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Autogenic training and cognitive self-hypnosis for the treatment of recurrent headaches in three different subject groups

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Summary The aims of this study were to (a) investigate the efficacy of autogenic training (AT) and cognitive self-hypnosis training (CSH) for the treatment of chronic headaches in comparison with a waiting-list control (WLC) condition, (b) investigate the influence of subject recruitment on treatment outcome and (c) explore whether the level of hypnotizability is related to therapy outcome. Three different subjects groups (group 1, patients (n = 58) who were referred by a neurological outpatient clinic; group 2, members (n = 48) of the community who responded to an advertisement in a newspaper; and group 3, students (n = 40) who responded to an advertisement in a university newspaper) were allocated at random to a therapy or WLC condition. During treatment, there was a significant reduction in the Headache Index scores of the subjects in contrast with the controls. At post-treatment and follow-up almost no significant differences were observed between the 2 treatment conditions or the 3 referral sources regarding the Headache Index, psychological distress (SCL-90) scores and medication use. Follow-up measurements indicated that therapeutic improvement was maintained. In both treatment conditions, the high-hypnotizable subjects achieved a greater reduction in headache pain at post-treatment and follow-up than did the low-hypnotizable subjects. It is concluded that a relatively simple and highly structured relaxation technique for the treatment of chronic headache subjects may be preferable to more complex cognitive hypnotherapeutic procedures, irrespective of the source of recruitment. The level of hypnotic susceptibility seems to be a subject characteristic which is associated with a more favourable outcome in subjects treated with AT or CSH.

Key words: Chronic headache; Autogenic training; Hypnotherapy; Subject recruitment; Hypnotizability

Introduction

Research into psychological treatment for recurrent tension headaches has indicated that, although treatment is more effective than no treatment and/or placebo treatment, different procedures such as EMG biofeedback and progressive relaxation training yield comparable results (Holroyd and Penzien 1986). Cognitive-behavioural therapy seems to be a promising approach but as yet few reports are available (Blanchard 1992). Although autogenic training or hypnosis are used fairly often in clinical practice, controlled studies on these procedures are scarce and have produced conflicting and unequivocal results (Schlutter et al. 1980; Collot et al. 1986; Janssen and Neutgens 1986; Melis et al. 1991).

The present study is part of a research project into the treatment of recurrent chronic headaches with autogenic training (AT) and different forms of self-hypnosis. In the first phase, an abbreviated version of AT was compared to a hypnotic procedure called future-oriented hypnotic imagery (FI) which was not presented as hypnosis (Van Dyck et al. 1991). In the second phase, FI was also investigated, but the procedure was explicitly labelled as hypnosis (FI-H) (Zitman et al. 1992). In the third phase, training in multiple self-hypnosis strategies was compared to the same ab-

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breviated version of AT (Spinhoven et al. 1992). In the earlier phases of this project, it was found that during treatment the subjects reduced their headache activity significantly in contrast to a waiting-list period and that the results were maintained at follow-up. AT and self-hypnosis were almost equally effective at post-treatment and follow-up (Van Dyck et al. 1991; Spinhoven et al. 1992; Zitman et al. 1992).

Although the treatments in the earlier phases were effective, in comparison with the average success rates mentioned in the literature (Holroyd and Penzien 1986) the results were modest. Two possible explanations for these modest therapy results can be given: (1) they may be due to the treatment procedures applied, and/or (2) they may be related to characteristics of the subject samples. In the fourth and present phases, both explanations were investigated further.

Firstly, the abbreviated AT procedure was extended from 3 to 6 exercises, as developed by Schultz (1956). Furthermore, a procedurally more individualized form of self-hypnosis training was used in which attention was also paid to pain and stress-related cognitions. In both therapy conditions, the total number of therapy hours was extended from 4 to 7. The first aim of this study was to test the hypothesis that treatment will produce better results than a waiting-list control (WLC) condition and that cognitive self-hypnosis training (CSH) in which a subject is offered a wide range of relaxation or imaginative and cognitive strategies and is motivated to choose and develop his/her own strategy, will result in a greater reduction in headache pain than AT in which a subject is taught relatively simple and highly standardized relaxation procedures in consecutive steps.

Meta-analytic reviews on different types of therapy for recurrent tension headaches revealed that treatment outcome varied with the client characteristics of the study samples, such as age, gender and source of referral (Holroyd and Penzien 1986). The outcomes reported may be less dependent on the treatment variables which have been the primary focus of attention in headache research so far. In the earlier phases of our research project, all the subjects were general hospital patients who had been referred by a neurological outpatient clinic. It is conceivable that solicited subjects have higher expectations of treatment efficacy than referred subjects and will achieve a greater response to treatment. The meta-analytic review by Holroyd and Penzien (1986) supports this supposition. They found that solicited subjects who responded mostly to an advertisement in a local newspaper tended to have better treatment results than subjects who were referred by a medical specialist ($P < 0.1$). However, these results could not be confirmed in a later meta-analytic review performed by one of the authors (Bogaards and Ter Kuile, submitted), in which no differences were observed between the solicited and referred subjects. These conflicting findings may have been due to the use of different data bases in the two meta-analytic reviews. Moreover, meta-analysis involves a comparison of treatment efficacy between studies which differ on many relevant treatment, subject or study characteristics. So far, no within-study comparison has been made of therapy outcome in solicited and referred subjects with recurrent tension headaches. In a study on the treatment of chronic low back pain, however, the solicited advertisement subjects achieved better treatment results at post-treatment than did the referred subjects (Spinhoven and Linssen 1991). Therefore, the second aim of this study was to test the hypothesis that a solicited subject population will achieve better treatment results than subjects referred from a neurological outpatient clinic.

