

RESEARCH ARTICLE

Effect of equestrian therapy and onotherapy in physical and psycho-social performances of adults with intellectual disability: a preliminary study of evaluation tools based on the ICF classification

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Purpose: To assess the effects of equestrian rehabilitation (ER) and onotherapy (Ono) on physical and psycho-social performances of subjects affected by intellectual disability (ID), and to develop a measurement tool based on the International Classification of Functioning Disability and Health-Children and Youth (ICF-CY). **Method:** A tool based on the ICF-CY classification was designed to evaluate subjects undergoing equine rehabilitation within a bio-psychosocial approach. A simplified version of this evaluation form was developed for the equestrian instructors. The agreement between the two tools was evaluated with the Cohen's κ coefficient. Treatment benefits were evaluated in the different areas covered by the evaluation tool. **Results:** A general improvement in the autonomy and social integration of subjects with ID undergoing horse and donkey therapy was observed. ER and Ono produced maximum benefits respectively at six and 3 months in the large majority of patients, and benefits persisted over time. Although the agreement between the two tools proposed was rather slight, both evaluation groups measured similar improvements in subjects undergoing equine rehabilitation. **Conclusions:** There is an improvement in autonomy and social integration for subjects with ID, undergoing horse and donkey therapy. Ono emerged as a suitable and effective alternative to equestrian therapy. The simplified measurement tool proved to be sensitive and easy to apply, even if further improvements will be necessary.

Keywords: Equestrian rehabilitation, ICF-CY, intellectual disability, onotherapy

Introduction

In the past 10 years, interest in equine therapy as an innovative technique of physical rehabilitation has dramatically increased. This therapeutic approach has been developed and extensively used in UK, Germany, Nordic countries, and

Implications for rehabilitation

- The equine rehabilitation program is designed to recover and/or develop interpersonal interactions capacity and mental functions.
- An evaluation tool based on the International Classification of Functioning Disability and Health (ICF) and ICF-Children and Youth systems was developed to quantify the beneficial effect of equine rehabilitation.
- Rehabilitation therapy with horse and donkey produces improvements in autonomy and social integration in subjects with intellectual disability.

subsequently in the US [1–3]. The use of horses and donkeys in the animal-assisted therapy aims at improving body functions, activities, participation, by attending to environmental and personal conditions in subjects affected by various disabilities. Despite the growing interest, only a handful of studies tried to evaluate the beneficial effects of this therapy on physical performances, and even fewer addressed the issue of psychosocial improvements [4–7].

Most studies published so far, mainly focused on physiological benefits of equine therapy, such as improvement in balance, strength, trunk and head stability, spasticity, coordination, and posture gait. Literature showed that the most commonly treated groups were children with cerebral palsy and physical disability [6–8]; and adults with spinal cord injury, mental retardation and multiple sclerosis [9,10]. Instead, no systematic evaluation of the most recent therapy with donkeys (onotherapy (Ono)) was found into the literature. This treatment, which is a new instrument between animal-assisted therapy and mental health care, considers the donkey as a co-therapist, with special indication for people with damaged

psychomotor, emotional, communicative functions. Equestrian rehabilitation (ER) improves posture, balance, and overall function by decreasing muscle stiffness, improving head and trunk postural control, and developing balance reactions in trunk. Also, equine therapy influences patient's confidence and feeling of pleasure by touching, stroking, grooming and giving verbal commands to the horse/donkey. The strength of the helping relationship, characterized by warmth, empathy, trust, acceptance and elaboration, is the most powerful predictor of positive outcome [11].

The general need of validated evaluation tools that properly assess functional changes in subjects undergoing equine therapy was clearly emerged from the analysis of the literature. A further priority identified is the use of standard classification criteria for assessing functions, such as those reported in the International Classification of Functioning Disability and Health (ICF [12]). Recent papers on rehabilitation theories suggest that ICF may be regarded as a new paradigm which has integrated the individual model of disability with the social model of disability [13,14]. The emphasis on environmental factors and human functioning as well as the interaction between the two represents a revolution in the way we think about rehabilitation.

ICF is not a measurement tool but rather a classification system, therefore the present research faces two challenges, translating measures of functional status and environmental aspects into the ICF language [15], and managing major difficulties which prevent a reliable and standard measurement of the rehabilitation outcome. Among them, the heterogeneous interpretation of terms describing therapeutic activities involving equines, the lack of common rehabilitation protocols, and the poor sensitivity of the few available validation tools are the most critical issues. As a direct consequence of these limitations, no large scale trials have been performed so far [10,16].

In order to fill the gaps emerging from the literature, a research program was started at Villa Buon Respiro in Viterbo, Italy, a rehabilitation centre specialized in equine therapy, finalized to (i) evaluate the beneficial effect of ER and Ono on adults with intellectual disability (ID) (ii) explore and assess two evaluation tools based on the ICF [12] and ICF-CY classification [17], for personnel with psychological training and for equestrian instructors, respectively. We decided to use also the ICF-CY classification in order to gather as many information as possible, given its wider and more complete range of tools. Furthermore, the use of the ICF-CY classification will facilitate the use of these tools in children undergoing ER.

