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Review article

Behavioral activation treatments of depression: A meta-analysis

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Abstract

Activity scheduling is a behavioral treatment of depression in which patients learn to monitor their mood and daily activities, and how to increase the number of pleasant activities and to increase positive interactions with their environment. We conducted a meta-analysis of randomized effect studies of activity scheduling. Sixteen studies with 780 subjects were included. The pooled effect size indicating the difference between intervention and control conditions at post-test was 0.87 (95% CI: 0.60~1.15). This is a large effect. Heterogeneity was low in all analyses. The comparisons with other psychological treatments at post-test resulted in a non-significant pooled effect size of 0.13 in favor of activity scheduling. In ten studies activity scheduling was compared to cognitive therapy, and the pooled effect size indicating the difference between these two types of treatment was 0.02. The changes from post-test to follow-up for activity scheduling were non-significant, indicating that the benefits of the treatments were retained at follow-up. The differences between activity scheduling and cognitive therapy at follow-up were also non-significant. Activity scheduling is an attractive treatment for depression, not only because it is relatively uncomplicated, time-efficient and does not require complex skills from patients or therapist, but also because this meta-analysis found clear indications that it is effective.

Keywords: Activity scheduling; Depression; Meta-analysis; Cognitive behavior therapy

Contents

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1. Introduction

It is already more than three decades ago that research showed that there is a significant relationship between mood and the number of pleasant activities engaged in (Lewinsohn & Graf, 1973; Lewinsohn & Libet, 1972; Gallagher, 1981); that depressed individuals find fewer activities pleasant, engage in pleasant activities less frequently, and obtain therefore less positive reinforcement than other individuals (MacPhillamy & Lewinsohn, 1974).

Based on these premises, Lewinsohn, Biglan and Zeiss (1976) developed a behavioral treatment of depression, in which patients learn techniques to monitor their mood and daily activities, and to see the connection between these. Then the patients learn how to develop a plan to increase number of pleasant activities and to increase positive interactions with their environment. In this approach, specific attention is paid to social skills and interactions with other people.

In the seventies and eighties, several trials were conducted in which the effects of this approach were examined (Barrera, 1979; McNamara & Horan, 1986; Zeiss, Lewinsohn & Munoz, 1979). Most of these studies found promising results. Other cognitive behavioral treatments developed in that period integrated activity scheduling into their manual as one of the basic elements. The most important examples of these treatments include cognitive therapy as developed by Beck, Rush, Shaw and Emery (1979), and the "Coping with Depression" course, as developed by Lewinsohn, Antonuccio, Steinmetz and Teri (1984). Both treatment modalities have been examined in dozens of studies, and there is no doubt that these treatments are effective. However, it is not clear what the contribution of activity scheduling is to these effects.

Since that period, activity scheduling has not received much attention by researchers, except for an important dismantling study (Jacobson et al., 1996), and the use of activity scheduling in specific patient groups in which other psychological treatments are less feasible. In the dismantling study by Jacobson and colleagues in the nineties the core elements of cognitive behavioral treatment were compared to each other and to the full package (Jacobson et al., 1996). Although this study indicated that activity scheduling is an effective treatment for depression on its own, this has not prompted researchers to further examine the effects of this approach.

Other more recent approaches have used activity scheduling in difficult target populations, in which more complex approaches are not feasible. For example, it has been used with success in dementia patients, after the training of their caregivers in the principles of activity scheduling (Teri, Logsdon, Uomoto & McCurry, 1997). Because activity scheduling is a relatively uncomplicated and time-efficient method for treating depression, it has also been used recently with success in a pilot project with psychiatric inpatients (Hopko, Lejuez, Lepage, Hopko & McNeil, 2003).

Although activity scheduling seems to be an interesting treatment approach for depression, and recent studies show that it is a useful method for specific target populations, no formal meta-analysis of activity scheduling has been conducted until now (NICE, 2004). We decided, therefore, to conduct a meta-analysis to examine the effects of activity scheduling on depression, on the relative effects of activity scheduling compared to other treatments, and on the longer term effects.