In studies on the hypnotic treatment of headache pain other than tension headaches, it has been repeatedly demonstrated that pain reduction is positively associated with a subject's level of hypnotizability (Hilgard 1977; Wadden and Anderton 1982; Spinhoven 1988). The level of hypnotizability has been shown to be a fairly stable personality characteristic even over a 10–25-year period (Morgan et al. 1974; Piccione et al. 1989). In the earlier phases of this project (Van Dyck et al. 1991) it was found that in the self-hypnosis condition, reduction in tension headache pain was also associated with the level of hypnotizability. A third aim of the present study was to determine whether low-hypnotizable subjects differed in their degree of pain reduction from high-hypnotizable subjects and whether this difference was related to the type of therapy applied.

To summarize, the aims of this study were to investigate: (a) the efficacy of AT and CSH for the treatment of chronic headaches in comparison with a WLC condition; (b) the influence of subject recruitment on the treatment outcome; and (c) whether hypnotizability is related to therapy outcome.

Method

Subjects

For the selection of subjects for this study, three different sources of referral were used: (1) referral by a neurological outpatient clinic at a university hospital, (2) response to an advertisement in a local newspaper, and (3) for students, response to an advertisement in a university newspaper.

To be included in the project, subjects were required to meet the following inclusion criteria: (1) a history of headache complaints for a minimum of 1 day a week for at least the previous 6 months, with pain being present for at least 3 days a week during the past month; (2) headaches as the primary complaint; and (3) over 18 and under 60 years of age. The subjects who were referred by a neurologist had undergone neurological examination which excluded various headache disorders, such as cluster headaches and migraine. Exclu-

sion criteria for this study were: (1) the occurrence of vomiting or nausea in 50% or more of the headache periods; (2) drug dependence as defined by the WHO criteria; (3) previous therapy with autogenic training or hypnosis; and (4) concurrent treatment during the project and a major affective disorder or other psychiatric diagnosis which required immediate treatment.

Measures

Dependent measures. (1) *Headache Index.* Subjects made hourly ratings of the pain intensity over a period of 1 week. Headaches were recorded using a 6-point scale from 0 = no headache to 5 = incapacitating headache. From these records, a daily Headache Index score was calculated in which the number of hours of headache activity was weighed by the intensity of the headache pain (Holroyd et al. 1991). (2) *Use of analgesic medication.* Subjects recorded hourly their pain medication use (name, dosage and frequency) over a period of 1 week. From these records, a weekly total number of analgesic tablets was calculated. (3) *Symptom Checklist-90 (SCL-90).* The Dutch version of the SCL-90 (Derogatis 1983; Arrindell and Ettema 1986) was applied to obtain a psychological distress score. In addition, the following 3 measures were used. (1) *Stanford Hypnotic Clinical Scale for Adults (SHCS-Adults).* At the post-treatment assessment session, the Dutch version of the SHCS-Adults (Oyen and Spinhoven 1983), developed by Morgan and Hilgard (1978/1979), was applied to obtain a hypnotic susceptibility score. The SHCS is a 20-min 5-item scale that is administered to the subjects individually. SHCS-Adult scores are based on the assessment of both behaviour and experience (via verbal reports) and range from 0 to 5. In this study, subjects were classified in terms of whether they were low-hypnotizable (score: 0–2) or high-hypnotizable (score: 3–5). (2) *Headache Characteristics Questionnaire.* This questionnaire was developed by the authors and was used for the selection of subjects and the assessment of migraine and other headache characteristics. It contains a subscale with 8 items for symptom characteristics of migraine headaches; for example, unilateral location, vomiting, nausea, photophobia or phonophobia. These migraine symptoms were scored using a 4-point scale from 1 = never to 4 = nearly always. (3) For this study, a *Migraine Index score* was derived, which provided a measure of the frequency of migraine symptoms. This score was calculated by adding the item scores and dividing them by the number of items.

Treatment expectations. At pretreatment, before randomization, the subjects were asked to make a proportional rating of their headaches at post-treatment in comparison with their headaches at the start of treatment, using a 0–200% scale.

Treatment

General aspects. In each treatment condition, 7 individual sessions of 1 h were provided per week. Three booster sessions were scheduled 2, 4 and 6 months after completion of the treatment period. As homework, the subjects were encouraged to practice with tape-recorded exercises for about 15 min twice a day. The treatments were conducted by 12 students graduated in clinical psychology (2 men and 10 women). The therapists followed a detailed written outline for each session and were supervised by a senior therapist. All the therapy sessions were audio-taped and checked by the supervisor to ensure treatment integrity.

Cognitive Self-hypnosis (CSH). The programme for the self-hypnosis training used in this study was an extended version of the programme used in a previous study on chronic headache subjects (Van Dyck et al. 1991; Spinhoven et al. 1992; Zitman et al. 1992). During sessions 1–4, the following exercises were presented: relaxation; imaginative inattention; pain displacement and transformation; and hypnotic analgesia. The treatment also focussed on altering maladaptive cognitive responses which were assumed to mediate the occurrence of headaches. In the second session, subjects were asked to monitor pain- and stress-related cognitions during the next 3 weeks, 4 times a day. Sessions 3 and 4 were used to discuss the self-monitoring diaries. Meanwhile, the subjects continued to practise the other exercises. During session 5, the rationale of achieving improvement by 'changing cognitions' was discussed. In addition, each subject received a written description of more adequate stress or pain cognitions (compiled by the therapist). This description was based on the subjects' self-monitoring cognition diaries. During session 6, an individualized tape was recorded with FI and more adequate cognitions, based on the results of the discussions held in session 5. Session 7 consisted of discussing the results obtained and giving instruction on how to continue practising.

