



Contents lists available at ScienceDirect

NJAS - Wageningen Journal of Life Sciences

journal homepage: www.elsevier.com/locate/njas

Research paper

Social farming and work inclusion initiatives for adults with autism spectrum disorders: A pilot study

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ARTICLE INFO

Keywords:

Social farming
Autism spectrum disorders
Evaluation methods
Work inclusion in agriculture

ABSTRACT

In recent years, an increasing number of social farming initiatives have involved adults with autism spectrum disorders, both to improve their life conditions and promote their work inclusion. Several studies have assessed these experiences, showing that the participants derive important benefits from being part of a social community, working in the countryside, and establishing a good relationship with the farmer.

This paper aims to assess the ability of 9 adults with autism spectrum disorders – who attend an adult day care centre in the Umbria region of Italy – to carry out agricultural and animal husbandry activities. Results from panel data analysis show that the activity of olive grove, indoor cleaning, and tidying at the agritourism farms has a considerable positive effect on the performances of the adults with autism spectrum disorders.

Moreover, the adults studied prefer the activities in a greenhouse over those occurring inside (e.g., agritourism farm or the warehouse) and outside (e.g., vegetable, olive, and grape production). Further, the higher the precision level required to perform an action, the lower is their observed performance.

Generally, the tasks that receive the highest evaluations are those in which the autistic person can relate with other people and/or animals. These findings confirm the role of social farming in developing working and relational skills in adults with autism spectrum disorders.

1. Introduction

The term ‘Autism spectrum disorders’ (ASDs) is used to refer to the different types of life-long, pervasive developmental disorders. People with autism need a set of intensive and planned educational, social, and medical services (Baird et al., 2006); therefore, ASDs have considerable functional and financial effects on the individual and their family (Howlin et al., 2004).

Until the early part of the 20th century, individuals with ASDs were confined to places with non-productive care and had no opportunity for proactive engagement (Gerhardt, 2009).

Only since the 1970s have studies on the development of autism put forward the idea of designing real-life contexts, closely related to the behavioural, psychological, educational, and rehabilitative measures in order to increase their effectiveness (Giddan and Ucelli di Nemi, 2003). Thus, a number of studies specifically focused on the educational and behavioural needs of children with autism and helped the educational

services, families, and professionals interested in autism to recognise that the needs of people with ASDs change as they grow. It was acknowledged that the institutionalised interventions (such as group homes, family, or traditional institutions) without an vocational path were neither valid nor effective in the treatment of autism (Giddan and Ucelli di Nemi, 2003); specific innovation in residential programs is necessary in order to effectively respond to individuals with autism needs (Giddan and Giddan, 1991; Giddan and Giddan, 1993; Mesibov, 1990; Schneider, 2000).

Farm communities for adults with ASDs have been developed as one of the many alternative residential options. The aim of social or inclusive farming is to create working environments, which enable people with special or limited abilities to undertake meaningful activities. Thus, farm communities for those with ASDs have become one of the more popular alternatives for young adults (Schneider, 2000). Inclusive farming is carried out by agricultural and horticultural farms that integrate people with physical, mental, or emotional disabilities into their

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<https://doi.org/10.1016/j.njas.2019.02.001>

Received 22 February 2018; Received in revised form 13 November 2018; Accepted 3 February 2019

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labour force; these include the socially disadvantaged, young offenders, addicts, or the long-term unemployed. ‘*Inclusive farming embraces provision, inclusion, rehabilitation training and a better quality of life*’ ((Schäfer, 2016), p. 2). The importance of inclusive farming was also underlined by the United Nations Convention on the Rights of Persons with Disabilities (United Nations, 2006).

In recent years, the inclusion of adults with ASDs in the social farming initiatives has achieved appreciable results and this, in turn, has led to the development of experimental projects to promote work opportunities for autistic adults in the agricultural sector (Schneider, 2000; Giddan and Ucelli di Nemi, 2003; Van Bourgondien et al., 2003; Orsi et al., 2008; Montagnoli and Canalicchio, 2013; Comunello and Berti, 2013; Kaley, 2015). The development of both relational and organisational skills by adults with ASDs in social farms has given rise to the idea that these people may be able to work, producing goods and services and meeting economic goals.

On the one hand, the number of people diagnosed with ASDs has increased considerably (so much so that in 2010 there were an estimated 52 million cases of ASDs, which translates into a prevalence rate of 7.6 per 1000 or one in every 132 persons) (Baxter et al., 2015); on the other hand, the number of farm communities for adults with ASDs has also grown.

The growing of farm communities could be a realistic response also at the work inclusion issue of people with disabilities; in fact, relating to Italy, the unemployment rate for people with disabilities is 4 times higher than that for others who are able-bodied, despite there being a National Law No. 68/99 on work inclusion for people with disabilities. It is the worst (only one in 10 employed) for adults with ASDs, in detail: 50% of people with ASDs and over 21 years attend an adult day-care centre; 21.7% are at home / school all day without doing anything; and only 10% work (Censis, 2012).

In our study, we focus on the work inclusion for adults with ASDs in the agricultural sector. The data used were collected during the execution of a pilot project—on agricultural work inclusion—named ‘Agriculture Encounters Autism’ (shortened to A squared or A²).

The A² project focused on the realistic possibility of adults with ASDs making contributions in various real-farming contexts. This paper presents the results of data collected using a specific evaluation model to assess personal aptitude, autonomy and independence at work, personal satisfaction, and the performance levels achieved. The evaluation took into consideration the point of view of the farmers, the farm workers, the social workers (who always accompanied the adults with ASDs in real-farming contexts) and a psychologist university researcher involved in the project.

Specifically, the main goal of this paper is to evaluate the attitude of adults with ASDs to carry out agricultural and animal husbandry work in order to: i) study and validate the agricultural activities that are most suitable for adults with ASDs; ii) explore the possibility of work inclusion for adults with ASDs on farms; iii) test an evaluation tool for farming activities (which is based on an already validated medical assessment tool) by focusing on its validity and reliability; iv) point out if the pilot project could be both feasible to implement the work inclusion of people with ASDs in agriculture, and transferable to other social farms. The remainder of this paper is structured as follows: Section 2 reviews both the experiences of work inclusion of persons with ASDs in agriculture and moreover, the literature review on effectiveness of social farming initiatives, according with one of the aims project to evaluate the activities of persons with ASDs in real-farm context.. Section 3 describes the A² pilot project, the tasks planning and the evaluation tool utilised, where as a Section 4 presents the data collection. Section 5 provides the data analysis in terms of data coding, statistical and econometric analysis, and result. Finally, Section 6 provides the discussion and Section 7 contains the concluding remarks and perspectives for future research.

