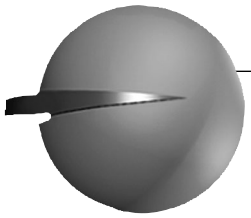

Original Article

The Effect of Hypnosis on Anxiety in Patients With Cancer: A Meta-Analysis

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Keywords
hypnosis, hypnotherapy, anxiety, psychological distress, cancer, meta-analysis, moderator

ABSTRACT

Background: Anxiety is a common form of psychological distress in patients with cancer. One recognized nonpharmacological intervention to reduce anxiety for various populations is hypnotherapy or hypnosis. However, its effect in reducing anxiety in cancer patients has not been systematically evaluated.

Aim: This meta-analysis was designed to synthesize the immediate and sustained effects of hypnosis on anxiety of cancer patients and to identify moderators for these hypnosis effects.

Methods: Qualified studies including randomized controlled trials (RCT) and pre-post design studies were identified by searching seven electronic databases: Scopus, Medline Ovidsp, PubMed, PsycInfo–Ovid, Academic Search Premier, CINAHL Plus with FT-EBSCO, and SDOL. Effect size (Hedges' *g*) was computed for each study. Random-effect modeling was used to combine effect sizes across studies. All statistical analyses were conducted with Comprehensive Meta-Analysis, version 2 (Biostat, Inc., Englewood, NJ, USA).

Results: Our meta-analysis of 20 studies found that hypnosis had a significant immediate effect on anxiety in cancer patients (Hedges' *g*: 0.70–1.41, $p < .01$) and the effect was sustained (Hedges' *g*: 0.61–2.77, $p < .01$). The adjusted mean effect size (determined by Duvan and Tweedie's trim-and-fill method) was 0.46. RCTs had a significantly higher effect size than non-RCT studies. Higher mean effect sizes were also found with pediatric study samples, hematological malignancy, studies on procedure-related stressors, and with mixed-gender samples. Hypnosis delivered by a therapist was significantly more effective than self-hypnosis.

Linking Evidence to Action: Hypnosis can reduce anxiety of cancer patients, especially for pediatric cancer patients who experience procedure-related stress. We recommend therapist-delivered hypnosis should be preferred until more effective self-hypnosis strategies are developed.

INTRODUCTION

Anxiety is a normal reaction to unpleasant stimuli (Lim, Devi, & Ang, 2011). However, excessive anxiety can be harmful. For cancer populations, anxiety has been reported as one of the most common types of psychological distress (Gregurek, Bras, Dordevic, Ratkovic, & Brajkovic, 2010).

Anxiety-related emotional distress can be relieved by sedatives, but they cause side effects such as dizziness, drowsiness, and impaired thinking and judgment (Glass, Lanctôt, Herrmann, Sproule, & Busto, 2005). Therefore, nonpharmacological complementary therapies, such as psychological counseling and hypnosis, become a viable solution to reduce anxiety (Fischer & Wedel, 2012). During hypnosis, the therapist often guides subjects to be highly focused, relaxed, calm and comfortable, and instructs subjects to imagine or recall a pleasant experience (Fulcher, Badger, Gunter, Marrs, & Reese, 2008). This relaxed state then distracts subjects' attention from stimuli causing anxiety (Levitan, 1992), thus alleviating anxiety symptoms.

Hypnotherapy has been reported to significantly mitigate cancer patients' psychological symptoms (Farrell-Carnahan et al., 2010; Katz, Kellerman, & Ellenberg, 1987; Kellerman, Zeltzer, Ellenberg, & Dash, 1983; Laidlaw, Bennett, Dwivedi, Naito, & Gruzelier, 2005; Liossi, 1999; Montgomery et al., 2007; Plaskota et al., 2012; Snow et al., 2012; Zeltzer, Kellerman, Ellenberg, & Dash, 1983), enhance positive emotions (Schnur et al., 2009), and improve quality of life (Laidlaw et al., 2005; Liossi & White, 2001). Furthermore, combining hypnosis with cognitive therapy has been shown to more effectively alleviate negative emotions than cognitive therapy alone (Schnur et al., 2009).

Although hypnosis was shown in two meta-analyses to relieve emotional distress under medical procedures or surgery (Schnur, Kafer, Marcus, & Montgomery, 2008; Tefikow et al., 2013), these studies did not focus on cancer patients who may have both disease-related and procedure-related emotional distress. Patients with cancer face a life-threatening diagnosis, suffer from multiple cancer treatments, and experience

