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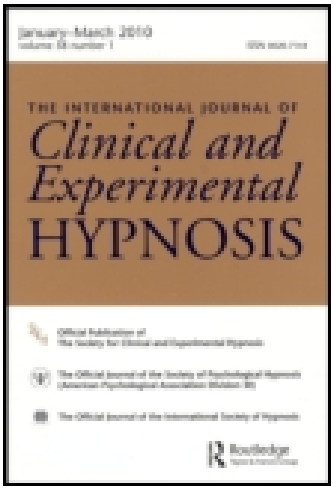

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THE EFFICACY OF HYPNOTHERAPY IN THE TREATMENT OF PSYCHOSOMATIC DISORDERS: *Meta-Analytical Evidence*

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Abstract: Hypnotherapy is claimed to be effective in treatment of psychosomatic disorders. A meta-analysis was conducted with 21 randomized, controlled clinical studies to evaluate efficacy of hypnosis in psychosomatic disorders. Studies compared patients exclusively treated with hypnotherapy to untreated controls. Studies providing adjunctive standard medical care in either treatment condition were also admitted. Hypnotherapy was categorized into classic (n = 9), mixed form (n = 5), and modern (n = 3). Results showed the weighted mean effect size for 21 studies was d^+ = .61 (p = .0000). ANOVA revealed significant differences between classic, mixed, and modern hypnosis. Regression of outcome on treatment dose failed to show a significant relationship. Numerical values for correlation between suggestibility and outcome were only reported in three studies (mean r = .31). The meta-analysis clearly indicates hypnotherapy is highly effective in treatment of psychosomatic disorders.

Hypnosis has been claimed a useful therapeutic tool in psychosomatics (Pinnell & Covino, 2000), and there are numerous reports about its application to a large variety of psychosomatic disorders (e.g., Anbar, 2001; Banerjee, Srivastav, & Palan, 1993; Cedercreutz, Lahteenmaki, & Tulikoura, 1976; Citron, 1968; Clarke, & Reynolds, 1991; Domangue, Margolis, Lieberman, & Kaji, 1985; Elton, 1993; Ewer, & Stewart, 1986; Houghton, Heyman, & Whorwell, 1996; Rucklidge & Saunders, 2002; Simon & Lewis, 2000; Tschugguel & Berga, 2003; Younus, Simpson, Collins, & Wang, 2003). This claim is supported by laboratory research demonstrating the influence of hypnosis on

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physiological systems mediating or being the target of psychosomatic diseases. It has been shown that hypnosis exerts an influence on immunological functioning. Kiecolt-Glaser, Marucha, Atkinson, and Glaser (2001) analyzed the influence of hypnosis on immune function in the presence of acute stress. In the hypnosis condition, the decrement of immune function quantified by proliferative response to mitogens, percentages of CD3+ and CD4+ T-lymphocytes, and interleukin 1 production was significantly less compared to controls. Also, Gruzelier, Smith, Nagy, and Henderson (2001) demonstrated that hypnosis can buffer the effect of stress on immune function. Medical students at exam time showed significantly less decline in natural killer (NK) cells and CD8 cells as well as a significant increase in cortisol compared to controls. There exists a substantial body of evidence for the influence of hypnotic suggestions on dermal hypersensitivity reactions. Black and colleagues demonstrated the possibility of reducing immediate-type hypersensitivity responses (Black, 1963a) as well as a shift in dose-response curve of hypersensitivity skin reactions following hypnotic suggestions (Black, 1963b). Fry, Mason, and Pearson (1964) showed significantly smaller dermal reaction after the prick-test challenge in response to hypnosis in asthmatic patients. In another study on dermal reaction to a prick-test challenge, Zachariae, Bjerring, and Arendt-Nielsen (1989) were able to significantly reduce erythema area in subjects receiving hypnotic suggestions as compared to the control group. This study was replicated with asthmatic patients by Laidlaw, Richardson, Booth, and Large (1994), who demonstrated that erythema produced by a prick-test challenge was significantly reduced with hypnosis compared to no hypnosis. Zachariae, Jorgensen, Egekvist, and Bjerring (2001) also studied the influence of hypnotically induced emotions on immediate-type hypersensitivity reactions to a prick-test. In high hypnotizable subjects, the increase in erythema area was significantly less while they experienced induced happiness or anger compared to when they experienced induced sadness.

Regarding the cardiovascular system, Williamson et al. (2001) showed that the manipulation of the sense of effort under hypnosis during constant-load dynamic exercise was significantly associated not only with changes in heart rate and mean blood pressure but also with changes in regional blood flow in cortical regions, which are postulated to have key roles in the central modulation of cardiovascular responses. More recently, Jambrik, Sebastiani, Picano, Ghewlarducci, and Santarcangelo (2005) provided evidence for the ability of hypnosis to prevent stress-related reduction of peripheral vascular endothelial function. They found the expected drop of postischemic flow-mediated vasodilatation (FMD) under acute stress was prevented in high hypnotizable subjects. These subjects also exhibited a significant increment of the basal arterial diameter after hypnotic induction compared to the prehypnotic period. Moreover,

the increased heterogeneity of ventricular repolarization, a postulated process in ventricular arrhythmia and sudden cardiac death (Hemingway, Malik, & Marmot, 2001), under mental stress was significantly attenuated by hypnotic relaxation (Taggart et al., 2005).

