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FEATURE ARTICLE

A prospective study of group cohesiveness in therapeutic horticulture for clinical depression

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ABSTRACT: *This study aimed to assess changes in psychological distress and social participation in adults diagnosed with clinical depression during and after participating in a therapeutic horticulture programme, and to investigate if the changes covaried with levels of group cohesiveness during the intervention. An intervention with a single-group design was repeated with different samples in successive years (pooled n = 46). In each year, five groups of 3–7 participants went through the intervention. Data were collected before, twice during, and immediately after a 12-week therapeutic horticulture programme, as well as at 3-months' follow up. Mental health assessments included the Beck Depression Inventory, the State Subscale of Spielberger State-Trait Anxiety Inventory, the Positive Affect Scale from the Positive and Negative Affect Scale, the Perceived Stress Scale, and the Therapeutic Factors Inventory–Cohesiveness Scale. The analysis of the pooled data confirmed significant beneficial change in all mental health variables during the intervention. Change from baseline in depression severity persisted at 3-months' follow up. Increased social activity after the intervention was reported for 38% of the participants. The groups quickly established strong cohesiveness, and this continued to increase during the intervention. The average level of group cohesiveness correlated positively, but not significantly, with change in all mental health outcome variables.*

KEY WORDS: *affect, anxiety, depression, group process, perceived stress.*

BACKGROUND

Depression is a serious health issue that has a tendency to recur and become chronic (Evans & Charney 2003; World Health Organization 2001); it is often associated with work disability (Lopez & Murray 1998; Ustun 1999). Beneficial treatments include cognitive behavioural and interpersonal psychotherapies and antidepressant medications (Butler *et al.* 2007). Therapies based on behavioural activation (Cuijpers *et al.* 2007; Gawrysiak *et al.* 2009; Hopko *et al.* 2004; Lejuez *et al.* 2001) and an increase in enjoyable activities are also reported to be beneficial (Hammen & Glass 1975; Jorm *et al.* 2002; Lewinsohn & Graf 1973; Zeiss *et al.* 1979). Evidence also suggests that physical exercise alleviates depression (Mead *et al.* 2009).

Therapeutic horticulture (TH) is a nature-based intervention that involves social and behavioural activation, participation in enjoyable activities, and moderate levels

of physical activity in pleasant surroundings. The present paper reports on change in mental health assessed in a TH intervention for clinical depression that was implemented within small groups. The study addresses the possibility that group cohesiveness promotes beneficial change.

Therapeutic horticulture

Therapeutic horticulture (TH) is 'a process that uses plant-related activities through which participants strive to improve their well-being through active or passive involvement' (GrowthPoint 1999, p. 4). It includes easy gardening activities, in which a person engages with nature and gains distance from everyday demands. Across cultural and national borders, TH is both a new and old strategy in nursing practice and research (Cooper Marcus & Barnes 1999; Hansen-Ketchum *et al.* 2009; Maller *et al.* 2006; Meehan 2003; Page 2008). In the UK, the term 'social horticulture' is often used instead of TH, indicating that beside its horticultural aspect, it also has a relational and social therapeutic potential (Sempik *et al.* 2003). This makes it even more relevant for nursing practice.

Despite its long clinical tradition in mental health care, there are few published studies of the use of TH for mental health problems (Sempik *et al.* 2003). Beneficial effects have been reported for anxiety (Lee *et al.* 2004; Stepney & Davis 2004) and depressive symptoms (Stepney & Davis 2004) in heterogeneous samples. Declines in depression severity, together with improvement in perceived attentional capacity, were reported for a TH intervention in clinical depression by Gonzalez *et al.* (2009). Increased social interaction was reported to be associated with levels of group integration in healthy individuals (Cho & Mattson 2004).