2. Background

2.1. Autism and agriculture

In the literature review several studies indicate that people with autism benefit from spending time in farms because of the availability of open spaces and the contact with nature (Elings, 2012; Ferwerda-van Zonneveld et al., 2012). For this reason, agricultural works seem to be among the best ones to help autistic people to break down the isolation wall. In fact, there have been numerous initiatives to include autistic people in farm work, starting with the historic agricultural community constituted by the Camphill movement, founded in the 1939 in Scotland. It developed not only functional community structures, but also ensured that those who lived there focused their attention on the ability, rather than the disability, of the person with a developmental disorder (Giddan and Ucelli di Nemi, 2003; Schneider, 2000).

Later, one of the earliest examples of an European farm community for people with ASDs, ‘Somerset Court’, was established in 1974 in England and, over the years, similar communities have successfully spread to other European countries (Giddan and Ucelli di Nemi, 2003).

In 1983, ‘Bittersweet Farms’ was inaugurated as the first agricultural community for people with ASDs in North America; in 1985 the ‘Rusty Morningstar Ranch’ was set up in Arizona and its philosophy and approach have been recognised as a model for others to follow (Giddan and Ucelli di Nemi, 2003; Schneider, 2000).

Concerning Italian situation, there are also several work inclusion examples of adults affected by ASDs. ‘Cascina Rossago’, founded in 2002, is acknowledged by both academicians and practitioners in health services as one of best examples of farm community for people affected by ASDs (Giddan and Ucelli di Nemi, 2003); the ‘God-ega4Autism Village’ represents the first example of European co-housing for families with a member who is autistic (Baranger et al., 2014); the ALI project includes a model for training and job placement and covers the catering and tourist accommodation business, as well as the breeding of animals and gardening (Bonanni, 2016); ‘Conca d’Oro’ was founded with the aim to design a better work inclusion process, and its management has adopted a method of dynamic work planning that is evolving based on observations of autistic adults’ approaches toward both work and non-work activities (Comunello and Berti, 2013).

2.2. Effectiveness of social farming initiatives

The main reason for being involved in a social farming project is the range of positive benefits for those who engage in it. Kinsella et al. ((Kinsella et al., 2014), p. 19) point out that the ‘*evidence of benefits is not just anecdotal, or based on personal “feel-good” stories. Reported benefits from engaging in social farming documented throughout the history of social farming practice are many and varied, with positive impacts for the farmers, and for the clients, as well as for the community as a whole*’.

Health and well-being benefits of contact with nature have garnered great interest in the literature (Seymour, 2003; Frumkin, 2003; De Vries et al., 2003; Maas et al., 2006; Pretty et al., 2005, 2006; Bird, 2007; Barton and Pretty, 2010; Bowler et al., 2010; Pretty et al., 2011; O’Brien and Morris, 2014; Allen and Balfour, 2014); this interest ‘*has come from a cross-section of disciplines like psychology, environmental health, environmental conservation, ecology, horticulture, landscape planning, urban design, leisure and recreation, public health policy, and medicine*’ ((Bragg et al., 2015), p. 13).

This attention of academic researchers, coupled with the increasing number of care farms, has brought to the fore the challenges in identifying the evidence of their effectiveness.

However, the complexities and the distinctiveness of care farm initiatives do not lend themselves ‘*easily to a randomised controlled study design*’ ((Elsey et al., 2014), p. 2). In fact, many studies report experiences that offer different perspectives about positive effects and benefits, either from a purely sociological point of view (Elings, 2012; Elings

and Hassink, 2008), or from a more specifically medical-clinical perspective (Barale et al., 2009; Orsi et al., 2008; Ucelli di Nemi et al., 2012; Barale et al., 2013).

In the past 10 years (Elsey et al., 2014), several qualitative and cross-sectional or panel studies have been published regarding care farming; these studies have focused on a range of client groups within different types of care farms. The results of these studies show that the participants have: benefitted from being part of a social community; established a good relationship with the farmer (and other farm staff); and engaged in the agricultural activities, exhibiting some possibility of work inclusion (Berget et al., 2007; Elings, 2012)

Other studies pointed out the improvements in both mental well-being and social interactions (Elsey et al., 2014; Bragg et al., 2013, 2014), the reduction in anxiety and depression in people with mental health issues (Pedersen et al., 2011; Gonzalez et al., 2010); and the increased cognitive functioning and well-being of those with dementia (Bruin et al., 2009).

In a systematic review, Wickramasekera et al. (2014) have studied the existing literature regarding the impact of green care interventions on adult populations, focusing on health-related quality-of-life measures that could be used for a cost-effectiveness or cost-utility analysis. Analysing five studies with 484 participants, the authors highlighted that two studies supported the interventions, whereas three studies did not find strong evidence that the green care intervention had led to an improvement in the quality of life of even a few participants. This review suggested the need to conduct more high quality trials with larger sample sizes and longer term follow-up.

In Italy, there is no established tradition of evaluating therapies that use plants or animals, although the last twenty years have witnessed a rise in interest in both protected contexts (hospitals, rehabilitation centres, etc.) and production contexts (cooperatives, farms, etc.). In many cases, there is collection of data and information about the processes activated but this not supported by an appropriate methodological approach. In other cases, precise methods and excellent results are not matched by an adequate effort to communicate them to the scientific community, compare them with existing methods, and confirm their validity (Giarè, 2011).

Specifically, the Italian studies have focused on sector-based research (Giarè, 2011) or different approaches; for example, using the social and health services point of view, Giarè (2014) aimed at monitoring and assessing changes in individual subjects. She reported that in several cases both public and private operators involved in social farming carried out only a data collection on the trials activated. Ciaperoni et al. (2008) utilised medical tools¹, and reported results for the experimental evaluation of animal-assisted activities for people with mental health problems; the data collected were used to create a step-by-step guide on best practices on work inclusion in the agricultural sector. In contrast, by using a participatory evaluation approach towards social farming experiences Giarè and Macrì (2012) analysed the pioneering Italian case studies in social farming by interviewing the clients of social farms and their families, as well as the coordinators of social farming cooperatives and experts.