The influence of hypnosis on the respiratory and visceral systems has also been studied. Ewer and Stewart (1986) found high hypnotizable asthmatic patients to show significant improvement in bronchial hyperresponsiveness and peak expiratory flow rate following hypnosis. In several studies, Prior, Colgan, and Whorwell (1990) demonstrated that hypnosis was able to normalize abnormal visceral sensations. Houghton, Calvert, Jackson, Cooper, and Whorwell (2002) studied the effect of hypnotically induced emotions on visceral sensitivity of the gut in patients with irritable bowel syndrome (IBS). While hypnotic relaxation significantly increased rectal distension volume required to cause discomfort compared to the nonhypnotic condition, hypnotically induced anger reduced this threshold compared to the nonhypnotic condition, hypnotic relaxation, and happiness.

While the available clinical reports, clinical studies, and laboratory studies hint at the usefulness of hypnosis in psychosomatics, a systematic review of the efficacy of hypnotherapy in treating psychosomatic illness has not yet been conducted. In this article, randomized, controlled clinical studies will be systematically evaluated and meta-analytic evidence for the efficacy of hypnotherapy in psychosomatic disorders will be presented.

Meta-analytic methods allow estimation of the average outcome of a treatment across a large number of studies with the focus not on statistical significance of the single outcome but on the size of treatment effect. This study on the efficacy of hypnosis will consider only randomized, controlled trials that compare a patient group exclusively treated by hypnosis with an untreated patient group. Because durations of follow-up periods are expected to be heterogeneous, for computation of the effect sizes per study only the first measurement after completion of treatment ("posttreatment") was taken into account. To ensure a neutral and comprehensible evaluation of the efficacy of hypnotherapy, all variables of a study for which sufficient information was provided to calculate effect sizes were used for the computation of the efficacy; that is, no selection of variables was made.

METHOD

Randomized, controlled trials ensure high relevance for a meta-analytic study (Benson & Hartz, 2000; Concato, Shah, & Horwitz, 2000; Matt & Navarro, 1997; Shadish & Ragsdale, 1996) and, therefore, in this analysis, only randomized, controlled clinical studies that compared a treatment and a waiting control group have been included.

Search Strategies

Relevant literature has been found by searching the databases PsycLIT, Medline, and Dissertation Abstracts for the period 1887–2005 for clinical studies on the efficacy of hypnotherapy using the search keys "Hypn*," "Hypnotics," "Psychother*" as well as a combination of these by the operators "and," "or," "not." Limits were set on "humans." Moreover, the literature reviews by Wadden and Anderton (1982), Rhue, Lynn, and Kirsch (1993), and Kirsch, Montgomery, and Sapirstein (1995) were used. In addition, other relevant studies were identified by consideration of cited literature from papers already examined ("footnote chasing").

Criteria for Inclusion

To be eligible for the present meta-analysis, the studies had to meet the following criteria:

(a) Inclusion of clinical studies only, that is, studies with psychotherapeutic or medical indication for hypnotic intervention. Studies were included if the efficacy of hypnotherapy was assessed in the treatment of either patients with disorders that could be coded according to International Classification of Diseases-10th ed. (ICD-10) or with patients undergoing medical procedures (e.g., in dentistry, surgery, or cancer treatment). However, for a study to be included in the analysis, it was not required for the study to provide an explicit diagnosis based on ICD-10 criteria. Studies that used hypnosis for treatment of warts were also included. Studies that were intended to merely increase performance without psychotherapeutic indication (e.g., improvement of athletic or academic performances) were excluded.
(b) The exclusive use of hypnotic techniques, that is, a treatment condition that applied only hypnotic interventions (hypnosis-only condition). The combination of hypnotherapy with another form of psychotherapy was excluded. In case of medical intervention, the studies that utilized hypnosis in combination with standard medical care (e.g., medical care in cancer patients) were included.
(c) The use of between-groups comparisons, that is, comparing a hypnosis-only condition with a waiting control. The waiting control group was excluded from any form of explicit psychotherapeutic intervention. Studies that used hypnosis for supporting medical interventions (e.g., medical care for burn patients) and standard medical care, as well as the control conditions, were also included into the meta-analysis.
(d) Randomized assignments of treatment and control conditions.

The above criteria were met by 91 studies. Out of this pool, 22 studies that assessed the effectiveness of hypnotherapy in psychosomatic disorders were selected. A disorder was defined as a *psychosomatic disorder* (e.g., dyspepsia, IBS) if it met criteria for somatoform disorder (F45) according to the ICD-10 classification. In addition, disorders were

included where the presence of psychological or behavioral factors have played a major part in the etiology of physical disorders (ICD-10, F54) (e.g., asthma, duodenal ulcer, dermatitis), or presumably affected a physical condition (e.g., headache, chronic pain, pain associated with chronic disease, or enuresis). Studies that evaluated the efficacy of hypnosis with cancer, viral infections (HIV-infection), and warts were excluded.

Coding of the Studies

All 22 studies were coded with regard to sample size (for treatment group and for control group), patient characteristics, setting of treatment, types of disorder treated, and the kinds of comparison (pre/posttreatment comparison or comparison between treatment group and control group). With respect to the hypnotic interventions utilized, the studies were assigned into three categories: *classical hypnosis*, *modern hypnosis*, and *mixed form of hypnosis*. Classical hypnosis consisted of direct suggestions (for relaxation, for alleviation of symptoms, and for inducing imaginations or visualization), relaxation, and posthypnotic suggestions. Hypnotic interventions that used indirect suggestions (for relaxation, etc.), metaphors, and age regression were categorized as modern hypnosis. Studies that primarily used classical interventions but also included modern elements were also assigned to the category of classical hypnosis. On the other hand, if predominantly modern forms of hypnotic intervention were used but with some classical elements in them, these studies were assigned to the category of modern hypnosis. In one study (Llaneza-Ramos, 1989), the investigator reported the use of "Ericksonian hypnotherapy" with chronic headaches but gave no further information about treatment. This intervention was coded as modern hypnosis. Studies that combined classical and modern hypnosis without any predominance of classical or modern interventions were rated as mixed form of hypnosis.