2. Method

2.1. Identification and selection of studies

Studies were traced by means of several methods. First, we used a large database of 777 papers on the psychological treatment of depression in general. This database was developed through a comprehensive literature search (from 1966 to March 2005) in which we examined 5178 abstracts in Pubmed (1224 abstracts), Psycinfo (1336), Embase (1118) and the Cochrane Central Register of Controlled Trials (1500). We identified these abstracts by combining terms indicative of psychological treatment (psychotherapy, psychological treatment, cognitive therapy, behavior therapy, interpersonal therapy, reminiscence, life review) and depression (both MeSH-terms and text words). For this database, we also collected the primary studies from 22 meta-analyses of psychological treatment of depression (Cuijpers & Dekker, 2005). For the current study, we examined the abstracts of these 777 studies, and selected the ones which focused on activity scheduling. In addition, we examined references of an earlier review on activity scheduling (NICE, 2004), and we reviewed reference lists of retrieved papers.

We included studies in which (–) effects of activity scheduling (–) on adults (–) with a depressive disorder or an elevated level of depressive symptomatology, (–) were compared to a control condition or another (psychological or pharmacological) treatment (–) in a randomized controlled trial. No language restrictions were applied.

Table 1
Selected characteristics of controlled and comparative studies on activity scheduling

1st author	C	Population	Recr	Definition of depression	Conditions	*N*	N_{se}	Frm	Measurements	Measures
Barrera (1979)	US	Adults	Com	MMPI criteria	1. Activity scheduling	10	8	GRP	Pre, post, 1, 7 mn	MMPI-D, BDI
					2. WL	10				
Comas-Diaz (1981)	US	Low SES women	Com	Depressed (not further specified)	1. CT	8	nr	GRP	Pre, post, 5 week	BDI; HRSD
					2. Activity scheduling	8				
					3. WL	10				
Gallagher (1981)	US	Elderly	Clin	NR	1. Activity scheduling	14	10	GRP	Pre	MMPI-d, BDI Zung,
					2. Supportive therapy	14			Post	
Gallagher and Thompson (1982)	US	Elderly	Com	MDD (SADS/RDC)+ HRSD ⩾ 14+BDI ⩾ 17	1. CBT	10	16	IND	Pre, Post, 1½, 3, 6, 12 month	HRSD
					2. Activity scheduling	10				BDI
					3. Psychodynamic ther	10				Zung
Hopko, Lejuez, Lepage, Hopko and McNeil (2003)	US	Psychiat inpatients	Clin	MDD	1. Activity scheduling	10	4–5	IND	Pre, post	BDI
					2. Nondirective therapy	15				
Jacobson et al. (1996)	US	Adults	Com/clin	MDD (SCID/DSM-III-R)+ BDI ⩾ 20+HRSD ⩾ 14	1. Activity scheduling	57	20	IND	Pre, post, 6, 12, 24 mn	BDI, HRSD
					2. CT	44				
					3. Act sched+CT	50				
McNamara and Horan (1986)	US	Young adults (19–31)	Clin	BDI ⩾ 18+HRSD ⩾ 20	1. CT	10	8–10	IND	Pre, post, 2 mn	BDI, HRSD
					2. Activity scheduling	10				
					3. CT+act schedul	10				
					4. High demand control	10				
Padfield (1976)	US	Low SES women	Com	Depr disorder Grinker Int.	1. Activity scheduling	12	Nr	IND	Pre, post	Zung
					2. Counseling	12				
Shaw (1977)	US	Young adults (18–26)	Com	BDI ⩾ 18+HRSD ⩾ 20+ VAS ⩾ 40	1. CT	8	8	GRP	Pre, post, 1 mn	BDI, HRSD
					2. Activity scheduling	8				
					3. Nondirective control	8				
					4. WL	8				