Autogenic training (AT). The AT procedure used in this study was an extended version of the AT procedure used in previous studies (Van Dyck et al. 1991; Spinhoven et al. 1992; Zitman et al. 1992). During sessions 1 to 6, the following standard exercises were presented: arm heaviness, arm warming, steady and regular heart beat, easy breathing, pelvic warming and relaxation, comfortable coolness of the forehead (Schultz 1956). Session 7 was identical to session 7 of the CSH procedure.

Procedure

In order to study the effectiveness of the 2 treatment conditions in different referral groups, a between-group comparison was designed. The 3 different referral groups were allocated at random to the therapy and control conditions. Data were collected in the 2 treatment conditions at pretreatment (week 0), post-treatment (week 8) and at follow-up (week 35: 6 months after completion of treatment).

The subjects who entered a WLC condition formed the control group. In week 0, the pretreatment measurements took place and after a waiting-list period of 7 weeks, the second measurement took place (week 8). The subjects who had entered the WLC condition were then allocated at random to AT or CSH. Data were collected at post-treatment (week 15) and at follow-up (week 42).

Statistical analyses

In order to analyse differences in efficacy between treatment conditions or referral sources 3×3 (Treatment×Referral Source) analyses of covariance (ANCOVA) were conducted in order to analyse differences in Headache Index and SCL-90 scores at post-treatment, using corresponding pretreatment measures as covariates. Two by three ANCOVA (Treatment (without WLC)×Referral Source) were executed on the follow-up data. If significant differences were found at post-treatment or follow-up, post-hoc analyses were performed using Scheffé statistics.

In order to analyse differences in reduction of the use in analgesics between treatment conditions or referral sources, difference scores were first computed for pretest–post-test and pretest–follow-up changes. Subsequently, separately Kruskal-Wallis 1-way ANOVA and Mann-Whitney U tests were executed in order to analyse differences in the reduction in analgesics between the 3 referral sources and treatment conditions at post-treatment and follow-up. If the Kruskal-Wallis 1-way ANOVAs indicated an overall significant difference between groups, Mann-Whitney U tests were executed to analyse pairwise whether differences between groups were significant.

To test whether the dependent variables changed significantly in time between pretreatment, post-treatment and follow-up, repeated-measures ANOVA (Headache Index, SCL-90) and Friedman 2-way ANOVA (Medication use) were executed. If an overall significant time effect was found, Scheffé contrast or Wilcoxon matched-pair signed-rank tests were performed to analyse the differences between the 3 moments of testing in more detail.

Data analyses described above were repeated after incorporation of data from subjects in the WLC condition once they had completed treatment.

To analyse differences in efficacy between high- and low-hypnotizable subjects in the 2 treatment conditions 2×2 ANCOVAs (SHCS × Treatment) were performed in order to analyse differences in the Headache Index at post-treatment and follow-up, using corresponding pretreatment measures as covariates. These analyses were only conducted on the largest groups (subjects from the WLC condition were included in the analyses).

Data analysis was conducted in 5 steps. The first step included a description of the subject selection and preliminary analyses to evaluate (a) pretreatment differences between drop-outs and compliers, (b) pretreatment differences between the treatment groups, and (c) pretreatment differences between the referral sources. In the second and third steps, post-treatment or follow-up differences for the dependent variables were compared between the 3 (two) treatment conditions and the 3 referral sources. In the fourth step, differences for the dependent variables were assessed at pretreatment, post-treatment and follow-up for the total group of subjects. The fifth step investigated whether the low- or high-hypnotizable subjects treated with AT or CSH reported differences in efficacy on the Headache Index at post-treatment and follow-up.

Results

Preliminary analyses

Treatment (CSH, n = 52; AT, n = 48) or a waiting-list period (n = 57) was started on 157 subjects, but a total of 11 subjects dropped out before the second assessment session. The difference in the number of drop-outs at post-treatment in the WLC condition and in the 2 treatment conditions (WLC, n = 1; AT and CSH, n = 10) was statistically significant (Fisher's exact test, $P = 0.03$). There were fewer drop-outs from the WLC condition in comparison with the treatment conditions. The number of drop-outs at post-treatment (AT, n = 4; CSH, n = 6) and during the follow-up period (AT, n = 3; CSH, n = 7) did not differ significantly between the 2 treatment conditions or 3 referral sources. No significant differences at pretreatment were found between the treatment compliers (n = 146) and the drop-outs at post-treatment (n = 11) regarding biographical, medical status variables and dependent measures. No significant differences at post-treatment were found between the subjects who completed the follow-up period of 6 months (n = 80) and the drop-outs at the follow-up (n = 10) regarding the Headache Index scores.

Preliminary analyses indicated that there were significant differences in biographical, medical status, treatment expectations and dependent variables at pretreament between the referral sources (Table I). The students were younger than the subjects referred by a neurologist and the latter were younger than the advertisement subjects. The advertisement group had a history of headache complaints which was twice as long as that of the other 2 groups and the advertisement subjects expected less pain reduction from treatment than the referred subjects. There was a higher percentage of women in the student group than in the other 2 groups. The subjects referred by a neurologist had a higher daily Headache Index score than the advertisement subjects and students. There was no significant difference between the 3 referral sources with respect to the Migraine Index and the SHCS scores.

The lack of any significant differences on biographical, medical status and dependent variables between the treatment conditions within each referral source and in the total group showed that randomization was succesful.