Materials and methods

Study design and subjects

An evaluation tool based on the ICF and ICF-CY classification system was developed by a team composed of neurologists, psychiatrists, psychologists, and all equestrian instructors (professionals specialized in ER). This tool aimed at measuring the health condition and domains of subjects undergoing equine rehabilitation according to relevant items reported in the ICF. Most of the evaluation features included in this evaluation tool were designed to be applied only by personnel with

psychological training (Tool A), and therefore, a simplified version of this list, after removing neuro-psychological items, was developed for the use of all therapists involved in the rehabilitation program (Tool B). A copy of these tools, both for ER (Tool A-ER; Tool B-ER) and for Ono (Tool A-Ono; Tool B-Ono), can be downloaded from the official website of the rehabilitation centre (http://buonrespiro.sanraffaele.it/rep/publicazioni.asp?hw=12&id_reparto=703). The first aim of the analysis was to assess the degree of concordance between the two evaluation tools in measuring the improvement of selected abilities in adults with ID. The comparative evaluation was performed in a group of subjects undergoing Ono (at the beginning of the study, after 3 months, 6 months, and 12 months), and in a smaller group undergoing ER (at the beginning of the study, after 6 months, 12 months, and 18 months). The assessment of individual performances was done independently and blindly between personnel with psychological training and equestrian instructors. The performance of the two tools was also compared in the different areas covered by the evaluation program. Finally, the timing at which the improvements were observed and their persistence over time were evaluated.

Eight adult individuals undergoing equine therapy with horses (ER) (mean age=42.9; SD=1.5), and fifteen individuals undergoing therapy with donkeys (Ono) (mean age=38.6; SD=8.6) were evaluated with both the functioning measurement tools over time. No changes were expected in the cognitive status of subjects included in the study, given their adult age. No external controls were recruited and performance at T0 was considered as reference. In the group undergoing Ono, there were two subjects affected by slight (13.3%), nine affected by moderate (60.0%), and four by severe intellectual impairment (26.7%); in the ER sample, one subject was affected by slight (12.5%), five by moderate (62.5%), and two by severe intellectual impairment (25.0%). Some selected clinical and demographic characteristics of the two study groups are summarized in Table I. The extent of intellectual impairment was assessed at the beginning of treatment by a psychiatrist and a psychologist through a physical examination and a clinical interview with the use of the Vineland Adaptive Behavior Scale [18]. All measurements were performed independently by psychologists and by

Table I. Characteristics of the two study groups undergoing equestrian rehabilitation.

		Equestrian rehabilitation	Onotherapy
N°		8	15
Age (mean)		42.9	38.6
Sex	Men	87.5%	87.7%
	Women	12.5%	12.3%
Environment	Institutionalized	50.0%	60.0%
	Non-institutionalized	50.0%	40.0%
Intellectual disability	Slight	12.5%	13.3%
	Moderate	62.5%	60.0%
	Severe	25.0%	26.7%
Comorbidity	Psychiatric	37.5%	73.3%
	Medical	12.5%	6.7%
	Neurologic	12.5%	6.7%
	Nothing	37.5%	13.3%

therapists of the rehabilitation team at Villa Buon Respiro. All subjects included in the research group or their tutors gave the authorization to process personal data.

Evaluation tools development and description

After identifying the specific goals of the ER and Ono, the rehabilitation team proceeded to select those ICF and ICF-CY codes that best describe the functions and domains of the rehabilitation with horses and donkeys. The codes identified were operationally declined into specific items relating to the rehabilitative activities carried out at Villa Buon Respiro. The codes of the psychologists' tool (Tool A) are very detailed, mainly of 4 levels, while those of the instructors' tool (Tool B) are more comprehensive, mostly of 3 levels. The rehabilitation team also followed the ICF-CY qualifiers, by considering those from 1 to 4 in a decreasing scale. The qualifier "0" was assumed to mean no impairment, so it was not included into the tools.

Regarding ER, the Tool A-ER consists of 68 items overall. Ten of them were included to assess the area of autonomy, 20 the motor-praxis area, 7 the neuro-psychological area, 17 the affective-relational area, 5 the mental cognitive area, and 9 to assess communication. Tool B-ER is composed of 22 items overall, which excluding the neuro-psychological area, stated in a more global and general way the same areas (Appendix 1).

As regards Ono, the Tool A-Ono consists of 60 items overall, 10 of which assess autonomy, 11 the motor-praxis area, 7 the neuro-psychological area, 18 the affective-relational area, 4 the mental cognitive area, and 10 assessing communication. The Tool B-Ono is composed of 13 comprehensive items described in the Appendix 2.

