Journal of Holistic Nursing

http://jhn.sagepub.com

# A Meta-Analysis of the Effect of Guided Imagery Practice on Outcomes

Debra Van Kuiken

*J Holist Nurs* 2004; 22; 164
DOI: 10.1177/0898010104266066

# *A Meta-Analysis of the Effect of Guided Imagery Practice on Outcomes*

**Debra Van Kuiken, R.N., B.S., B.S.N.**
*University of Cincinnati*

*Guided imagery is an intervention used by nurses in a variety of settings. It has been suggested that better outcomes will occur with continued practice. No studies were found that examined the relationship between practice duration and strength of outcomes. The focus of this meta-analysis was the effect size of guided imagery intervention studies with different durations. Statistical findings of 10 studies of various durations were converted to* d *statistics and plotted against the duration of study. The results show an increase in effect size of guided imagery over the first 5 to 7 weeks; however, the effect was decreased at 18 weeks.*

***Keywords:*** *meta-analysis; guided imagery; mind-body techniques; self-hypnosis*

**Imagery, as a healing art**, has been around for millennia (Achterberg, 1985). From the use of symbolism, dreams, and visions by shamans to the guided imagery of today, healers have used the connection of mind and body to affect health. Increasingly, researchers have been looking at the efficacy of this low-technology approach to health care. Guided imagery has been studied in a variety of settings including cardiac surgery, cardiology, oncology, stroke rehabilitation, and pain management (Halpin, Speir, CapoBianco, & Barnett, 2002; Klaus et al., 2000; Kolcaba & Fox, 1999; Maguire, 1996; Page, Levine, Sisto, & Johnston, 2001). When Wallace (1997) analyzed the literature on relax-

AUTHOR'S NOTE: I would like to acknowledge Linda Baas, Ph.D., R.N., for her encouragement, mentoring, and help in preparing this article.

JOURNAL OF HOLISTIC NURSING, Vol. 22 No. 2, June 2004 164-179
DOI: 10.1177/0898010104266066

ation and imagery, several concerns emerged regarding the delivery of guided imagery as an intervention. Wallace noted that the length, frequency, and details of the intervention were varied and often missing from the research report. Eller's (1999b) review of the literature noted inconsistencies in content and methods of delivery. Delivery of the intervention has been by audiotape or personal interaction, one on one or in groups. The images used ranged from pleasant environments and memories to symbols and physiological processes. Furthermore, studies ranged in duration from hours to months.

## Purpose

Little research has been done to establish the frequency or duration of guided imagery required to effect change. The purpose of this meta-analysis was to examine the research literature published since 1996 to ascertain the relationship between the duration of guided imagery intervention and the resultant effect size. For purposes of the current study, duration of the intervention was the measure of the time from the beginning of the intervention until the time of outcome measurement.

## Literature Review

### Imagery

Imagery is the thought process that takes into account and translates the senses for the nervous system to, in turn, produce healing change throughout the body (Achterberg, 1985; Horrigan, 2002). Guided imagery may be done through prompting by a live practitioner, an audiotape, or self-prompting. Several theories for this process have been proposed. Achterberg (1985) illustrated pleasant imagery as a method of inducing a deep sense of calm and an avenue of reframing emotions and thus changing the sympathetic-parasympathetic balance. Achterberg also described a neuroanatomic model in which formation of nonverbal images and the processing of emotions occur adjacent to each other in the cerebral right hemisphere. This association is translated to an autonomic response. The left hemisphere's conscious control of the voluntary nervous system then modulates the emotional-autonomic response pathway. Research in the field of psychoneuroimmunology has established the presence of neurons in areas of white blood cell production and storage, further indication of a direct link between thought and physiological function (Zeller, McCain, & Swanson, 1996).

Dr. Marty Rossman, founder of the Academy for Guided Imagery, stated in an interview that guided imagery is based on the assumption that the body has an innate ability for self-healing and should be used as a complementary therapy to existing medical care, rather than an alternative healing practice (as cited in Horrigan, 2002).

In a review of the literature, four types of guided imagery were identified. The four types are pleasant imagery, physiologically focused imagery, mental rehearsal or reframing, and receptive imagery. Pleasant imagery guides the individual to imagine a calm, comfortable place. This may include images of mountains, oceans, or past memories that generate feelings of calm and nurturance. The individual may also be asked to imagine images of general well-being and health.