Depression and psychosocial issues

Depression is characterized by low levels of positive affect (Joiner & Timmons 2009). It is also highly comorbid with anxiety (Boland & Keller 2009) and associated with stress (Bergdahl & Bergdahl 2002; Melchior *et al.* 2007; Pedrelli *et al.* 2008) and reduced interest in activities (American Psychiatric Association 2000). Depression also has notable interpersonal and social aspects, including shyness (Alfano *et al.* 1994; Elovainio *et al.* 2004), interpersonal dependency (Mazure *et al.* 2000; Sanathara *et al.* 2003), and an anxious attachment style (Reinecke & Rogers 2001; Roberts *et al.* 1996). Interpersonal stress and excessive reassurance seeking are reciprocally involved with depression (Joiner & Timmons 2009). Depression is further characterized by social withdrawal

and low self-reported social skills ratings (Huprich *et al.* 2004; Joiner & Timmons 2009). Poor social skills have been reported to predict depression recurrence (Bos *et al.* 2007).

Depression and behavioural activation

Depression is also associated with inactivity, high levels of behavioural inhibition (behavioural avoidance) (Kasch *et al.* 2002; Stone & Quartermain 2005), and a lack of socially reinforcing activities related to 'active leisure' (Barge-Schaapveld *et al.* 1995).

Behavioural activation as a strategy in the treatment of depression is rooted in the behavioural tradition in psychology and was established by Lewinsohn (1974). Behavioural activation aims to move the patient from a lifestyle of behaviour avoidance into a lifestyle that is activity based (Dimidjian *et al.* 2006; Hopko *et al.* 2003). This psychotherapeutic process combines activation through positively reinforcing activities with psychotherapy sessions addressing behavioural avoidance patterns (Hopko *et al.* 2003). In the present study, we look at TH as a single behavioural activation strategy, without the coordinated psychotherapy sessions. Behavioural activation alone might be as effective as the therapeutic strategy that also includes psychotherapy for behavioural avoidance (Jacobson & Gortner 2000).

Group cohesiveness as a therapeutic quality in group activities

Group psychotherapy is effective in alleviating symptoms of depression (McDermut *et al.* 2001). Group participation has the potential to address a core variable in the course of depression, namely interpersonal functioning and support (Brown & Moran 1994).

The primary therapeutic factor related to psychotherapy in groups is group cohesiveness (Yalom 1995). Group cohesiveness involves a sense of belonging, experience of acceptance, mutual trust, and group cooperation (Lese & MacNair-Semands 2000). As group cohesiveness represents the investments in and commitment to the group by its members, it is a quality that any group formation might develop, no matter its task or focus. In cohesive groups, the members feel engaged and mutually rewarded with a feeling of being uplifted and affirmed after the group meeting (Hornsey *et al.* 2009). Following this, the development of cohesiveness might yield therapeutic benefits and facilitate social skills improvement (Bernthal & Insko 1993; Ettin 1999). In this study, we investigate the contribution of cohesiveness in a group-based TH intervention for clinical depression.

Study aims

The primary aim of this study was to assess the covariation of changes in depression severity, anxiety, positive affect, and perceived stress levels with the level of group cohesiveness in a sample of people with clinical depression during and after a TH intervention. Another aim was to investigate how the participants evaluated the social dimension of TH. This study used data from an intervention implemented with two separate samples. Pooling of the data enabled us to address an additional aim: to determine whether change measured during and after the TH intervention varied across samples.

METHODS

Design

We employed a single-group, within-subjects design with two samples in two successive years (2008 and 2009).

Participants

We included adults with DSM-IV major depression, dysthymia, or depressive phase of bipolar II disorder, and a Beck Depression Inventory (BDI) score ≥15. We excluded people with borderline personality disorder, eating disorders, post-traumatic stress disorder, schizophrenia, addictive problems that could not be controlled 6 months prior to the commencement of the study, those presently hospitalized in a psychiatric unit, and those who enjoyed gardening as a leisure activity. Participants were mainly recruited through advertisements in newspapers, but in 2009, they were also recruited from the register of the Norwegian Labour and Welfare Administration. Fifty-one participants fulfilled the criteria; 21 in 2008, and 30 in 2009. In the 2 years, five participants dropped out early in the intervention, one due to the recurrence of serious cancer, one due to a vocational rehabilitation opportunity, two because of psychological distress, and one for an unknown reason. The remaining 46 completed the intervention ($n_{2008} = 18$, $n_{2009} = 28$). The participants (10 men, 36 women) ranged in age from 25 to 65 years (mean = 46.3, SD = 11.6). Seven had bipolar II disorder, with the most recent episode depressive; 38 had major depressive disorder (recurrent); and one had major depressive disorder (single episode). The 2008 and 2009 samples were statistically equivalent in terms of sex composition ($P = 0.717$) and mean age ($P = 0.112$). At the 3-month follow up, 41 participants completed and sent in the questionnaires.