Taylor and Marshall (1977)	Au	Young adults (18–26)	Com	BDI ⩾ 13 + D-scale ⩾ 30	1. CT	7	6	IND	Pre, post, 5 week	BDI, D-30
					2. Activity scheduling	7				
					3. CT + Act schedul	7				
					4. WL	7				
Teri et al. (1997)	US	Dementia patients	Clin	MDD or minD (RDC/DSM)	1. Activity scheduling	23	9	IND	Pre	HRSD
					2. Problem solving	19			Post	BDI
					3. CAU	10			6 mn	CSDD
					4. WL	20				
Thompson and Gallagher (1984)	US	Elderly	Nr	MDD; HRSD ⩾ 14; BDI ⩾ 16	1. BT	17	16–20	IND	Pre	HRSD
					2. CBT	11			Post, 1½, 3, 6,	BDI
					3. PD	14			12, 24 mn	
					4. WL (6-weeks)	10				
Thompson, Gallagher and Breckenridge (1987)	US	Elderly	Com	MDD (RDC); BDI ⩾ 17; HRSD ⩾ 14	1. CT	27	16–20	IND	Pre	BDI
					2. BT	25				HRSD
					3. PD	24			Post	BSI-D
					4. WL(6-weeks)	19				
Wilson (1982)	Au	Adults (20–55)	Com	BDI ⩾ 20 + selfreported depression ⩾ 2 months	1. Act Sched + AD	11	7	IND	Pre, post, 6 mn	BDI, depression scale
					2. Relaxation + AD		11			
					3. AD + min contact		11			
					4. Act Sched + PLAC		11			
					5. Relaxation + PLAC		11			
					6. Min contact + PLAC		11			
Wilson, Goldin and Charbonneau (1983)	Au	Adults (20–60)	Com	BDI ⩾ 17 + selfreported depr ⩾ 3 months	1. CT	8	8	IND	Pre, post, 5 mn	HRSD, BDI
					2. Activity scheduling	8				
					3. WL	9				
Zeiss, Lewinsohn and Munoz (1979)	US	Adults (19–68)	Com	MMPI criteria + Grinker criteria	1. CT	11	12	IND	Pre, post, 1 mn	MMPI-D
					2. Activ Scheduling	11				
					3. Social skills training	11				
					4. WL	33				

Abbreviations: C: country; Recr: recruitment; *N*: number of subjects; N_{se}: number of sessions; Frm: format; Com: community recruitment; WL: waiting list; GRP: group treatment; IND: individual treatment; mn: months; wk: weeks; CT: cognitive therapy; nr: not reported; clin: clinical sample; MDD: major depressive disorder; Act sched: activity scheduling; Au: Australia; minD: minor depression.

We considered an intervention to be activity scheduling when the registration of pleasant activities and the increase of positive interactions between a person and his or her environment were the core elements of the treatment. Social skills training could be a part of the intervention. Although this intervention has been developed by Lewinsohn et al. (1976), we also included studies that used the principles of this intervention, but did not refer directly to the work of Lewinsohn.

2.2. Quality assessment

The methodological quality of the studies was assessed using four basic criteria (Higgins & Green, 2005): allocation to conditions was done by an independent (third) party; adequacy of random allocation concealment to respondents; blinding of assessors of outcomes; and completeness of follow-up data.

2.3. Meta-analysis

We calculated effect sizes (d) by subtracting (at post-test) the average score of the control group (M_e) from the average score of the experimental group (M_c) and dividing the result by the pooled standard deviations of the experimental and control groups (SD_{ec}; Hedges & Olkin,1985; Cooper & Hedges, 1994). An effect size of 0.5 thus indicates that the mean of the experimental group is half a standard deviation larger than the mean of the control group. Effect sizes of .56 to 1.2 can be assumed to be large, while effect sizes of .33 to .55 are moderate, and effect sizes of 0 to .32 are small (Lipsey & Wilson, 1993).

In calculations of effect sizes we only used those instruments that explicitly measure depression (Table 1). If more than one depression measure was used, the mean of the effect sizes was calculated, so that each study (or contrast group) only had one effect size.

To calculate pooled mean effect sizes, we used the computer program Comprehensive Meta-analysis (version 2.2.021), developed for support in meta-analysis. As we expected considerable heterogeneity, we decided to calculate mean effect sizes both with the random effects model and the fixed effects model. However, because heterogeneity was low in all analyses, and the differences between the results based on the fixed and those based on the random effects were very small, we present only the results of the analyses based on the fixed effects model.

As indicator of homogeneity, we calculated Cochran's heterogeneity statistic Q. With this statistic the null hypothesis is tested that effect sizes from each of the studies were similar enough that a common population effect size could be calculated (Cochran, 1954). Cochran's Q was calculated using the following formula:

$$Q = \sum_{i=l}^{k} w_i (d_i - d_w)^2$$

where d_i is the effect size index for the ith study, w_i the weight for that particular effect size and d_w is the weighted average effect size from all studies. The significance of Q is determined by a chi-squared distribution with $k-1$ degrees of freedom where k is the number of studies included in the analysis.

