

Chapter 5. Farm-based interventions for people with mental disorders. A systematic review of literature

Abstract

Purpose: Farms are increasingly used in mental healthcare. This study aimed to systematically review the evidence on the effectiveness of farm-based interventions for patients with mental disorders. **Method:** Controlled and uncontrolled studies of farm-based interventions were included. Within- and between group effect sizes were calculated. Qualitative data were summarized using thematic synthesis. The review followed the PRISMA, Cochrane and COREQ standards. **Results:** The eleven articles included reported results of five studies, three of which were randomized control trials (RCTs). Overall, 223 patients with depressive disorders, schizophrenia or heterogeneous mental disorders attended three types of farms-based interventions. Favourable effects on clinical status variables were found in one study in patients with treatment-resistant depressive disorder and in one RCT in patients with schizophrenia. Assessment of rehabilitative effects (functioning and quality of life) was limited and yielded conflicting results. Patients' experiences revealed that social and occupational components of interventions were perceived as beneficial, and provided insights into how farm-based interventions may facilitate recovery. **Conclusions:** Our results suggest that the farm environment should be considered, especially for patients with mental disorders who do not achieve an adequate response with less intensive treatment options. Further research is needed to clarify potential social and occupational benefits.

Implications for rehabilitation

- Farm-based interventions for people with mental disorders make use of a range of elements present in the farms environment, such as restorative natural elements, opportunities for work and social support.
- Farm-based interventions alleviate depressive and anxiety symptoms in patients with treatment-resistant, persistent mental disorders, but effects on functioning and on quality of life remain insufficiently researched.

- Participants' experiences with the farm-based interventions related to experiences of disability and recovery, as well as to specific farm elements, highlighted the importance of the social and occupational aspects of the farm-based interventions.

Introduction

Rural spaces have long been considered to be places for recovery and rehabilitation but their use in mental healthcare has fallen in and out of favour during the past century. Historically, care of the mentally ill was provided in residential institutions located in remote areas, surrounded by farms and gardens. In the absence of other therapeutic options, farms and gardens were used for their restorative effects and as means of occupying the time of patients (Fause, 2008; Sullivan, 1979). From the 1950s onwards, when psychoactive drugs became available, the model of the mental asylum was largely abandoned. Buildings were either transformed into mental health hospitals and outpatient clinics, or were dismantled, and the surrounding land was sold (Ravelli, 2006). Mental healthcare services were being modernized, and farms no longer seemed relevant to the new developments in healthcare.

By the 1980s, it became apparent that psychiatric treatments could not, by themselves, provide full mental health recovery. Increasing acknowledgement that mental disorders affected a range of life domains led to the development of the field of psychiatric rehabilitation. Using a series of psycho-social interventions, psychiatric rehabilitation aimed to assist people with mental disorders in developing the skills needed for living independent lives in the community (Farkas & Anthony, 2010; Rössler, 2006). Since an important goal of rehabilitation is represented by employment, a range of vocational services was developed. Initially, farm-based services were considered an interesting, though exceptional location for rehabilitation services (Corbiere & Lecomte, 2009). Since the beginning of the century, however, private farms in Western Europe and in the United States became involved in providing services for people with (mental) disabilities (Di Iacovo & O'Connor, 2009; Hassink & Van Dijk, 2006; Haubenhofers et al., 2010; Sempik et al., 2010). This development occurred as part of a broader phenomenon known in the literature as "green care", which also includes gardening, landscape or nature conservation, animal husbandry and exercise in natural environments (Haubenhofers et al., 2010).

Initial research on the potential benefits of farm-based services for people with mental disorders reported positive findings, such as significant improvements in mood and self-esteem (Hine et al., 2008), and self-reported feelings of social inclusion and empowerment (Elings &

Hassink, 2008; Hassink, Elings, et al., 2010). The farm environment was also evaluated positively by mental healthcare professionals, who viewed the real-life setting of farms and the focus on users' abilities as additional benefits to regular services (Hassink, Elings, et al., 2010) and expected that work with farm animals would improve participants' social skills (Berget et al., 2008b).

Despite these findings, to date no study reviewed systematically the effectiveness of farm-based interventions for people with mental disorders. This leaves unanswered questions about whether or not these interventions bring any added value to the current models of mental care and, if so, for which groups and under which circumstances. Answers to these questions could help mental healthcare service users and professionals make better choices among available services, and could guide public health and health policy makers in reconciling the increasing costs of mental healthcare with the limited resources available. In this context, the current study aimed to systematically review the evidence on the effectiveness of farm-based interventions for people with mental disorders.

Methods

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses standard (PRISMA) (Liberati et al., 2009).