More recently, an in-depth study was conducted by Masani (2014) on eight social farming initiatives, where the production process plays an important role. The results show that people with mental illness who worked there improved both their relational and professional competences, especially with respect to agricultural work. However, difficulties were encountered in catering and in direct sales because these activities often take place outside the context of the user's reference and involve getting in touch with people 'outside' the farm.

Focusing on the evaluation of care farming for adults with ASDs, Nagel & van Elsen (Nagel and van Elsen, 2011) reported the opinions of six social farming experts in their qualitative social research; all the

experts believed farm work can offer a suitable occupation for adults with ASDs because they show a positive development in their abilities and behaviours when performing agricultural work. The interviewees affirmed that these positive aspects occur only if: the agricultural works are both well-structured and diversified; the staff members are specialists; and adequate cooperation between the agricultural working place and the pedagogical institution is present. However, it is still not clear if the positive effects are due to: the agricultural works; the living situation; or a mix of both (Nagel and van Elsen, 2011).

In fact, the social farming participants within the farms or social agricultural cooperatives are fully involved in the agricultural activities and allied services (agritourism, catering, teaching, packaging, sales, etc.), carrying out different tasks and contributing to farm activity. Therefore, it is an interweaving of different factors that require complex approaches and detailed analysis (Nagel and van Elsen, 2011).

In evaluation studies of social farming, it is worth remembering that the outcomes of these activities on the beneficiaries is influenced by many factors: the type of farms involved; the services offered and the users; the characteristics of projects; the resources available; the degree of involvement of both the authorities and the families; formal and informal relations with other parties; and the reference context.

Often, these studies lack an analysis of the 'agricultural aspect' of social farming or their approaches focused on the opinion of green care staff concerning the potential outcomes of care farming in terms of clients' personal growth (Hemingway et al., 2016). As Di Iacovo et al. (Di Iacovo et al., 2016, p. 28) have pointed out, 'the social farming practices have been evaluated by measuring the direct impact on users within the frame of traditional public welfare', suggesting that other aspects are not considered adequately. Therefore this approach has underestimated the importance of the rural component in 'agricultural tools' that make use of plants or animals as co-therapeutic instruments (Di Iacovo et al., 2016).

3. The pilot project

The A² pilot project was carried out from February 2014 to May 2015 and was funded by Umbria Region's Rural Development Programme (RDP) 2007–2013 through the Measure 1.2.4. «Cooperation for development of new products, processes and technologies in the agriculture and food sector and in the forestry sector» that emphasizes the Region's focus also on social innovation projects in agriculture.

The pilot project was carried out thanks to the commitment of a public-private partnership built around the adult day-care centre "La Semente" (The Seed)². The other project partners were the University of Perugia, the Italian Association of Organic Agriculture (AIAB), the Confederation of Italian farmers (CIA), five farms and Innovation & Research Department of the Technological Agri-Food Park of the Umbria Region (Torquati and Paffarini, 2014).

La Semente seeks to enhance the autonomy of its autistic clients and improve the quality of their personal, social, and work life through an itinerary of training and assistance characterised by: 1) multi-disciplinary formation that begins with knowledge about autism; 2) involvement of the parents; 3) functional diagnosis and evaluation of the individual areas of development; 4) intervention strategies based on the abilities and interests of the person; 5) appropriateness of the requests, identifying the strengths of the autistic client and using them as the starting point for setting attainable objectives, and at the same time

² It has been founded by the National Association of Autistic Subject Parents (ANGSA). Located in the East countryside area of Umbria region, it hosts nine adults with ASDs. The goal of this therapeutic and socio-rehabilitative centre, which is part of the network of services for adults with ASDs in Umbria, is to foster the acquisition of skills for the attainment of the best possible levels of personal autonomy, social interaction, and engagement in the world of work for its autistic clients.

¹ See Ciaperoni et al. (Ciaperoni et al., 2008 p. 49) for a deeper study.

acknowledging and accepting their weaknesses; 6) teaching that makes use of visuals to convey information; 7) adaptation of the environment to the difficulties of the individual.

According with medical team that oversees its activities, La Semente uses an objective instrument of functional evaluation for its nine clients³; it is known as the Treatment and Education of Autistic and related Communication Handicapped Children - Transition Assessment Profile (The combination of the acronyms TEACCH and TAP is henceforth referred to as TTAP (Mesibov et al., 2007)). Though this tool was developed for children and adolescents, it has also proven to be effective in evaluating the itineraries of adults with ASDs. TTAP can be used by educators, parents, counsellors, and care providers to assist individuals with ASDs (Mesibov et al., 2007).

Evaluation with the TAPP is performed in three different environmental contexts, using three scales of observations: 1) direct observation by the examiner; 2) at home, by the family; 3) at school, by the teachers or work tutors. There are also three key evaluation outcomes: 1) success, when the subject executes and completes the task successfully; 2) emerging, when the subject executes the task only in part, showing initial understanding of how to execute it; 3) failure, when the subject does not want to execute the task or is ignorant about it.

Moreover, since an autistic subject reasons through images, and images allow him or her to communicate more easily with others, and vice-versa, La Semente uses the Picture Exchange Communication Systems (PECS)⁴.

3.1. Planning the farm tasks

In planning the implementation of the A² project on farm work for adults with ASDs, the experience of La Semente and the tools it uses for communication (PECS) and evaluation (TTAP) of its clients served as a very useful resource. While the farms have been selected for their availability, proximity to the day-care centre and for their different crop and animal productions to guarantee a wide range of activities to be carried out. In particular three of these farms run agritourism businesses—two of which raised both crops and livestock and the third one produces permanent crops; the fourth is a livestock farm and the last one is specialised in horticulture.

The adults with ASDs involved in the project were all clients of La Semente: they were 9 clients with different behaviours and communication skills. According with the aim to verify the pilot project feasibility of work inclusion on farms of adults with different levels of ASDs, the diversity among clients has adapted to the features of the agricultural sector, characterized by several activities with different complexity levels. The project's challenge was find the better match between the ASDs abilities and agriculture peculiarities.

During the planning stage the day-care centre medical team and the social workers analysed the ability of each client and the feasibility of their participation in the project activities. The families opinion on clients participation was also taken into consideration.

The assignment of the 9 adults to the farms and tasks considered the characteristics of their specific pathology and the problematic behaviours that could affect their abilities.