COMPUTATIONS AND STATISTICAL ANALYSIS

To counteract a distorted estimation of the efficacy of hypnosis by subjective selection of variables, no selection of dependent variables for the individual study was made. Instead it was assumed that the choice of dependent variables made by the investigators represented an appropriate operationalization of the constructs examined. Doing so allows the computation of the average effect size for the individual studies to be replicated by other investigators as well.

For every dependent variable from a study, an effect size was computed from the reported test statistic either relative to a control group or in relation to pre-/posttreatment differences. As the measure for the effect size, the standardized mean difference d was used (J. Cohen, 1988). For between-groups comparisons, the effect size was defined as

$d = \frac{\bar{X}_T - \bar{X}_C}{SD_{pooled}}$ with $\bar{X}_T$ = mean of treatment group at first posttreatment measurement, $\bar{X}_C$ = mean of control group at first posttreatment measurement, and SD_{pooled} = pooled standard deviation from treatment and control group. For pre-/posttreatment comparisons the effect size was computed as above with $\bar{X}_T$ = mean of treatment group at first posttreatment measurement, $\bar{X}_C$ = mean of treatment group at pretreatment measurement and SD_{pooled} = pooled standard deviation from pretreatment and posttreatment measurements. When insufficient data were provided for a direct computation of effect sizes, they were calculated using the procedures described by Rosenthal (1984, pp. 20–31). When the results were only reported to be not significant, the effect sizes were assumed to be zero. For results that were only reported to be significant, a p value of .05 was assumed and converted in an effect size estimate (Rosenthal, pp. 26, 33). Because of the heterogeneity of the available follow-up data, only those values that were recorded at the first point (time) of measurement after termination of treatment were used for the computation of effect sizes.

To calculate a mean effect size, different units of analysis can be used. Effect sizes can be averaged either across individual dependent variables, or across averaged effect sizes from individual trials. Averaging across individual dependent variables results in a substantial violation of the assumption of statistical independence, which is crucial for standard inferential statistical tests (Gleser & Olkin, 1994). To solve the problem of intercorrelations, only a single average effect size was determined for every study, so that the effect sizes that were included in the meta-analysis could be assumed to be independent (Hunter & Schmidt, 1990). For the computation of the average study effect size, one standardized mean difference was determined per variable.

Because estimates of effect sizes from larger studies are more precise than estimates from smaller studies (Hedges & Olkin, 1985), study level average effect sizes should be weighted to obtain unbiased mean effect size estimates (Matt & Navarro, 1997). Weights are the inverse estimated variances of the average effect size of a single trial (Hedges & Olkin, 1985). The mean effect size d^+ was calculated as the average of variance weighted trial level effect sizes (Hedges & Olkin, p. 111).

To determine whether studies yielding different effect sizes can be reasonably described as sharing a common population effect size, homogeneity was tested using a chi-square test (Hedges & Olkin, 1985, p. 123). In case of heterogeneity of variance of the effect size, estimates were decomposed into a variance component because of the variability of the underlying population parameters and sampling error (Hedges & Olkin, p. 194). If effect sizes exhibited variability beyond expectation

due to sampling error, a cluster analysis (Hedges & Olkin, pp. 265–283) was conducted to identify homogeneous clusters. As a measure of treatment success, the binomial effect size display (BESD) was computed (Rosenthal & Rubin, 1982). The BESD (BESD = $.50 \pm r/2$) refers to the effect size r, that is, the point biserial correlation r(pb) between treatment condition (hypnosis or waiting control) and therapy outcome, which can easily be obtained from the standardized mean difference d by conversion (Rosenthal, 1984, p. 25). The BESD represents the estimated difference between treatment group and control group with regard to success rates. For example, a d of .50 (i.e., an r of .24) results in binomial effect sizes of 38% and 62%. This means that without treatment 38% of patients experience an alleviation of symptoms, but after treatment 62% of patients can expect symptom alleviation.

Due to publication bias (studies yielding significant results may be more likely to be published), reporting bias (no or insufficient information about nonsignificant results provided by the investigators of a study), or retrieval bias (inadequate key terms or limitation to some specified languages), the available studies in a meta-analysis may not be representative of all studies addressing the research question (Greenhouse & Iyengar, 1994). To address these possible sources of bias, a fail-safe N (Orwin, 1983) was determined. The fail-safe N indicates the number of further studies with an average effect size of $d = 0$ that have to be included in the analysis in order to lower the mean effect size to a predefined critical value. Further, a possible presence of publication bias was assessed by a funnel plot (Light & Pillemer, 1984). In general, effect sizes from larger studies are more precise (i.e., show less variability) than those from smaller studies (Hedges & Olkin, 1985). This suggests that when effect sizes are plotted as a function of sample size, the distribution should take the shape of an inverted funnel (Mullen, 1989), provided no publication bias is present.

Statistical analyses were carried out using the SAS-JMP IN computer package release 5.1 and the Meta-Analysis Programs computer package version 5.3 by Schwartzer.

RESULTS

The characteristics of the 22 studies included in the meta-analysis are summarized in Table 1.