Physiologically focused imagery guides the individual to imagine the physiological function of the healing needed. For example, it may include images of lymphocytes and macrophages in the fighting an infection. Images may also be symbolic such as teaching patients undergoing skin grafts to imagine hands of the grafted skin holding hands with the blood vessels of the tissues below. This type of guided imagery requires education about the biological processes involved before the initiation of the guided imagery experience (Achterberg, Dossey, & Kolkmeier, 1994).

Another type of imagery is mental rehearsal or reframing. Mental rehearsal is the process of imagining the performance of a specific task in a relaxed state prior to actually performing the task. One familiar example of mental rehearsal is the athlete's imaging the physical maneuvers needed before actually attempting those maneuvers physically. Neuronal firing with imagery occurs in the appropriate brain areas and may also reinforce neural pathways (Kosslyn, Ganis, & Thompson, 2001). Reframing imagery involves imagining and reinterpreting an event and the emotions connected to that event.

Finally, receptive imagery involves a scanning of the body (Horrigan, 2002). Because receptive imagery is of a diagnostic or reflective nature, the current study did not include receptive imagery as an intervention.

## METHOD

### Study Selection

Computerized searches using the words *guided imagery*, *imagery psychotherapy*, and *visualization and health* on CINAHL (43 hits), MEDLINE (45 hits), and PubMed (10 hits) were done in October 2002. Limits on searches included only published research articles with adult human participants between the years 1996 to 2002. Eller (1999b) and Wallace (1997) provided detailed syntheses of the literature. They described the lack of reported details in many studies of guided imagery. The current meta-analysis attempted to quantify the effect of imagery; therefore, only studies since 1996 were included in the current analysis. Searches were limited to English texts. Thirty-three studies combining imagery with other therapies such as music, journaling, or healing touch were excluded because of the difficulty in isolating the effect of imagery. Studies (25) done for primary psychiatric diagnosis such as post-traumatic stress disorder, anorexia, or depression were also excluded because the confounding emotional and mental factors. Studies using self-hypnosis were included if imagery was the primary component and any induction was described as a simple relaxation technique. After combining the searches, the sample consisted of 16 published studies. Six of these studies did not provide adequate statistical data, such as *F* or *t* values, needed for calculating effect size in a meta-analysis. No unpublished studies were used for this analysis.

### Analysis

The method of analysis of the data included the transforming of statistics from each original study to the *d* statistic. Using the equations set forth by Moody (1990) and Cooper (1998), the *d* statistic allows for a comparison of the effect size for each of the studies. Effect size represents the difference of the means of the groups (intervention and control) in terms of their pooled standard deviations (Cooper, 1998). If studies had several dependent variables producing more than one effect size per time period, the mean effect size was used to represent each study equally and to prevent violation of independence (Fernandez & Turk, 1989). For the purposes of the current analysis, weighting factors were not calculated. In studies where only

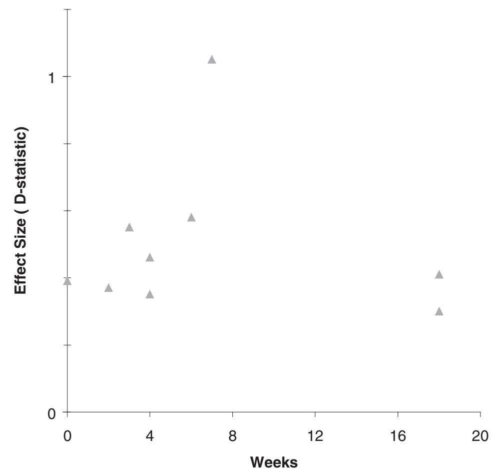


**Figure 1: Guided Imagery Effect Size as a Function of Duration of Intervention.**

means and standard deviation were available, an estimated effect size was obtained by the following formula: $M_E - M_C / [(SD_E - SD_C) / 2]$ (Cooper, 1998).

To determine the relationship between duration of the intervention and the effectiveness of guided imagery, the effect size was plotted against the weeks (duration) of the study (see Figure 1). All studies were represented by only one point, except two studies that had repeated measures at distinct times (Donaldson, 2000; Kolcaba & Fox, 1999). A separate *d* statistic was calculated for each data collection point. Duration of the intervention was defined as the time in weeks from the onset of the intervention to the time of measuring the outcome.