Medical information from a general practitioner (GP) on ongoing treatment was obtained for 40 participants.

Each participant brought a form to his or her GP, who thereafter filled out the form in cooperation with the participant. The participant then sent the form to the researcher. Thirteen participants attended psychotherapy of varying intensity as the only treatment, one received antidepressant medication only, and 24 received a combination of these. Two participants who did not receive any treatment at the time of recruitment were advised to consult their GP.

Research settings

The present study was part of a larger 'green care' project on mental health benefits of therapeutic activities in farm settings. Four urban farms with strong historical and cultural identity were selected for the TH project. The farms were easy to access either by bicycle, car, or bus from where the participants lived. The farmers were given basic instructions prior to the intervention and received continuing support from the researcher during the intervention periods. For more information on 'green care' approaches, see Hassink *et al*. (2010).

Intervention

The 12-week TH intervention included ordinary and easy gardening activities. The activities were not part of the ordinary farm work. Participation implied attendance twice a week in 3-hour TH sessions as a group activity. The TH sessions also allowed alone time. The participants continued their ordinary treatment during the intervention. The groups included 3–7 participants. Mean attendance was 18.4 for 24 sessions. For more details about the intervention and research setting, see Gonzalez *et al*. (2009).

Outcome measures

The BDI was used to measure depression severity (Beck & Steer 1987). Each of the 21 items consists of four response options that are statements about current depressive symptoms. The value assigned to each statement ranges from 0 (normal) to 3 (most severe). Thus, the maximum score on the BDI is 63. The internal consistency and stability of the BDI are well established. It discriminates between patients with varying degrees of depression, and it accurately reflects changes in depression intensity over time (Beck *et al*. 1988; Richter *et al*. 1998). In the present study, α fell between 0.79 and 0.90 across the measurement points.

The State-Trait Anxiety Inventory–State Subscale (STAI-SS) was used to measure current anxiety (Spielberger *et al*. 1983). Participants rate how much they feel in line with 20 descriptions of possible present states

(1 = not at all; 4 = to a great degree), with a possible maximum score of 80. The test has good construct validity and test–retest reliability. In the present study, α fell between 0.88 and 0.93 across the measurement points.

We measured positive affect with seven items from the Positive and Negative Affect Scale (PANAS-PA) (Watson *et al*. 1988). Participants rated the extent to which they currently experienced the following affects: interested, strong, enthusiastic, inspired, proud, alert, strong, and active (1 = very little; 5 = extremely). The PANAS-PA has good internal consistency and is sensitive to mood fluctuations. In the present study, α fell between 0.89 and 0.92 across the measurement points for the seven items.

The Perceived Stress Scale (PSS) contains 14 items concerning the degree to which general situations in one's life are appraised as stressful (Cohen *et al*. 1983). The four-item version that we used exhibits good predictive validity (Cohen & Williamson 1988). It includes two positively- and two negatively-stated items, aimed at assessing the frequency of experiences of stress during the preceding 4 weeks (0 = never; 4 = very often), with a maximum possible score of 16. In the present study, α fell between 0.53 and 0.66 across the measurement points.

The Therapeutic Factors Inventory Cohesiveness Scale (TFI-CS) measures socio-emotional aspects of group cohesion (Lese & MacNair-Semands 2000) and addresses group therapeutic factors described by Yalom (1995). Of the subscale's nine items, we selected seven that reflect a group member's general sense of belonging and experience of acceptance, trust, and group cooperation (Strauss *et al*. 2008). Responses are rated on a seven-point scale (1 = strongly disagree; 7 = strongly agree). A test–retest reliability of 0.93 over 1 week and $\alpha = 0.90$ were reported for this measure with all nine items (Lese & MacNair-Semands 2000). In the present study, with seven items, α fell between 0.90 and 0.93 across the measurement points.