In the first evaluation, the hypnotherapeutic methods employed in the 22 studies were examined (see Table 1). The classical approach to hypnosis was predominantly used in 45.5% ($n = 10$) of the trials, while only 13.6% ($n = 3$) of the trials consisted of modern hypnosis. The mixed form of hypnosis was used in 22.7% ($n = 5$) of the trials. For 18.2% ($n = 4$) of the trials, the categorization of the hypnotherapy could not be made.

Table 1
Characteristics of the 22 Studies Used in the Meta-Analysis

Number of studies including waiting control:	22
Total number of patients	1091
Dropouts (%) mean for 21 studies	12.2
Number of treated patients:	
Hypnosis	420
Control	423
Dropouts (%):	
Hypnosis (*M* for 20 studies)	5.9
Control (for 10 studies)	4.6
Age of patients:	
Children /adolescents	2
Adults	13
Mixed	2
No specification	5
Sex of patients:	
Female	1
Male	3
Mixed	16
No specification	2
Patient group:	
Inpatients	1
Outpatients	18
Mixed	1
No specification	2
Setting:	
Individual sessions	10
Group sessions	1
Mixed	1
No specification	10
Number of sessions (*M* for 20 trials)	6.3
Follow-up:	
Trials with follow-up	14
Trials without follow-up	8
No specification	0
M (weeks) for 22 trials (with/without follow-up)	17.45
M for 14 trials (with follow-up)	29.54
Type of treatment:	
Classical hypnosis	10
Modern hypnosis	3
Mixed	5
Indecisive	4
Suggestibility:	
Suggestibility tested	12
Validated test of suggestibility used	11

Table 2
Types of Hypnotherapeutic Interventions Used in the 22 Trials of the Meta-Analysis

Intervention	Number of trials	% of trials
Direct suggestions	8	36.36
Indirect suggestions	5	22.73
Symptom-orientated suggestions	20	90.91
Posthypnotic suggestions	3	13.64
Self-hypnosis	15	68.18
Relaxation	16	72.73
Imagery	8	36.36
Visualization	4	18.18
Displacement	2	9.09
Dissociation	2	9.09
Ego-strengthening	3	13.64
Age regression	2	9.09
Metaphors	3	13.64
Symbolization	1	4.55

Table 2 provides detailed information about the types of hypnotic interventions used. Classical hypnosis was used in 86.4% (n = 19) of the trials, while 36.4% (n = 8) of the studies employed modern methods of hypnosis. Seventeen studies (77.3%) targeted solely on the psychosomatic symptoms and two studies (9.1%) focused on maladaptive cognitions or irrational ideas, in addition to targeting somatic symptoms. Two studies (9.1%), in addition to using symptom-focused interventions, reported using hypnotherapy for facilitating expression of emotions, gaining insight, and dealing with underlying causes of the somatic symptoms. Therefore, most of the studies included in the meta-analysis involved classical hypnosis.

Table 3 describes the individual studies with regard to their average effect sizes, disorders, etc. Values from d = .20 to d = .50 are rated as low, values from d = .50 to d = .80 as medium; and values of d > .80 are regarded as large effect sizes (J. Cohen, 1988).

To provide a more accurate estimation of the mean effect size, one study (Hill, 1981), yielding an extremely high between-groups effect size of d = 7.07, was excluded from all analyses concerning between-groups effect sizes. Computation of the weighted mean effect size for 21 studies resulted in d^+ = .61 (SE = .076, Z = 7.88; p = .0000). Figure 1 shows the stem-leaf diagram for the distribution of the weighted effect sizes.

The unweighted mean effect size amounts to d = .83 (SE = .1465). The BESD for d^+ = .61 are .36 and .65. This means that without treatment 36% of the patients experience an alleviation of their symptoms, after treatment, however, 65% of the patients can expect alleviation.

Table 3
Details on the 22 Trials Used for the Meta-Analysis

Author(s)	Disorder	*N**	In-/ Outpatient	Sex	Age group	Setting	Hypnosis Type	# of Sessions	Effect Size	
									Between Groups	Pre/Post
Attias et al., 1990	tinnitus	24	Out	male	adults	Individual	modern	4	.71	.71
Borkovec et al., 1973	insomnia	19	Out	female	unknown	Individual	classical	3	.61	
Calvert et al., 2002	func. Dyspepsia	61	Out	mixed	unknown	individual	unknown	12	.73	
Colgan et al., 1988	duodenal ulcer	30	Unknown	mixed	unknown	group	classical	7	.89	
Edwards et al., 1985	enuresis	24	Out	male	child./teens	unknown	classical	6	.00	1.08
Ewer & Stewart, 1986	asthma	39	Out	mixed	adults	unknown	classical	6	.16	.26
Galovski et al., 1998	IBS	12	Out	mixed	adults	unknown	mixed	12	1.71	
Gay et al., 2002	osteoarthritis	23	Out	mixed	adults	unknown	modern	8	1.36	1.04
Hill, 1981	stress	100	Out	mixed	adults	unknown	classical	3	7.07	2.62
Hoppe, 1984	chronic pain	29	Out	mixed	adults	Individual	mixed	8	.74	0.00
Kohen, 1995	asthma	14	Mixed	mixed	child./teens	Individual	mixed	2	1.17	0.00
Langewitz et al., 2005	hayfever	66	Out	mixed	mixed	unknown	unknown	unknown	.59	.89