The ability of the different subjects to function ranged from high to mid-level to quite poor, and the research took into consideration their

personal aptitude and the contribution they could make to the farm activities. Social, agronomic, economic, and relational skills of the project partners were employed in the planning stage. The reference figure was the agri-social operator, whose social and agronomic skills serve to create a work and living environment that promotes the primary goal of the well-being of the individuals and the group, and who views agricultural production and management as important, but secondary.

Initial meetings, supervised by the La Semente medical team and attended by those involved in the research (social workers and volunteers of the adult day-care centre, workers on the farms that had made available their facilities and work spaces, university researchers and agronomic consultants), were held to provide information about the adult day care centre methods, relational dynamics, and therapeutic approaches, as well as about the agricultural activities carried out on the partner farms of the project.

Subsequently, agricultural tasks were assigned to each of 9 autistic clients on the basis of their abilities and the organisation of the farms that would host them. The social workers visited the host farms to inspect them, learn about the tasks proposed by the farms, and identify possible situations that could create unease for the clients. In this context, a task is a specific operation (e.g., feeding animals) carried out as part of a specific production activity (e.g., raising beef cattle), which is part of a given category of production (e.g., animal husbandry). The farm owners and agricultural workers shared their skills and knowhow to help the social workers make their choices and facilitate the introduction of the autistic clients to agriculture and its tasks.

During the inspections, photographs were taken of the places where the clients would go to work and of some tools that they would use for the specific tasks assigned to them. Using the PECS method, a visual sequence was prepared for each task, to show the rhythms of the days and help the autistic clients understand and follow the phases of their work. It featured images of work clothes, the host farm, the agricultural activity, the specific task, and the tool to be used for performing it.

Tasks were planned to offer the 'maximum ease' of movement, that is, by considering the spaces where a person with incomplete mobility could work in the best way. Another important consideration was to avoid noisy environments as much as possible, given the auditory hypersensitivity that is characteristic of autism. In addition, there would be one social worker for each autistic client, or at most one for every two clients.

An effort was made to ensure that roles could be exchanged among the people engaged in the tasks. This aspect was not included in the protocol of visual sequences, but rather served as an index of the understanding of the pure mechanical action, as well as of the correct timing and dynamics of the group work.

Finally, it was decided that only organic farming methods should be used in the social farms because work environments where chemical residues are present would be unsuitable for the participants' health.

The A² project was spread over 16 months. The first 4 months were dedicated to designing the model for this farm work experience and the next 12 months were spent to its implementation. La Semente social workers always accompanied the 9 clients with ASDs to the farm, where they always met the farmer. In this way the clients considered the farmers as their employer and at the same time they feel themselves belonging to the farm family.

The farm accesses of the autistic clients was planned and monitored, and the procedure included formation meetings to help them adapt to the new work environment, preparation for the farm routine, and familiarization with the farm workers. When performing their farm tasks, the autistic clients were supported, if necessary, with verbal or physical help from the farm or social workers present.

Weekly plans were prepared and one or more of the autistic clients were matched with a farm on the basis of the work aptitude they had exhibited during the daily activities at La Semente, keeping in mind their personal characteristics and subjective preferences, and seeking to

³ The average age of the 8 men and 1 woman is 26 years. The youngest is 20, whereas the oldest is 40 years old. Their ability to function differs: two of them are high-functioning; two are mid-high-functioning; two are mid-range-functioning; one is mid-low functioning; and the remaining two are low-functioning.

⁴ The picture exchange communication system (PECS) is a training program frequently used with children, but also with adults with autism (Bondy and Frost, 1994; Siegel, 2000; Yamall, 2000; Bondy, 2001); it was developed as a means of circumventing some shortcomings associated with social-communication deficits and it uses a pictorial system (black-and-white or color drawings) as the communicative referent (Charlop Christy et al., 2002).

avoid potentially problematic situations.

Initially, the participants worked only 30 min a day at the farm, either alone or in groups. Gradually, as their comfort with the farm activity and farm workers grew, the daily work time was increased until it reached 90 min.

The specific operations were planned in 6 different productive settings: agritourism; animal husbandry; cultivation in greenhouses and fields; product storage warehouse; green areas and green areas equipped for free time; and workshops for packaging and spinning.

Precisely, the specific operations in which the autistic clients participated were: 1) cleaning and tidying rooms and the kitchen, and serving breakfast on an agritourism farm; 2) on two cattle farms, distribution of hay along the central aisles; feed disbursement and mucking stalls on the alpaca farm, and collection of eggs and cleaning of cages in the chicken coop; 3) preparation of seeds in planting trays, transfer of seedlings, re-potting, transfer, watering, harvesting, and selection of vegetables in the two greenhouses; pruning of vineyards and olive groves, harvesting of olives and wild herbs and flowers in the fields of three farms; 4) loading of hay and its transport in a wheelbarrow at the two product storage warehouses; 5) mowing grass and trimming hedges in green areas equipped for free time; 6) packaging and labelling of legumes, packing of eggs in cartons, washing and preparation of cases of vegetables, selection, and carding and spinning alpaca wool in the packaging and spinning workshop.

3.2. Evaluation tool

The evaluation tool used was based on a questionnaire, which was devised by referring to the TTAP evaluation instrument that La Semente uses in evaluating the itineraries of clients with ASDs.

We decided to implement a questionnaire with the aim to analyse the agricultural aspects and the potential outcomes of work inclusion of clients with ASDs in agriculture through the opinions of green care staff. In fact the use of traditional health indicators could be *'ineffective and even detrimental'* (Di Iacovo et al., 2016, p. 28) in evaluation of social farming initiatives due to underestimation of 'agricultural tools' like plants or animals that are used as co-therapeutic instruments. The design of questionnaire was shared by A² project partners (namely *'the actors with diverse competences and attitudes'* as suggested by Di Iacovo et al. (2016, p. 28), and by Hemingway et al. (2016).

The questionnaire was structured to cover four functional areas: 1) functional communication; 2) independent functioning; 3) work behaviour; and 4) aptitude for farm work. A two-part daily monitoring chart contained one or two questions on each functional area. The first part—on 'behaviour'—had seven questions, and the second part—on 'contribution to activities'—had one question. Each of the 8 questions defines an evaluation dimension, whose scores were used in the statistical analysis and econometric model described in section 5. The questions about the first functional area, communication, served to evaluate the client's ability to communicate in general, as well as the ability to ask for help, exchange information (thus, for those who could not communicate verbally, this would involve the use of an alternative communication code), and understand complex instructions.