The list of the areas evaluated was compiled according to definitions traditionally used at Villa Buon Respiro (although the global reference paradigm was the ICF-CY classification) to simplify the participation of all professionals figures involved, especially in the building of the equestrian instructors' tool.

Equine therapy

The equine rehabilitation program is designed to recover and/or develop (1) interpersonal interactions capacity by involving the internal motivation, openness to experience and control of emotions of the person and (2) mental functions by involving memory, psychomotor, higher-level cognitive and language functions. The rehabilitation aim is to achieve the best level of autonomy, both on individual and societal perspectives, improving self-esteem and enhancing communication/interactions with others.

The equine rehabilitation treatment is based on two programs, with horses and donkeys.

Therapy with horses (ER)

Inspired by the findings from the International Congress on ER in 1982, the rehabilitation program is articulated into three phases (1) hippotherapy, (2) equestrian re-education through riding and vaulting, and (3) pre-sporting riding. The rehabilitation program implemented at Villa Buon Respiro included a fourth stage, the horse carousel, which replaced the original athletic stage.

Hippotherapy: It is a passive form of riding in which the person benefits from the movement of the horse. Horse's pace and rhythm break the pathological patterns such as stereotyped movements, isolation, postural rigidity and aggressive behavior. During this activity, the instructor can relate with the person and integrate the riding with movement on the ground, i.e. horse handling.

Equestrian re-education: It is characterized by a first phase of approaching and a second one of learning with the final aim of controlling the horse and making the person able to perform the riding alone. These steps allow to rehabilitate cognitive, emotional and psychomotor functions through harness care, horse cleaning and relationship with the horse.

Pre-sporting riding: The person develops the awareness of riding as a sport. That means not only performance and competitiveness, but also a special relationship with the horse and the full participation in riding activities along with non-intellectual impaired people and interactions with the outside world.

Horse carousel: Villa Buon Respiro's choice to replace the athletic stage with the horse carousel was made to ensure a real integration of the rehabilitated individuals. Differently from a competition, the horse carousel allows disabled people to work and perform together with other riders experiencing in this way, a real integration.

Therapy with donkeys (Ono)

This therapy uses the gentle nature of the donkey to facilitate the recovery of spontaneous communication. This makes it an effective treatment especially, for people with affective and emotional disorders.

The rehabilitation program is scheduled into three stages: (1) approaching and contact; (2) interaction with donkey; (3) making donkey respond to command.

Statistical methods

The agreement between two group of raters, i.e. psychologists and instructors, was measured with the Cohen's κ coefficient. According to Landis and Koch [19], if κ is smaller than 0.00, there is no agreement; values between 0.01 and 0.40 suggest a slight or fair agreement; between 0.41 and 0.60, a moderate agreement, while for values greater than 0.61, the agreement is substantial. κ equal to 1 indicates perfect concordance.

To evaluate the effect of equine therapies, we defined one index that quantifies the change of subjects' performance over baseline, i.e. the baseline relative improvement, Δ_{Ba} . This statistics represents – in each area of the evaluation scheme – the mean improvement during the period of treatment, i.e.

$$\Delta_{Ba} = \sum_{s=1}^{n_s} \frac{\Delta_{Bas}}{n_s}$$

where,

$$\Delta_{Bas} = \frac{F_{as} - I_{as}}{I_{as}} \times 100$$

where,

$$F_{as} = \sum_{i=1}^{n_a} \max(p_s) \text{ and } I_{as} = \sum_{i=1}^{n_a} pb_{is}$$

and, i=item; a=area; s=subject; p=score; pb=baseline score.

A linear regression model was fitted to each therapy and each group of raters to determine the treatment performance over time within and between areas. Scatter plot and quantile-quantile plot confirmed the normality of residuals. The time when a individual achieved the maximum score, per each item, was considered to evaluate the timing of the treatment effects. The persistence of these effects was evaluated according to the average frequency of subjects achieving their maximum score, and described with time-line plots.

The critical limit for significance was fixed at 5%. The software used for the analysis was SPSS V.13.0 (SPSS Inc., Chicago, IL, USA).

Results

ER

The overall agreement between the psychologists' and the instructors' evaluation scores was rather slight, although in the cognitive area, the κ coefficient reached the value $K=0.279$

($p=0.001$). The poorest concordance was in the motor-praxis ($K=0.122$, $p=0.001$) and in the affective-relational ($K=0.154$, $p=0.001$) areas. The instructors gave lower scores to individual performance, except for the autonomy area. No comparison between the two evaluators was possible for the neuro-psychological and communication areas, since the instructor's tool did not include these parameters.