Llaneza-Ramos, 1989	chronic headache	35	Out	mixed	unknown	unknown	modern	9	2.62	
Maher-Loughnan et al., 1962	asthma	55	Out	mixed	mixed	unknown	classical	unknown	.65	1.00
Melis et al., 1991	chronic headache	26	Out	mixed	adults	unknown	unknown	4	.83	
Moene et al., 2003	convrsn. Disorder	44	Out	mixed	adults	unknown	mixed	10	.70	.35
Pearson, 1994	chronic pain	22	Unknown	Unknown	adults	unknown	classical	1	1.16	.98
Raskin et al., 1999	hypertension	24	In	male	adults	unknown	classical	4	.66	.46
Senser et al., 2004	atopic dermatitis	33	Out	unknown	adults	unknown	mixed	12	2.00	1.04
Spanos et al., 1993	chronic headache	57	Out	mixed	adults	mixed	classical	?	.08	.24
ter Kuile et al., 1994	chronic headache	93	Out	mixed	adults	unknown	classical	6	.06	.10
Tosi et al., 1989	duodenal ulcer	13	Out	mixed	unknown	unknown	unknown	7	0.030.26	

*both treatment and control groups.

Stem	Leaf	Count
2	6	1
2		
2		
2	0	1
1		
1	7	1
1	4	1
1	22	2
1		
0	89	2
0	66777777	8
0		
0	2	1
0	0011	4

Figure 1. **Stem-leaf diagram for the 21 studies included.**

Computation of the fail-safe *N* showed that in addition to the 21 studies included, further 56 studies with an average effect size of $d = 0$ would have to exist to reduce the average effect size from $d = .61$ to $d = .20$. The funnel plot of the unweighted effect sizes as a function of sample size suggests the presence of publication bias, as the shape of the distribution is asymmetric due to the absence of larger studies with larger effect sizes (see Figure 2).

Apart from calculating a mean effect size for between-groups comparisons, a mean effect size for pre-/posttreatment comparisons was computed for 16 out of the 22 studies providing the necessary statistical information. Doing so resulted in a mean weighted effect size of $d+ = .70$ ($SE = .0812$) and in a BESD of 35% and 65%. The fail-safe *N* necessary to reduce $d = .70$ to $d = .20$ amounts to 40 studies.

To test the hypothesis that the average effect sizes computed for individual studies are estimates of a common population parameter, a test of homogeneity (Hedges & Olkin, 1985) was carried out for the 21 studies. The test yielded an inhomogeneous distribution of effect sizes, $Q_{(20)} = 49.74$; $df = 20$; $p = .00024$, i.e., the effect sizes of the 21 studies may not be regarded to stem from a common population. Decomposition of the variance of the effect sizes according to the method described by Hedges and Olkin shows that 43.95% of the variability is explained by sampling error. A subsequent cluster analysis (Hedges & Olkin) identified three clusters at the 5% level of significance (see Table 4).

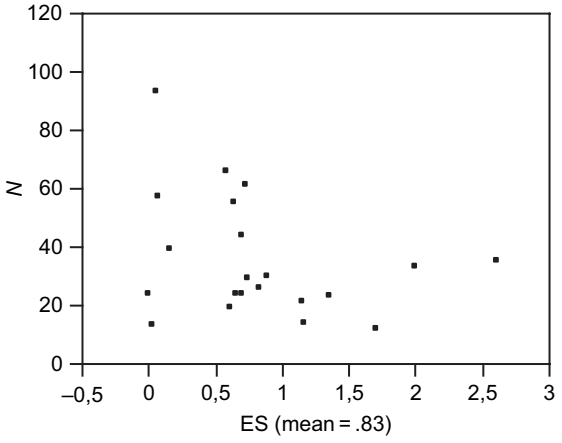

Figure 2. **Unweighted effect sizes (ES) as a function of sample size for 21 studies.**

Table 4
Results of Cluster Analysis for the 21 Studies Included

Cluster	Author	Disorder
1	Llaneza-Ramos (1989)	chronic headache
2	Attias et al. (1990)	tinnitus
	Borkovec & Fowles (1973)	insomnia
	Calvert et al. (2002)	functional dyspepsia
	Colgan et al. (1988)	duodenal ulcer
	Galovski & Blanchard (1998)	irritable bowel syndrome
	Gay et al. (2002)	osteoarthritic pain
	Hoppe (1984)	chronic pain
	Kohen (1995)	asthma
	Langewitz et al. (2005)	hay fever
	Maher-Loughnan et al. (1962)	asthma
	Melis et al. (1991)	chronic headache
	Moene et al. (2003)	conversion disorder
	Pearson (1994)	chronic pain
	Raskin et al. (1999)	hypertension
	Senser et al. (2004)	atopic dermatitis
3	Edwards & van der Spuy (1985)	enuresis
	Ewer & Stewart (1986)	asthma
	Spanos et al. (1993)	chronic headache
	ter Kuile et al. (1994)	chronic headache
	Tosi et al. (1989)	duodenal ulcer

Tests of homogeneity confirmed Cluster 2, $Q = 12.4269$; $df = 14$; $p = .5721$, and Cluster 3, $Q = .1154$; $df = 4$; $p = .9984$, to be homogenous.