The following questions were formulated:

- 1) How did you interact with the autistic client during today's work?
- 2) How did the autistic client use the information received to carry out today's work?
- 3) What is your evaluation of the autistic client's ability to learn today?
- 4) What is your evaluation of the autistic client's ability to ask for help today?

The second functional area, the degree of independence achieved by the autistic client, was evaluated through the following two questions:

- 5) What is your evaluation of the autistic client's ability to work autonomously today?

Table 1

Evaluation criteria for 'behaviour'.

Source: Authors' own data.

Problem	Difficulty encountered	Score	Value attributed
Serious	During the entire activity	Failure	0.25
Mid-range	During most of the activity	Low emerging	0.50
Mild	In a few moments of the activity	High emerging	0.75
None	Never	Successful	1.00

6) What is your evaluation of the autistic client's ability to recognise his or her mistakes today?

Work behaviour was viewed as the concentration that the autistic client demonstrated in controlling his or her work and self-correcting when needed. It was evaluated using the following question:

7) What is your evaluation of the autistic client's concentration on work today?

The aptitude for farm work was seen as the set of practical abilities needed to complete the individual tasks, and was evaluated using the following question:

8) What is your evaluation of the autistic client's contribution to the agricultural activity today?

The TTAP evaluation method was also a source for the questionnaire evaluation criteria chosen. The evaluation criteria for the first part, that is, behaviour, are listed in Table 1.

Since the tasks were all calibrated and made known to the autistic clients through the sequence of images, the possible results did not contain the option for 'complete problem', corresponding to the autistic client refusing to do the activity because the proposed task was inappropriate, and to which a value of zero would be assigned.

The evaluation criteria for the second part—contribution to activities—are listed in Table 2.

4. Data collection

Data were collected during the execution of A² project in order to verify the ability of those affected by ASDs to work on farms. Specifically, the data were obtained through a daily survey based on the questionnaire described before; a panel data analysis was performed on the data collected.

We decided to involve in evaluation different professional figures, according with TTAP tool that it can be used by educators, parents, counsellors, and care providers to assist individuals with ASDs.

Therefore, the daily work of each client was evaluated by the social worker, by the farm worker and by a psychologist university researcher involved in the A² project; the aim was to take into consideration their different point of view, in terms of background, knowledge and concept of work.

They were involved in the evaluation of the attitude of adults with ASDs to carry out agricultural work because they had daily contact with ASDs clients in all steps of these activities.

Specifically, all the La Semente's social worker work with the day-care centre clients since long time, they have high experiences with evaluation of the itineraries of adults with ASDs and they received a base training concerning the agricultural works. Vice versa, the farm workers attended meetings, supervised by the La Semente medical team, concerning relational dynamics and therapeutic approaches to hold with adults with ASDs. The evaluations made by university researcher were useful because we considered these as external observations.

The social workers, the farm workers and the university researcher filled out the evaluation questionnaire described in Tables 1 and 2.

The farm tasks were carried out by the autistic clients over the course of a year, from June 2014 to May 2015, and a total of 1078 complete evaluations relating to the different farm activities in which

Table 2
Evaluation criteria for 'contribution to farm tasks'.
Source: Authors' own data.

Contribution	Attitude	Score	Value attributed	Farmer opinion
Insufficient	He/she did not contribute to the normal performance of the farm activities	Failure	0.25	Negative judgment
Almost sufficient	He/she contributed partially to the normal performance of the farm activities	Low emerging	0.50	I am not satisfied
Sufficient	He/she contributed moderately to the normal performance of the farm activities	High emerging	0.75	I am moderately satisfied
Good	He/she contributed to the normal performance of the farm activities	Successful	1.00	I am satisfied

Table 3
Attributes and levels of the farm tasks.
Source: Authors' own data.

Productive settings	Activity	Location where work took place	Use of tools	Degree of precision required	Degree of complexity
Agritourism	cleaning and tidying	inside	no	high	high
	tidying		yes	high	very high
	servicing	outside	no	mid-range	mid-range
Animal husbandry	breakfast		yes	high	high
	cattle	outside	no	low	low
	hens		no	low	low
alpaca			no	mid-range	mid-range
			no	high	high
			no	low	low
Cultivation	vegetables	inside	no	high	high
		outside	no	mid-range	mid-range
		greenhouse	no	low	low
vineyard			no	mid-range	mid-range
			yes	high	high
			yes	high	very high
olive grove			no	low	low
			yes	high	very high
			no	high	high
Product storage warehouse	flower garden	inside	no	low	low
	transportation	outside	no	low	low
Green areas equipped for passing free time	maintenance	outside	no	low	low
	mowing grass		yes	mid-range	mid-range
Workshop	spinning wool	inside	no	high	high
	packaging			high	high
	handiwork	outside		mid-range	mid-range

the 9 autistic clients engaged, were collected.

5. Data analysis

5.1. Data coding

In order to classify the farm tasks where the autistic client's was involved, the following 6 attributes were taken into consideration: 1) productive settings; 2) activity; 3) location where work took place; 4) use of tools; 5) degree of precision required and 6) degree of complexity. For each attributes was considered different levels as shows in Table 3.

The first and second attributes are represented by the 6 productive settings selected for the experiment, and by the activities carried out in each productive setting, respectively; the following were the 15 activities for the clients: cleaning and tidying, and serving breakfast for the agritourism productive setting; activities with cattle, hens, and alpaca for the animal husbandry productive setting; activities in vegetable gardens, vineyards, olive groves, and flower gardens for the cultivation productive setting; transportation activities for the warehouse productive setting; activities of maintenance and grass mowing for the green areas productive setting; packaging, spinning, and handiwork for the

workshop productive setting.

The third attribute identified the exact work location of the activity that could be performed outdoors (e.g., vegetable, olive, and grape production), within a building (e.g., agritourism farm or the warehouse), or in a greenhouse (e.g., vegetable gardening under a covering). The fourth attribute specified whether the activity required a particular tool (e.g., a lawn mower or a pair of pruning shears) or not. The fifth attribute specified three levels of precision required to perform the activity: a high level for the tasks such as vine pruning and wool spinning; an average level for tasks such as the selection of flowers and mowing grass; and a low level for tasks such as transporting hay and cleaning the chicken coop. The sixth attribute specified the degree of complexity of the task, calculated basis of the following combinations: low, if it requires no tools and a low level of precision in wielding them; mid-range, if no tools and mid-range level of precision required; high, if the combination is either no tools and a high level of precision required or use of tools and mid-range level of precision required; very high for the combination of tools and a high level of precision required.

