 01 november 2021 werd het hierboven vernoemd dossier ingediend bij het CME UHasselt. Op 23 november 2021 werd een voorlopig advies opgemaakt.

Na inzage van de bijkomende informatie en/of aangepaste documenten met betrekking tot dit dossier is het Comité voor Medische Ethiek UHasselt van oordeel dat de voorgestelde studie, zoals beschreven in het protocol, wetenschappelijk relevant en ethisch verantwoord is.

Het definitief gunstig advies betreft de volgende documenten:
- Protocol versie 2, dd 23/12/2021
- Informatie en toestemmingsformulier versie 2.0, dd 23/12/2021
- Bewijs van 'No-fault' verzekering, dd 27/08/2021
- Vragenlijsten
- Flyer
- CV's en GCP-attesten

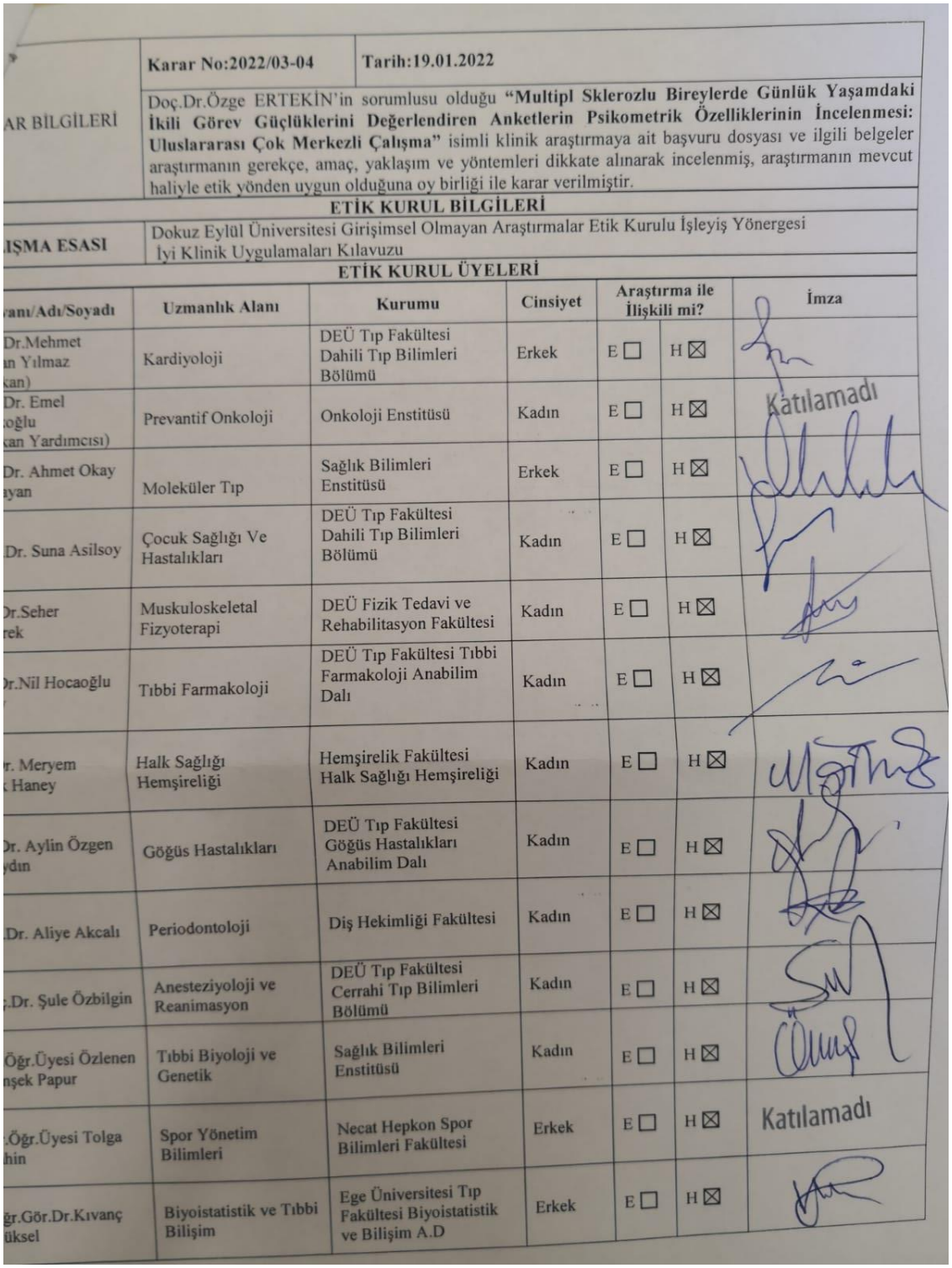
Het Comité voor Medische Ethiek van UHasselt handelt volgens de geldende richtlijnen van de 'International Conference of Harmonization (ICH) Good Clinical Practice (GCP)' en volgens alle geldende en van toepassing zijnde wetten en reglementen.