A general improvement was observed in subjects undergoing rehabilitation with horses (Figure 1). In particular, the psychologists observed significant improvements in autonomy ($\Delta_{Bau} = 31.4\%$, $p=0.001$), motor-praxis ($\Delta_{Bm-p} = 18.5\%$, $p=0.035$), affective-relational ($\Delta_{Ba-e} = 33.7\%$, $p < 0.001$), and cognitive ($\Delta_{Bcog} = 41.6\%$, $p < 0.001$) areas. On the other hand, the instructors recorded improvements in autonomy ($\Delta_{Bau} = 39.9\%$, $p < 0.001$), affective-relational ($\Delta_{Ba-e} = 26.7\%$, $p=0.002$), and cognitive ($\Delta_{Bcog} = 55.2\%$, $p < 0.001$) areas. Considering the areas of major psychological pertinence, an improvement over baseline was observed in neuro-psychological area ($\Delta_{Bn-p} = 38.6\%$, $p < 0.001$), while no evidence of improvement was reached in the communication area ($\Delta_{Bcom} = 8.8\%$; $p = 1.000$).

The distribution of subjects' performances over the study period showed that 75% of individuals reached their best performance in most areas after 12 months of therapy. The only exception concerns the psychologists, which found the highest frequency of subject reaching the maximum score before 6 months in communication and affective-relational areas

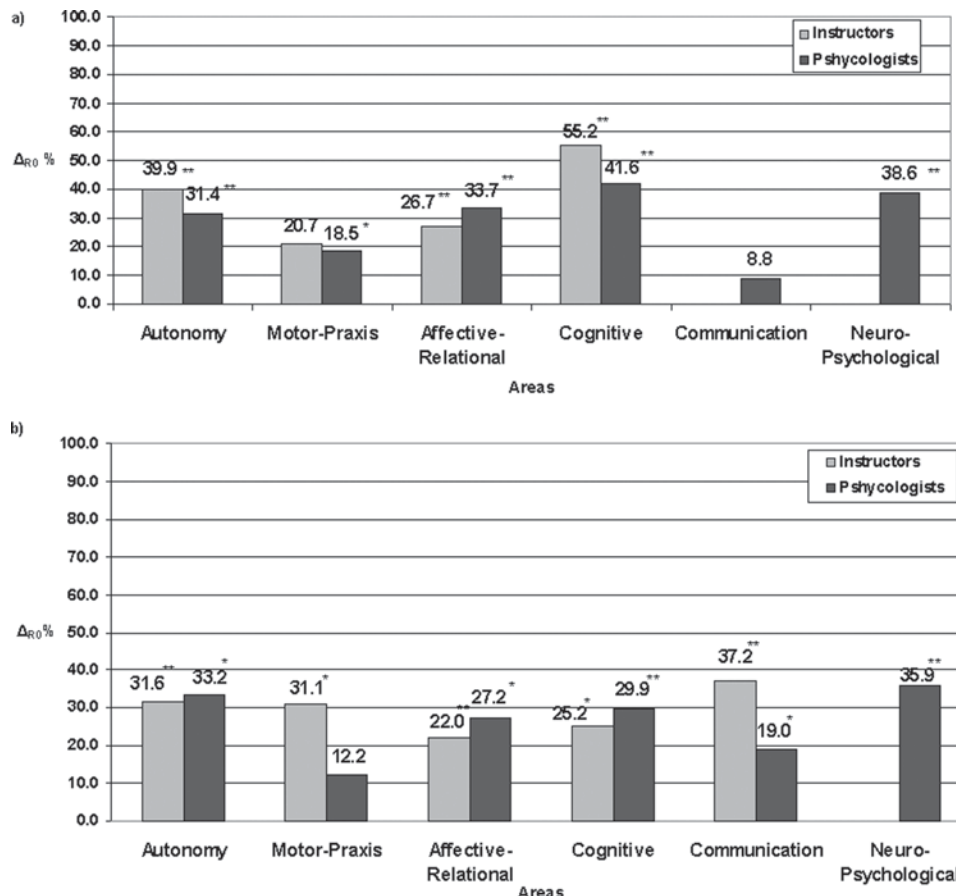


Figure 1. Relative improvement over baseline ($\Delta_{RO}\%$) by group of raters and area (* $p < 0.05$; ** $p < 0.01$). (A) The improvement relative to the equestrian rehabilitation (ER). (B) The improvement relative to the onotherapy (Ono).

Table II. Frequency distribution of eight subjects undergoing equestrian rehabilitation according to the moment when they reach the maximum score, by group of raters and by area.

Areas	Number of items	Baseline	6 months		12 months		18 months	
		%	%	% cum.	%	% cum.	%	% cum.
Instructors								
Autonomy	3	29.2	8.3	37.5	41.7	79.2	20.8	100.0
Motor-praxis	7	47.5	7.5	55.0	32.5	87.5	12.5	100.0
Affective-relational	8	37.5	14.1	51.6	35.9	87.5	12.5	100.0
Cognitive	4	43.8	9.4	53.1	25.0	78.1	21.9	100.0
Psychologists								
Autonomy	10	46.3	18.8	65.0	16.3	81.3	18.8	100.0
Motor-praxis	19	59.9	12.5	72.4	15.8	88.2	6.6	94.7
Neuro-psychological	6	35.4	25.0	60.4	29.2	89.6	10.4	100.0
Affective-relational	17	62.5	14.7	77.2	11.8	89.0	11.0	100.0
Cognitive	5	45.0	15.0	60.0	22.5	82.5	17.5	100.0
Communication	7	78.6	12.5	91.1	1.8	92.9	7.1	100.0

Cum, cumulative.