## Results

### Sample

Ten studies from nursing and medical journals between 1996 and 2002 comprised the sample. The study samples included healthy medical students at exam time ($n$ = 2), persons suffering chronic illness ($n$ = 7), and those experiencing acute illness or invasive procedures ($n$ = 1). Outcomes include physiological measures (immune parameters) and psychosocial measures such as anxiety, locus of control, and coping. Table 1 is a summary of the studies included in the meta-analysis.

### Variations in Duration

Plotting the effects of guided imagery against duration of the intervention revealed increasing effects as time progresses (see Figure 1). However, at 18 weeks, the effects declined in strength. Kolcaba and Fox (1999) substantiated this in their findings that the effect size of the intervention at 3 weeks is indeed more than at 18 weeks. Donaldson (2000) found the effect of guided imagery increased with time as evidenced by effect sizes of 4.27, 4.89, and 6.64 for days 30, 60, and 90, respectively (see Figure 2). These results were excluded from Figure 1 as they represented possible outliers. However, the increase in white blood cells (WBCs) of 38.3% over the 90 days of the study is worth noting.

### Variation in the Intervention

Unlike previous literature reviews, studies obtained for the current analysis are more consistent in delivery method of guided imagery. All but two studies (Kiecolt-Glaser, Marucha, Atkinson, & Glaser, 2001; Lang et al., 2000) used instruction accompanied by an audiotape for practice at home. Page et al. (2001) reported using three different tapes, providing participants with a variety, whereas Kolcaba and Fox (1999) used one tape for the 18-week intervention.

The content of the imagery for a majority (60%) of the studies was physiologically focused on immune function or disease process. Three studies that used immune parameters as dependent variables found significant results. Twenty people with chronically low WBC counts demonstrated very strong effect size (ranging 4.27 to 6.64), which accumulated over time, after physiologically focused imaging (Donaldson, 2000). In two studies, students under the stress of exams experienced a stable immune function after imagery, while students in the control groups experienced decreases in key immune factors (Gruzelier, Smith, Nagy, & Henderson, 2001; Kiecolt-Glaser et al., 2001). However, it must be noted that these two studies, published in the same year, yielded conflicting results. The markers, natural killer and CD8, that showed stability in the Gruzelier et al. study were the markers least affected by imagery in the Kiecolt-Glaser study.

**TABLE 1**

## Studies Used in Meta-Analysis

| *Author* | N | *Sample Characteristics/Design* | *Intervention* | *Duration in Weeks* | *Dependent Variable* | d *Statistic* |
|---|---|---|---|---|---|---|
| Donaldson, 2000 | 20 | Dx depressed WBC (< 5000) × 6 months, pre- and posttest, repeated measures | Physiological imagery of immune system | 12 | WBCs<br>1. At 30 days<br>2. At 60 days<br>3. At 90 days | <br>1. 4.27<br>2. 4.89<br>3. 6.64 |
| Eller, 1999a | 69 | HIV diagnosis, outpatient clinic RCT | Physiological imagery of immune system | 6 | 1. QOL<br>2. Perceived health status | 1. Ns<br>2. Ns |
| Fors, Sexton, Götestam, 2002 | 55 | Women with fibromyalgia RCT | Pleasant imagery attention focusing | 4 | Pain<br>1. With pleasant imagery<br>2. With attention focusing | <br>1.[a] .41<br>2.[a] –.29 |
| Gruzelier, Smith, Nagy, & Henderson, 2001 | 28 | Students at exam time RCT | Physiological imagery of immune system self-hypnosis | 4 | 1. NK cells<br>2. CD8<br>3. Cortisol<br>4. CD3,4,&13 | 1. .98<br>2. .70<br>3. 1.07<br>4. Ns |
| Kiecolt-Glaser, Marucha, Atkinson, & Glaser, 2001 | 33 | Students at exam time RCT | Physiological imagery of immune system self-hypnosis | 2 | 1.immune assays<br>2. CD8/NKlysis/ macrophages | 1. .83<br>2. Ns |
| Kolcaba & Fox, 1999 | 53 | Women with BC RCT | Structured-reframing of RT experience | 18 | Comfort<br>1. At 3 wks<br>2. At 18 wks | <br>1.[b] .55<br>2.[b] .47 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Lang et al., 2000 | 241 | Primarily White, during percutaneous procedures/RCT | Pleasant imagery hypnosis induction | 0 | 1. Analgesic used<br>2. Length of procedure | 1. .46<br>2. .33 |
| Maguire, 1996 | 33 | Multiple sclerosis (MS) diagnosis, outpatient RCT | Physiological imagery | 6 | 1. State anxiety<br>2.internal control of health<br>3. MS symptoms | 1. .85<br>2. .80<br>3. Ns |
| Page, Levine, Sisto, & Johnston, 2001 | 13 | Stable poststroke RCT | Pleasant imagery, mental rehearsal | 7 | 1. Motor recovery<br>2. Arm function | 1.[a] .85<br>2.[a] 1.25 |
| Walker et al., 1999 | 86 | Women with advanced BC (nonmetastasized) RCT | Physiological imagery of immune system | 18 | 1. Coping<br>2. QOL<br>3 Clinical response to chemotherapy | 1. .47<br>2. .45<br>3. Ns |