The social aspect of TH was also addressed with a single question about whether the participants considered the social dimension of TH as important (1 = totally agree; 5 = totally disagree). Further, at the end of the intervention, the participants were asked to report whether the level of their social activity had increased. At the 3-month follow up, they reported on the level of their social activity after the intervention. The participants were also asked to answer, in writing, one open question: How did you experience taking part in the TH project?

Procedure

Potential participants addressed themselves directly to the lead researcher by telephone, and they received information about the project, an informed consent sheet, and the BDI by mail. Upon receiving their informed consent and completed BDI (screening, baseline 1, T1), the researcher contacted the potential participant by telephone and obtained a DSM-IV diagnosis with the Mini-International Neuropsychiatric Interview (MINI) (Sheehan *et al*. 1998). Different studies have demonstrated the reliability of such a telephone interview (Cacciola *et al*. 1999; Crippa *et al*. 2008; Rohde *et al*. 1997). Those who satisfied the MINI criteria for depression were included in the study.

After recruitment and inclusion, the participants were sent questionnaires by mail. In 2008, we had only two baseline assessments (T1 and T2) for BDI. In 2009, we also had double baseline (T1 and T2) for all the outcome measures. The questionnaires at the intervention start (T2) were sent together with information on practical issues and information about the farm. Beyond T1 and T2, the measurement points were as follows: after 4 weeks (T3) and 8 weeks (T4) for BDI and TFI-CS (cohesiveness), after 12 weeks (i.e. termination of the intervention) (T5) for all variables, and at 3-months' follow up (T6) for the BDI, STAI-SS, PANAS-PA, and PSS. Questionnaires were sent at each measurement point and returned by mail to the researcher within a couple of days. On occasion, a participant was called and reminded to return the completed forms.

Ethical considerations

The study was approved by the Regional Committee for Medical Research Ethics in Norway and the Norwegian Social Science Data Services. The participants received printed information about the project with the invitation to participate, and they provided written, informed consent.

Statistical analysis

We used repeated measures ANOVA (RM-ANOVA) to assess stability across baseline measurement points (T1, T2) for depression severity (BDI), anxiety (STAI-SS), positive affect (PANAS-PA), and perceived stress (PSS). As a double baseline was available for BDI in both 2008 and 2009, we used the data from both samples for the check of stability in that measure, and included year as a between-subject factor to check the comparability of the samples in levels of and pre-intervention change in depression severity. The assessment of pre-intervention stability in the other outcomes was made with the data for the 2009 sample only.

In a second set of RM-ANOVA, we assessed change over the course of the intervention for the BDI, STAI-SS, PANAS-PA, PSS, and TFI-CS. Using the pooled data, we

included year as a between-subject factor to assess whether change measured during the TH intervention was similar across years/samples, as reflected in a non-significant time–year interaction. For these analyses, we report Greenhouse–Geisser corrected degrees of freedom where appropriate. We used planned contrasts (Helmert) to determine when during the intervention BDI and TFI-CS changed most.

In a third set of RM-ANOVA, we assessed the persistence of change in the BDI, STAI-SS, PANAS-PA, and PSS at 3-months' follow up (T6), relative to the start of the intervention (T2). Again, pooling the data, we included year as a between-subject factor to assess whether the persistence of change after the TH intervention was similar across years/samples, as reflected in a non-significant time–year interaction.

Bivariate correlations (Pearson r) were calculated to assess the degree to which change in outcomes during the intervention, and persistence of change after the intervention, covaried with the average level of TFI-CS measured during the intervention (T3–T5). Change scores for the outcomes (ΔBDI, ΔSTAI-SS etc.) were the differences between T2–T5 and T5–T6, calculated so that positive scores reflected improvement in mental health.

We applied a method proposed for small samples to check for type 1 errors stemming from the nesting of patients within groups (Baldwin *et al.* 2005). We repeated some analyses using group mean scores instead of individual scores. Given the small number of 'cases' (i.e. five

groups of patients in each year), this is a very conservative assessment of change.

Missing values on single items were replaced by the mean of the scores on the remaining items for the given individual. Five people did not complete the 3-months' follow up and were excluded from analyses involving T6 scores. The data were analyzed using SPSS version 17 (SPSS, Chicago, IL, USA).

In the examination of the written answers to the open question about the experience of participation in the TH project, we looked for significant statements, recurrent themes, and phrases related to the social component of the TH experience.