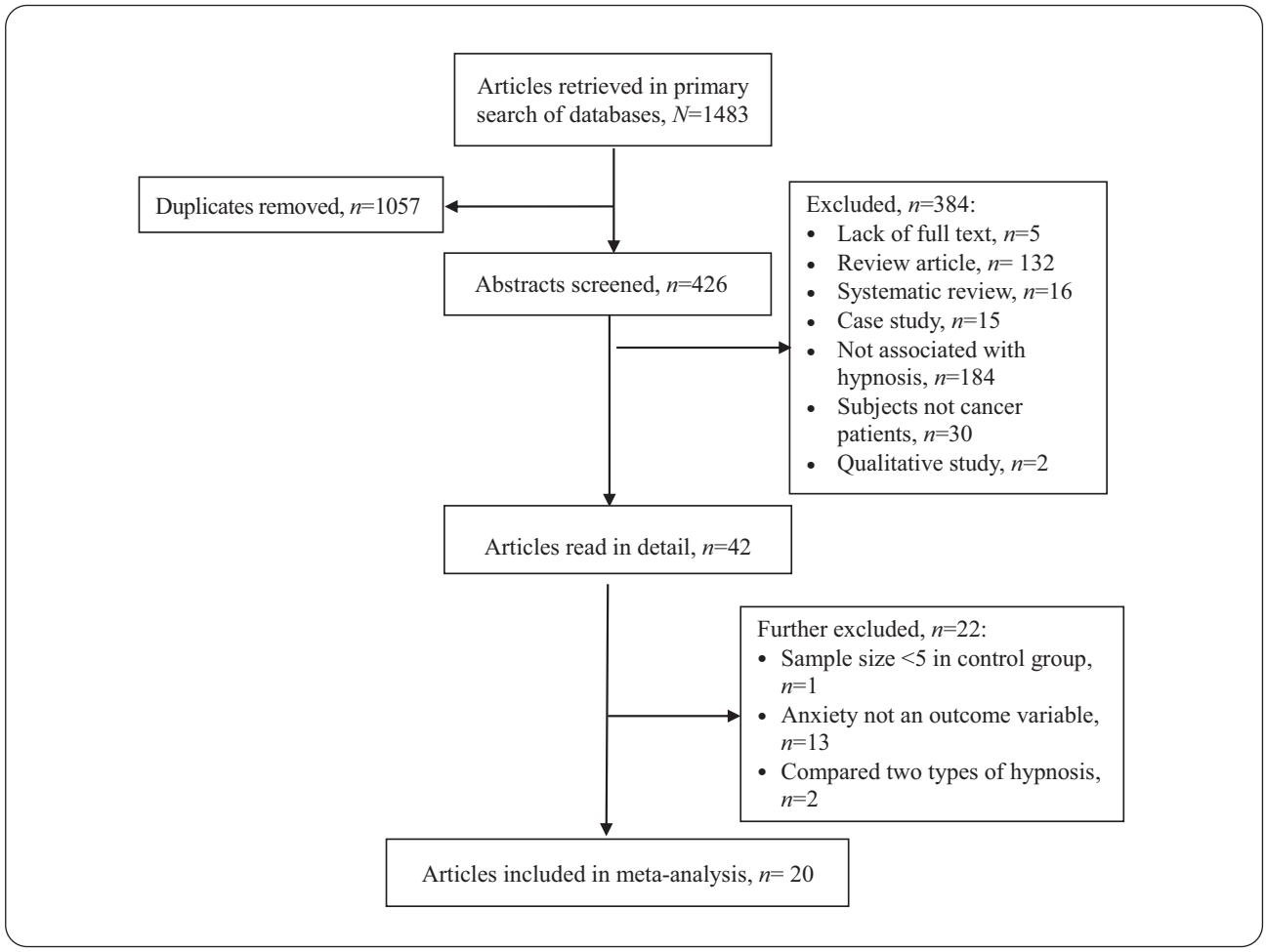

Figure 1. Flowchart of article selection for meta-analysis.

uncertainty associated with disease recurrence and prognosis, which all provoke anxiety (Bužgová, Jarošová, & Hajnová, 2015; Hinz et al., 2010). Because many primary studies have reported a positive effect of hypnosis in relieving psychological distress in patients with cancer, this meta-analysis aimed to calculate the overall effect size of hypnosis on reducing anxiety for patients with cancer and to identify moderators of the effect of hypnosis, including characteristics of the studies and hypnotic interventions.

METHODS

Search Strategy

Articles on using hypnosis for cancer patients published between 1966 and May 08, 2015 were searched in seven electronic databases: Scopus, Medline Ovidsp, PubMed, PsycInfo–Ovid, Academic Search Premier, CINAHL Plus with FT-EBSCO, and SDOL. The relevant literature was searched using three groups of keywords: Hypnosis-related keywords (including hypnosis and hypnotherapy), cancer-related keywords (including cancer, oncology, and neoplasm), and anxiety-related keywords (including anxiety, distress, emotional, symptom, and mood). Keywords in each group were combined to generate 30 search terms (e.g., hypnosis*cancer*anxiety) in three fields: title, abstract, and keywords. This search yielded 1,483 articles. After removing duplicates (n = 1,057), the remaining 426 articles were screened by reading abstracts. Abstracts were independently reviewed by the first and second authors to identify if articles meet the criteria for this meta-analysis (see below). Discrepancies were rechecked and discussed until consensus was reached. This screening excluded another 384 articles, leaving 42 articles for full text evaluation (Figure 1).

Study Criteria

These 42 articles were included in this meta-analysis if they met these criteria: (a) hypnosis used as an intervention, (b) subjects were cancer patients (both children and adults), (c) anxiety was an outcome variable, (d) sample for each group >5, (e) sufficient data (e.g., mean, *SD*, *p*, and *t* or *F* value), and (f) published in English.