Identification of studies

Relevant studies were identified through a search of the English language literature published before May 2012 in the electronic databases PsycINFO, MEDLINE and ISI Web of Knowledge. Keywords were selected from the green care terminology (Haubenhofner et al., 2010): *care farm*, *animal-assisted therapy*, *green exercise*, *horticultural therapy*, *therapeutical horticulture*, *gardening*, *green care*, in combination with *farm*. The reference lists of relevant articles were searched manually (forward citation tracking). In order to identify potentially relevant reviews on green care, the search was extended to the Cochrane Library.

Inclusion and exclusion criteria

Studies were included in the review if they met the following criteria:

- evaluated farm-based interventions, defined as any type of green care activity (i.e., agriculture, gardening, animal keeping and husbandry) taking place on a farm;
- were designed as controlled or uncontrolled treatment outcome studies;

- included people with mental disorders, 18 years of age or older;
- used validated measurement scales (self-ratings or assessor ratings) to report outcomes related to mental health outcomes, defined as clinical status variables, functioning or quality of life.

Interventions for people with mental retardation were excluded.

Data extraction

Relevant data were identified using a coding scheme with codes for: article characteristics (year of publication and journal), participant recruitment (sampling method, inclusion/exclusion criteria, number of participants, number of completers and drop-outs, reason for non-participation), intervention characteristics (type, duration and schedule, providers, other treatments received), participant characteristics (diagnosis, diagnostic criteria, age, sex), outcome measurements (timing of measurements, outcome measures, results on outcome measures of interest), and results (of quantitative and qualitative analysis). Data was extracted by the first author and checked by the third author.

Statistical analysis

Inclusion of both controlled and uncontrolled studies required the calculation of two different types of effect sizes (Morris & Deshon, 2002). Changes in mental health outcomes from the start to the end of the intervention (within-group effect size), were assessed using the standardized mean difference between pre- and post-test scores, corrected for small samples (Hedges' g for repeated measures, g_{RM}) (Hedges, 1981). For controlled studies, we compared pre-post test changes in mental health outcomes in experimental groups to those in controls (between-group effect size), using the standardized mean difference between the pre-post test changes reported in the two groups, corrected for small samples (Hedges' g for independent groups, g_{IC}).

Analysis was performed using Comprehensive Meta-Analysis (version 2.2.064). We performed both completer- and intention-to-treat (ITT) analyses, assuming that scores would not change in participants who dropped out. Statistical significance was set at $p < 0.05$. Magnitude of effect size estimates was interpreted as small ($g = 0.2$), medium ($g = 0.5$), or large ($g = 0.8$) (Cohen, 1998). Given the clinical heterogeneity of the studies included in the review, no summary indicators were calculated.

Thematic synthesis of participants' experiences with farm-based interventions

Data on participants' experiences with the farm-based interventions, collected in three studies (Gonzalez et al., 2011a, 2011b; Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012), were summarized through a three-stage thematic synthesis (Thomas & Harden, 2008). First, the main concepts identified by the authors of the original articles were extracted and summarized across studies. Thereafter, concepts were grouped into descriptive themes which were checked against the results of original articles in order to ensure that they remained true to the original data. The descriptive themes were then organized within analytical categories. The first stage was conducted independently by the first and third authors, who discussed possible interpretations of data. The second and third stages were completed by the first author, and checked by the third author. Divergences were solved by referring to the original articles.

Quality assessment

The internal validity of the three RCT studies included in the review (Berget et al., 2008a; Berget et al., 2011; Berget et al., 2007; Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012; Pedersen, Martinsen, et al., 2012; Pedersen et al., 2011) was assessed across eight domains (sequence generation; allocation concealment; blinding of participants, investigators and outcome assessors; incomplete data reporting; selective outcome reporting; and other biases), in accordance to the Cochrane Handbook for Systematic Reviews of Interventions (Higgins & Altman, 2008). All RCTs included small samples; only one reported data on compliance (Pedersen, Martinsen, et al., 2012). Overall, we found a high risk for performance bias (impossibility to blind participants and study personnel to experimental condition), and low risk for selection bias (adequate allocation sequence, adequate concealment), attrition bias (overall drop-out rate of 17.1%) and reporting bias (no selective outcome reporting). Risk of detection bias was unclear, as outcome assessors were blinded only in one study (Kam & Siu, 2010). We found no evidence for publication bias (symmetrical funnel plots).

Data on participants' experiences with farm-based interventions were collected in three studies (Gonzalez et al., 2011a, 2011b; Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012). In-depth interviews were conducted in two studies (Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012), but only one (Pedersen, Ihlebaek, et al., 2012) included participant quotes and distinguished between major and minor themes, as recommended by the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong, Sainsbury, & Craig, 2007). The third study used questionnaires with closed- and open-ended items to collect data on participants' experiences, and summarized results as percentages (Gonzalez et al., 2011b) and as recurrent themes and statements (Gonzalez et al., 2011a) respectively.