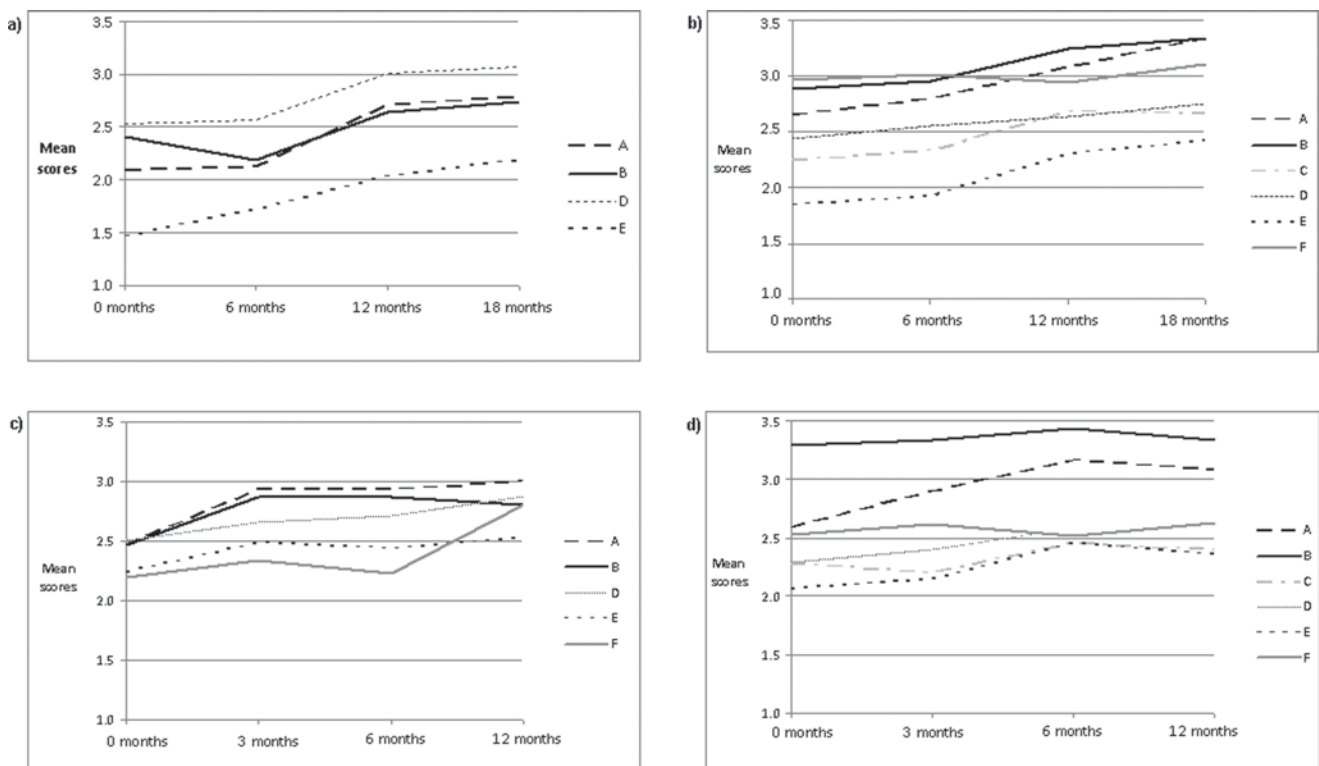


Figure 2. Trend over time of subjects performance, by area, rehabilitation protocol, and group of raters (A, Autonomy; B, Motor-praxis; C, Neuro-psychological; D, Affective-relational; E, Cognitive; F, Communication). (A) and (B) The trend assessed for the ER, respectively by instructors and psychologists. (C) and (D) The trend assessed for the Ono respectively by instructors and psychologists.

(Table II). However, a significant improvement of mean scores was registered by both groups of evaluators in all areas after 6 months from the start of rehabilitation treatment (Figure 2).

Onotherapy

The agreement between psychologists and instructors ranged from slight to fair in the six areas considered. The area with the highest concordance was communication ($K=0.283$, $p=0.001$), while the motor-praxis area showed the poorest inter-rater concordance ($K=0.006$, $p=0.429$), with psychologists providing a much higher score for motor-practical ability. Instructors systematically rated the individual abilities lower.