RESULTS

Stability in baseline scores

Over the two baseline measurement points, depression severity remained at a moderate level (Table 1). BDI scores declined modestly, but not significantly from T1 to T2, F $(1,44) = 3.53$, $P = 0.067$, partial eta $\eta^2 = 0.07$. Neither the main effect of year nor the time–year interaction was significant ($P = 0.152$ and $P = 0.948$, respectively), implying that the two samples had similar, stable levels of depression severity before the intervention.

In the 2009 sample, anxiety did decline modestly from T1 to T2, but the change was not significant (F $(1,27) = 3.80$, $P = 0.062$, partial eta $\eta^2 = 0.12$). Levels

TABLE 1: *Means (standard deviations) for scores on the Beck Depression Inventory (BDI), Spielberger State Trait Anxiety–State Subscale (STAI-SS), Positive and Negative Affect Scale–Positive Affect (PANAS-PA), Perceived Stress Scale (PSS), and the Therapeutic Factor Inventory– Cohesiveness Subscale (TFI-CS) over the six measurement points (T1–T6)†*

Measure	Year	T1 Baseline 1	T2 Baseline 2 start	T3 4 weeks	T4 8 weeks	T5 12 weeks' end	T6 3-month follow up
BDI	Pooled	26.5 (7.4)	25.4 (7.9)	21.2 (6.6)	19.5 (7.4)	18.8 (7.8)	20.9 (9.5)
	2008	28.4 (6.3)	27.3 (6.8)	20.5 (6.2)	19.3 (7.0)	17.6 (7.4)	20.8 (9.0)
	2009	25.2 (7.8)	24.1 (8.4)	21.6 (7.0)	19.6 (7.7)	19.6 (8.0)	20.4 (10.3)
STAI-SS	Pooled	53.3 (11.4)	55.9 (10.4)			51.4 (9.3)	53.6 (10.8)
	2008		56.8 (8.8)			49.3 (9.4)	53.1 (10.4)
	2009		55.4 (11.4)			52.7 (9.2)	52.7 (11.4)
PANAS-PA	Pooled	2.09 (0.72)	2.25 (0.82)			2.51 (0.79)	2.36 (0.89)
	2008		2.37 (0.75)			2.75 (0.79)	2.42 (0.87)
	2009		2.18 (0.86)			2.36 (0.77)	2.34 (0.88)
PSS	Pooled	14.2 (2.4)	14.1 (2.3)			13.0 (2.3)	13.3 (2.4)
	2008		14.2 (2.4)			13.0 (2.4)	12.9 (2.7)
	2009		14.0 (2.2)			13.0 (2.3)	13.6 (2.3)
TFI-CS	Pooled			5.66 (0.97)	5.81 (0.94)	5.89 (0.96)	
	2008			5.78 (0.92)	5.57 (1.03)	5.82 (0.91)	
	2009			5.72 (0.95)	5.83 (0.98)	5.93 (0.99)	

†For T1–T5, pooled $n = 46$. For T6, $n = 41$.

also remained stable over the baseline measures for positive affect (F (1,27) = 1.17, P = 0.289, partial eta η^2 = 0.04) and perceived stress (F (1,27) = 0.16, P = 0.692, partial eta η^2 = 0.01).

Change in mental health outcomes during the intervention

Change in all of the outcomes indicated improvement in mental health during the intervention in each of the two samples/years (Table 1). The main effect of time in the RM-ANOVA confirmed that the improvement from T2 to T5 was statistically significant for the BDI, STAI-SS, PANAS-PA, and PSS (Table 2). The overall levels of the outcomes and the patterns of change in the outcomes did not vary substantially across the samples/years, as reflected, respectively, in the non-significant main effect of year and the non-significant time–year interaction in each analysis (Table 2). Looking only at the BDI, planned contrasts indicated that the T2 mean BDI was significantly higher than the mean for T3–T5 (F (1,45) = 32.75,

P < 0.001, partial η^2 = 0.42); the T3 mean was significantly higher than the mean for T4 and T5 (F (1,45) = 6.60, P = 0.014, partial η^2 = 0.13), and the T4 and T5 means did not differ (F (1,45) = 0.86, P = 0.358, partial η^2 = 0.02) (Table 1). These tests confirm the impression given by the means that most of the decline in depression severity occurred during the first 4 weeks of the intervention.