The type of coding adopted meant that there were 30 different task combinations that were evaluated with varying frequency.

5.2. Statistical and econometric analysis

A necessary tool for identifying the effect of agricultural and animal husbandry practices, in terms of the score obtained by the autistic clients, was the creation of a summary index to aggregate the score on the 8 evaluation dimensions. This was done to provide a global measure of the evaluation, which can be used as a dependent variable in an econometric model. To this end, factor analysis was carried out with the principal component analysis (PCA) method, which made it possible to identify the latent variables in each of the dimensions evaluated. The first factor extracted, which was able to explain the largest share of variance, was used in the next phase as a dependent variable in a regression model. To confirm the factor analysis, Cronbach's alpha was calculated to evaluate the confidence and the internal coherence of the 8 evaluation dimensions examined in the specific context of this study.

The study adopted a quasi-experimental within-subject design, since all participants are exposed to every treatment (independent) variable, across time.

Then, the obtained panel-data were analyzed throughout a fixed-effects model allowing to control for time invariant individual characteristics (for example, the different in behaviours and communication skills of the clients) that could influence the outcome being correlated with the predictors, in order to obtain consistent parameter estimation (Cameron and Trivedi, 2010).

More specifically, the model estimation had the following general formula:

$$Y_{it} = \alpha + \beta X'_{it} + u_i + \varepsilon_{it}$$

where:

- Y_{it} is the dependent variable (DV), where i denotes an autistic client and t denotes time;
- α is the unknown intercept;
- β is the parameter vector, measuring the effects of the exogenous variables on the outcomes of interest;

– X'_{it} represents the vector of independent variables (IV);
 – u'_i is the vector of dummies related to each individual (fixed effects);
 – ε_{it} is the error term.

Since the objective of the analysis was to verify the ability of the autistic clients to work, especially in a farm setting, evaluate their personal aptitudes, and their contribution to the agricultural activities, the dependent variable was represented by the first factor extracted by the factor analysis conducted on the 8 evaluation dimensions identified previously. The explanatory variables were all categorical, and thus, were inserted into the model in the form of dummies, and their number was equivalent to the n-1 modality for each of the covariates considered.

More precisely, the following variables were included as predictors: 1) the level of complexity of the task, for which the average level was omitted; 2) the task carried out, given by the combination of the productive category and activity, for which the dummy relating to the alpaca farm was omitted; 3) the location of the task, for which the dummy for the 'inside' modality was omitted; 4) the use or non-use of particular tools, for which it was decided to omit 'tools not used'; 5) the level of precision, for which the dummy relating to the average level was omitted.

In order to obviate the problem of autocorrelation among the observations related to the same evaluator and the same farm, it was deemed best to insert: m-1 dummy variables for the evaluators that encompass the specific characteristics of each of them and n-1 dummy variables for the farm where the task was carried out, which cover all the characteristics specifically linked to the farm. By eliminating the main effects of these confounding factors on the dependent variable, it was possible to limit distortion in the estimates of the effect of the variables of interest on the outcome considered.

On the basis of these considerations, the model had the following final specification: where i denotes the autistic clients; $t = \text{time}$; $FC1$ is the first factor extracted from the PCA, α is the unknown intercept; β is the parameter vector associated to the independent variables based on

the definitions shown in Table 4, which reports also the descriptive statistics; u'_i is the vector of dummies related to each individual (fixed effects); ε_{it} is the error term.

The interpretation of the estimated β coefficients associated with the various dummy covariates is worth noting because they represent the differential effect of the respective modality, in relation to the omitted modality, on the dependent variable.

In order to solve problems of heteroscedasticity, the model was estimated through the OLS method using the White estimator to obtain robust standard errors. Diagnostic tests were carried out to assess the global validity of the model (F -test) and verify the statistical significance of each parameter (t -test). All the statistical analyses were performed using IBM SPSS software (Version 21).

5.3. Results

Taking into consideration all the functional areas examined, the judgments expressed by the evaluators indicated that the task could be considered successful in 40% of the cases and high emerging in 38% of the cases. This means that in most cases the task performed presented either no problem or only a mild one. Serious problems occurred in 22% of the cases, for which the evaluation was low emerging (17%) and failure (5%).

Looking at the results according to the functional areas, the most problematic ones were aptitude for farm work and independent functioning, while the least problematic was functional communication (Table 5).

Analysing the evaluations on the basis of the subject who made them, it emerges that the social worker tended to give a higher evaluation than the farm worker for the functional areas of communication and independent functioning, while the reverse was the case for the areas involving work behaviour and aptitude for farm work.

Analysing the results for each autistic client, the significant differences that emerged were linked, as expected, to the level of their ability to function. High functioning autistic clients generally received high

Table 4

Descriptive statistics of variables included in the OLS model.

Source: Authors' own data.

Label	Description	Mean	SD	Min	Max
compl1	Low level of complexity of the task (1 = yes;0 = no)	0.43	0.50	0	1
compl3	High level of complexity of the task (1 = yes;0 = no)	0.35	0.48	0	1
compl4	Very high level of complexity of the task (1 = yes;0 = no)	0.12	0.32	0	1
act1	Activity done: cleaning and tidying (1 = yes;0 = no)	0.06	0.24	0	1
act2	Activity done: maintenance outdoors (1 = yes;0 = no)	0.02	0.15	0	1
act3	Activity done: raising cattle (1 = yes;0 = no)	0.18	0.38	0	1
act4	Activity done: raising chicken (1 = yes;0 = no)	0.02	0.13	0	1
act6	Activity done: cultivation vegetables (1 = yes;0 = no)	0.27	0.44	0	1
act7	Activity done: cultivation vineyard (1 = yes;0 = no)	0.07	0.26	0	1
act8	Activity done: cultivation olive grove (1 = yes;0 = no)	0.05	0.22	0	1
act9	Activity done: cultivation flowers (1 = yes;0 = no)	0.02	0.14	0	1
act10	Activity done: transport (1 = yes;0 = no)	0.00	0.07	0	1
act11	Activity done: maintenance (1 = yes;0 = no)	0.01	0.12	0	1
act12	Activity done: mowing grass (1 = yes;0 = no)	0.03	0.18	0	1
act13	Activity done: spinning (1 = yes;0 = no)	0.05	0.21	0	1
act14	Activity done: packaging (1 = yes;0 = no)	0.01	0.10	0	1
act15	Activity done: handiwork (1 = yes;0 = no)	0.09	0.28	0	1
location2	Location where the activity was done: outside (1 = yes;0 = no)	0.69	0.46	0	1
location3	Location where the activity was done: greenhouse (1 = yes;0 = no)	0.14	0.35	0	1
tool1	Use of a tool (1 = yes;0 = no)	0.87	0.34	0	1
prec1	Low level of precision (1 = yes;0 = no)	0.43	0.50	0	1
prec3	High level of precision (1 = yes;0 = no)	0.45	0.50	0	1
type_eval1	Evaluator is social worker (1 = yes;0 = no)	0.66	0.47	0	1
type_eval3	Evaluator is external worker (1 = yes;0 = no)	0.02	0.14	0	1
farm2	Farm 2 (1 = yes;0 = no)	0.09	0.29	0	1
farm3	Farm 3 (1 = yes;0 = no)	0.23	0.42	0	1
farm4	Farm 4 (1 = yes;0 = no)	0.09	0.29	0	1
farm5	Farm 5 (1 = yes;0 = no)	0.15	0.36	0	1
farm6	Farm 6 (1 = yes;0 = no)	0.04	0.19	0	1