The relative improvement versus baseline is shown by group of raters and by area in Figure 1. Both groups of raters reported a statistically significant improvement of individuals' skills during treatment in all areas except motor-praxis, where the psychologists didn't report a significant improvement ($\Delta_{Bm-p}=12.2\%$, $p=0.103$). The psychologists also reported a higher improvement in the autonomy, affective-relational and cognitive areas, while instructors scored higher improvements in motor-praxis and communication. The smaller number of subjects undergoing Ono resulted in a smaller number of statistically significant results.

Table III. Frequency distribution of 15 subjects undergoing onotherapy according to the moment when they reach the maximum score, by group of raters and by area.

Areas	Number of items	Baseline	3 months		6 months		12 months	
		%	%	% cum.	%	% cum.	%	% cum.
Instructors								
Autonomy	2	40.0	40.0	80.0	3.3	83.3	16.7	100.0
Motor-praxis	1	46.7	33.3	80.0	13.3	93.3	6.7	100.0
Affective-relational	5	50.7	18.7	69.3	9.3	78.7	21.3	100.0
Cognitive	3	51.1	26.7	77.8	8.9	86.7	13.3	100.0
Communication	2	46.7	10.0	56.7	3.3	60.0	40.0	100.0
Psychologists								
Autonomy	10	34.7	28.0	62.7	27.3	90.0	10.0	100.0
Motor-praxis	10	68.5	12.1	80.6	6.1	86.7	4.2	90.9
Neuro-psychological	6	45.6	24.4	70.0	21.1	91.1	8.9	100.0
Affective-relational	18	59.6	17.0	76.7	13.7	90.4	8.1	98.5
Cognitive	4	38.3	11.7	50.0	30.0	80.0	20.0	100.0
Communication	10	67.3	14.7	82.0	6.7	88.7	11.3	100.0

Further parameters to be evaluated were the timing in which the improvements were observed, and their persistence over time. The majority of subjects reached their maximum improvement 3 months after the start of the therapy almost in each area for both group of raters (Table III). Two exceptions were observed in the affective-relational and communication areas, the instructors registered the individual maximum score 12 months after the start of therapy, 21% and 40% of subjects, respectively. On the other hands, the psychologists scored the best performance in the cognitive areas after 6 months of treatment. To further explore the timing of subjects' best performance, we set the moment when the 75% of subjects reached the maximum score as a threshold. For both group of raters and for most areas, this value was reached at 3 months, with a few exceptions, i.e. according to instructors, the maximum score in the affective-emotional and relational area was reached at 6 months, and in the communication area, 12 months after the start of the rehabilitation program. On the other hand, the psychologists measured the maximum score in the autonomy, neuro-psychological and cognitive areas after 6 months of treatment (Table III).

As far as persistence is concerned, according to the instructors, the improvements remained constant after the third month with the exception of the communication area, whereas the psychologists reported a constant increment in most areas until 6 months. A different trend was observed in the motor-praxis area, with stable scores up to sixth month, followed by a rapid decrease, and for the communication area, with scores decreasing from 3 to 6 months and then increasing again up to 12 months (Figure 2).

Discussion

Equine rehabilitation successfully rehabilitates people with intellectual and learning disabilities. The horse/donkey movement and the non-clinical environment improve not only physical but also mental, social, communication, and behavioral outcomes. Disabled people often develop a bond with the horse/donkey that alleviates feelings of loneliness and isolation.

The need of a reliable evaluation of benefits from ER on physical and cognitive abilities of subjects with ID is a leading priority in the field. The assessment of suitable outcomes

to quantify the improvement, and the development of validated tools of evaluation, are the two major milestones. In this manuscript, we presented the results of a double analysis comparing psychologists and equestrian instructors, as well as and ER vs. Ono.

The first aim of the study was to evaluate the beneficial effect of equine rehabilitation with horse and donkey on physical and psycho-social performances of adults with ID.

The study results showed that both psychologists and instructors recorded a significant improvement in the autonomy, cognitive and affective-relational areas in ER. These findings confirmed the suitability of the tool developed by the authors to register behavioral changes in the study subjects, as well as the beneficial effect of treatment. Furthermore, the study provided a basic information useful for the planning of individual rehabilitation programs, which is the time required to get the treatment effect. The highest performance was reached after 12 months of therapy with the exception of the communication and affective-relational areas rated by psychologists which found the best performance before 6 months.

As regards Ono, the evaluation of psychologists and instructors was quite different. The psychologists recorded significant improvements in autonomy, affective-relational and cognitive areas, in contrast with the instructors scores, which emphasizes the improvement in the motor-praxis and communication areas. The highest improvement was reached for both raters at 3 months with a few exception. As far as the persistence of benefits over time is concerned, the instructors reported a constant increasing trend after the third month, while the psychologists after 6 months.

The results of this study showed that both horse and donkey therapies help disabled people to become more aware of the surrounding environment, thanks to the consistent reaction of the animal to patient's actions. This controlled interaction allows the patient to engage his mind and to lengthen the attention span and focus. Horse and donkey also provide positive acceptance and increase confidence and self-esteem in the patient which enhances the level of participation.