Twenty-two articles were excluded by these criteria: small control-group sample (≤5; n = 1), anxiety not an outcome variable (n = 13), insufficient data (n = 5), combined hypnosis with

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cognitive behavioral therapy ($n = 1$), and compared two types of hypnosis ($n = 2$; Figure 1). Thus, 20 articles were included in this meta-analysis.

Quality Assessment

The quality of randomized control trials (RCT) and non-RCT studies was assessed using the 6-item and 8-item Quality Assessment Scales, respectively, based on Cochrane Collaboration Guidelines (Mulrow & Oxman, 1996). The maximum score for both RCT and non-RCT scales is 8, with higher scores indicating better study quality.

Data Abstraction

A researcher-developed coding form was used to extract four categories of data: (a) effect size-related statistics (mean and *SD* of anxiety, sample size, and test statistics); (b) study characteristics (research design, sample size, subjects' age, sex, diagnosis, anxiety-causing stressor (procedure- vs. non-procedure-related); (c) intervention characteristics (e.g., hypnosis delivery and duration of hypnosis); and (d) instrument used to measure anxiety.

Five randomly selected studies were independently read and coded by the first and corresponding authors to determine inter-rater data-coding consistency. Discrepancies in coding were resolved through discussion to achieve consensus. Data for the remaining 15 studies were extracted by the first author.

Quantitative Data Synthesis

Characteristics of included studies were summarized by descriptive statistics (e.g., frequency, percentage, mean, and range). Effect sizes were represented by Hedges' *g*. Hedges' *g* is standardized mean difference corrected for bias. Each study contributed one immediate effect size after intervention, except for six studies that repeatedly assessed post-therapy effects (Bakke, Purtzer, & Newton, 2002; Jensen et al., 2012; Liossi & Hatira, 2003; Liossi, White, & Hatira, 2006, 2009; Stalpers et al., 2005). For these studies, in addition to the immediate effect size, an average sustained effect size was determined. If two or more effect sizes were generated from a single study due to subgroup analysis (Smith, Barabasz, & Barabasz, 1996; Zeltzer & LeBaron, 1982), the average effect size was used. Effects sizes from different primary studies were combined by random-effect modeling. A random-effects meta-analysis was chosen to accommodate heterogeneity among studies (Higgins & Green, 2011). All statistical analyses were conducted with Comprehensive Meta-Analysis, version 2 (Biostat, Inc., Englewood, NJ, USA).

The homogeneity of effect sizes was examined by Q statistic and I^2 value. A nonsignificant Q statistic indicates homogeneity, and I^2 values (0%–100%) indicate the degree of heterogeneity. The I^2 values of 0%, 25%, 50%, and >75% represent no, low, moderate, and high heterogeneity, respectively (Higgins, Thompson, Deeks, & Altman, 2003). Publication bias was assessed by funnel plot, Egger's regression test, and Duval and Tweedie's trim and fill (Borenstein, Hedges, Higgins, & Rothstein, 2009). Subgroup analyses were performed to identify potential moderators including characteristics of study (e.g., design, country), participants (age group, gender, cancer diagnosis), stress, timing of outcome measurement, and hypnosis delivery.

RESULTS

Study Characteristics

Among the 20 qualified studies, 12 were conducted in the United States, 7 in the United Kingdom, and 1 in the Netherlands. Thirteen were RCTs, and 7 were single-group studies with pre- and post-test designs (non-RCT; Table 1). The 13 RCTs used various types of control groups: standard care ($n = 10$), attention care ($n = 5$), distraction ($n = 2$), and CBT ($n = 1$). The total number of participants was 878 (range = 8–201), with 428 receiving hypnosis. Studies were published between 1982 and 2012. Eleven studies focused on adult patients (age >20 years, range = 25–87), and nine focused on pediatric patients (age ≤20 years, range = 5–20). Participants in eight, six, and four studies were diagnosed with solid tumors, hematological malignancy, and a mix of solid and hematological malignancies, respectively. Hypnosis was delivered by therapists only in 10 studies, by therapists plus self-hypnosis in 7 studies, and by self-hypnosis only in 3 studies. Among the 10 studies with information on hypnosis duration, the mean was 32.50 min (range = 15–60; Table 1). Continuous anxiety scores were reported in all included studies using various anxiety instruments. Ten studies used multi-item instruments, including the Hospital Anxiety and Depression Scale-Anxiety subscale ($n = 5$), the State-Trait Anxiety Inventory ($n = 3$), the Profile of Mood State-Tension/Anxiety subscale ($n = 1$), and the Generalized Anxiety Disorder 7-item scale ($n = 1$). The other 10 studies used single-item scales, including the Visual Analogue Scale for anxiety ($n = 3$), the Faces Rating Scale for anxiety ($n = 3$), the Numerical Rating Scale for anxiety ($n = 2$), the Condensed Memorial Symptom Assessment Scale-Modified, Anxiety item ($n = 1$), and the Children's Global Rating Scale ($n = 1$; Table S1). The average quality scores for the RCTs and non-RCTs studies were 4.32 (Table S2) and 6.29 (Table S3), respectively.