Results

Study selection

The study selection process is summarized in Figure 5.1. The search of electronic databases generated 753 articles. These were screened on the basis of title and abstract; potentially relevant articles were reviewed in full text and checked against the inclusion criteria. Of the 738 citations, 72 were duplicates, 625 did not meet the eligibility criteria when screened on the basis of title and abstract, and 32 did not meet the eligibility criteria when examined in full text. As a consequence, 9 articles were included in the review. Forward citation tracking generated 20 additional articles, of which two met the eligibility criteria. No other relevant articles were identified using the Cochrane Library. The final sample consisted therefore of 11 articles reporting the results of 5 studies.

Description of studies

Among the 5 studies, three were RCTs (Berget et al., 2008a; Berget et al., 2011; Berget et al., 2007; Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012; Pedersen, Martinsen, et al., 2012; Pedersen et al., 2011) and two did not use a control group (Cerino, Cirulli, Chiarotti, & Seripa, 2011; Gonzalez et al., 2009, 2010, 2011a, 2011b). In total, 223 participants were recruited (167 in experimental groups and 58 in control groups). The samples consisted of participants with depressive disorder (Gonzalez et al., 2009, 2010, 2011a, 2011b; Pedersen, Ihlebaek, et al., 2012; Pedersen, Martinsen, et al., 2012; Pedersen et al., 2011), schizophrenia (Cerino et al., 2011; Kam & Siu, 2010), or a variety of common and severe mental disorders (Berget et al., 2008a; Berget et al., 2011; Berget et al., 2007). Farm-based interventions consisted of farm animal-assisted activities (Berget et al., 2008a; Berget et al., 2011; Berget et al., 2007; Pedersen, Ihlebaek, et al., 2012; Pedersen, Martinsen, et al., 2012; Pedersen et al., 2011), horticulture (Gonzalez et al., 2009, 2010, 2011a, 2011b; Kam & Siu, 2010) or therapeutic horse riding (Cerino et al., 2011).

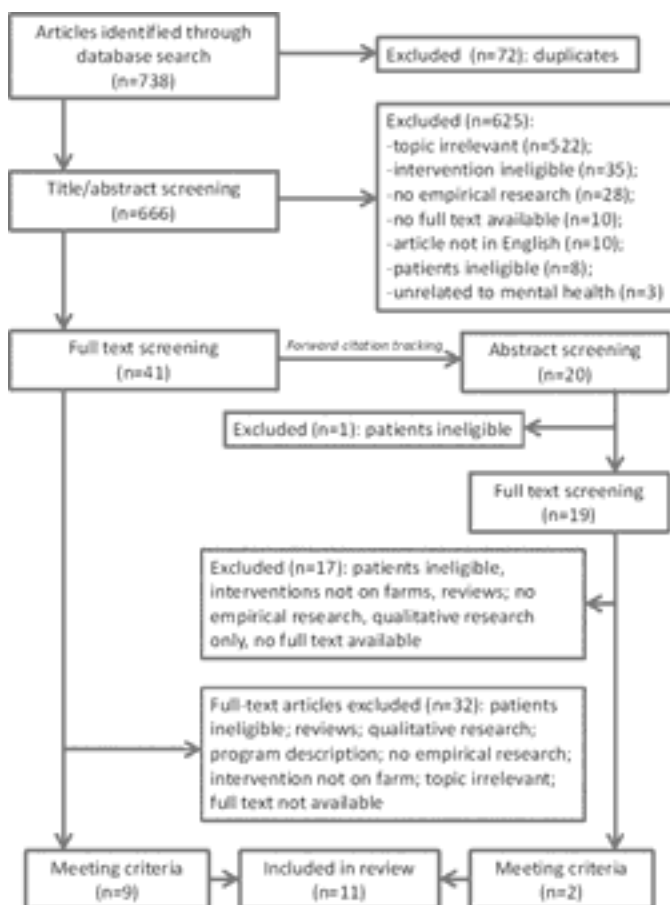


Figure 5.1. Flow chart of systematic review process

Interventions were evaluated in relation to clinical status (Berget et al., 2011; Cerino et al., 2011; Gonzalez et al., 2009, 2010; Kam & Siu, 2010; Pedersen, Martinsen, et al., 2012), cognitive functioning (Gonzalez et al., 2009, 2010), psychosocial functioning (Berget et al., 2008a; Gonzalez et al., 2011a, 2011b; Kam & Siu, 2010; Pedersen, Martinsen, et al., 2012), occupational functioning and quality of life (Berget et al., 2007; Kam & Siu, 2010). Participants also provided data on their experiences with the farm-based interventions (Gonzalez et al., 2011a, 2011b; Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012). The aims, methods and results of the five studies are reviewed below.