Differences at post-treatment between treatment conditions and referral sources

Headache Index. No main effect for Referral Source was found, whereas a significant main effect was found for Treatment (F (124, 2) = 5.8, $P = 0.004$) (Table II). Post-hoc analyses using Scheffé statistics indicated that only the mean of the Headache Index scores in the AT condition at post-treatment differed significantly from the post-treatment mean in the WLC condition. Also, an interaction effect was found between Treatment and Referral Source (F (124, 4) = 3.7, $P = 0.007$). Post-

TABLE I

CHARACTERISTICS OF 146 SUBJECTS WITH CHRONIC HEADACHES

	ADV	NEURO	STS	F/χ^2	Post-hoc analyses/χ^2
n	48	58	40		
Age (years) mean (SD)	45.0 (11.0)	33.3 (10.4)	22.6 (2.6)	$F = 65.5$ ***	STS < NEURO < ADV
Gender (% women)	58%	50%	82%	$\chi^2 = 11.7$ **	NEURO = ADV < STS
Migraine Index mean (SD)	1.8 (0.4)	1.8 (0.4)	1.7 (0.4)	$F = 1.9$	ns
Pain duration (years) mean (SD)	17.9 (11.7)	8.2 (9.8)	7.5 (4.3)	$F = 17.6$ ***	NEURO = STS < ADV
Headache Index mean (SD)	22.9 (13.6)	31.7 (16.6)	21.6 (13.6)	$F = 7.1$ **	ADV = STS < NEURO
Analgesic use median (range)	3.0 (0–77)	2.0 (0–28)	1.0 (0–18)	$\chi^2 = 5.3$	ns
SCL-total mean (SD)	127.5 (30.0)	133.2 (32.5)	128.3 (26.6)	$F = 0.6$	ns
SHCS mean (SD)	1.9 (1.3)	2.2 (1.3)	2.4 (1.4)	$F = 1.6$	ns
Expectations mean (SD)	64% (19%)	52% (21%)	58% (20%)	$F = 4.5$ *	NEURO < ADV

ADV, advertisement subjects; NEURO, subjects referred by a neurologist; STS, student subjects. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

hoc analyses indicated that this interaction effect was entirely due to a significant difference between CSH and AT in the advertisement group. In this group, AT was more effective than both the WLC and CSH conditions. [1,2]

SCL-90. No significant main effects or interaction effect were observed for Treatment or Referral Source regarding the scores for psychological distress (Table III).

Use of analgesics. No significant differences were observed in the reduction in analgesics between treatment conditions (n = 134, $\chi^2 = 4.1$, $P = 0.13$)) and between the referral sources (n = 132, $\chi^2 = 5.6$, $P = 0.06$) (Table IV) [3].

Finally, data analyses were repeated after incorporation of data from the subjects in the WLC condition once they had completed treatment. [4] In this way, a larger number of treated subjects could be compared at post-treatment in the 3 referral groups. No significant differences were found at post-treatment regarding the Headache Index and SCL-90 scores between the 2 treatments or the 3 different referral sources. Furthermore, in this larger group of subjects, the interaction effect for the Headache Index scores (F (123, 2) = 2.50, $P = 0.086$) was no longer observed. No differences were observed in analgesic reduction between the treatment conditions. However, in this larger group of subjects, a significant difference was found in the reduction in analgesics between the 3 referral sources (n = 130, $\chi^2 = 6.2$, $P = 0.045$). Post-hoc analyses indicated that this effect was due to significant differences in the reduction in analgesics between the neurological

[1] At post-treatment and follow-up, a score for the percentage of improvement was derived, for each subject based on the Headache Index score ((Pre-Post)/Pre) * 100% and ((Pre-FU)/Pre) * 100% (Blanchard et al. 1980). The results of the ANOVA on these scores of percentage of improvement at post-treatment and follow-up were similar to the results of the ANCOVA on the Headache Index scores reported in this study.

[2] As pretreatment differences were found between the referral sources regarding subject and medical status variables, Headache Index scores were also corrected for the duration of pain, age, gender and treatment expectations, at post-treatment and follow-up. The results of these AN(C)OVAs at post-treatment and follow-up were similar to those reported in this study.

[3] Subjects did not change their kind of analgesic use.

[4] All the data analyses were repeated on the data of the subjects in the WLC condition only. The results of the analyses on the WLC data were comparable to the results of the analyses on the orginal data-set reported in this study.

TABLE II

DAILY HEADACHE INDEX SCORES (means and SD) AT PRETREATMENT, POST-TREATMENT AND FOLLOW-UP

Condition (Referral source)	n	Pre-		Post-		n	Follow-up	
		means	SD	means	SD		means	SD
WLC								
ADV	15	26.7	(15.5)	24.2	(13.7)	–	–	–
NEURO	21	28.2	(15.9)	28.5	(17.6)	–	–	–
STS	17	22.3	(16.4)	22.6	(15.9)	–	–	–
Total	53	25.9	(15.9)	25.4	(16.0)	–	–	–
CHS								
ADV	14	25.7	(14.8)	30.1	(18.6)	13	22.3	(17.0)
NEURO	15	36.3	(15.5)	22.6	(9.3)	11	24.7	(10.8)
STS	11	16.5	(9.1)	12.7	(9.7)	11	11.4	(10.5)
Total	40	27.2	(15.7)	22.5	(14.8)	35	19.6	(14.2)
AT								
ADV	16	19.4	(12.4)	11.7	(7.5)	16	13.8	(12.6)
NEURO	14	30.1	(15.5)	18.9	(13.9)	13	15.3	(14.9)
STS	11	23.7	(13.2)	19.4	(13.9)	8	20.0	(18.8)
Total	41	24.2	(14.2)	16.2	(12.1)	37	15.7	(14.7)
Total	134 [a]	25.8	(15.2)	21.7	(15.0)			
Total (FU)	72 [b]	25.6	(15.0)	18.9	(13.1)	72	17.6	(14.5)

WLC, waiting-list control condition; CSH, cognitive self-hypnosis; AT, autogenic training; ADV, advertisement subjects; NEURO, subjects referred by a neurologist; STS, student subjects.