Weighted Mean Effect Size

The 20 studies had significant heterogeneity of immediate effects ($Q = 121.41$, $p < .05$, $I^2 = 84.35\%$). The six studies with sustained effects also had significant heterogeneity ($Q = 79.05$, $p < .05$, $I^2 = 93.68\%$). The 20 studies had a weighted mean immediate-effect size (Hedges' *g*) of 1.05 ($p < .01$; range = 0.70–1.41), favoring hypnosis (Figure 2). The weighted sustained-effect size (Hedges' *g*) was 1.69 ($p < .01$; range = 0.61–2.77; Figure 3).

Table 1. Characteristics of Included Studies

Author, year	Country	Design	Treatment sample, *n*	Control sample, *n*	Adults/ children	Cancer diagnosis	Medical procedure	Measurement timing	Hypnosis	Hypnosis duration (min/session)	Hypnotic susceptibility
Bakke et al., 2002	USA	Non-RCT	25	No control group	Adults	Breast cancer	Cancer survivorship	Baseline T_1: Immediately post hypnosis T_2: 3 months post hypnosis	• Therapist (8 weekly sessions) • Self-hypnosis with audiotapes (3 times/week) • Individually tailored	60	Stanford hypnotic susceptibility scale
Elkins et al., 2008	USA	RCT	27	24/Standard care	Adults	Breast cancer	Cancer survivorship	Baseline T_1: Immediately post hypnosis	• Therapist (5 weekly sessions) • Self-hypnosis with audiotapes (frequency unavailable) • Individually tailored	50	Not described
Farrell-Carnahan et al., 2010	USA	RCT	14	14/Standard care	Adults	Breast and other cancers	Cancer survivorship	Baseline T_1: Immediately post hypnosis	• No therapist involved • Self-hypnosis by watching video and listening to audio file from a website (3 times/week for 4 weeks) • Not individually tailored	20	Not described
Jensen et al., 2012	USA	Non-RCT	8	No control group	Adults	Breast cancer	Cancer survivorship	Baseline T_1: Immediately post hypnosis T_2–T_4: 1, 3, and 6 months post hypnosis	• No therapist involved • Self-hypnosis with CDs (once/day for 4 weeks) • Individually tailored	Not described	Not described
Katz et al., 1987	USA	RCT	17	19/Attention care	Children	Leukemia	BMA	Baseline T_1: Immediately post 1st hypnosis session T_2: Immediately post 2nd hypnosis session T_3: Immediately post 3rd hypnosis session	• Therapist (one session per procedure for three procedures) • No self-hypnosis • Individually tailored	20	Not described

(Continued)

Table 1. Continued

Author, year	Country	Design	Treatment sample, *n*	Control sample, *n*	Adults/ children	Cancer diagnosis	Medical procedure	Measurement timing	Hypnosis	Hypnosis duration (min/session)	Hypnotic susceptibility
Kellerman et al., 1983	USA	Non-RCT	16	No control group	Children	Mixed	BMA LP injection	Baseline T_1: Immediately post hypnosis	• Therapist (one session during procedure) • Self-hypnosis with suggestion (frequency unavailable) • Individually tailored	Not described	Not described
Lang et al., 2008	USA	RCT	66	70/Standard care 65/Attention care	Adults	Hepatic malignancies	TAE & RF ablation	No baseline T_1–T_{10}: every 15 minutes throughout medical procedures	• Therapist not involved • Self-hypnosis with hypnotic script read by research assistant (frequency unavailable) • Not individually tailored	Not described (throughout the procedure)	Not described
Lew et al., 2011	USA	Non-RCT	20	No control group	Adults	Breast cancer	Surgery	Baseline T_1: Immediately post hypnosis	• Therapist (one session at presurgery) • No self-hypnosis • Not individually tailored	15	Not described
Lioosi et al., 2009	UK	RCT	15	15/Standard care 15/Attention care	Children	Hematological malignancy	VP	Baseline T_1: Immediately post hypnosis T_2–T_3: Follow-up post self-hypnosis	• Therapist (one session before the medical procedure) • Self-hypnosis with Gardner's model (frequency unavailable) • Individually tailored	15	Stanford Hypnotic Clinical Scale for Children (SHCS-Children)

(Continued)

Table 1. Continued

Author, year	Country	Design	Treatment sample, *n*	Control sample, *n*	Adults/ children	Cancer diagnosis	Medical procedure	Measurement timing	Hypnosis	Hypnosis duration (min/session)	Hypnotic susceptibility
Lioosi et al., 2006	UK	RCT	15	15/Standard care15/Attention care	Children	Leukemia & non-Hodgkin disease	LP	Baseline T_1: Immediately post hypnosis T_2–T_3: Follow-up post self-hypnosis	• Therapist (one session before the medical procedure) • Self-hypnosis with Gardner's model (frequency unavailable) • Individually tailored	40–45	SHCS-Children
Liossi & Hatira, 2003	UK	RCT	20	20/Standard care 20/Attention care	Children	Leukemia & non-Hodgkin disease	LP	Baseline T_1: Immediately post hypnosis T_2: Follow-up post 3 self-hypnosis sessions	• Therapist (one session during the 1st medical procedure) • Self-hypnosis with Gardner's model (frequency unavailable) • Individually tailored	40–45	SHCS-Children
Liossi & White, 2001	UK	RCT	25	25/Standard care	Adults	Unclear	Palliative care	Baseline T_1: Immediately post hypnosis	• Therapist (4 weekly sessions) • No self-hypnosis • Individually tailored	30	Not described
Liossi & Hatira, 1999	UK	RCT	10	10/Standard care 10/Cognitive behavioral	Children	Leukemia	BMA	Baseline T_1: Immediately post hypnosis	• Therapist (2 sessions before the medical procedure) • No self-hypnosis • Individually tailored	30	SHCS-Children