Farm-based interventions for participants with depressive disorders. Farm-based interventions were evaluated as a form of complementary treatment for participants with depressive disorders in two studies from Norway (Gonzalez et al., 2009, 2010, 2011a, 2011b;

Pedersen, Ihlebaek, et al., 2012; Pedersen, Martinsen, et al., 2012; Pedersen et al., 2011). Building on theories of social support and self-esteem, Pedersen et al (Pedersen, Ihlebaek, et al., 2012; Pedersen, Martinsen, et al., 2012; Pedersen et al., 2011) assessed the effects of a farm-animal assisted intervention consisting of work and contact with farm animals. Thirty-four participants with major depressive disorder (79.3% women; mean age 37.8 years) receiving TAU (treatment as usual: medication and/or psychotherapy) were randomly assigned by a computer program to either the experimental or waiting list control group. The intervention was organized twice a week, for 12 weeks, on 11 farms. Sixteen participants in the experimental group and 13 in the control group started the intervention, but only 12 completed it in each group. Assessments were performed twice at baseline, at 4 and 8 weeks, at the end of intervention, and at 3 month follow-up. Assessors were not blinded. Outcomes included clinical status (severity of depressive and anxiety symptoms, measured with the Beck Depression Inventory, BDI (Beck & Steer, 1987), and the state version of the State-Trait Anxiety Inventory, STAISS (Spielberger, Gorsuch, & Lushene, 1983) respectively), and psychosocial functioning (general self-efficacy, measured with the General Self-Efficacy Scale, GSE (Schwarzer & Jerusalem, 1995)). In 14 participants in the experimental group, video recordings were used to estimate the time spent in various tasks early and late in the intervention. Experiences with the intervention were explored through in-depth interviews conducted with 8 completers.

The intention-to-treat analysis revealed significant improvements in the severity of depressive symptoms and general self-efficacy in the experimental group, but no differences were found when compared to controls (Pedersen, Martinsen, et al., 2012). Normal levels were achieved by 6 completers in the experimental group and by one in the control group. Severity of anxiety symptoms was not affected significantly (Pedersen, Martinsen, et al., 2012). The time spent in work activities increased during the intervention, and progressive involvement in complex tasks correlated significantly with changes in mental health outcomes (Pedersen et al., 2011). Participants perceived the intervention as positive, due to participation in ordinary (work) life, distraction from disorders, flexibility to accommodate different levels of functioning, and experiences of coping (Pedersen, Ihlebaek, et al., 2012).

Gonzalez et al (Gonzalez et al., 2009, 2010, 2011a, 2011b) evaluated the effects of a horticultural intervention in participants with depressive disorder. Forty-six participants (78.3% women; mean age 46.3 years) receiving TAU (medication and/or psychotherapy) attended twice a week during three hours, for 12 weeks, gardening activities on four urban farms. No control group was used. Five participants dropped out early in the intervention. Assessments were performed twice at baseline, at 4, 8 and 12 weeks and at 3 month follow-up. Outcomes included clinical status (severity of anxiety and depressive symptoms assessed with BDI and

STAI-SS respectively), cognitive functioning (perceived attentional capacity and rumination, assessed with Attentional Functional Index (Cimprich, 1993) and Ruminative Response Scale - Brooding Subscale (Treyner, Gonzalez, & Nolen-Hoeksema, 2003) respectively), and psychosocial functioning (perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), Positive and Negative Affect Scale (PANAS-PA) (Watson, Clark, & Tellegen, 1988), Life Regard Index-Revised (Debats, 1998) and Sense of Coherence Scale (SOC) (Antonovsky, 1987)). Existential issues were explored using open and close-ended questions. Analysis, based on completer data, showed that depression scores were stable between the two baseline measurements, and declined in the first month of the intervention, suggesting that improvements were related to the intervention, rather than the associated use of TAU (Gonzalez et al., 2009, 2010). Significant improvements were also found in severity of anxiety symptoms, positive affect, perceived stress, rumination, attentional capacity and social activity (Gonzalez et al., 2009, 2011b), but not in existential issues (Gonzalez et al., 2011a). Improvements in the severity of depressive symptoms were maintained at 3 month follow-up (Gonzalez et al., 2009, 2010).

Farm-based interventions for participants with schizophrenia. Two studies from China and Italy evaluated farm-based interventions for their potential for psychiatric rehabilitation in participants with schizophrenia.

In China, Kam and Siu (Kam & Siu, 2010) assessed the effects of a standardized horticultural intervention, using a vulnerability-stress-coping perspective on mental disorders. Twenty-four participants (70.8% men, mean age: 44.3 years, 91.7% diagnosed with schizophrenia) were randomly assigned to the experimental group receiving the intervention and vocational rehabilitation (VR), or to the control group receiving VR only. The intervention consisted of one-hour structured horticultural sessions over 10 days, provided by an occupational therapist. VR consisted of unstructured horticulture activities and indoor industrial activities. Use of psychiatric treatments was not reported. Ten participants started the intervention in the experimental group and 12 in the control group. No further drop-outs occurred. Participants were assessed blindly before and after the intervention. Outcomes included clinical (severity of anxiety and depressive symptoms) and psychosocial functioning (levels of perceived stress), assessed with the Depression Anxiety Stress Scale (Henry & Crawford, 2005); occupational functioning (work behaviour, assessed with the Work Behaviour Assessment Scale (New Life Psychiatric Rehabilitation Association, 2005)); and quality of life, assessed with the Personal Well-being Index (Lau, Cummins, & McPherson, 2005). No schizophrenia assessments were included.