[a] Twelve of the 146 subjects who completed the treatment or WLC period and the post-treatment assessment session failed to return 1 of the 2 headache diaries at pretreatment or post-treatment assessment.

[b] Ten of the patients dropped out during the follow-up period. Eight of the 80 subjects who completed the booster sessions and attended the follow-up assessment session failed to return 1 of the 3 headache diaries at pretreatment, post-treatment or follow-up assessment.

TABLE III

SCL-90 SCORES (means and SD) AT PRETREATMENT, POSTTREATMENT AND FOLLOW-UP

Condition (Referral source)	n	Pre-		Post-		n	Follow-up	
		means	SD	means	SD		means	SD
WLC								
ADV	16	146.6	(51.0)	134.4	(40.9)	–	–	–
NEURO	23	135.7	(39.5)	129.2	(26.1)	–	–	–
STS	17	127.4	(23.0)	120.7	(23.2)	–	–	–
Total	56	136.3	(39.3)	128.1	(30.3)	–	–	–
CSH								
ADV	16	124.1	(22.2)	124.4	(26.9)	13	122.0	(22.1)
NEURO	18	131.8	(29.9)	136.3	(41.8)	14	128.6	(52.1)
STS	12	126.0	(20.1)	129.9	(28.5)	11	118.6	(31.3)
Total	46	127.6	(24.7)	130.5	(33.6)	38	123.5	(37.3)
AT								
ADV	16	123.9	(24.0)	125.8	(23.2)	16	108.1	(17.5)
NEURO	17	140.1	(42.4)	131.9	(43.5)	15	136.0	(49.4)
STS	11	142.5	(33.4)	132.4	(34.5)	10	124.9	(23.6)
Total	44	134.8	(34.6)	129.8	(34.3)	41	122.4	(35.3)
Total	146	133.1	(33.9)	129.4	(32.4)			
Total (FU)	79	131.4	(29.6)	131.0	(33.5)	79	122.9	(36.1)

WLC, waiting-list control condition; CSH, cognitive self-hypnosis; AT, autogenic training; ADV, advertisement subjects; NEURO, subjects referred by a neurologist; STS, student subjects.

and advertisement subjects ($Z = -2.1$, $P = 0.037$) and between the neurological subjects and the students ($Z = -2.2$, $P = 0.029$). The reduction in analgesics was greater in the neurological subjects than in the other 2 referral groups. [5]

[5] Tables with data from the larger groups of subjects can be obtained from the first author.

Differences at follow-up between treatment conditions and referral sources

No significant differences were found at follow-up regarding the Headache Index, SCL-90 scores or the difference scores for the use of analgesics between the 2 treatment conditions or the 3 different referral sources (Tables II, III and IV).

To test whether the follow-up results were main-

TABLE IV

WEEKLY ANALGESIC MEDICATION USE AT PRETREATMENT, POST-TREATMENT AND FOLLOW-UP

Condition (Referral source)	n	Pre-			Post-			n	Follow-up		
		median	(range)	% non	median	(range)	% non		median	(range)	% non
WLC											
ADV	15	2.0	(0–16)	27	2.0	(0–17)	33	–	–	–	–
NEURO	21	3.0	(0–27)	19	3.0	(0–30)	10	–	–	–	–
STS	17	1.0	(0–14)	47	3.0	(0–14)	41	–	–	–	–
Total	53	2.0	(0–27)	30	3.0	(0–30)	26	–	–	–	–
CSH											
ADV	14	3.5	(0–23)	29	6.5	(0–30)	14	13	3.0	(0–16)	23
NEURO	15	1.0	(0–28)	47	0.0	(0–11)	67	11	0.0	(0–7)	73
STS	11	1.0	(0–18)	46	0.0	(0– 3)	64	11	0.0	(0–4)	64
Total	40	2.0	(0–28)	40	1.0	(0–30)	48	35	0.0	(0–16)	51
AT											
ADV	16	3.0	(0–52)	19	2.0	(0–23)	25	16	1.5	(0–22)	31
NEURO	14	1.5	(0–18)	14	0.0	(0– 8)	57	13	0.0	(0–12)	54
STS	11	2.0	(0– 7)	36	0.0	(0– 3)	55	8	0.5	(0– 3)	50
Total	41	2.0	(0–52)	22	1.0	(0–23)	44	37	1.0	(0–22)	43
Total	134	2.0	(0–52)	31	2.0	(0–30)	38				
Total (FU)	72	2.0	(0–52)	32	1.0	(0–30)	47	72	1.0	(0–22)	47

WLC, waiting-list control condition; CSH, cognitive self-hypnosis; AT, autogenic training; ADV, advertisement subjects; NEURO, subjects referred by a neurologist; STS, student subjects. Medication, weekly total number of analgesic tablets; % non, percentage of subjects who used no analgesic medication (based on headache diaries).

tained in a larger group, data on the treatment results of the subjects in the WLC condition were included in the analyses after they had completed treatment. All the results were maintained.

Differences between pretreatment, post-treatment and follow-up

As almost no significant differences were found between the 2 treatment conditions or the 3 referral sources regarding post-treatment and follow-up measurements, the data from the total group of subjects were collapsed across the 2 treatment conditions (AT, CSH) and the 3 referral sources, in order to test whether the dependent variables changed significantly in time between pretreatment, post-treatment and follow-up.