To identify possible moderator variables, separate weighted analyses of variance (ANOVA) for sex (male, female, mixed), age group (children/adolescents, adults, mixed), setting (individual sessions, group sessions, mixed), patient group (inpatients, outpatients, mixed), and kind of hypnosis (classical, modern, mixed) were performed. Weighting was derived using the inverse estimated variances of the average effect sizes of a single trial. Due to the loss of degrees of freedom, these factors were not testable in a common ANOVA-model. Prior to the analyses, a Shapiro-Wilks W test for normal distribution of effect size estimates and Levene tests of equality of variances for the ANOVA-models for age group, setting, patient group, and kind of hypnosis were carried out. The test for normality failed to confirm the normal distribution assumption ($W = .8993$; $p = .034$). Equality of variances for sex was, due to small sample sizes, not testable. All other tests for equality of variances were not significant (all $p > .10$). The weighted ANOVAs for sex, age group, setting, and patient group showed no significant effect (all $p > .05$). The effect for kind of hypnosis was significant, $F = 5.9098$; $df = 2, 14$; $p = .0138$. The weighted mean effect sizes were $d^+ = .33$ ($SE = .1068$, $n = 9$), $d^+ = .73$ ($SE = .1617$; $n = 5$), and $d^+ = 1.42$ ($SE = .2566$; $n = 3$) for classical hypnosis, the mixed form of hypnosis, and modern hypnosis, respectively. The unweighted mean effect sizes were $d = .47$ ($SE = .1383$) for modern hypnosis, $d = 1.26$ ($SE = .2591$) for the mixed form of hypnosis, and $d = 1.56$ ($SE = .5607$) for classical hypnosis. Because under some circumstances nonnormality can affect the robustness of F tests in ANOVA (Miller, 1986), nonparametric Wilcoxon rank-sum tests for sex, setting, age group, patient group, and kind of hypnosis were conducted to confirm the results in the presence of nonnormality. Only the test for kind of hypnosis was significant ($\chi^2 = 8.3974$; $df = 2$; $p = .015$). All other tests were not significant (all $p > .05$). Testing for homogeneity confirmed homogeneity of variance for all three types of hypnotic intervention: classical hypnosis, $Q = 10.3356$; $df = 9$; $p = .2423$, mixed form of hypnosis, $Q = 2.4388$; $df = 4$; $p = .6556$, and modern hypnosis, $Q = 8.6753$; $df = 2$; $p = .0131$.

To assess the relationship between the number of treatment sessions and treatment outcome, a weighted linear regression model for the 21 studies included was fitted. The model contained the number of sessions as regressor, the average effect size of trial as dependent variable, and the inverse variances of the average effect sizes as weights. The regression model accounted for only about 16% ($R^2 = .1561$) of the variability of the effect sizes and failed to be significant, $F = 3.1668$; $df = 1, 16$; $p = .093$. The coefficient for the number of sessions also failed to be significant (see Table 5).

Table 5
Results of Regression Analysis for the 21 Studies

Term	coefficient	SE	*t*	*p*
Intercept	.135	.3142	.43	.6728
Duration	.0759	.0427	1.78	.093

Finally, the effect of suggestibility was assessed. In 16 out of 22 trials, a test of suggestibility was used. Out of these, 14 tests were validated. Seven trials provided information about the correlation between suggestibility and treatment outcome. Three of the trials found a significant positive correlation, three trials found a positive correlation, and one trial failed to find a correlation. Three of the trials reported numerical values for the correlation coefficient *r* with a mean of .31.

DISCUSSION

In this study, a meta-analysis on the efficacy of hypnosis with psychosomatic disorders was conducted, which exclusively included randomized, controlled clinical studies that compared groups of patients receiving hypnotherapy with a waiting control group. The analysis indicates medium efficacy of hypnosis by a weighted mean effect size of $d^+ = .61$ for psychosomatic disorders. However, the mixed and the modern forms of hypnosis showed superiority over the classical approach ($d^+ = .33, .73, 1.42$, for the classical, mixed, and modern forms, respectively). This finding is similar to the medium effect size obtained by Flammer and Bongartz (2003) in their meta-analytic study of the efficacy of hypnosis with various psychological disorders.

Regarding the effect size obtained in this study, it should be mentioned that all the dependent variables from each study were included in the computation of the effect size. If only some selected variables of a study are included in the computation of the effect size, the effect size will vary a lot, depending on which variables are used in the computation (e.g., Shapiro & Shapiro, 1982). Moreover, most of the measures used in the studies included in the analysis were heterogenous and of unknown reliability and validity. When standardized and uniform measures are used in a meta-analysis, there is a high level of homogeneity. Out of 81 variables used in the studies, only 15 variables were measured with validated instruments with known reliability. Using nonvalidated instruments with unknown reliability is likely to cause a reduction of the total effect size (J. Cohen, 1988; Hunter & Schmidt, 1990). It is well known that different kinds of measurement result in different outcomes (e.g., Shadish & Ragsdale, 1996; Shapiro &

Shapiro, 1982)—self-ratings and behavioral counts usually produce relatively favorable outcomes, whereas physiological and psychometric measures usually produce relatively unfavorable outcomes. The estimates of the effect sizes reported in this meta-analysis must, therefore, be regarded as very conservative. To avoid computation bias and subjective selection of variables, the present study included all the variables from each study to calculate the effect size. But, despite the overinclusiveness of the variables, a medium effect for the efficacy of hypnotherapy with psychosomatic disorders was found.

As suggested by the funnel plot of effect sizes versus sample size, the large treatment effects seen in large studies were missing. This may be due to publication bias but may also be a consequence of the restricted strategy used for selecting studies. While the search for the studies was not limited to certain languages, only studies in English, German, and French were actually eligible, because of the authors' limited skills in foreign languages and limited capacities for translation. With respect to language bias in medical trials, Egger and colleagues (1997) have argued that negative findings are more often published in non-English journals, which contributes to retrieval bias. If this kind of publication bias exists in psychotherapy research, then the limitation of languages is likely to lead to an underrepresentation of studies with nonsignificant or negative results.