NOTE: Ns = nonsignificant; RCT = randomized controlled trial; QOL = quality of life; WBC = white blood cells; BC = breast cancer; NK = natural killer; CD3, 4, 8, & 13 = types of t-lymphocytes; NKlysis = measure of NK function; RT = radiation therapy.
a. Effect size estimated using means and *SD*.
b. Effect size given by the author.

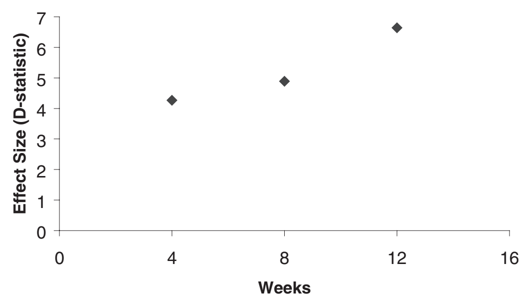


**Figure 2: The Effect Sizes in Donaldson's Study of a Guided Imagery in Persons With Chronically Low White Blood Cell Counts.**

Fors, Sexton, and Götestam (2002) showed surprising results in comparing "attention focused" to "attention distracting" (pleasant) imagery in women with chronic fibromyalgia. Those whose imagery focused on the physiology and pain reported an increase in pain ($t$ = 4.4, $p < .001$). This was compared to a smaller increase in pain for the control group ($t$ = 2.6, $p < .01$). However, the group using attention-distracting or pleasant imagery experienced a decrease in pain ($t$ = 3.3, $p$ = .001). Maguire (1996), also using physiologically focused imagery in patients with multiple sclerosis, found no significant decrease in symptoms associated with the disease. Eller (1999a) noted that two participants dropped out of the study citing increased anxiety when imagining "the virus." This may partially explain the finding that the relaxation (control) group experienced a 5% increase in perceived health compared to an 11% decline with the physiologically focused guided imagery group.

Pleasant imagery was incorporated into four studies, including Fors et al. (2002) mentioned above. Lang et al. (2000) used attentiveness with pleasant imagery during percutaneous procedures that led to a decrease in the amount of pain medication needed as compared to the control group. Page et al. (2001) combined pleasant imagery with mental rehearsal and found significant increase in motor recovery and arm function in patients poststroke. Kolcaba and Fox (1999) combined pleasant imagery with reframing of the radiation treatment in a caring and supportive context (e.g. "the table is a reassuring presence, providing strong support for your body," p. 68).

**Variation in Outcomes**

Significant physiological outcomes included increased number of WBC and other immune parameters (Donaldson, 2000; Gruzelier et al., 2001; Kiecolt-Glaser et al., 2001). Physical symptoms of multiple sclerosis and clinical response to chemotherapy were not significantly different than those of controls following physiologically focused imagery (Maguire, 1996; Walker et al., 1999). However, pain, motor recovery, and arm function were improved with pleasant imagery.

Other outcome measures in the study samples include psychosocial feelings of anxiety and control, perception of health, mood, coping, and quality of life. Maguire (1996) reported a significant increase in internal control of health and a decrease in distress. Comfort, during radiation treatments, improved with pleasant reframing imagery (Kolcaba & Fox, 1999).

## Discussion

This meta-analysis included only 10 studies to answer the question of whether the duration of practice influenced the effectiveness of guided imagery. Although the number of studies prevented statistical analysis, it is clear that immediate results from guided imagery are possible, and practice does increase the effectiveness of the intervention. Results prompt the question of sustainability of the intervention. Kolcaba and Fox's (1999) findings of a decrease in the effect size at 18 weeks may be due to only one tape being used for the duration of the intervention and, consequently, participants losing interest. The sample did not include studies lasting between 8 and 18 weeks, thus there were no data points for those weeks. Increasing the number of studies and including studies with durations evenly distributed may give greater knowledge about a plateau effect and when it might occur.