Persistence of change in mental health outcomes after the intervention

Relative to baseline (T2), depression severity remained significantly lower at 3-months' follow up (Tables 1,2). The improvements in perceived stress, anxiety and positive affect had, however, dissipated to levels that no longer differed significantly from their respective T2 levels. The main effects of year and the time–year interactions were not significant (Table 2), indicating that the overall levels of the outcomes and the persistence of improvement at 3-months' follow up were similar across the two samples/years.

TABLE 2: *Tests of change in scores on the Beck Depression Inventory (BDI), Spielberger State Trait Anxiety–State Subscale (STAI-SS), Positive and Negative Affect Scale–Positive Affect (PANAS-PA), and Perceived Stress Scale (PSS) during (T2–T5) and after (T2–T6) the therapeutic horticulture (TH) intervention†*

Measure	Measurement point	Effect	F	P-value	Partial η^2
BDI	T2–T5	Time	20.94	<0.001	0.32
		Year	0.00	0.975	<0.01
		Time × year	3.59	0.065	0.08
	T2–T6	Time	13.76	0.001	0.26
		Year	0.52	0.474	0.01
		Time × year	0.94	0.339	0.02
STAI-SS	T2–T5	Time	9.49	0.004	0.18
		Year	0.16	0.696	<0.01
		Time × year	2.15	0.150	0.05
	T2–T6	Time	2.82	0.101	0.07
		Year	0.24	0.629	0.01
		Time × year	0.29	0.595	0.01
PANAS-PA	T2–T5	Time	5.48	0.024	0.11
		Year	1.94	0.170	0.04
		Time × year	0.75	0.391	0.02
	T2–T6	Time	1.52	0.225	0.04
		Year	0.80	0.378	0.02
		Time × year	0.16	0.687	<0.01
PSS	T2–T5	Time	9.63	0.003	0.18
		Year	0.02	0.899	<0.01
		Time × year	0.10	0.758	<0.01
	T2–T6	Time	3.67	0.063	0.09
		Year	0.00	0.983	<0.01
		Time × year	2.14	0.151	0.05

†For BDI, degree of freedom (df) = 2.46, 108.42 for the analysis of T2–T5 change. For the other measures, df = 1, 44 for analyses of T2–T5 change, and df = 1, 39 for the analyses of T2–T6 change. Year is included as a between-subject factor to determine whether the pattern of change varies across groups taken through the TH intervention in the two successive years.

Change in group cohesiveness during the intervention

The level of TFI-CS (cohesiveness) was high after 4 weeks of treatment, and it increased slightly during the following weeks (T3–T5: F (1.69,76.2) = 3.21, P = 0.054, η^2 = 0.067). Planned contrasts showed that the mean TFI-CS score at T3 was significantly lower than the mean T4–T5 scores (F (1,45) = 4.04, P = 0.050, partial η^2 = 0.08); the T4 and T5 means did not differ (F (1,45) = 1.30, P = 0.260, partial η^2 = 0.03) (Table 1). Neither the main effect of year nor the time–year interaction was significant (P = 0.714 and P = 0.836, respectively); levels of and change in TFI-CS were similar across samples/years.

Correlations between cohesiveness and changes in the outcome measures

The level of TFI-CS correlated positively with improvements in each of the mental health outcome measures (Table 3); however, none of the correlations were significant. This might have resulted from the restriction of range in the TFI-CS variable; scores were, with only one exception, above the mid-point of the scale (see Table 1).

Analysis of aggregated data

To address the concern of the inflated type 1 error rate with the analysis of data from individuals nested in groups, we checked our conclusions about change in the mental health outcome measures by treating the 10 different groups over the two seasons as cases. Taking the group means from T2–T6 as the data, the RM-ANOVA largely affirmed the results obtained with the individual-level data; the decline in aggregated scores over the course of the intervention (T2–T5) was statistically significant for the BDI (F (3,24) = 25.57, P < 0.001, partial η^2 = 0.76), STAI-SS (F (1,8) = 9.19, P = 0.014, partial η^2 = 0.55), and for PSS (F (1,8) = 21.66, P = 0.002, partial η^2 = 0.73). The same could not be said for the PANAS-PA (F (1,8) = 2.87, P = 0.129, partial η^2 = 0.26).