(Continued)

Table 1. Continued

Author, year	Country	Design	Treatment sample, *n*	Control sample, *n*	Adults/ children	Cancer diagnosis	Medical procedure	Measurement timing	Hypnosis	Hypnosis duration (min/session)	Hypnotic susceptibility
Plaskota et al., 2012	UK	Non-RCT	11	No control group	Adults	Unclear	Palliative care	Baseline T_1: Immediately post the 2nd hypnosis T_2: Immediately post the 4th hypnosis	• Therapist (4 sessions) • Self-hypnosis with suggestion (frequency unavailable) • Individually tailored	Not described	Not described
Stalpers et al., 2005	The Netherlands	RCT	33	36/Standard care	Adults	Solid tumor	Radiotherapy	Baseline T_1: Immediately post 1st hypnosis session T_2: Immediately post 2nd hypnosis session T_3: at 30th R/T T_4: at 3–6 weeks after completing R/T course	• Therapist (one session before the 1st and 15th R/T) • Self-hypnosis with tapes (frequency unavailable) • Not individually tailored	Not described	Not described
Smith et al., 1996	USA	RCT	14	13/Distraction	Children	Mixed	LP	Baseline T1: Immediately post hypnosis	• Therapist (one session) • Self-hypnosis with audiotapes (once/day for 1 week) • Individually tailored	Not described	SHCS-Children

(Continued)

Table 1. Continued

Author, year	Country	Design	Treatment sample, *n*	Control sample, *n*	Adults/ children	Cancer diagnosis	Medical procedure	Measurement timing	Hypnosis	Hypnosis duration (min/session)	Hypnotic susceptibility
Snow et al., 2012	USA	RCT	41	39/Standard care	Adults	Hematological disorder	BMA & biopsy	Baseline T_1: Immediately post hypnosis	• Therapist (one session throughout medical procedures) • No self-hypnosis • Not individually tailored	Not described (throughout the procedure)	Not described
Wright et al., 2002	USA	Non-RCT	18	No control group	Adults	Breast cancer	Treatment-related cancer	Baseline T_1: Immediately post self-hypnosis	• Therapist not involved • Self-hypnosis with autogenic training (3 times/day) • Individually tailored	Not described	Not described
Zelter et al., 1983	USA	Non-RCT	9	No control group	Children	Mixed	Chemotherapy	Baseline T_1: Immediately post hypnosis	• Therapist (1–3 sessions) • No self-hypnosis • Individually tailored	Not described	Not described
Zelter & LeBaron, 1982	USA	RCT	24	25/Distraction	Children	Mixed	LP & BMA	Baseline T_1: Immediately post hypnosis	• Therapist (one session throughout medical procedures) • No self–hypnosis • Individually tailored	Not described	Not described

Note. Mixed = combined solid tumor and hematologic malignancy; BMA = bone morrow aspiration; VP = venipuncture; LP = lumbar puncture; TAE = transcatheter arterial embolization; R/T = radiotherapy; baseline: preintervention.