Dit gunstig advies houdt niet in dat het Comité de verantwoordelijkheid voor de geplande studie op zich neemt. De onderzoeker blijft zelf verantwoordelijk hiervoor. Bovendien dient u erover te waken dat uw mening als betrokken onderzoeker wordt weergegeven in publicaties, rapporten voor de overheid enz., die het resultaat zijn van dit onderzoek.

Bij Serious Adverse events (SAE's) dient de onderzoeker het comité hiervan op de hoogte te brengen.

Wijzigingen in het studieprotocol, informatie en toestemmingsformulier, onderzoeksteam) dienen te worden goedgekeurd door het Comité via een amendement.

Ethics Committee approval - Turkey



AR BİLGİLERİ	**Karar No:2022/03-04**	**Tarih:19.01.2022**				
	Doç.Dr.Özge ERTEKİN'in sorumlusu olduğu **"Multipl Sklerozlu Bireylerde Günlük Yaşamdaki İkili Görev Güçlüklerini Değerlendiren Anketlerin Psikometrik Özelliklerinin İncelenmesi: Uluslararası Çok Merkezli Çalışma"** isimli klinik araştırmaya ait başvuru dosyası ve ilgili belgeler araştırmanın gerekçe, amaç, yaklaşım ve yöntemleri dikkate alınarak incelenmiş, araştırmanın mevcut haliyle etik yönden uygun olduğuna oy birliği ile karar verilmiştir.					
ETİK KURUL BİLGİLERİ						
IŞMA ESASI	Dokuz Eylül Üniversitesi Girişimsel Olmayan Araştırmalar Etik Kurulu İşleyiş Yönergesi İyi Klinik Uygulamaları Kılavuzu					
ETİK KURUL ÜYELERİ						
anı/Adı/Soyadı	**Uzmanlık Alanı**	**Kurumu**	**Cinsiyet**	**Araştırma ile İlişkili mi?**		**İmza**
Dr.Mehmet n Yılmaz kan)	Kardiyoloji	DEÜ Tıp Fakültesi Dahili Tıp Bilimleri Bölümü	Erkek	E ☐	H ☒	
Dr. Emel oğlu kan Yardımcısı)	Prevantif Onkoloji	Onkoloji Enstitüsü	Kadın	E ☐	H ☒	Katılamadı
Dr. Ahmet Okay yan	Moleküler Tıp	Sağlık Bilimleri Enstitüsü	Erkek	E ☐	H ☒	
Dr. Suna Asilsoy	Çocuk Sağlığı Ve Hastalıkları	DEÜ Tıp Fakültesi Dahili Tıp Bilimleri Bölümü	Kadın	E ☐	H ☒	
Dr.Seher rek	Muskuloskeletal Fizyoterapi	DEÜ Fizik Tedavi ve Rehabilitasyon Fakültesi	Kadın	E ☐	H ☒	
Dr.Nil Hocaoğlu	Tıbbi Farmakoloji	DEÜ Tıp Fakültesi Tıbbi Farmakoloji Anabilim Dalı	Kadın	E ☐	H ☒	
r. Meryem Haney	Halk Sağlığı Hemşireliği	Hemşirelik Fakültesi Halk Sağlığı Hemşireliği	Kadın	E ☐	H ☒	
Dr. Aylin Özgen ydın	Göğüs Hastalıkları	DEÜ Tıp Fakültesi Göğüs Hastalıkları Anabilim Dalı	Kadın	E ☐	H ☒	
Dr. Aliye Akcalı	Periodontoloji	Diş Hekimliği Fakültesi	Kadın	E ☐	H ☒	
Dr. Şule Özbilgin	Anesteziyoloji ve Reanimasyon	DEÜ Tıp Fakültesi Cerrahi Tıp Bilimleri Bölümü	Kadın	E ☐	H ☒	
Öğr.Üyesi Özlenen nşek Papur	Tıbbi Biyoloji ve Genetik	Sağlık Bilimleri Enstitüsü	Kadın	E ☐	H ☒	
Öğr.Üyesi Tolga hin	Spor Yönetim Bilimleri	Necat Hepkon Spor Bilimleri Fakültesi	Erkek	E ☐	H ☒	Katılamadı
ğr.Gör.Dr.Kıvanç üksel	Biyoistatistik ve Tıbbi Bilişim	Ege Üniversitesi Tıp Fakültesi Biyoistatistik ve Bilişim A.D	Erkek	E ☐	H ☒	