The RM-ANOVA with the group-level data also affirmed the persistence of change in some of the mental health outcomes from baseline to 3-months' follow up (T2–T6). For the BDI, F (1,8) = 21.02, P = 0.002, partial η^2 = 0.72; for the STAI-SS, F (1,8) = 4.98, P = 0.056, partial η^2 = 0.38; for the PANAS-PA, F (1,8) = 2.35, P = 0.16, partial η^2 = 0.23; and for the PSS, F (1,8) = 7.75, P = 0.024, partial η^2 = 0.49. The results of these conservative tests strengthen confidence in the individual-level results for the BDI, STAI-SS, and PSS. They do suggest, however, that the individual PANAS-PA results should be regarded with some caution.

Exploration of the group dimension

The majority of the participants (93%) answered from 'agree' to 'totally agree' that the social component of TH intervention was important. After 12 weeks of intervention (T5), 38% of participants reported that their social activity level had increased. Of those who provided data at T6, 31% still had increased social activity at the 3-month follow up, implying that the increase was stable over the period.

The qualitative data related to the theme 'significance of group membership' emphasized that being in a group was important. Participants expressed appreciation of the group atmosphere and group composition. Mutual trust and respect, possibilities for being oneself in the group, being together with people in the same situation, and improvement in social security were highlighted. However, some participants felt that participation in the group had been challenging, especially as a sole man in a group. The participants would have wanted to continue in the TH programme, expressed sadness that it had concluded, and hoped for it to become permanent in the future.

TABLE 3: *Correlations between the average level of scores on the Therapeutic Factor Inventory–Cohesiveness Scale during the therapeutic horticulture (TH) intervention and change in scores on the Beck Depression Inventory (ΔBDI), Spielberger Trait Anxiety State Subscale (ΔSTAI-SS), Positive and Negative Affect Scale–Positive Affect (ΔPANAS-PA), and Perceived Stress Scale (ΔPSS) between T2 and T5, and between T5 and T6†*

Time	ΔBDI	ΔSTAI-SS	ΔPANAS-PA	ΔPSS
T2–T5				
r	0.043	0.242	0.235	0.059
P-value	0.778	0.104	0.116	0.697
T5–T6				
r	0.230	0.291	0.146	0.073
P	0.147	0.065	0.362	0.651

†From T2–T5, n = 46. From T5–T6, n = 41.

DISCUSSION

We found no significant changes across baseline BDI scores in the pooled data set, and no significant changes across baseline scores for anxiety, positive affect, and perceived stress in the 2009 data. This implies that the level of distress was stable during the period prior to the intervention, and that receiving treatment as usual during that period did little to reduce symptoms.

Depression severity, anxiety, and stress declined during the intervention, while positive affect increased. Depression severity had already declined significantly after 4 weeks of TH intervention and continued to do so in the following 4 weeks. These findings are in line with the results of Stepney and Davis (2004) and Lee et al. (2004) in TH research. The findings also fit well with studies on depression and enjoyable activities (Lewinsohn & Graf 1973; Zeiss et al. 1979) and a meta-analysis related to behavioural activation treatments of depression (Cuijpers et al. 2007).

At the 3-month follow up, the mean BDI still remained significantly lower than baseline. In contrast, scores on the STAI-SS, PANAS-PA, and PSS showed some relapse.

We did not find that the pattern of change differed from one year to the next in any of the analyses of change. This was true for the analyses of change during the intervention, as well as for the analyses of the persistence of change after the intervention. This means that despite different weather conditions, participants, group cultures, and so on, the findings were in essence replicated. This reinforces confidence in the results.

The high and fairly stable levels of TFI-CS (cohesiveness) underline the importance of the group throughout the intervention. The slight increase in TFI-CS during the intervention suggests that the groups became still more important to their members as time went by, which might also explain the sadness experienced when concluding the project. However, it is important to bear in mind that the intent of the TH intervention was not to strengthen group processes, as it also provided possibilities for being alone. Despite this, considering that all 10 groups developed high levels of group cohesiveness and acted as well-functioning groups, it is tempting to assume that the TH activities fostered benign group processes. This assumption is supported by the fact that commitment to the group task is the strongest component in establishing group cohesiveness (Mullen & Copper 1994).