We also calculated the I^2-statistic, which is an indicator of heterogeneity in percentages ($I^2 = 100\% \times (Q - df)/Q$, where Q is Cochran's heterogeneity statistic and df the degrees of freedom). A value of 0% indicates no observed heterogeneity, and larger values show increasing heterogeneity, with 25% as low, 50% as moderate, and 75% as high heterogeneity (Higgins, Thompson, Deeks & Altman, 2003).

We examined whether the effect sizes of specific subgroups differed from each other, with the subgroup analyses as implemented in Comprehensive Meta-analysis version 2.2.021.

3. Results

3.1. Description of studies

Sixteen studies, with a total of 780 subjects (241 in the Activity scheduling conditions, 367 in other intervention conditions, and 172 in the control conditions) met the inclusion criteria and were included in the current study. Selected characteristics of the included studies are described in Table 1.

In 10 studies, subjects were recruited from the community, while in four studies subjects were recruited from clinical settings (in the two other studies, a mixed recruitment method was used or the recruitment method was not reported. Five studies were aimed at older adults, and the remaining eleven studies focused on younger adults. Two studies focused on women with lower socio-economic status, three others focused on younger adults (mostly students), one on psychiatric inpatients, and one other on dementia patients. In five studies, the participating subjects had to meet diagnostic criteria for a major depression (in one study subjects with minor depression were also included). The remaining eleven studies included subjects who scored high on a self-rating depression, or used another definition of depression. In four studies the activity scheduling intervention was delivered in group format, in the other twelve studies in individual format. Number of sessions varied between four and twenty. In ten studies, activity scheduling was compared to a control condition; seven of the ten used a waiting list control group, while three used a psychological placebo intervention. Activity scheduling was compared to other treatments in fourteen studies, with eighteen comparisons between activity scheduling and another psychological treatment. Activity scheduling was compared to cognitive therapy in ten studies. In fourteen of the sixteen studies the BDI was used as an outcome measure. Thirteen studies were conducted in the United States, and three in Australia.

The quality of studies was not optimal. None of the studies reported that allocation to conditions was conducted by an independent party. Concealment of random allocation to respondents was not possible or not reported in any of the studies. However, ten of the sixteen studies reported blinding of assessors of outcomes. Drop-out numbers ranged from 2 to 39%, but five studies did not report drop-out rates. In none of the studies intention-to-treat analyses were conducted.

3.2. Effects of activity scheduling at post-test

We could compare effects of activity scheduling to control conditions at post-test in ten studies (Table 2), totaling 239 subjects (106 in the Activity scheduling conditions, and 133 in the control conditions). The mean effect size was 0.87 (95% CI: 0.60~1.15). Heterogeneity was low ($Q=11.37$; n.s.; $I^2=20.87\%$). The effect sizes and 95% confidence intervals of the individual contrast groups are plotted in Fig. 1. Because heterogeneity was low, we did not conduct subgroup analyses.

3.3. Comparison to other treatments

Activity scheduling could be compared directly to other psychological treatments in 18 contrast groups (in 14 studies). The pooled effect size indicating the difference between activity scheduling and other psychological treatments was 0.13, in favor of activity scheduling. This difference was not significant (95% CI: −0.05~0.30), and heterogeneity (indicated by I^2) was zero.

Table 2
Meta-analyses of studies examining the effects of activity scheduling on depression compared to control conditions at post-test: Overall results and subgroup analyses

Study	N_{comp}	d [a]	95% CI	Q [b]	I^2 (%)
Overall effects					
AS vs. control	10	0.87	0.60~1.15	11.37 n.s.	20.87
Comparison to other treatments					
AS vs. all other treatments	18	0.12	−0.05~0.29	8.91 n.s.	0
AS vs. CT	10	0.01	−0.22~0.24	4.35 n.s.	0
AS vs. CT+AS	3	−0.01	−0.34~0.33	2.72 n.s.	26.41
CT vs. CT+AS	3	−0.16	−0.19~0.52	2.89 n.s.	30.84
Effects at follow-up					
Post-test to 1–3 months follow-up	5	0.18	−0.24~0.60	4.28 n.s.	6.44
Post-test to 4–6 months follow-up	5	0.03	−0.25~0.31	0.35 n.s.	0.00
Post-test to 7–12 months follow-up	2	0.53	−0.11~1.17	2.07 n.s.	51.71
Comparison to CT at follow-up					
At 1–3 months follow-up	4	0.02	−0.47~0.51	1.61 n.s.	0.00
At 4–6 months follow-up	4	−0.13	−0.46~0.20	2.43 n.s.	0.00