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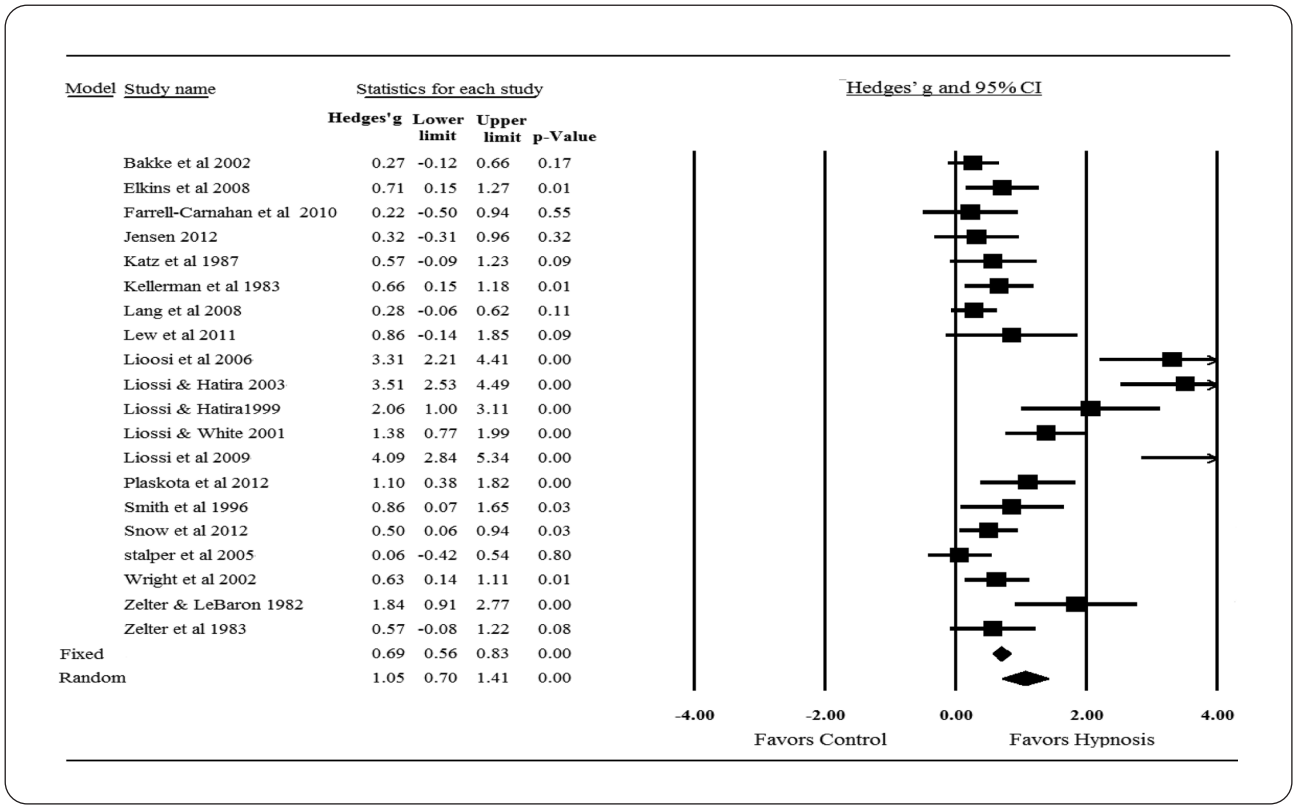

Figure 2. Overall immediate-effect size.

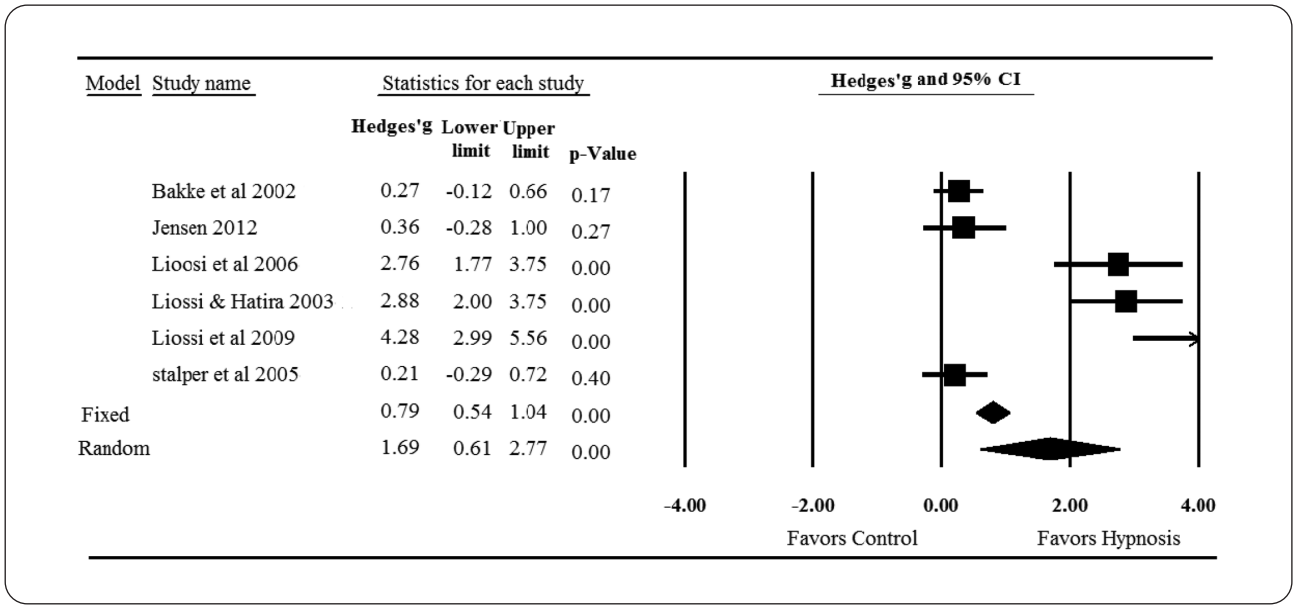

Figure 3. Overall sustained-effect size.

Moderating Effects

The effect of hypnosis interventions was found to significantly interact with seven factors: the country study was originated (America vs. Europe), study design (RCT vs. non-RCT), participants' age group (children vs. adult), gender (female only vs. mixed), cancer type (solid tumor vs. hematological malignancy), stressor type (procedure-related or not), and hypnosis-related factors.