The uniformly positive correlations between improvement in the mental health outcomes and the general level of group cohesiveness are consistent with the idea that group cohesiveness serves beneficial change. The correlations were, however, uniformly non-significant, and the strongest was only moderate in size. Arguably, any contribution of group cohesiveness to beneficial change would, according to the present results, have been quite modest at most. However, the severely restricted range of cohesiveness scores might have worked against the detection of stronger correlations with change in the outcomes. The change in outcomes might of course also be due to reasons other than group cohesiveness. The strongest

correlations between group cohesiveness were for change in anxiety during and after the intervention. Given the associations between depression and social skills difficulties (Huprich et al. 2004; Joiner & Timmons 2009), participation in the TH group activities might have led to decreased social anxiety and increased social skills. This might explain why the participants evaluated the social aspect of the TH intervention so positively. It might also explain why social activity had increased for more than one-third of the participants by the end of the intervention and at the 3-months' follow up.

The qualities of the experience of participating in the group, reported in the open-ended data, appear to be closely related to an important therapeutic factor in group psychotherapy, namely, universality (Yalom 1995). Universality has to do with the participants' experience of sharing much in common, and it can work to strengthen group cohesion. The sadness the participants expressed concerning the end of the project, as well as their hopes for it to be permanent, also give an indication that the participants attached significance to each other and to the group as a whole. The fact that 93% answered that the social component of the TH intervention was important gives some indication of how to organize a TH programme for clients diagnosed with clinical depression in clinical settings.

The present study has several limitations. First, we did not have a control group, and this limits conclusions about causation. The data collection was planned and approved as a randomized control design, but despite extensive efforts at recruiting participants in both intervention periods, we did not succeed in enrolling a large number of participants. In addition, candidates for participation expressed hesitation about entering a control group. Given the likelihood of losing a large proportion of an already small sample, we decided in each season to adopt a single-group design. Although the multiple measurement structure we adopted enabled us to track change in conjunction with participation (Shadish et al. 2002), we still cannot with complete confidence attribute the measured changes to the TH intervention. Likewise, with the recruitment procedure we used, we have to assume that the participants were motivated to change their condition, and so were likely to notice some improvement. Despite this, even highly-motivated participants can become demotivated by aspects of an intervention. We observed few such problems with our participants.

Another limitation of the study has to do with the lack of an early measure of group cohesiveness (e.g. obtained after one or two sessions). This hindered investigation of the development of group cohesiveness as a possible mediator of beneficial change.

Despite its limitations, this study has important strengths. First, the use of multiple measurement points, including double baselines and a follow up, provided some leverage for distinguishing change due to the intervention from change per se (i.e. with ongoing psychotherapy and medication). Second, the multiple measures also enabled a determination that the most substantial change in depression severity took place in the initial weeks of the intervention. Third, when implemented with two different samples in successive years, the intervention yielded similar results. This indicates that despite the various differences across years, mental health improved following the start of the intervention, after a period of relatively stable symptoms of distress prior to the intervention. Fourth, responses to the open question about the group experiences affirm the importance assigned to the group, as also seen in the high cohesiveness scores.

CONCLUSIONS AND RESEARCH RECOMMENDATIONS

The findings suggest that TH can be a beneficial supplementary intervention in clinical depression. Organizing TH as a group activity is relevant and feasible. It can easily be implemented in inpatient and outpatient nursing practice, bearing in mind that participants at times have a need for being and working alone.

Further research can sharpen the focus on social aspects of TH by investigating the development of group cohesiveness as a mediator of beneficial change in the therapeutic process. It can also consider whether TH, as group-based behavioural activation, contributes to improved interpersonal style and social skills. Studies with a randomized control trial design would be helpful, but in our experience, it is difficult to implement, especially with a long TH programme in an area with a short growing season. An alternative approach that might be implemented in lower latitudes or in greenhouse settings could involve staggering the start dates, so that some participants start the programme 4 weeks before others. Our data indicate that most of the reduction in depression severity occurs during the first 4 weeks of intervention.

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