The difficulty of measuring the effect of equine rehabilitation, along with the need of standard classification criteria for assessing outcomes, was the second aim of the study. Two new measurement tools, based on the ICF-CY classification,

were developed for the use of the equestrian rehabilitative team, under the assumption that validation procedures are a fundamental part of rehabilitation programs, and that all the personnel should be involved in this activity. As a first step, the two tools developed to be applied by psychologists (Tool A) and the simplified version of this schedule (lacking of the neuro-psychological items) for all the rehabilitation team (Tool B), were tested. The simpler version of the tool was validated by measuring the degree of concordance between the two evaluation teams. Regarding horse therapy, the agreement between psychologists' and instructors' tool resulted rather slight, except for the cognitive area, where the concordance was fair ($K=0.28$). The instructors showed the trend to give lower scores than psychologists, except for the autonomy area. Regarding donkey therapy, the agreement ranged from slight to fair and the score trend was the same with the instructors giving lower scores. The area with the highest concordance was communication ($K=0.28$).

The results showed that the protocol developed for psychologists was more sensitive and complete than that designed for instructors, given the specific expertise of raters. However, routine practice is usually performed by instructors, and the validation of a measurement tool suitable for this group would represent a valuable means in the planning and evaluation of the equine rehabilitation programs. The results showed the presence of a slight agreement between psychologists and instructors in detecting individual improvements during the treatment, although there was a certain discordance concerning the degree of improvement. It's to underline that the number of items of the instructors' measurement tool was much smaller than the psychologists' one (i.e. respectively 2 items vs. 10 items in the communication area and 10 items vs. 19 in the motor-praxis area). One of the basic assumption of the study was to adopt the ICF to assess functional status, treatment monitoring, and outcome measurement. The ICF is WHO's framework for measuring health and disability at both individual and population levels, and it is endorsed as the International standard to describe and classify health and disability. The choice of using this classification, besides technical advantages of a validated procedure, provides results concerning health outcomes and disability management which are immediately available to the International Scientific Community.

The study is affected by some limitations. The sample size was small, and the subjects were not randomly assigned to groups, and no control group was enrolled. Additional adjustments, such as, the use of a larger number of items in the instructors' form, and the selection of psychological items that showed the best sensitivity, are needed to increase the agreement between the two tools.

Conclusion

The results of this research demonstrated improvement in the general autonomy and social integration of subjects with mental and neuro-motor disabilities undergoing horse and donkey therapy. ER and Ono produced benefits respectively at six and 3 months in the large majority of subjects, and

benefits persisted over time. The use of the ICF classification system makes the results provided by the present study comparable with other international researches, and in-line with the WHO approach, by increasing the possibility of an evidence based evaluation of the equine rehabilitation.

Both equine therapies appeared to be valid treatments for mental and neuro-motor rehabilitation. The study showed that Ono may be considered as a suitable alternative to equestrian therapy for adults with ID. The measurement tools proposed here proved to be a suitable approach to measuring ER and Ono outcome, although further improvements are required. The two study groups were followed for a slightly different period of time, i.e. 18 months those undergoing equestrian therapy, and 12 months those undergoing Ono. This difference did not affect the interpretation of results, since the peak of rehabilitation results was reached in all settings and areas within the first 12 months of treatment, and performances tended to level off after the first 12 months of treatment.

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Appendix I. Matching codes of Villa Buon Respiro program with ICF-CY (equestrian rehabilitation).

Evaluation areas Villa Buon Respiro rehabilitation program	Tool A–ER professionals	Tool B–ER equestrian instructors	ICF-CY	
Autonomy	A1	7	b140	
		7	b144	
	A1.1		d5404	
	A1.2	9	b1141	
	A1.3	9	b1144	
	A1.4	18-19-20-21	b176	
		8-10-22	b7601	
			d4752	
			d4758	
	A1.5		d5308	
	A2	2-3-14	d7400	
	A2.1	2-3-14	d7203	
	A2.2	2-3-14	d7200	
	A2.3	2-3-14	d7201	
	Motor-praxis	B1		d4154
		B1.2		d4154
		B1.3		b770
		B1.4	8-10-12-13-15	b760
			15-16-17	b147
B1.41			b260	
B1.42		15-16-17	b147	
B1.43		15-16-17	b147	
B1.44		15-16-17	b147	
		15-22	b7601	
B1.45			d415	
B2			d4109	
B2.1		12-13	d455	
B2.2		12-13	d455	

(Continued)

Appendix I. (Continued)