The completer analysis revealed that depression and anxiety scores improved significantly in the experimental group, compared to controls, but occupational functioning

and quality of life were not affected. Interviews with participants in the experimental group suggested that the intervention was experienced as beneficial, helped enhance occupational performance and promote emotional health and social performance, and gave a feeling of connecting with nature (Kam & Siu, 2010).

In Italy, Cerino et al (Cerino et al., 2011) assessed the effects of therapeutic horse riding as a rehabilitation programme for patients with schizophrenia. Twenty-four male and female participants, aged 18 to 40 years, were included in an experimental group. No drop-out rates were reported. The intervention, held on 6 farm-based riding centres, consisted of 40 weekly, standardized sessions aiming to improve specific riding abilities, self-esteem and social functioning, and to reduce stigma. Use of psychiatric treatments was not reported. Assessments were performed before and after the intervention, and investigated changes in clinical status variables (negative and positive symptoms), using the Brief Psychiatric Rating Scale (Overall & Gorham, 1962) and the Positive and Negative Syndrome Scale (Kay, Fiszbein, & Opler, 1987). Results indicated significant improvements in symptoms, with most apparent changes across negative symptoms (Cerino et al., 2011).

Farm-based interventions for participants with common and severe mental disorders.

Berget et al evaluated a non-standardized, farm-animal assisted intervention both as a form of treatment, additional to psychiatric treatment (Berget et al., 2008a; Berget et al., 2011), and as a form of occupational therapy (Berget et al., 2007). The intervention, provided on 15 farms in Norway, was organized twice a week for 12 weeks. Ninety participants with ICD10 diagnoses of schizophrenia (35.3%), personality disorders (27.9%), depressive disorders (26.5%) and anxiety disorders (10.3%) were randomized using a computer program to either experimental group receiving the intervention and TAU (psychiatric medication), or to TAU control. Sixty-nine participants (75.6% women, average age 34.7 years) completed the intervention: 41 in the experimental group and 28 in the control group. Drop-out was related to disorder severity. Measurements, performed before and after the intervention, and at 6 month follow-up, assessed clinical status (severity of depressive and anxiety symptoms, measured with BDI and STAI-SS); psychosocial functioning (general self-efficacy, using GSE, and coping skills, using the Pressure Management Indicator-Coping Strategies Scale (Cooper, Sloan, & Williams, 1988)); and quality of life (using the Quality of Life Scale (Wahl, Burckhardt, Wiklund, & Hanestad, 1988)).

In a subsample of 35 participants (16 completers), working abilities (intensity and exactness) were assessed early and late in the intervention, using video-recordings. Analysis, performed on completer data, revealed no significant changes in clinical status variables, psychosocial functioning or quality of life during the intervention (Berget et al., 2008a; Berget et al., 2011), but showed significant improvements in work abilities in participants in the

experimental group (Berget et al., 2007). However, changes in work abilities did not correlate with changes in clinical status variables, functioning or quality of life (Berget et al., 2007). At 6 month follow-up, significant improvements were found in severity of anxiety symptoms (Berget et al., 2011) and general self-efficacy (Berget et al., 2008a) in the experimental group, compared to controls. Coping skills also improved in the experimental group but differences relative to controls were not reported (Berget et al., 2008a).

Summarizing the effects of farm-based interventions

Within-group effects. The within-group effect sizes calculated across studies are presented in Table 5.1. For participants with depressive disorders (Gonzalez et al., 2011b; Pedersen, Martinsen, et al., 2012), we found moderate to large improvements in severity of depressive and anxiety symptoms in both experimental and control groups. This suggests that, during the intervention, participants with depressive disorders experienced clinically relevant improvements in depressive and anxiety symptoms, regardless of whether they attended farm-based interventions and TAU, or TAU only. In the experimental groups, some aspects of cognitive and psychosocial functioning also improved moderately.

For participants with schizophrenia, the addition of horticulture to vocational rehabilitation (Kam & Siu, 2010) was associated with large improvements in depressive and anxiety symptoms and in perceived stress in the exposed, but not in the control group, suggesting an increased efficiency of the combined approach. Work behaviour and quality of life were not affected, possibly due to the relatively short duration of the study (10 days). The one-year therapeutic horse riding intervention (Cerino et al., 2011) was associated with moderate to large improvements in positive and negative psychotic symptoms.

Participants with common and severe mental disorders (Berget et al., 2008a; Berget et al., 2011) experienced small and non-significant improvements in severity of depressive and anxiety symptoms, self-efficacy, coping and quality of life. This indicates that, in heterogeneous samples, neither the addition of farm-based intervention to TAU, nor TAU alone induced improvements in clinical status, psychosocial functioning or quality of life.