Higher mean effect sizes were found for studies conducted in Europe (1.93 vs. 0.52, $p < .01$), RCT design (1.37 vs. 0.54,

$p < .01$), with child participants (1.86 vs. 0.52, $p < .01$), with hematological malignancy (2.28 vs. 0.35, $p < .01$), with procedure-related stressors (1.58 vs. 0.56, $p < .01$), and with participants of mixed sex (1.29 vs. 0.48, $p < .01$). Among four hypnosis-related factors, only one showed a significant moderating effect. Hypnosis was more effective when it combined therapist delivery with self-hypnosis than self-hypnosis only (1.44 vs. 0.37, $p < .01$; Table 2).

Publication Bias

Thepotential publication bias was assessed by funnel plot and Egger's regression test. Asymmetry was found by visually inspecting the funnel plot (Figure S1); more studies toward the bottom of the graph (less precision) than near the top (more precision), and more studies on the right (larger effect size) than on the left (smaller effect size). Egger's test of the intercept was significant (intercept = 5.74, $p < .05$) for publication bias, and the positive intercept indicates that smaller studies tended to report more positive results than larger trials. With the trim-and-fill method, seven studies were imputed (Figure S1); the adjusted mean effect size was 0.46, which is smaller than the original analysis of 1.05.

DISCUSSION

This meta-analysis is the first to examine the effect of hypnosis on anxiety for patients with cancer. We found that hypnosis effectively reduced anxiety with an average effect size of 1.05 before adjusting for potential publication bias. After adjusting for publication bias with trim and fill, the effect size decreased to 0.46, which is considered a small effect size (Cohen, 1988).

The positive effect of hypnosis found in this study is consistent with previous meta-analyses of hypnosis effects for noncancer patients receiving medical procedures (Schnur et al., 2008; Tefikow et al., 2013; Uman, Chambers, McGrath, & Kisely, 2008). The last meta-analysis of hypnosis reported a large effect size (standardized mean difference = −2.20, 95% CI [−3.69, −0.71]) in relieving puncture-related distress for noncancer children and adolescents (Uman et al., 2008). However, this analysis included only five articles and the precision of the estimate was poor. Positive effects of hypnosis were also found in the other studies in reducing distress (Schnur et al., 2008) or anxiety (Tefikow et al., 2013) for patients receiving medical procedures or surgery. Our results extending the positive effect of hypnosis to cancer patients suggest that this clinical intervention is valuable not only in relieving procedure-related stress, but also in reducing general anxiety experienced by cancer patients after treatment.

We found that hypnosis had a significantly larger effect size in studies originated from Europe, with children, mixed gender, hematologic malignancies, and procedure-related stressors. However, these moderators confounded each other's effects. The distribution of these moderators differed significantly in studies with child and adult participants ($p < .01$). Studies on children tended to be conducted in Europe, have a higher proportion of hematological malignancies, mixed-gender samples, and receiving medical procedures. Therefore, the moderating effects of cancer diagnosis, gender, and receiving medical procedures may simply reflect the effect of participants' age.

The reason for a hypnosis-favoring effect on children may reflect that children are more responsive to hypnotic suggestions than adults (Morgan & Hilgard, 1973) and have a higher hypnotic susceptibility than adults (Accardi & Milling, 2009). Hypnotic susceptibility gradually increases from the age of 3 years, with a peak around age 8–12 years, and declines between ages 12 and 16, thereafter tending to maintain a stable status throughout life (Morgan & Hilgard, 1973).

The effect size of therapist-delivered hypnosis combined with self-hypnosis was triple that of self-hypnosis (1.29 vs. 0.46, $p < .01$), as previously reported (Schnur et al., 2008; Tefikow et al., 2013). This difference may be due to the hypnosis effect being compromised by lack of individualized instruction and adjustment by a live therapist or to environmental noise interrupting the shift of consciousness to a trance state. Indeed, the effect size of hypnosis delivered by a live therapist was significantly higher than that using audiotapes (1.22 vs. 0.19, $p = .004$; Schnur et al., 2008). Patients listening to hypnosis tapes or CDs may not reach as deep a trance state as patients induced into hypnosis by a live therapist who can deepen subjects' trance state based on their relaxation level and depth of hypnosis. It is worth noting that not every study provided a detailed description of the hypnosis process. Among studies that did describe their hypnosis, procedures were quite heterogeneous, making it difficult to determine whether the success of hypnosis was due to its process or the therapist. Therefore, we recommend standardizing the hypnosis details and process for cancer patients.

The effects of hypnosis seemed unaffected by the duration of hypnosis. Hypnosis >30 minutes did not have a significantly higher effect than hypnosis lasting 0–30 minutes. However, only 10 of 20 included studies reported hypnosis duration. Thus, our study power to detect any moderating effect of hypnosis duration might have been too low. Further studies are needed to identify the best duration of a hypnosis session. Moreover, we did not find a significant difference between the immediate and sustained effects of hypnosis, contrary to our expectation that the immediate effects would be better. Hypnosis appears to have had not only an immediate effect in reducing anxiety, but the effect was also sustained.