Surprisingly, the number of treatment sessions did not influence treatment outcome in any substantial manner. A possible explanation is that a linear regression model was fitted rather than a dose-response relationship (Chatterjee & Price, 1991). But a plot of duration versus effect size showed no obvious pattern of nonlinear relationship and the models with logarithmic transformation or quadratic terms also failed to show significance and fitted the data even worse than a simple linear regression model. Another explanation for the unexpected lack of association between therapy dose and outcomes may be that a dose-response relationship might have been strong for some measures or some disorders but not for others.

With respect to an association between suggestibility and treatment outcome, only seven studies provided information about a correlation. Three studies found a positive correlation, three studies reported a significant positive correlation, and one study reported no correlation. Since the numerical values for the correlation coefficient were provided in only three studies, the mean correlation must be interpreted with caution. However, when taken together, the data hint at a positive correlation between suggestibility and treatment success.

As reported above, classical hypnosis was predominantly used in the studies of this analysis. While 53.6% of the studies were categorized classical hypnosis, only 14.3% were assigned to modern hypnosis. Thus, the results of this analysis essentially refer to the practice of classical hypnosis.

The 22 studies selected for this meta-analysis invariably used symptom-oriented suggestions (90.1%) and relaxation (72.73%) in the hypnotic treatment of the psychosomatic disorders. But psychosomatic illnesses are not simply caused by maladaptive behaviors; they can also be caused by pathogenic emotions such as repressed aggression, pathogenic grief, anxiety, etc. For example, Pennebaker and Watson (1991) conceptualized psychosomatic symptoms in terms of negative affectivity, a variant of negative self-concept. K. Cohen, Auld, and Brooker (1994) have provided evidence for the relationship between alexithymia and psychosomatic disorders. This finding has been recently supported by Waller and Scheidt (2006), who found evidence for a link between somatoform disorders and a diminished capacity to experience, to differentiate, and to express affects. Moreover, Rodin, deGroot, and Spivak (1998) have examined the role of dissociation in somatization disorders. Craig, Boardman, Mills, Daly-Jones, and Drake (1993) found lack of parental care and severe illness in childhood as the best predictors of somatization in adulthood. With respect to defense styles, Nickel and Egle (2006) provided evidence for an association between immature defense styles and somatization. Over and above those findings, a multitude of studies reveal high comorbidity between psychosomatic disorders and other psychological disorders. Bridges and Goldberg (1985) point out that patients in primary care, especially those with depressive or anxiety disorders, usually present their symptoms via somatization. After reviewing the relevant literature, Kirmayer and Young (1998) concluded that somatization is a common style for expressing distress. In patients with unexplained somatic complaints, Brown, Golding, and Smith (1990) report lifetime prevalence rates of 54.6% for major depression and 33.6% for generalized anxiety disorder. In an extensive meta-analysis of 244 studies, Henningssen, Zimmermann, and Sattel (2003) found moderate but statistically highly significant associations between IBS, nonulcer dyspepsia, fibromyalgia, and chronic fatigue syndrome with depression and anxiety.

As the examination of the clinical trials subjected to this meta-analysis reveals, it is clearly evident that hypnosis is essentially used for symptomatic treatment. It would appear the regular hypnotherapy protocol for psychosomatic illnesses does not include strategies for dealing with maintaining factors. Similarly, the treatment protocol does not address cognitions. While 95.5% (n = 21) of the studies addressed the symptoms, only 9.5% (n = 2) of the studies focused on maladaptive cognitions or irrational ideas. The same applies to addressing emotions and to gaining insight into the underlying causes of the somatic symptoms. Only two studies (9.5%) included these aspects in their treatment plan. So the interventions employed in the clinical studies included in this analysis might be well suited to alleviate the symptoms, but they might not have been effective in preventing relapses, because they did not

address triggering or maintaining factors. If this is true, the treatment outcome would be expected to be less stable over time compared to those interventions that focused on triggering and maintaining factors.

This study has several limitations. First of all, the definition of psychosomatic disorders is somewhat arbitrary, as there is no such distinct category in either the ICD-10 or the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (*DSM-IV*) classification systems. In a broad sense, the concept of psychosomatic illness may include somatoform disorders as well as disorders with psychological factors assumed to play a major role in the etiology, triggering, and maintenance of somatic complaints. Applying the ICD-10 F54 definition could justify inclusion of studies on diabetes, infectious diseases, or even cancer. Clearly, the definition of *psychosomatic* may not only substantially affect the interpretation of meta-analytic results but also the magnitude of mean effect sizes itself. A restrictive definition of psychosomatic disorders would have been to include in the analysis only studies that treated somatoform disorders meeting ICD-10 criteria. Such a limitation would facilitate replication and create a more homogeneous sample, thus allowing a more straightforward interpretation of the results. In this study, a broader definition of psychosomatic disorders was chosen in order to obtain a reasonable sample size from randomized, controlled trials.

Although a wide variety of conditions are considered psychosomatic disorders, only a limited range of psychosomatic problems were included in this evaluation. This limitation was imposed by the availability of published randomized, controlled trials. Nonrandomized trials and studies consisting of single-group pretest-posttest designs were excluded in order to ensure greater relevance to the meta-analysis and to counteract positive distortion of the evaluation of treatment efficacy by inflated effect size estimates. But relying solely on data from randomized trials may not be totally justified if the selected studies provided insufficient information on highly relevant aspects of treatment and outcome, such as severity of symptoms, qualification of the therapist, or long-term follow-up data.