Inventory

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KNOWLEDGE IN ACTION

INVENTORY FORM SCIENTIFIC INTERNSHIP PART 2

DATE	CONTENT OF THE MEETING	SIGNATURES
5/10/2021	- Last version of DT project - Certain dates for internship in Turkey - Plan for EC preparation	Promotor: not present Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: niet aanwezig
13/10/2021	- Completion major parts of the EC application	Promotor: not present Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen
15/10/2021	- Expansion of students in this master's thesis - Discussion of the practical elaboration of data collection in Belgium and Turkey	Promotor: Peter Feys Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen
10/11/2021	- Discussion on METC application of DT PRO Project	Promotor: not present Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen
13/12/2021	- METC revision - Revision and correction of grammatical errors in the Dutch translations - The GCP course and certificate - Master thesis topics and timeline	Promotor: Peter Feys Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen
5/01/2022	- Latest situation of internship (Turkey) - Planning of HC recruitment	Promotor: Peter Feys Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen
1/02/2022	- Start-up CMI - PRO tests - Introduction of students 1st/2nd Master - Discussion of translation/adaptation of Dutch version of DIDA-Q	Promotor: Peter Feys Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen
18/5/2022 and 20/05/2022	- Advice and feedback on statistical analysis	Promotor: not present Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen
30/05/2022	- Analysis of feedback on total scription/thesis	Promotor: not present Copromotor: Zuhal Abasiyanik Student: Amber Fostier Student: Carolien Van Goubergen

Verklaring op eer – Amber Fostier

Verklaring op Eer

Ondergetekende, student aan de Universiteit Hasselt (UHasselt), faculteit Revalidatiewetenschappen en kinesitherapie aanvaardt de volgende voorwaarden en bepalingen van deze verklaring:

1. Ik ben ingeschreven als student aan de UHasselt in de opleiding Revalidatiewetenschappen en kinesitherapie, waarbij ik de kans krijg om in het kader van mijn opleiding mee te werken aan onderzoek van de faculteit Revalidatiewetenschappen en kinesitherapie aan de UHasselt. Dit onderzoek wordt beleid door Prof. Peter Feys en kadert binnen het opleidingsonderdeel Wetenschappelijke stage/masterproef deel 2. Ik zal in het kader van dit onderzoek creaties, schetsen, ontwerpen, prototypes en/of onderzoeksresultaten tot stand brengen in het domein van neurowetenschappen (hierna: "De Onderzoeksresultaten").