LIMITATIONS

This study has several limitations. First, due to the small samples in 13 RCT studies, we could not do subgroup analyses based on the type of control groups used. These control groups were rather heterogeneous, including standard care and other treatments (e.g., distraction or CBT). Hypnosis may have had a higher effect size when compared to standard care than when compared to other treatments. Even if only standard care was

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Table 2. Effects of Moderators

Moderator	*n*	Point estimate	Standard error	95% CI	Z	*p*	Q_B	*p*
Country of study originated							8.88	.003
America	12	0.52	0.10	0.34–0.71	5.51	<.001		
Europe	8	1.93	0.46	1.02–2.83	4.17	<.001		
Study design							7.63	.006
RCT	13	1.37	0.28	0.82–1.92	4.87	<.001		
Non-RCT	7	0.54	0.11	0.33–0.75	4.99	<.001		
Age							9.83	.002
Adults	11	0.52	0.11	0.30–0.74	4.59	<.001		
Children	9	1.86	0.41	1.05–2.67	4.51	<.001		
Gender							8.65	.003
Female	5	0.48	0.12	0.24–0.72	3.92	<.001		
Mixed	15	1.29	0.24	0.80–1.76	5.24	<.001		
Diagnosis							12.58	.002
Solid tumor	8	0.35	0.10	0.18–0.53	3.95	<.001		
Hematological malignancy	6	2.28	0.41	1.02–3.53	3.55	<.001		
Mixed	4	0.89	0.24	0.41– 1.36	3.68	<.001		
Stressor							8.10	.004
Procedure-related	11	1.58	0.33	0.93– 2.23	4.78	<.001		
Non-procedure-related	9	0.56	0.14	0.28– 0.83	3.98	<.001		
Therapist involved							12.58	.002
Therapist only	7	1.02	0.22	0.58– 1.46	4.54	<.001		
Therapist + self-hypnosis	9	1.44	0.36	0.74–2.14	4.03	<.001		
Self-hypnosis	4	0.37	0.12	0.13–0.61	3.00	<.001		
Duration of hypnosis (min)							0.25	.62
0–30	6	1.44	0.45	0.56–2.33	3.19	<.001		
31–60	4	1.87	0.74	0.43– 3.32	2.55	.010		
Control group care*							0.44	.51
Standard care	10	1.48	0.35	0.84–2.19	4.29	<.001		
Nonstandard care	8	1.86	0.46	0.96–2.76	4.07	<.001		
Hypnosis effect							0.03	.87
Immediate	6	1.83	0.61	0.64–3.01	3.01	.003		
Sustained	6	1.69	0.55	0.61–2.77	3.06	.002		

Note. Gender: mixed = female + male; diagnosis: mixed = solid tumor + hematological malignancy; RCT = randomized controlled trial.
*Five studies provided two types of control groups.

included for control-group analysis, the actual "standard" care might differ due to cultural differences or unit-related characteristics in different countries. We suggest describing the details of control group care when reporting primary RCTs so that future meta-analyses can use the control-group condition as an inclusion criterion or moderator of treatment effects.

The second limitation is that we could not analyze the potential moderating effect of hypnotic susceptibility because most of the original studies did not measure hypnotizability, a factor suggested to be associated with the effect of hypnosis (Flammer & Bongartz, 2003; Montgomery, Schnur, & David, 2011). Third, five studies were excluded because of insufficient data to compute the effect size; including these studies might have affected the overall effect sizes.

The last limitation of this study is that only articles published in English were included and most of the included studied were conducted in either United States or United Kingdom. Although excluding non-English articles may threaten the validity of this meta-analysis, study reported that language-restricted meta-analysis, compared to language-inclusive meta-analyses, did not differ on the estimate of intervention benefit (Moher et al., 2000).

Implications for Practice and Future Research

The overall effect size documented in this meta-analysis suggests that hypnosis can alleviate anxiety for patients with cancer, particularly children or adolescents. We also found that therapist-provided hypnosis was more effective than self-hypnosis in relieving cancer patients' anxiety. We recommend therapist-delivered hypnosis should be preferred until more effective self-hypnosis strategies are developed. However, therapist delivery of every hypnosis session may not be practical due to cost concerns. Therefore, strategies should be developed to help patients become aware of their consciousness and achieve a trance state in self-hypnosis. Because the effect of hypnosis in reducing anxiety is more evident for children with cancer, hypnosis skills may be considered as one of the advanced topics for pediatric oncology nurse specialist education. Future studies on the effect of self-hypnosis should consider adherence-related parameters, such as practice frequency, time, and self-efficacy, as potential predictors of outcome variables. **WVN**

LINKING EVIDENCE TO ACTION

- The findings of this meta-analysis support hypnosis as an adjuvant intervention for immediate and long-lasting relief of anxiety in patients with cancer, especially children with medical procedure-related anxiety.
- An important factor for the success of this therapy may be involving a therapist in the hypnosis process.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's web site:

Table S1. Instruments Used to Measure Anxiety
Table S2. Quality of Included Randomized Controlled Trials (RCTs)
Table S3. Quality of Included Single-Group Studies (non-RCT)
Figure S1. Funnel plot of standard errors by Hedges' *g* with trim and fill.

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