Table 5.1.

Within-group effect sizes Hedge's g in mental health outcomes across the studies included in the review (completer analysis)

Study population	Depressive disorders				Schizophrenia				Common and severe mental disorders							
	Pedersen ¹		Gonzalez		Kam		Cerino		Berget							
First author																
Intervention groups	Experimental	Control	Experimental	Experimental	Control	Experimental	Experimental	Control	Experimental	Control						
Condition	F-AAI + TAU	TAU	HI +TAU	HI + VR	VR	TRI	F-AAI + TAU	TAU	F-AAI + TAU	TAU						
n per group	(n=12)	(n=12)	(n=46)	(n=10)	(n=12)	(n=24)	(n=41)	(n=28)	(n=41)	(n=28)						
	<i>g_{ov}</i>	p	<i>g_{ov}</i>	p	<i>g_{ov}</i>	p	<i>g_{ov}</i>	p	<i>g_{ov}</i>	p	<i>g_{ov}</i>	p	<i>g_{ov}</i>	p		
Clinical status variables – severity of																
Depression	0.88	***	0.69	**	0.83	***	0.92	***	0.13	ns	-	-	0.21	ns	0.18	ns
Anxiety	0.83	***	0.91	***	0.45	***	1.07	***	-0.08	ns	-	-	0.14	ns	-0.08	ns
Schizophrenia																
BPRS	-	-	-	-	-	-	-	-	-	-	0.84	***	-	-	-	-
PANNS	-	-	-	-	-	-	-	-	-	-	0.64	***	-	-	-	-
Cognitive functioning																
Attentional capacity	-	-	-	-	0.52	***	-	-	-	-	-	-	-	-	-	-
Rumination	-	-	-	-	0.49	**	-	-	-	-	-	-	-	-	-	-
Psychosocial functioning																
Self-efficacy	0.66	**	0.41	ns	-	-	-	-	-	-	-	-	0.06	ns	-0.04	ns
Stress	-	-	-	-	0.47	***	0.77	**	0.05	ns	-	-	-	-	-	-
Coping	-	-	-	-	-	-	-	-	-	-	-	-	0.14	ns	-0.09	ns
Positive affect	-	-	-	-	0.32	ns	-	-	-	-	-	-	-	-	-	-
Existential issues	-	-	-	-	0.16	ns	-	-	-	-	-	-	-	-	-	-
Occupational functioning																
Work behaviour	-	-	-	-	-	-	0.29	ns	0.08	ns	-	-	-	-	-	-
Work intensity ²	-	-	-	-	-	-	-	-	-	-	-	-	1.11	***	-	-
Work exactness ²	-	-	-	-	-	-	-	-	-	-	-	-	1.10	***	-	-
Quality of life																
	-	-	-	-	-	-	0.04	ns	0.09	ns	-	-	0.00	ns	0.08	ns

Notes:

RM = repeated measurements;

g_{ov} reflects the difference from pre-test to post-test in each group: positive values indicate that scores improved at post-test, compared to pre-test.

F-AAI: farm animal-assisted intervention; TAU = treatment as usual (medication or psychotherapy); HI: horticultural intervention; VR = vocational rehabilitation; TRI = therapeutic riding intervention;

¹ = original article reported ITT data; calculations for this table were based on the assumption that scores would not change in drop-outs;

² = based on a subsample of 19 completers from the experimental group;

*p≤0.05, **p≤0.01, ***p≤0.001, ns – not significant

Between-group effects. The between-group effects corroborated the results presented above. In both completer and intention-to-treat analyses (Tables 5.2. and 5.3., respectively), small and non-significant effects were found for depressive disorder (Pedersen, Martinsen, et al., 2012), confirming that improvements in participants who received both the intervention

and TAU were similar to those who received TAU only. In contrast, in participants with schizophrenia (Kam & Siu, 2010), effects on severity of anxiety symptoms, and on perceived stress, were significantly larger than for controls. Finally, in participants with common and severe mental disorders (Berget et al., 2008a; Berget et al., 2011), the between-group analysis yielded small and non-significant effect sizes, confirming the similar trajectories of the experimental and control groups.

Table 5.2.