Table 5

Categorisation of aptitude evaluations that emerged from the monitoring charts.

Source: Authors' own data.

Evaluation	Failure serious problem	Low emerging mid-range problem	High emerging mild problem	Success (no problem)	In total
Interaction	2%	11%	21%	66%	100%
Use of information	3%	18%	37%	43%	100%
Ability to learn	3%	15%	34%	47%	100%
Ability to ask for help	6%	19%	41%	35%	100%
Total functional communication	3%	16%	33%	48%	100%
Ability to recognise his or her mistakes	7%	20%	44%	30%	100%
Ability to work independently	8%	20%	47%	25%	100%
Total independent functioning	8%	20%	45%	28%	100%
Work behaviour - Concentration on work	5%	15%	42%	38%	100%
Aptitude for farm work - Contribution to the activity	9%	21%	42%	29%	100%

evaluations (successful and high emerging). Mid-functioning clients obtained predominantly low and high emerging evaluations. Low functioning clients obtained evaluations that indicated a grave or mild problem.

Examining the results for each task, the highest evaluations were for the activities carried out at the alpaca and chicken farms, outdoors, without the use of particular tools and with an average level of precision, as well as those performed at agritourism farms, with a high index of complexity. Favourable evaluations were also obtained for the activities carried out in greenhouses for vegetable farming, and outdoors in the maintenance of green areas, and the pruning of olive trees—all of them are tasks characterised by a high index of complexity.

Lower evaluations were obtained for the activities carried out in the cattle stalls, which had a low index of complexity and in the workshops for wool spinning, an activity with a high index of complexity.

Before the estimate of the econometric model, a Principal Component Analysis (PCA) conducted on the 8 evaluation dimensions enabled the isolation of one factor, which had an eigenvalue greater than 1 and could account for a high share of the total variance (74.4%). This result was confirmed by the Cronbach's alpha of 0.950, which revealed high internal coherence among the 8 items examined. Subsequently, the first factor scores obtained through PCA were used as dependent variable in the econometric model described previously.

Table 6 shows the results of the OLS model formulated to analyse the data obtained from 1078 observations.

The estimates obtained for the different types of activities reveal a positive and statistically significant influence on the summary index of evaluation for activities 1 and 8. In the first case, the activity of indoor cleaning and tidying at the agritourism farm had a considerable positive

Table 6

OLS model estimates.

Source: Authors' own data.

Variable	Coeff.	Std. Err.	P > t	Variable	Coeff.	Std. Err.	P > t
compl1	-0.817	0.495		act14	-0.548	0.579	
compl3	0.226	0.463		act15	0.016	0.220	
compl4	-0.046	0.707		location2	-0.228	0.290	
act1	1.009	0.481	**	location3	0.617	0.302	**
act2	0.026	0.418		actr1	-0.246	0.464	
act3	-0.113	0.261		prec1	0.280	0.542	
act4	-0.200	0.453		prec3	-1.236	0.504	**
act6	-0.396	0.347		type_eval1	-0.046	0.131	
act7	0.627	0.584		type_eval3	-0.654	0.440	
act8	1.391	0.628	**	farm2	0.126	0.397	
act9	0.549	0.726		farm3	-0.100	0.219	
act10	-4.499	11.874		farm4	-0.805	0.320	**
act11	0.716	0.538		farm5	-1.513	0.403	**
act12	-1.054	11.723		farm6	0.070	11.716	
act13	0.128	0.266		_cons	2.362	0.663	**

Significance at .05 level indicated by ** ; F -test (37, 1039) = 40,21; Prob > F = 0.000; R -squared = 0.561.

effect on the performance of the autistic client, as the value (1.0) of the coefficient indicates.

The beneficial effect was even greater in the case of the second activity carried out in an olive grove cultivation setting. There was a 1.39 increase in the summary of evaluation for this activity, when compared with the omitted activity (alpaca farm).

On the other hand, none of the other activities seemed to have had statistically significant effects.

Instead, a positive coefficient emerged for the dummy regarding activities carried out in the greenhouse (location3), which resulted in higher performances than both outdoor and indoor activities.

While the use or avoidance of a tool to carry out an activity had no significant influence on the evaluation, there was a significant and negative coefficient for the highest level of precision required to do a task. It caused a substantial reduction in the evaluation, when compared with the intermediate level of precision.

Regarding confounding factors, the type of subject who made the evaluations did not seem to significantly condition the evaluation, but in some cases, the farm where the activity took place seemed to lower the evaluation, when compared with that for the omitted level (farm 1), as demonstrated by the negative coefficients associated with the dummy farms 4 and 5.

6. Discussion

The complexity of social farming, in terms of the actors involved, and its practices adopted by the organisation determines the complexity of its evaluation and only a few studies have focused on a narrow set of outcomes (Di Iacovo et al., 2016; Paffarini et al., 2015; Torquati et al., 2015). The methodology proposed and the results obtained in the area of farm work experience for adults with ASDs, notwithstanding the limitations inherent in an pilot study, promoted an environment in the farm conducive to the development of concrete abilities and skills rather than one that would simply house the disabled.