2. Bij de creatie van De Onderzoeksresultaten doe ik beroep op de achtergrondkennis, vertrouwelijke informatie[1], universitaire middelen en faciliteiten van UHasselt (hierna: de "Expertise").

3. Ik zal de Expertise, met inbegrip van vertrouwelijke informatie, uitsluitend aanwenden voor het uitvoeren van hogergenoemd onderzoek binnen UHasselt. Ik zal hierbij steeds de toepasselijke regelgeving, in het bijzonder de Algemene Verordening Gegevensbescherming (EU 2016-679), in acht nemen.

4. Ik zal de Expertise (i) voor geen enkele andere doelstelling gebruiken, en (ii) niet zonder voorafgaande schriftelijke toestemming van UHasselt op directe of indirecte wijze publiek maken.

5. Aangezien ik in het kader van mijn onderzoek beroep doe op de Expertise van de UHasselt, draag ik hierbij alle bestaande en toekomstige intellectuele eigendomsrechten op De Onderzoeksresultaten over aan de UHasselt. Deze overdracht omvat alle vormen van intellectuele eigendomsrechten, zoals onder meer – zonder daartoe beperkt te zijn – het auteursrecht, octrooirecht, merkenrecht, modellenrecht en knowhow. De overdracht geschiedt in de meest volledige omvang, voor de gehele wereld en voor de gehele beschermingsduur van de betrokken rechten.

6. In zoverre De Onderzoeksresultaten auteursrechtelijk beschermd zijn, omvat bovenstaande overdracht onder meer de volgende exploitatiewijzen, en dit steeds voor de hele beschermingsduur, voor de gehele wereld en zonder vergoeding:

   - het recht om De Onderzoeksresultaten vast te (laten) leggen door alle technieken en op alle dragers;
   - het recht om De Onderzoeksresultaten geheel of gedeeltelijk te (laten) reproduceren, openbaar te (laten) maken, uit te (laten) geven, te (laten) exploiteren en te (laten) verspreiden in eender welke vorm, in een onbeperkt aantal exemplaren;

[1] Vertrouwelijke informatie betekent alle informatie en data door de UHasselt meegedeeld aan de student voor de uitvoering van deze overeenkomst, inclusief alle persoonsgegevens in de zin van de Algemene Verordening Gegevensbescherming (EU 2016/679), met uitzondering van de informatie die (a) reeds algemeen bekend is; (b) reeds in het bezit was van de student voor de mededeling ervan door de UHasselt; (c) de student verkregen heeft van een derde zonder enige geheimhoudingsplicht; (d) de student onafhankelijk heeft ontwikkeld zonder gebruik te maken van de vertrouwelijke informatie van de UHasselt; (e) wettelijk of als gevolg van een rechterlijke beslissing moet worden bekendgemaakt, op voorwaarde dat de student de UHasselt hiervan schriftelijk en zo snel mogelijk op de hoogte brengt.

- het recht om De Onderzoeksresultaten te (laten) verspreiden en mee te (laten) delen aan het publiek door alle technieken met inbegrip van de kabel, de satelliet, het internet en alle vormen van computernetwerken;
- het recht De Onderzoeksresultaten geheel of gedeeltelijk te (laten) bewerken of te (laten) vertalen en het (laten) reproduceren van die bewerkingen of vertalingen;
- het recht De Onderzoeksresultaten te (laten) bewerken of (laten) wijzigen, onder meer door het reproduceren van bepaalde elementen door alle technieken en/of door het wijzigen van bepaalde parameters (zoals de kleuren en de afmetingen).

De overdracht van rechten voor deze exploitatiewijzen heeft ook betrekking op toekomstige onderzoeksresultaten tot stand gekomen tijdens het onderzoek aan UHasselt, eveneens voor de hele beschermingsduur, voor de gehele wereld en zonder vergoeding.

Ik behoud daarbij steeds het recht op naamvermelding als (mede)auteur van de betreffende Onderzoeksresultaten.

7. Ik zal alle onderzoeksdata, ideeën en uitvoeringen neerschrijven in een "laboratory notebook" en deze gegevens niet vrijgeven, tenzij met uitdrukkelijke toestemming van mijn UHasseltbegeleider Prof. Peter Feys.