Headache Index and SCL-90. Repeated-measures ANOVAs revealed a significant main effect for the factor Time when the Headache Index scores (F (142, 2) = 13.3, $P = 0.000$) and SCL-90 scores for psychological distress were analysed (F (156, 2) = 4.3, $P = 0.016$). A-posteriori contrasts using Scheffé statistics indicated that the mean of the Headache Index at post-treatment and follow-up differed significantly from the pretreatment mean and that the mean of the SCL-90 at follow-up differed significantly from the pretreatment and post-treatment means. Indices of effect size (d) (Cohen 1977), as a means of evaluating the degree of psychological relevance of the changes obtained in time regarding the Headache Index scores, were $d = 0.48$ at post-treatment and $d = 0.54$ at follow-up. For the purpose of interpretation, Cohen (1977) considered $d = 0.2$ to be small, $d = 0.50$ to be medium and $d = 0.80$ to be large.

Use of analgesics. No significant difference was found when the scores for analgesic medication were analysed in time (n = 72, $\chi^2 = 4.1$, $P = 0.129$).

To test whether the follow-up results were maintained in a larger group, the subjects in the WLC condition were included in the analyses. In this larger group, the results were comparable with one exception. There was a significant difference for analgesic medication use when the scores were analysed in time (n = 114, $\chi^2 = 7.6$, $P = 0.0226$). Post-hoc analyses indicated that the means of the scores for the use of analgesics at post-treatment ($Z = -3.0$, $P = 0.0028$) and follow-up ($Z = -3.2$, $P = 0.0013$) were significantly lower than the mean at pretreatment.

Differences in improvement between low- and high-hypnotizable subjects

In the larger group, significant differences were found at post-treatment (F (108, 1) = 7.1, $P = 0.009$) and follow-up (F (108, 1) = 7.0, $P = 0.009$) regarding the Headache Index scores between the low- and high-hypnotizability subjects (see Fig. 1). Post-hoc analyses using Scheffé statistics indicated that the means of the Headache Index scores at post-treatment and follow-up were significantly lower in the high-hypnotizable subjects than in the low-hypnotizable subjects. These results show that the high-hypnotizables treated with AT or CSH reported a more favourable therapy outcome on the Headache Index at post-treatment and follow-up, independent of the pretreatment levels of pain. The indices for the effect size (d) indicated that the effect sizes were small in the low-hypnotizable subjects ($d_{post} = 0.27$; $d_{fu} = 0.29$) and medium to large in the high-hypnotizable subjects ($d_{post} = 0.62$; $d_{fu} = 0.76$) (Cohen 1977).

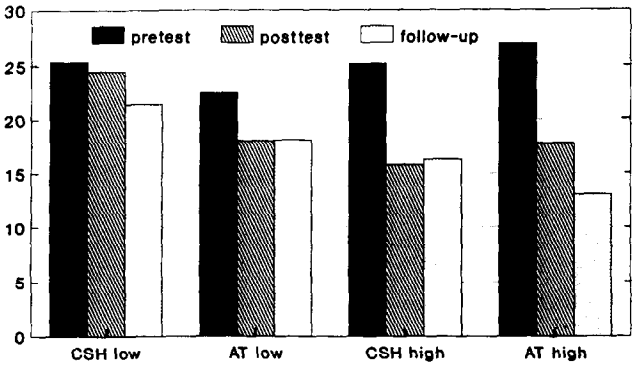

Fig. 1. Means of the Headache Index scores at pretreatment, post-treatment and follow-up across treatment conditions and hypnotizability. AT, autogenic training; CSH, cognitive self-hypnosis; low, low hypnotizability (SHCS scores: 0–2); high, high hypnotizability (SHCS scores: 3–5).

Discussion

The study concerned the psychological treatment of a clinically relevant population of general hospital patients with long-term chronic headache complaints. The primary questions this study tried to answer were: (1) will individualized treatment procedures obtain better treatment result than more simple and standardized procedures, and (2) are the treatment results reported by hospital patients referred by medical specialists for psychological treatment less pronounced than those reported by subjects who volunteer to be treated with psychological techniques. The main conclusions which can be drawn from the present study are that simple and more complex procedures yield comparable therapy results and that general hospital patients benefit from psychological treatment to the same extent as solicited subjects. Before assessing the implications for clinical practice, the study results are discussed below in more detail.

In line with the results of other studies (Holroyd and Penzien 1986) and our own previous study (Spinhoven et al. 1992), it can be concluded that the

short-term effects of treatment are better than those of a waiting-list condition. During treatment, headache pain was significantly reduced in contrast with a WLC condition and the therapy results were maintained at 6 months follow-up. In this study, a 29% reduction in headache pain was found at post-treatment. This percentage is comparable with the results in the earlier phases of our research project (Van Dyck et al. 1991; Spinhoven et al. 1992; Zitman et al. 1992) and the 35% reduction in tension headaches reported by Holroyd and Penzien (1986) in their meta-analysis on outcome studies published since 1980. The results of this study are smaller in comparision with the 52% reduction in headaches for studies published before 1980 (Holroyd and Penzien 1986). The treatment effect seems to decrease during the last years. In a more recent meta-analytic review (Bogaards and Ter Kuile submitted) performed by one of the authors the year of publication was also negatively related to improvement ($r = -0.36$). The importance of the year of publication for treatment results is intriguing. Possibly, treatment effects may have been overestimated in the past and the effect scores in studies conducted in more recent years yield a more realistic view. In the larger group of subjects (including the subjects in the WLC condition) a small decrement was found at post-treatment and follow-up regarding the use of analgesics. Therefore, it cannot be concluded that pain reduction was a consequence of the increased use of analgesics. The level of psychological distress was significantly reduced at follow-up in comparison with the pretreatment and post-treatment levels.