Another critical point of this study is that publication bias might have existed. In fact, the fail-safe *N* of the 56 studies (more than twice the number of studies included in the analysis) seems to support the validity of this bias. But a look at the heavily skewed funnel plot of the effect sizes as a function of sample size shows that this may not be taken for granted. Instead, the validity of the results should be judged with some caution, unless further meta-analytic evaluations are conducted.

An additional shortcoming of the present analysis is its lack of a closer investigation of factors crucial for the treatment outcome. Even small differences in diagnostic criteria, age, and severity of symptoms can lead to the formation of very different groups of patients, inevitably resulting in differential treatment effect. Since the studies selected

for the analysis did not provide sufficient information, the effects of these factors were not subjected to examination. Moreover, the effect of therapist variables, e.g., qualification and experience, on treatment could not be investigated due to a lack of information. In future investigations, such moderator factors as accurate diagnosis, measurements, and therapist variables should be taken into account.

Finally, the analysis did not break down the studies into homogeneous subgroups with respect to dose-response relationship. The finding that there was no significant relationship between treatment dose and treatment outcome appears anomalous. It is possible that the relationship was compromised by the presence of some underlying, undetected moderator variables.

CONCLUSIONS

The present meta-analysis indicates hypnosis is an effective adjunct in the treatment of psychosomatic disorders. However, the three types of hypnotherapy protocol (classical, modern, and mixed) utilized in the studies provided differential treatment outcome. Modern hypnotherapy appears to be comparatively superior to classical hypnotherapy. However, the review of the studies included in the analysis indicated that hypnotherapy could be made more effective by including components addressing emotional and underlying factors rather than just focusing on symptoms.

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Die Effektivität von Hypnotherapie bei der Behandlung von psychosomatischen Störungen: Metaanalytische Evidenz

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Zusammenfassung: Es wird behauptet, dass Hypnotherapie effektiv bei der Behandlung psychosomatischer Störungen sei. Eine Metaanalyse über 21 randomisierte kontrollierte klinische Studien wurde durchgeführt, um die Effektivität von Hypnose bei psychosomatischen Störungen zu evaluieren. Die Studien verglichen Patienten, welche ausschließlich mit Hypnotherapie behandelt wurden, mit unbehandelten Kontrollpersonen. Studien, welche adjunktive medizinische Standardversorgung beinhalteten, wurden ebenfalls in die Untersuchen einbezogen. Die Art der Hypnotherapie wurde dabei klassifiziert als klassisch (n = 9), gemischt (n = 5) oder modern (n = 3). Die Ergebnisse dieser 21 Studien zeigten eine gewichtete mittlere Effektstärke d^+ = .61 (p = .0000). Eine Varianzanalyse erbrachte signifikante Unterschiede zwischen klassischer, gemischter und modernen Hypnose. Eine Regression des Ergebnisses auf die Behandlungsdosis ergab keinen signifikanten Zusammenhang. Die numerischen Werte für die Korrelation zwischen Suggestibilität und Ergebnis wurden lediglich in 3 Studien berichtet (Mittelwert r = .31). Die Metaanalyse belegt klar, dass Hypnosetherapie bei der Behandlung psychosomatischer Störungen effektiv ist.

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L'efficacité de l'hypnothérapie dans le traitement des troubles psychosomatiques : données probantes méta-analytiques

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Résumé: L'hypnothérapie agirait efficacement dans le traitement des troubles psychosomatiques.
Une méta-analyse a été menée sur 21 études cliniques comparatives, à répartition aléatoire, afin d'évaluer l'efficacité de l'hypnose dans le traitement des troubles psychosomatiques. Ces études visaient à comparer

des patients traités exclusivement à l'aide d'hypnothépie à des cas témoins, non traités. Des études incorporant des traitements d'appoint standard, dans l'un ou l'autre des bras de traitement, ont également été admises. L'hypnothérapie a été divisée en trois groupes : classique (n = 9), mixte (n = 5) et moderne (n = 3). Les résultats ont montré que la valeur de l'effet moyen pondéré de ces 21 études était de d^+ = 0,61 (p = 0,0000). Une analyse de variance a révélé des différences considérables entre l'hypnose classique, mixte et moderne. Toutefois, on n'a pu établir un lien significatif entre la régression des résultats et la dose de traitement. Des valeurs numériques révélant une corrélation entre la suggestibilité et les résultats n'ont été rapportées que dans trois études (moyenne r = 0,31). Cette méta-analyse indique clairement la grande efficacité de l'hypnothérapie dans le traitement des troubles psychosomatiques.

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La eficacia de la hipnoterapia en el tratamiento de trastornos psicosomáticos: Evidencia meta-analítica

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Resumen: Concluyo que la hipnoterapia es eficaz en el tratamiento de trastornos psicosomáticos. Realicé un meta-análisis con 21 estudios clínicos aleatorios controlado para evaluar eficacia de la hipnosis en los trastornos psicosomáticos. Los estudios compararon pacientes exclusivamente tratados con hipnoterapia y un grupo control. También incluyo estudios que emplearon la atención médica convencional como un co-adyuvante. Categoricé a la hinoterapia como clásica (n = 9), mixta (n = 5), o moderna (n = 3). Los resultados mostraron un tamaño de efecto promedio balanceado de los 21 estudios de d = .61 (p = .0000). Una ANOVA arrojó diferencias significativas entre la hipnosis moderna, mixta, y clásica. Una regresión de resultado y dosis de tratamiento no mostó resultados significativos. Sólo en 3 estudios se dieron valores numéricos sobre la correlación entre la sugestionabilidad y los resultado (media de r = .31). El meta-análisis claramente indica que la hipnoterapia es altamente efectiva en el tratamiento de los trastornos psicosomáticos.

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