The need for a specific terminology regarding the type of imagery is evident from this and previous reviews of the literature (Eller, 1999b; Fernandez & Turk, 1989). When reporting on imagery, the type of imagery must be explicitly reported. The importance of this distinction was made evident when Fors et al. (2002) found pleasant imagery effective in reducing fibromyalgia pain, however imagery that focused on the pain was detrimental. This is consistent with Fernandez and Turk's (1989) findings, in a meta-analysis of cognitive strategies, that pleasant imagery provided a consistent reduction in pain whereas focused imagery increased pain in some studies. This is not to dismiss the use of imagery that focuses on and attempts to transform the pain. Syrjala and Abrams (2002) suggested focused imagery in treating chronic pain and distraction for acute pain. Future studies that are unambiguous in the type of imagery and the types of pain treated are needed to advance the science. Findings indicate that the clinician must monitor the clients' use of imagery to prevent adverse effects.

Studies with physiologically focused imagery demonstrate effectiveness in maintaining and bolstering immune function. Donaldson (2000) found significant results by having participants visualize an increased WBC count. Randomized controlled trials are needed to support these findings. The reduction of the effect of exam stress on immune function is also noteworthy (Gruzelier et al., 2001; Kiecolt-Glaser et al., 2001). Robinson, Mathews, and Witek-Janusek (2002) pointed out the many confounding factors in immunology studies and questioned the assumption of equating immune parameters with immune competence. The conflicting effects on CD8 cell counts (Gruzelier et al., 2001; Kiecolt-Glaser et al., 2001) demonstrate the need for continued study.

All six studies excluded because of inadequate data used pleasant imagery as the type of intervention (see Table 2). Intervention durations range from 2 weeks to 25 weeks and reflect significance at all time intervals. The studies involving patients of surgical procedures indicated a cost benefit of guided imagery with decreases in length of stay and analgesic use (Halpin et al., 2002; Tusek, Church, & Fazio, 1997). Lang et al. (2000) reported similar findings. Continued work in this area is needed to further develop guidance for safe and effective means of decreasing health care costs.

Richardson et al. (1997), in a study of women with breast cancer, and Klaus et al. (2000), with eight persons with congestive heart failure (CHF), each used pleasant imagery with a focus on well-being for duration of 6 weeks. Both reported positive changes in well-being, but not statistically significant findings. However, Richardson et al. (1997) did report a significant increase in coping in that time.

Another emerging area of research is the use of mental rehearsal in stroke rehabilitation. In a pilot study, two of three patients with hemiparetic stroke displayed increased ability after pleasant imagery combined with a mental rehearsal of tracing a line (Yoo, Park, & Chung, 2001). Page et al. (2001) and Yoo et al. (2001) utilized small samples, and further studies are needed, however this area of investigation appears promising.

**TABLE 2**

**Studies Reporting Insufficient Statistics to Calculate a *d* Statistic**

| *Author* | N | *Sample Characteristics/Design* | *Intervention* | *Duration in Weeks* | *Findings* |
|---|---|---|---|---|---|
| Baider, Peretz, Hadani, & Koch, 2001 | 90 | Cancer RCT | Pleasant imagery | 25 | Decrease distress[a] |
| Halpin, Speir, CapoBianco, & Barnett, 2002 | 120 | Cardiac surgery, quasi-experimental | Pleasant imagery | 4 | Significant for length of stay,[a] procedure, drug cost[a] |
| Klaus et al., 2000 | 8 | CHF pilot pre-/post- | Pleasant imagery focus on well-being | 6 | Ns for respiratory and lower extremity function, slight increase in QOL |
| Richardson et al., 1997 | 47 | BC RCT | Pleasant imagery focus on well-being | 6 | Ns for immune function, slight increase in QOL (Ns), improved coping[a] |
| Tusek, Church, & Fazio, 1997 | 130 | Colo-rectal surgery RCT | Pleasant imagery | 2 | Significant for lower analgesic requirement, time to 1st BM,[a] length of stay,[a] pain and anxiety[a] |
| Yoo, Park, & Chung, 2000 | 3 | Hemiparetic stroke, pilot time series | Pleasant imagery mental rehearsal | 17 sessions | 2 out of 3 showed better line-tracing ability |

NOTE: BC = breast cancer; Ns = nonsignificant findings; CHF = congestive heart failure; QOL = quality of life; BM = bowel movement; RCT = randomized controlled trial.
a. Study cites significant findings, data not reported.