The results of this study failed to confirm our hypothesis concerning the differential efficacy of AT and CSH for headache reduction. As in the earlier phases of our research project, no differences in efficacy were observed (Van Dyck et al. 1991; Spinhoven et al. 1992; Zitman et al. 1992). Apparently, presenting multiple strategies to subjects, including cognitive stress and pain coping strategies, did not enhance the efficacy of treatment. It seems unlikely that the finding of no differences between treatment conditions depended critically on the power of the study, because no trend was observed that CSH tended to produce a more favourable therapy outcome. Because irrespective of treatment condition treated subjects reduced their Headache Index in contrast to subjects in a WLC condition, without therapy contacts, it cannot be excluded that the observed improvement is caused by non-specific treatment effects such as treatment expectations and the therapeutic relationship. In the absence of a placebo-control condition it remains undecided whether treatment results are due to the unique characteristics of both treatments or can be attributed to non-specific treatment factors.

The results of this study also failed to confirm our hypothesis that solicited subjects would obtain a more favourable therapy outcome than referred subjects. It seemed that solicited advertisement subjects, but not solicited students, reported better results with AT than CSH only at post-treatment. However, this difference was not maintained at follow-up. This difference was also absent in the larger group of subjects which included the subjects in the WLC condition after they had completed treatment. This difference in treatment effect in the solicited subject group at post-treatment probably represents a chance finding.

At this point some remarks should be made. The paucity of differences between the 3 referral sources may be a consequence of the significant differences in pretreatment subject characteristics. For example, the solicited advertisement subjects had a history of headache complaints which was twice as long as that in the other 2 subjects groups and they had lower treatment expectations than did the referred subjects. It is conceivable that the sample of solicited advertisement subjects with their long history of headache complaints and lower treatment expectations may have been treated unsuccessfully in the past and may be more comparable with an unsuccesfully treated referred subject sample than the solicited advertisement subject sample we wanted to recruit. Unexpectedly, the solicited student sample in this study had a pain history and treatment expectations which were comparable with those of the referred subject group. The student sample also demonstrated two subject characteristics which were related to better treatment results in the meta-analytic review by Holroyd and Penzien (1986): they were younger, and the group contained a higher proportion of women. Although two prognostic factors for a better treatment outcome were present, they achieved a level of pain reduction which was comparable to that in the other 2 groups independent of pretreatment differences in pain level.

Although the 3 subject groups differed regarding pretreatment pain levels, history of complaints, treatment expectations, gender and age, we found a comparable level of pain reduction in the 3 groups after statistical correction for these pretreatment differences. Therefore it seems unlikely that the lack of differences between the 3 referral groups depended on the differences in pretreatment subject characteristics.

In both treatment conditions the highly hypnotizable chronic headache subjects achieved a greater reduction in headache pain at post-treatment and at follow-up than the low-hypnotizable subjects. The finding that pain reduction was related to the level of hypnotizability in both conditions (AT and CSH) is in line with the results reported in some other studies that high-hypnotizable subjects also achieved better therapy results with non-hypnotic procedures (Andreychuck and Skriver 1975; Knox and Shum 1977; Nace et al. 1982;

Evans 1988). This finding suggests that hypnotizability can be regarded as a general subject characteristic which compromises components such as cognitive flexibility and interpersonal trust, which predispose to a more favourable therapy outcome (Evans 1988). On the other hand, it is also possible that both procedures (AT and CSH) tap specific imagery and hypnotic skills of the subjects. For example, in AT, suggestions are given for a comfortable coolness of the forehead, a steady, regular heart beat and pelvic warming. This explanation is more in line with the neo-dissociation theory of Hilgard (1977, 1979). In both conditions, subjects with a higher level of hypnotizability profited to a greater extent from the more specific hypnotic therapy components. In line with the neo-dissociation theory, but contrary to the results of this study, was the finding in an earlier phase of our research project (Van Dyck et al. 1991) that pain reduction was only related to the level of hypnotizability in the hypnosis condition in contrast to the AT condition. A possible explanation for these conflicting findings is that the AT procedures used in this study comprised an extended version of the AT procedures used in previous phases of our research project. The extended version of AT used in this study may have tapped more specific imagery and hypnotic skills in the subjects in contrast to the previous abbreviated form which focused almost exclusively on relaxation.

In conclusion, a critical remark should be made. The study sample consisted a heterogeneous population of headache subjects; it comprised episodic and continuous tension headaches, as well as tension headache and mixed headache subjects. As this study started before the diagnostic criteria of the Headache Society (1988) were published we did not use this diagnostic system. Instead we used other diagnostic criteria as discussed above. However, the lack of differences in therapy outcome between the treatment conditions and the sources of referral cannot be attributed to differences in migraine headache symptoms because no differences were found between the treatment conditions or referral sources regarding migraine headache symptoms.

On the otherhand, certain medical status and patient characteristics may be related to improvement (Horoyd and Penzien 1986). In the near future we will report on analyses of whether responders with at least a 50% pain reduction can be discriminated from non-responders on the basis of diagnostic and other pre-treatment patient characteristics.

For clinical practice, the most important conclusion which can be drawn from our study is that a relatively simple and highly structured relaxation technique for the treatment of recurrent headache subjects may be preferable to more complex hypnotherapeutic procedures. They presuppose less technical skill of the therapist and may also be easier to apply by most of the subjects. It seems reasonable for most of the subjects to expect a modest degree of pain reduction in the short and long terms. The level of hypnotic susceptibility seems to be a subject characteristic which is associated with a more favourable outcome in subjects treated with AT or CSH. There are no indications that the results obtained in other studies on students or advertisement subjects cannot be generalized to the treatment of patients with recurrent headaches in clinical practice.