[a] A positive d indicates that the first treatment is more effective than the second.
[b] None of the Q-statistics was significant ($p<0.05$).

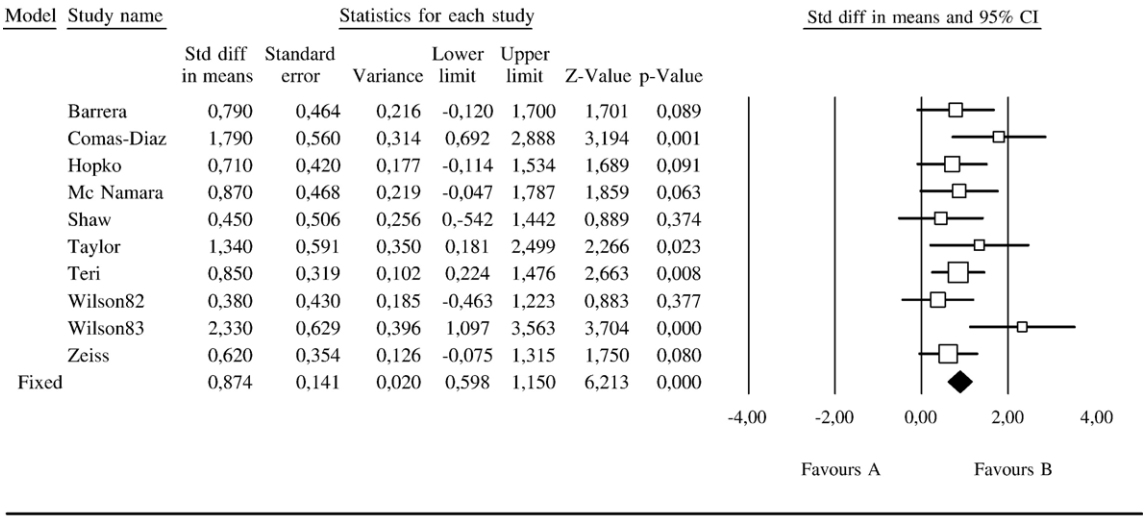

Fig. 1. Standardized effect sizes of activity scheduling for depression compared to control conditions at post-test.

In ten studies activity scheduling was compared to cognitive therapy. The pooled effect size indicating the difference between these two types of treatment was 0.02 (95% CI: −0.21~0.25), with heterogeneity (I^2) again being zero. In three studies, activity scheduling was compared to the combination of cognitive therapy and activity scheduling. The resulting pooled effect size indicating the difference between the two was −0.01 (not significant; fixed effects model; 95% CI: −0.34~0.33), with low heterogeneity (I^2 = 26.41). In the same three studies, the effects of cognitive therapy could be compared to the combination of cognitive therapy and activity scheduling. The resulting pooled effect size was 0.16 (not significant; fixed effects model; 95% CI: −0.19~0.52), with low heterogeneity (I^2 = 30.84).

Activity scheduling was compared to antidepressant medication in only one study (Wilson, 1982; effect size 0.26 in favor of activity scheduling).

3.4. Effects at follow-up

The effects of activity scheduling compared to a control condition at follow-up could be calculated in only two studies (because most studies used a waiting list control condition). The effect sizes ranged from 0.88 (at two months follow-up), to 0.54 (at six months follow-up), suggesting some support for the effectiveness of activity scheduling at the longer term.

We could calculate the effect size indicating the change between post-test and follow-up in nine studies. In five studies, the follow-up period was between one and three months. The resulting pooled effect size was 0.18 (95% CI: −0.25~0.31), indicating a small, but non-significant improvement from post-test to follow-up. The change between post-test and four to six months follow-up could also be calculated in five studies, and resulted in a pooled effect size of 0.03 (95% CI: −0.25~0.31). The change from post-test to seven to twelve months follow-up was presented in only two studies (d = 0.53; 95% CI: −0.11~1.17).