Evaluation areas Villa Buon Respiro rehabilitation program	Tool A–ER professionals	Tool B–ER equestrian instructors	ICF-CY	
Neuro-psychological	B3 (B3.1-B3.11- B3.12-B3.13)	8	d1550	
		8-10-12-13-15	b7600	
	B3 (B3.2-B3.21- B3.22-B3.23-B3-24)			b176
		8	d1551	
			d4402	
	B4	2-3-4	b1801	
	B5	15-16-17	d1473	
	B5.1		Qualitative	
	B6	16-17	b1470	
	B7	15-16-17	b1472	
	B7.1	8-15	b7602	
	C1	7	b1401	
			d160	
	C1.1	7	b1402	
	C1.2	7	b1400	
			d161	
	C1.3-C1.31-C1.32		Qualitative	
	C2	7	b1440	
		19-20-21	d2201	
C2.1	7	b1441		
	19-20	d2200		
C2.2	7	b1442		
Affective-relational	D1		b126	
	D1.1		b1265	
			b1266	
	D2		b1263	
		2-3-4-14	d7103	
	D2.1		b1304	
			b1521	
		2-3-4-14	d7103	
	D3		b1520	
	D4	1-6-11	b1264	
		1-11	b1301	
		1-5	d9201	
	D4.1	1-6-11	b1264	
		1-11	b1301	
		11	d480	
D4.2	1-6-11	b1264		
		b1300		
D5	2	d7100		
D5.1	14	d7400		
D6	3	d7504		
D6.1	3	d9201		
D6.2	3	d7202		
D6.3	3	d7204		
D7		d6506		
	4	d7108		
D8	2-3-4-14	d7203		
D9 (for b 1253 D9.1- D9.3 and for b 1265 D9.2-D9.4)			b1253	
	2-3-4	b126		
		b1265		

(Continued)

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Appendix I. (Continued)

Evaluation areas Villa Buon Respiro rehabilitation program	Tool A-ER professionals	Tool B-ER equestrian instructors	ICF-CY
Cognitive	E1	19-20-21	d2200 b164
	E2	19-20	d2201 d2101
	E3		b164 b1643
	E4		b1646 d1750
	E5	7	b1442
Communication	F1	5-7	b1671 d3150 d310
	F2		d3102
	F2.1		d330
	F2.2		d3350
	F3		d2100
	F4		d220
	F4.1	19-20-21	d220
	F5		d3352
	F5.1		d345

Appendix II. Matching codes of Villa Buon Respiro rehabilitation program with ICF-CY (onotherapy).

Evaluation areas Villa Buon Respiro rehabilitation program	Tool A-Ono professionals	Tool B-Ono equestrian instructors	ICF-CY	
Autonomy	A1	6	b140 b144	
	A1.1		d5404	
	A1.2	13	b1141	
	A1.3	13	b1144	
	A1.4	8-10	b176	
		8	b7601	
		8	d4752	
		8	d4758	
	A1.5		d5308	
	A2	2	d7400	
	A2.1	2-3	d7203	
	A2.2	2-3	d7200	
	A2.3	2-3	d7201	
	Motor-praxis	B1		d4154
		B1.2		d4154
		B1.3		b770
		B2	9	d4109
B (B3.1-B3.11-B3.12)		7	b7600	
		7	d1550	
B (B3.2-B3.21-B3.22-B3.23)			b176	
		7	d1551	
		7	d4402	
B4		2-3-6	b1801	
B5			d1473	
B5.1			Qualitative	
B6			b1472	
B6.1	7-8	b7602		
Neuro-psychological	C1	6	b1401 d160	
	C1.1	6	b1402	

(Continued)

Appendix II. (Continued)

Evaluation areas Villa Buon Respiro rehabilitation program	Tool A-Ono professionals	Tool B-Ono equestrian instructors	ICF-CY
Affective-relational	C1.2	6	b1400 d161
	C1.3-C1.31-C1.32		Qualitative
	C2	6	b1440 d2201
	C2.1	6	b1441 d2200
	C2.2	6	b1442
	D1		b126
	D1.1	2-3	b1266
	D2		b1263
			2-3
	D2.1		d7103 b1304
			2-3
			2-3
	D3		b1520
	D4	1	b1264
	D4.1	1-5	b1301 d9201
			1
	D5	2	d7100
D5.1	2	d7400	
D6	3	d7504	
D6.1	1	d9201	
D6.2	3	d7202	
D6.3	2-3	d7204	
D7	7	d6506	
		4	
D7.1		d7108 b1304	
		b1521	
D7.2		b1252	
		b1254	
		b1255	
D8	2-3-4	d7203	
D9 (for b 1253 D9.1-D9.3 and for b 1265 D9.2-D9.4)			
		2-3-4	
		b1253	
		b126	
		b1265	
Cognitive	E1	9	b1470
			d2201
		9-10	
	E2		d2101 b164
	E3	10	b1643
			b1646
		8-9-10	d1750
	E4	6	b1442
Communication	F1	6	b1671
			11
	F2		d3150
	F2.1		d310
	F3	12	d330
	F4		d2100
	F4.1		d2200
	F5	11	d3350
	F6	11	d315
	F7		d335
F8	12	d330	
		11	
		d3350	