8. Na de eindevaluatie van mijn onderzoek aan de UHasselt zal ik alle verkregen vertrouwelijke informatie, materialen, en kopieën daarvan, die nog in mijn bezit zouden zijn, aan UHasselt terugbezorgen.

Gelezen voor akkoord en goedgekeurd,

Naam: Fostier Amber

Adres: Heirweg 8, 9506 Idegem

Geboortedatum en –plaats : 18/06/1998 te Zottegem

Datum: 26/05/2022

Handtekening: 

Verklaring op eer – Carolien Van Goubergen

Verklaring op Eer

Ondergetekende, student aan de Universiteit Hasselt (UHasselt), faculteit Revalidatiewetenschappen en kinesitherapie aanvaardt de volgende voorwaarden en bepalingen van deze verklaring:

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[1] Vertrouwelijke informatie betekent alle informatie en data door de UHasselt meegedeeld aan de student voor de uitvoering van deze overeenkomst, inclusief alle persoonsgegevens in de zin van de Algemene Verordening Gegevensbescherming (EU 2016/679), met uitzondering van de informatie die (a) reeds algemeen bekend is; (b) reeds in het bezit was van de student voor de mededeling ervan door de UHasselt; (c) de student verkregen heeft van een derde zonder enige geheimhoudingsplicht; (d) de student onafhankelijk heeft ontwikkeld zonder gebruik te maken van de vertrouwelijke informatie van de UHasselt; (e) wettelijk of als gevolg van een rechterlijke beslissing moet worden bekendgemaakt, op voorwaarde dat de student de UHasselt hiervan schriftelijk en zo snel mogelijk op de hoogte brengt.

- het recht om De Onderzoeksresultaten te (laten) verspreiden en mee te (laten) delen aan het publiek door alle technieken met inbegrip van de kabel, de satelliet, het internet en alle vormen van computernetwerken;
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8. Na de eindevaluatie van mijn onderzoek aan de UHasselt zal ik alle verkregen vertrouwelijke informatie, materialen, en kopieën daarvan, die nog in mijn bezit zouden zijn, aan UHasselt terugbezorgen.

Gelezen voor akkoord en goedgekeurd,

Naam: Van Goubergen Carolien

Adres: Kardinaal Cardijnlaan 29, 2350 Vosselaar

Geboortedatum en –plaats : 27/03/1999 te Turnhout

Datum: 26/05/2022

Handtekening: 

Advice promotor Amber

Inschrijvingsformulier verdediging masterproef academiejaar 2021-2022,
Registration form jury Master's thesis academic year 2021-2022,

GEGEVENS STUDENT - *INFORMATION STUDENT*

Faculteit/School: **Faculteit Revalidatiewetenschappen**
Faculty/School: ***Rehabilitation Sciences***

Stamnummer + naam: **1746681 Fostier Amber**
Student number + name

Opleiding/*Programme*: **2 ma revalid. & kine inwendige**

INSTRUCTIES - *INSTRUCTIONS*

Neem onderstaande informatie grondig door.

Print dit document en vul het aan met DRUKLETTERS.

In tijden van van online onderwijs door COVID-19 verstuur je het document (scan of leesbare foto) ingevuld via mail naar je promotor. Je promotor bezorgt het aan de juiste dienst voor verdere afhandeling.

Vul luik A aan. Bezorg het formulier aan je promotoren voor de aanvullingen in luik B. Zorg dat het formulier ondertekend en gedateerd wordt door jezelf en je promotoren in luik D en dien het in bij de juiste dienst volgens de afspraken in jouw opleiding.
Zonder dit inschrijvingsformulier krijg je geen toegang tot upload/verdediging van je masterproef.

Please read the information below carefully.

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In times of COVID-19 and during the online courses you send the document (scan or readable photo) by email to your supervisor. Your supervisor delivers the document to the appropriate department.