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References

Andreychuck, T. and Skriver, C., Hypnosis and biofeedback in the treatment of migraine headaches, Int. J. Clin. Exp. Hypnosis, 23 (1975) 172–183.

Arrindell, W.A. and Ettema, J.H.M., SCL-90, Handleiding bij een Multidimensionele Psychological Indicator, Swets and Zeitlinger, Lisse, 1986.

Blanchard, E.B., Psychological treatment of benign headache disorders, J. Consult. Clin. Psychol., 60 (1992) 537–551.

Blanchard, E.B., Andrasik, F., Ahles, T., Teders, S.J. and O'Keefe, D., Migraine and tension headache: a meta-analytic review, Behav. Ther., 11 (1980) 613–631.

Bogaards, M.C. and Ter Kuile, M., The treatment of recurrent tension headaches: a meta-analytic review, submitted.

Cohen, J., Statistical power analysis for the behavioral sciences, Revised edition, Academic Press, New York, 1977.

Collot, L., Cottraux, J. and Juenet, C., GSR feedback and Schultz relaxation in tension headaches: a comparative study, Pain, 25 (1986) 205–213.

Derogatis, L.R., SCl-90-R, Administration, Scoring and Procedures Manual II, Clin. Psychomet. Res., 1983.

Dyck, van R., Zitman, F.G., Linssen, A.C.G. and Spinhoven, Ph., Autogenic training and future oriented hypnotic imagery in the treatment of tension headache: outcome and process, Int. J. Clin. Exp. Hypnosis, 39 (1991) 16–23.

Evans, J., Hypnosis as a predictor of treatment outcome, Paper presented at the 11th International Congress of Hypnosis and Psychosomatic Medicine, The Hague, The Netherlands, 1988.

Hilgard, E.R., Divided consciousness: multiple controls in human thought and action, Wiley, New York, 1977.

Hilgard, E.R., Divided consciousness in hypnosis: the implications of the hidden observer. In: E. Fromm and R.E. Shor (Eds.), Hypnosis Developments in Research and New Perspectives, Aldine, New York, 1979, pp. 45–80.

Holroyd, K.A. and Penzien, D.B., Client variables and the behavioral treatment of recurrent tension headache: a meta-analytic review, J. Beh. Med., 9 (1986) 515–536.

Holroyd, K.A., Nash, J.M., Pringel, J.D., Cordingley, G.E. and Jerome, A., A comparison of pharmacological (amitriptyline HCL) and nonpharmacological (cognitive-behavioral) therapies for chronic tension headaches, J. Consult. Clin. Psychol., 59 (1991) 387–393.

International Headache Society, Classification and diagnostic criteria

for headache disorders, cranial neuralgias and facial pain, Cephalalgia, 8 (1988) 71–96.

Janssen, K. and Neutgens, J., Autogenic training and progressive relaxation in the treatment of three kinds of headache, Behav. Res. Ther., 24 (1986) 199–208.

Knox, V.J. and Shum, K., Reduction of cold-pressor pain with acupuncture analgesia in high- and low-hypnotic subjects, J. Abnorm. Psychol., 86 (1977) 639–643.

Melis, P.M.L., Rooimans, W., Spierings, E.L.H. and Hoogduin, C.A.L., Treatment of chronic tension-type headache with hypnotherapy: a single-blind time controlled study, Headache, 31 (1991) 686–689.

Morgan, A.H. and Hilgard, J.R., The Stanford hypnotic clinical scale for adults, Am. J. Clin. Hypnosis, 21 (1978/1979) 134–147.

Morgan, A.H., Johnson, D.J. and Hilgard, E.R., The stability of hypnotic susceptibility, Int. J. Clin. Exp. Hypnosis, 22 (1974) 249–257.

Nace, E.P., Warwick, A.M., Kelley, R.L. and Evans, F.J., Hypnotizability and outcome in brief psychotherapy, J. Clin. Psychiat., 43 (1982) 129–133.

Oyen, F. and Spinhoven Ph., De Nederlandse bewerking van de Stanford hypnotic clinical scale (SHCS). (Dutch translation of the Stanford hypnotic clinical scale (SHCS)), Kwart. Direct. Ther. Hyp. (Dutch), 2 (1983) 155–172.

Piccione, C., Hilgard, E.R. and Zimbardo, P.G., On the degree of stability of measured hypnotizability over a 25-year period, J. Pers. Soc. Psychol., 56 (1989) 289–256.

Schultz, L.C., Das Autogene training (konzentrative selfbstentspannung), versuch einer klinisch-praktischen dartellung, Georg Thieme, Stuttgart, 1956.

Schlutter, L.C., Golden, C. and Blume, H.G., A comparison of treatments for prefrontal muscle contraction headache, Br. J. Med. Psychol., 53 (1980) 47–52.

Spinhoven, Ph., Similarities and dissimilarities in hypnotic and non-hypnotic procedures for headache control: a review, Am. J. Clin. Hypnosis, 30 (1988) 183–194.

Spinhoven, Ph. and Linssen, A.C.G., Behavioral treatment of low backpain. I. Relation of coping strategy use to outcome, Pain, 45 (1991) 29–34.

Spinhoven, Ph., Linssen A.C.G., Dyck, van R. and Zitman, F.G., Autogenic training and self-hypnosis in the control of tension headache, Gen. Hosp. Psychiat., 14 (1992) 408–415.

Wadden, T.A. and Anderton, C.H., The clinical use of hypnosis, Psychol. Bull., 91 (1982) 215–243.

Zitman, F.G., Dyck, van R., Spinhoven, Ph. and Linssen, A.C.G., Hypnosis and autogenic training in the treatment of tension headaches: a two-phase constructive design study with follow-up, J. Psychosom. Res., 36 (1992) 219–228.