Between-group effect sizes Hedge's g in mental health outcomes in the RCTs included in the review (completer analysis)

Study population	Depressive disorders		Schizophrenia		Common and severe mental disorders	
	Pedersen		Kam		Berget	
First author						
Experimental vs. control condition	F-AAI+TAU vs. TAU		HI+VR vs. VR		F-AAI+TAU vs. TAU	
n (completers)	(n=24)		(n=22)		(n=69)	
	<i>g_c</i>	p	<i>g_c</i>	p	<i>g_c</i>	p
<i>Clinical status variables – severity of</i>						
Depression	0.25	ns	0.89	*	0.04	ns
Anxiety	0.04	ns	1.27	**	0.22	ns
<i>Psychosocial functioning</i>						
Self-efficacy	0.11	ns	-	-	0.11	ns
Stress	-	-	0.86	*	-	-
Coping	-	-	-	-	0.23	ns
<i>Occupational functioning</i>						
Work behaviour	-	-	0.26	ns	-	-
Quality of life	-	-	-0.08	ns	-0.08	ns

Notes:

F-AAI: farm animal-assisted intervention; TAU = treatment as usual (medication or psychotherapy); HI: horticultural therapy; VR = vocational rehabilitation; IG = independent groups, completer analysis; *g_c* reflects the difference between experimental and control groups: positive values indicate that the intervention favours participants in experimental group; **p*≤0.05, ***p*≤0.01, ****p*≤0.001, ns – not significant

Participants' experiences with farm-based interventions. The thematic synthesis of qualitative data identified three analytic categories of themes related to disability, recovery and specific farm experiences (Table 5.4.). Referring to disability, participants described how the farm environment provided distraction, stress release and warm human and/or animal contact, thus alleviating suffering; how their limitations were accepted and taken into account on farms; and how flexible tasks were created to allow them to participate in work, despite their limitations. Recovery experiences were presented by participants who referred to a change in

the way they viewed themselves because of others' respect and appreciation, and because they realized that they could manage and accomplish tasks. Additionally, participants described that, on farms, they felt like ordinary workers (having an ordinary work life, improving or learning skills), they built up self-determination (improving motivation and feeling strengthened to continue during difficult periods), and felt socially included (increased social contacts, perceived improvements in social skills). Specific aspects of farm-based interventions referred to working with animals (farm-animal assisted interventions), enjoying the leisure-like activities, becoming absorbed in working with plants and being connected with nature (horticulture).

Table 5.3.

Between-group effect sizes Hedge's g in mental health outcomes in the RCTs included in the review (intention-to treat analysis, ITT)

Study population	Depressive disorders		Schizophrenia		Common and severe mental disorders	
	Pedersen		Kam		Berget	
First author						
Experimental vs. control condition	F-AAI+TAU vs. TAU		HI+VR vs. VR		F-AAI+TAU vs. TAU	
n (completers)	(n=24)		(n=22)		(n=69)	
	g_{IG-ITT}	p	g_{IG-ITT}	p	g_{IG-ITT}	p
<i>Clinical status variables – severity of</i>						
Depression	0.05	ns	0.69	#	-0.02	ns
Anxiety	-0.07	ns	1.03	**	0.17	ns
<i>Psychosocial functioning</i>						
Self-efficacy	0.00	ns	-	-	0.01	ns
Stress	-	-	0.82	*	-	-
Coping	-	-	-	-	0.19	ns
<i>Occupational functioning</i>						
Work behaviour	-	-	0.35	ns	-	-
Quality of life	-	-	-0.07	ns	-0.07	ns

Notes:

F-AAI: farm animal-assisted intervention; TAU = treatment as usual (medication or psychotherapy); HI: horticultural therapy; VR = vocational rehabilitation; IG-ITT = independent groups, intention-to treat analysis; g_{IG-ITT} reflects the difference between experimental and control groups: positive values indicate that the intervention favours participants in experimental group; * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$, ns – not significant

Table 5.4.

Participants' experiences with farm-based interventions, in relation to disability, recovery and specific experiences

	Study population	Depressive disorders		Schizophrenia
	First author (n)	Pedersen (n=8)	Gonzalez (n=46)	Kam (n=10)
Themes related to disability				
Setting accepting disability		√	√	
Intervention accommodating disability		√		
Intervention alleviating disability		√		√
Themes related to recovery				
Positive appraisals from others (verbal or non-verbal)		√	√	√
Becoming aware of one's own potential		√		√
Change in view of life			√	
Developing a worker identity		√		√
Building up self-determination		√	√	√
Feeling socially included		√	√	√
Themes of specific experiences				
Pleasurable, absorbing activities			√	√
Working with animals		√		
Connecting with nature			√	√

Discussion

The primary aim of this study was to systematically review the evidence on the effectiveness of farm-based interventions for adult participants with mental disorders. A systematic review of the English language literature published before May 2012 identified 11 articles reporting the results of five studies (three randomized control trials and two uncontrolled studies). Studies approached the farm-based interventions from different theoretical perspectives, illustrating the complexity of the farm environment which can act as a natural place with restorative qualities (Gonzalez et al., 2009, 2010), provide opportunities for work (Berget et al., 2007; Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012; Pedersen, Martinsen, et al., 2012), and facilitate social support among peers (Gonzalez et al., 2011b) and from farmers (Pedersen et al., 2011). However, the quality of the studies included in the review was moderate in our opinion, as some had small sample sizes, one used a measurement instrument better suited for people with depression disorder, rather than schizophrenia, one reported qualitative data succinctly, and none controlled for TAU. This probably conveys the difficulties in implementing interventions in the complex environments of farms, detached from the clinical practice.