The experience of A² pilot project highlighted that while providing work experience to adults with ASDs, one must continually seek to harmonise the construction of a production-oriented context and work dynamic by introducing another process that promotes and preserves the relationship between individuals.

Those who have daily contact with adults with ASDs and evaluate the incremental changes in them must be careful not to force them towards autonomy; they must be able to wait and learn to recognise the useful signs for undertaking this road. In fact, those with ASDs prefer things to be predictable and resist change. The observations obtained during the implementation of A² pilot project demonstrated that even this aspect can be improved, and that motivation plays a fundamental role to the extent that it can equip them to deal with even unexpected events.

In the cases in which the difficulties in carrying out the planned

tasks persisted, it was necessary to redefine the individual itineraries, so that they followed the logic of rehabilitative usefulness for the autistic client and functional usefulness for the farm.

On the basis of the project underway and the experience gained from them, some characteristics have been identified as most supportive of therapeutic and rehabilitative efforts, and/or social and work inclusion initiatives: a broad diversity in production processes; tasks that can be broken down easily into separate procedures; intense use of manual labour; brief or overlapping production cycles; functional throughout the year; and availability of spaces for non-farming activities. A social farming project seeks to find a balance between two needs—the farmer's need for maximum production and the autistic client's need for maximum peace of mind. A traditional farm obviously seeks the maximum profit, while an 'assistance' centre for the disabled at times tends to go along with the behavioural limitations imposed by the disability. One of the daily challenges of the agri-social worker is to harmonise the productive element with the environmental and relational one. For example, one of the autistic adults showed considerable satisfaction with his interactions with the agritourists when he served breakfast and cleared or set the tables. This was an excellent result in terms of social integration and engagement in the world of work.

From the very beginning of the A² project, most of the autistic clients appeared to be quite motivated by the fact that they had to go to work outside the adult day-care centre. They formed a good relationship with the farm owners and the people who accompanied them during their work, and showed a strong ability to relate with them. During the period of the experiment, the so-called 'problem behaviours' of the autistic clients (actions causing harm to themselves or others) declined by 18%. These observations highlight the increase in well-being of autistic people that is possible when they shift from protected jobs in the 'assistance-based' context of an adult day-care centre (with educators who help them to acquire skills) to work activities in actual farms, alongside 'real workers'.

On the whole, the tasks that received the highest evaluations in terms of behavioural aspects and the contribution to the individual activities were those in which the adults with ASDs had the opportunity to relate with other people and/or animals; these included feeding alpacas, collecting eggs, tidying rooms and serving breakfast in the agritourism farm, and distributing hay to cattle. Secondary to these tasks were those done prevalently outdoors but in circumscribed places; these included mowing grass and trimming hedges in the gardens of the agritourism farm, and harvesting olives and grapes. Good performances were also observed on tasks conducted in closed places such as greenhouses and packaging workshops, especially the packaging of legumes and eggs, preparing cases of vegetables, re-potting seedlings for vegetable plants, and watering vegetable plants. The least successful tasks were those with a high index of complexity, such as pruning olive trees and grape vines, or repetitive ones such as collecting spontaneous herbs and flowers; spinning alpaca wool was found to be too difficult for an adults with ASDs because it requires fine motor skills in both hands, coordinated with the continuous movement of one leg.

Two further considerations about the results obtained relate to the role of the workers and the collective dimension of the tasks. It was evident that the adults with ASDs engaged more actively in the work when the social and farm workers created a mechanism of collaborative empathy. In addition, the collective and communitarian dimension of the work during vegetable harvesting in the summer set into motion positive mechanisms in which the roles attributed to the workers and the autistic clients appeared less overtly defined, with improvements in productivity and relational performance. As the autistic clients gained work experience on the farms, there was a progressive blurring of the role-based distinctions, which in turn generated a community-based social agriculture that progressively lost its therapeutic-institutional form. The worker became an ordinary companion in the work group and the autistic client felt more independent and responsible, and thus, grew in self-esteem.

7. Conclusion

It's important to underline that the A² was a pilot study and all client's experiences described, in terms of tasks, evaluations of these and analysis of the results, must be validated by further study. However, since that the A² project was the match between typical Italian agriculture activities with the autistic clients (characterized by different behaviours and skills) of a day-care center, therefore this project could be transferable and replicable in a similar context.

In fact, the data analyses have thrown up interesting observations that could be useful suggestions in order to planning a better work inclusion in agriculture of adults affected by ASDs.

While all these observations hold true for the group of autistic people involved in the experiment, it is important to bear in mind that each of them has a different degree of medically-recognised autism; thus, each had an 'experience' during an itinerary that was very useful for themselves and their families.

Therefore, it is to be hoped that better understanding of the effects of social farming will encourage the development of innovative tools for mental health care.

Moreover, and this is not a secondary issue, the results obtained from A² pilot project made it possible to achieve two concrete objectives that underline the transferability of the results obtained. First, at the end of the pilot project, two high-functioning autistic participants were employed at the agritourism farm for hospitality work. Second, La Semente has been allowed to use the land belonging to the Umbria region authority, and built a greenhouse and two chicken coops where autistic adults work to produce and package vegetables and eggs.

These products are marketed through alternative food network : specifically, it is a solidarity purchasing group of supply and demand managed by the Italian Association for Organic Agriculture (Torquati et al., 2016; Viganò et al., 2012), one of the partner of the project, which emphasizes the importance of building a solid project network.

In fact involving in A² project different partners (in terms of purpose, funding, diversity of audience, organizational culture) but each one connected with social farming, another important goal was achieved: the fruitful connection between the non-profit and profit sectors.

From agricultural sector standpoint, social farming has the potential to be a strategic element in the evolution of multifunctionality (de Krom and Dessein, 2013), which could exploit untapped agricultural resources and better integrate care activities with work inclusion initiatives.

Further studies should take into consideration the development of more accurate evaluation tools in order to support businesses that decide to invest actively in the inclusion of autistic people in work and social life, also due to the new Italian Law No. 134/15 concerning the work inclusion of people with ASDs. In this way, grassroots experiences could be valorised by national legislators committed to creating new contexts of life that are suitable for the clinical peculiarities of autism, and perfecting current models of assistance through the multi-functionality of agriculture.

Acknowledgements

This work was supported by the Umbria region's Rural Development Programme (RDP) 2007–2013, under the Measure 1.2.4. on cooperation for development of new products, processes, and technologies in the agriculture, food, and forestry sector. We would like to thank Sheila Beatty for translation and editing work on the manuscript.

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