Fill out part A. Send the form to your supervisors for the additions in part B. Make sure that the form is signed and dated by yourself and your supervisors in part D and submit it to the appropriate department in accordance with the agreements in your study programme.
Without this registration form, you will not have access to the upload/defense of your master's thesis.

LUIK A - VERPLICHT - IN TE VULLEN DOOR DE STUDENT
PART A - MANDATORY - TO BE FILLED OUT BY THE STUDENT

Titel van Masterproef/*Title of Master's thesis:*

O behouden - *keep*	
☒ wijzigen - *change to:*	RELIABILITY OF PATIENT REPORTED OUTCOMES ASSESSING DUAL-TASK DIFFICULTIES IN DAILY LIFE IN PERSONS WITH MULTIPLE SCLEROSIS: A MULTICENTER STUDY IN TURKEY AND BELGIUM

UHvoorlev5 26/05/2022

/:

O behouden - *keep*

O wijzigen - *change to*:

In geval van samenwerking tussen studenten, naam van de medestudent(en)/*In case of group work, name of fellow student(s)*:

☒ behouden - *keep* CAROLIEN VAN GOUBERGEN

O wijzigen - *change to:*

LUIK B - VERPLICHT - IN TE VULLEN DOOR DE PROMOTOR(EN)
PART B - MANDATORY - TO BE FILLED OUT BY THE SUPERVISOR(S)

Wijziging gegevens masterproef in luik A/*Change information Master's thesis in part A:*

☒ goedgekeurd - *approved*

O goedgekeurd mits wijziging van - *approved if modification of:*

Scriptie/*Thesis:*

☒ openbaar (beschikbaar in de document server van de universiteit)- *public (available in document server of university)*

O vertrouwelijk (niet beschikbaar in de document server van de universiteit) - *confidential (not available in document server of university)*

Juryverdediging/*Jury Defense:*

De promotor(en) geeft (geven) de student(en) het niet-bindend advies om de bovenvermelde masterproef in de bovenvermelde periode/*The supervisor(s) give(s) the student(s) the non-binding advice:*

☒ te verdedigen/*to defend the aforementioned Master's thesis within the aforementioned period of time*

☒ de verdediging is openbaar/*in public*

O de verdediging is niet openbaar/*not in public*

O niet te verdedigen/*not to defend the aforementioned Master's thesis within the aforementioned period of time*

LUIK C - OPTIONEEL - IN TE VULLEN DOOR STUDENT, alleen als hij luik B wil overrulen
PART C - OPTIONAL - TO BE FILLED OUT BY THE STUDENT, only if he wants to overrule part B

In tegenstelling tot het niet-bindend advies van de promotor(en) wenst de student de bovenvermelde masterproef in de bovenvermelde periode/*In contrast to the non-binding advice put forward by the supervisor(s), the student wishes:*

O niet te verdedigen/*not to defend the aforementioned Master's thesis within the aforementioned period of time*

O te verdedigen/*to defend the aforementioned Master's thesis within the aforementioned period of time*

UHvoorlev5 26/05/2022

LUIK D - VERPLICHT - IN TE VULLEN DOOR DE STUDENT EN DE PROMOTOR(EN)
PART D - MANDATORY - TO BE FILLED OUT BY THE STUDENT AND THE SUPERVISOR(S)

Datum en handtekening student(en) *Date and signature student(s)*	Datum en handtekening promotor(en) *Date and signature supervisor(s)*
 26/05/2022	 27/5/2022

UHvoorlev5 26/05/2022

Advice promotor Carolien

Inschrijvingsformulier verdediging masterproef academiejaar 2021-2022,
Registration form jury Master's thesis academic year 2021-2022,

GEGEVENS STUDENT - *INFORMATION STUDENT*

Faculteit/School: **Faculteit Revalidatiewetenschappen**
Faculty/School: ***Rehabilitation Sciences***

Stamnummer + naam: **1745899 Van Goubergen Carolien**
Student number + name

Opleiding/*Programme*: **2 ma revalid. & kine inwendige**

INSTRUCTIES - *INSTRUCTIONS*

Neem onderstaande informatie grondig door.