The effects of activity scheduling at follow-up could be compared to the effects of cognitive therapy at follow-up in seven studies. The four comparisons at one to three months follow-up resulted in a pooled effect size of 0.02 (95% CI: −0.47~0.51), while the four comparisons at four to six months follow-up had a pooled effect size of −0.13 (−0.46~0.20), indicating non-significant differences between cognitive therapy and activity scheduling at follow-up. Only one study compared cognitive therapy to activity scheduling at one-year follow-up (d = 0.30).

4. Discussion

We found clear indications that activity scheduling is effective in the treatment of depression in adults. The overall effect size of 0.87 is large (Lipsey & Wilson, 1993), and comparable to effect sizes found for other psychological

treatments and treatment with antidepressants (Churchill et al., 2001; Gloaguen, Cottrauxa, Cucherata & Blackburn, 1998). The low heterogeneity in our meta-analyses indicated that the studies, target populations and interventions are probably highly comparable to each other.

Several of the studies on activity scheduling have compared it to cognitive therapy, and these comparisons indicated that activity scheduling and cognitive therapy are equally effective. This is true directly after the interventions at post-test, but also at follow-up periods up to six months.

These results should be considered with caution, however, because of the limitations of our study. First, the number of studies was small. Second, several studies were included with very small sample sizes. Third, the quality of the included studies was not optimal. Fourth, we found only one study in which activity scheduling was compared to antidepressant medication. Fifth, most studies used samples that were recruited from the community, and few studies used clinical populations. And sixth, in most studies waiting list control conditions were used, which typically result in larger effect sizes than care-as-usual or pill placebo control conditions.

Despite these limitations, effects of activity scheduling seem to be convincing, particularly because heterogeneity was low and all studies pointed in the same direction. Considering this, it is remarkable that activity scheduling has received so little attention from researchers in the past years. Although the study by Jacobson and colleagues in the nineties (Jacobson et al., 1996) pointed in a similar direction, and has received much attention from researchers, this has not resulted in more efficacy and effectiveness studies on activity scheduling.

One of the attractive aspects of activity scheduling is that it is a relatively simple intervention, easy to understand for depressed patients and does not require difficult or complex skills from patients and therapists (Lejuez, Hopko & Hopko, 2001). This makes this intervention especially interesting for 'difficult' target populations. Studies by Teri et al. (1997) in depressed dementia patients and the study by Hopko and colleagues in depressed psychiatric inpatients (Hopko et al., 2003) show that this may be a useful approach. More research using this intervention in difficult populations is certainly needed.

Our meta-analysis found indications that activity scheduling is as effective as cognitive therapy and as other psychological treatments. This can be seen as support for the hypothesis that all psychological treatments are equally effective and that the effects of a treatment are not achieved by the techniques of the treatment itself, but by common factors, such as an intensive relationship between a patient and a therapist, the expectation of a patient to be cured, the 'ritual' of the therapy, and the presentation of a clear 'rationale' with which the problems of the patient can be explained (Lambert & Barley, 2001). The discussion about these common factors and equal effects of all psychological treatments has been going on for three decades now (Luborsky, Singer & Luborsky, 1975), and has resulted in support both for the common factors and the therapy-specific techniques.

Accordingly, it may be possible that effects of activity scheduling are realized completely, or to a certain degree by these common factors. If this is the case, the advantages of activity scheduling are still large: a simple, easy to understand treatment, which does not require complex skills from therapists, which on the other hand does meet all requirements for common factors to be active. From this perspective, it would certainly be useful to examine whether activity scheduling can be applied in difficult populations which cannot be treated with complex interventions. Furthermore, it is also useful from a patient's perspective to examine whether activity scheduling could replace more complex psychological interventions, which require greater intellectual capabilities from patients.

Several questions concerning activity scheduling remain unanswered. And future research should use clinical samples, larger numbers of subjects, care-as-usual control conditions, and should focus on the relative efficacy of activity scheduling compared to antidepressant medication. The research conducted in the past three decades, however, shows that activity scheduling may be an effective, and interesting alternative to other treatments of depression.

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