All studies assessed farm-based interventions as forms of treatments, either alone or complementary to routine psychiatric treatment. The results of the studies included in this review do not support the use of farm-based interventions as treatment for depressive disorders with moderate severity (Pedersen, Martinsen, et al., 2012), but show promising first results for treatment-resistant depressive disorders (Gonzalez et al., 2009, 2010) and for schizophrenia (positive and negative symptoms (Cerino et al., 2011), and co-morbid anxiety symptoms (Kam & Siu, 2010)). In line with the stepped care model, which recommends that low-intensity interventions precede high-intensity, multi-professional and inpatient care (National Collaborating Centre for Mental Health (NICE), 2011), we propose that farm-based interventions should be reserved for people with mental disorders who do not achieve adequate response with less intensive treatment options. Given the difficulties in treating this group, the addition of farm-based interventions might hold promising prospects for the future.

The relevance of farm-based interventions for recovery and rehabilitation was explored only superficially by the studies included in the current review. Although multiple domains of functioning were assessed (i.e., cognitive, psychosocial and occupational), important knowledge gaps persist in understanding how farm-based interventions might contribute to rehabilitation of people with mental disorders. One domain that needs further investigation is occupational functioning which provided conflicting results: although observations and in-depth interviews suggested that work skills improved (Berget et al., 2007; Pedersen, Ihlebaek, et al., 2012; Pedersen et al., 2011), use of validated questionnaires yielded no effects, probably due to the short duration of the intervention (10 days) (Kam & Siu, 2010). A second domain that requires further attention is social functioning, an outcome of major importance in psychiatric rehabilitation (Rössler, 2006). Previous qualitative studies had indicated that farm-based services could improve social functioning (Berget et al., 2008b; Hassink, Elings, et al., 2010) but none of the studies we reviewed assessed potential changes in this domain. Remarkably, quantitative and qualitative data both seemed to suggest that the farm-based environments facilitated supportive social interactions: participants reported high levels of group cohesiveness (Gonzalez et al., 2011b), and described communication with farmers and peers as beneficial (Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012). However, it remained unclear whether the perceived quality of the social component of farm-based interactions was related to the possibility to interact with others or to specific characteristics of the social environment on farms.

The results of the thematic synthesis of participants' experiences on farms brought forward a different perspective on how farm-based interventions might facilitate recovery. Reference to improvements in clinical status and functioning were largely absent from participants' accounts, despite the fact that the studies in which they participated focused on

such outcomes. The only notable exception was stress which improved both objectively (Gonzalez et al., 2011b; Kam & Siu, 2010) and subjectively (Kam & Siu, 2010). In their accounts, participants referred to experiences of balancing disability and recovery, finding new meaning and redefining a positive sense of identity, and described learning new ways to deal with disability and discovering new ways to view oneself and life (Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012), much in agreement with the literature on mental health recovery (Anthony, 1993; Corrigan, Mueser, Bond, Drake, & Solomon, 2008; Davidson et al., 2005; Onken et al., 2007; Repper & Perkins, 2003; Roberts & Wolfson, 2004; Slade et al., 2008; van Lith, Fenner, & Schofield, 2011). A recent literature review described recovery as a multi-staged transition from being overwhelmed with disability, to ignition of hope and awareness of a better life, and learning to live with and beyond disability (Leamy et al., 2011). The qualitative results of our review, although based on limited data, seem to suggest that such processes also occur on farms. However, none of the studies explored how participants experienced the farm-based interventions, compared to other interventions, despite the fact that participants in two studies also attended other forms of rehabilitation (Kam & Siu, 2010; Pedersen, Ihlebaek, et al., 2012). Insights into similarities, as well as differences, between processes of recovery on farms and other rehabilitation services could result in a better understanding of the added value of farms, and facilitate a better match between services and needs of people with mental disorders.

To the best of our knowledge, the current research represents the first attempt to review systematically the literature on of farm-based interventions for people with mental disorders. Our literature search yielded a wealth of qualitative and observational studies on various green care interventions, and for different participant groups, suggesting that the topic of green care attracts a great amount of interest from the academic community. However, the number of high-quality studies seems to be limited, despite the calls for better evidence for green care interventions, as expressed by practitioners, researchers and healthcare professionals (Sempik, Aldridge, & Becker, 2003). The articles included in this review originated from three different countries, and were published within the last five years. This suggests that researchers are becoming aware of the importance of building stronger evidence for green care.

We recommend that future research on farm-based interventions assess functioning using validated instruments that cover multiple domains, such as the World Health Organization Disability Assessment Schedule (Chwastiak & Von Korff, 2003), WHO DAS II, and thus increase comparability across studies and populations. A second recommendation refers to the exploration of processes of recovery on farms, as compared to other rehabilitation services.