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Vul luik A aan. Bezorg het formulier aan je promotoren voor de aanvullingen in luik B. Zorg dat het formulier ondertekend en gedateerd wordt door jezelf en je promotoren in luik D en dien het in bij de juiste dienst volgens de afspraken in jouw opleiding.
Zonder dit inschrijvingsformulier krijg je geen toegang tot upload/verdediging van je masterproef.

Please read the information below carefully.

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Fill out part A. Send the form to your supervisors for the additions in part B. Make sure that the form is signed and dated by yourself and your supervisors in part D and submit it to the appropriate department in accordance with the agreements in your study programme.
Without this registration form, you will not have access to the upload/defense of your master's thesis.

LUIK A - VERPLICHT - IN TE VULLEN DOOR DE STUDENT
PART A - MANDATORY - TO BE FILLED OUT BY THE STUDENT

Titel van Masterproef/*Title of Master's thesis:*

☐ behouden - *keep*

☑ wijzigen - *change to*:
RELIABILTY OF PATIENT REPORTED OUTCOMES ASSESSING DUAL-TASK DIFFICULTIES IN DAILY LIFE IN PERSONS WITH MULTIPLE SCLEROSIS: A MULTICENTER STUDY IN TURKEY AND BELGIUM

UHvoorlev5 26/05/2022

/:

O behouden - *keep*

O wijzigen - *change to*:

In geval van samenwerking tussen studenten, naam van de medestudent(en)/*In case of group work, name of fellow student(s)*:

☑ behouden - *keep* AMBER FOSTIER

O wijzigen - *change to:*

LUIK B - VERPLICHT - IN TE VULLEN DOOR DE PROMOTOR(EN)
PART B - MANDATORY - TO BE FILLED OUT BY THE SUPERVISOR(S)

Wijziging gegevens masterproef in luik A/*Change information Master's thesis in part A:*

O goedgekeurd - *approved*

O goedgekeurd mits wijziging van - *approved if modification of:*

Scriptie/*Thesis:*

O openbaar (beschikbaar in de document server van de universiteit)- *public (available in document server of university)*

O vertrouwelijk (niet beschikbaar in de document server van de universiteit) - *confidential (not available in document server of university)*

Juryverdediging/*Jury Defense:*

De promotor(en) geeft (geven) de student(en) het niet-bindend advies om de bovenvermelde masterproef in de bovenvermelde periode/*The supervisor(s) give(s) the student(s) the non-binding advice:*

O te verdedigen/*to defend the aforementioned Master's thesis within the aforementioned period of time*

O de verdediging is openbaar/*in public*

O de verdediging is niet openbaar/*not in public*

O niet te verdedigen/*not to defend the aforementioned Master's thesis within the aforementioned period of time*

LUIK C - OPTIONEEL - IN TE VULLEN DOOR STUDENT, alleen als hij luik B wil overrulen
PART C - OPTIONAL - TO BE FILLED OUT BY THE STUDENT, only if he wants to overrule part B

In tegenstelling tot het niet-bindend advies van de promotor(en) wenst de student de bovenvermelde masterproef in de bovenvermelde periode/*In contrast to the non-binding advice put forward by the supervisor(s), the student wishes:*

O niet te verdedigen/*not to defend the aforementioned Master's thesis within the aforementioned period of time*

O te verdedigen/*to defend the aforementioned Master's thesis within the aforementioned period of time*

UHvoorlev5 26/05/2022

LUIK D - VERPLICHT - IN TE VULLEN DOOR DE STUDENT EN DE PROMOTOR(EN)
PART D - MANDATORY - TO BE FILLED OUT BY THE STUDENT AND THE SUPERVISOR(S)

Datum en handtekening student(en)
Date and signature student(s)
VAN GOUBERGEN CAROLIEN , 26/05/2022

Datum en handtekening promotor(en)
Date and signature supervisor(s)

27/5/2022