### Imaging Ability/Preference

Achterberg et al. (1994) pointed out that a substantial number of people are unable to visualize images. They may be more inclined to have auditory, tactile, or olfactory images, and therefore imagery should include all the senses and be sensitive to individual preferences. Richardson et al. (1997) cited the vividness of image as a factor in determining success with guided imagery. Kwekkeboom, Huseby-Moore, and Ward (1998) examined imaging ability as a function of image vividness and absorption.

Later work by Kwekkeboom (2001) explored the influence of outcome expectancy on the success of guided imagery. Donaldson (2000) found outcomes were independent of the participant's belief in the efficacy of the intervention. Baider, Peretz, Hadani, and Koch (2001) mentioned that participants' motivation is a key factor in the success of the intervention being practiced daily and thereby affects change. They also cited that participants with a low initial level of distress had little change in distress. Kolcaba and Fox (1999) indicated similar results of greater efficacy of imagery in the first 3 weeks when the women's anxiety level is usually highest. Further studies that measure pretreatment anxiety level of the participants may give us important information on the efficacy of guided imagery in individuals with different anxiety levels.

Personal preference of content should also be considered in the selection of the guided imagery. One participant from Kolcaba and Fox's (1999) study dropped out of the study citing preference of listening to religious tapes. Personal preference of styles may be fundamental to the success of an imagery program and warrants further study.

### Limitations

Meta-analyses of collected studies provide insight into a particular intervention or outcome that is unobtainable from a single study; however, they also have limitations. The sample for this analysis was not a random sample of previous research, and therefore generalizability is limited. Research studies that were either not published, had inadequate statistical data, or were not accessible were excluded from the analysis and may be a source of bias in the sampling (Byers & Stullenbarger, 2003). Nine of the 10 studies were randomized controlled studies; however, the sample sizes may not have provided adequate power. The calculated effect sizes were not weighted for quality or for sample size in this analysis.

Another limitation is the comparison of different outcomes (Polit & Hungler, 1999). Future analysis of studies with similar outcome measures will add rigor to the determination of the effect of practice. Participants were asked to practice daily in all the studies, and practice was recorded by practice log or diary in four studies. The continued need for precise and complete reporting of intervention details and outcomes is evident from the current meta-analysis.

## Conclusion

The purpose of this meta-analysis was to determine if there was a relationship between the duration of a guided imagery intervention and the effect size of the outcomes. Plotting the duration of the intervention against the success of that intervention revealed a positive relationship. Although the graph indicated that success does improve with time, the large effect sizes reported by Donaldson (2000) and the decreased effect at 18 weeks are areas for further study. From the results of this meta-analysis, it is difficult to determine a minimal dosing time for significant outcomes. The evidence supports possible moderate to strong results at 4 weeks. However, immediate results seen in Lang et al.'s (2000) study indicated that many weeks of practice might not be needed. The length of time that effectiveness can be maintained is unknown. Because of the small sample size and the diversity of dependent variables, the results of this analysis are not generalizable. Detailed reporting of type of imagery, practice, and outcome measures is needed in future studies. As more studies become available, future meta-analyses using similar outcome measures will reveal a clearer picture of the effect of time on the efficacy of guided imagery.

## References

Achterberg, J. (1985). *Imagery in healing: Shamanism and modern medicine*. Boston: Shambhala.

Achterberg, J., Dossey, B., & Kolkmeier, L. (1994). *Rituals of healing*. New York: Bantam.

Baider, L., Peretz, T., Hadani, P. E., & Koch, U. (2001). Psychological intervention in cancer patients: A randomized study [Electronic version]. *General Hospital Psychiatry*, *23*, 272-277.

Byers, J. F., & Stullenbarger, E. (2003). Meta-analysis and decision analysis bridge research and practice. *Western Journal of Nursing Research*, *25*(2), 193-204.

Cooper, H. (1998). *Synthesizing research: A guide for literature reviews* (3rd ed.). Thousand Oaks, CA: Sage.

Donaldson, V. W. (2000). A clinical study of visualization on depressed white blood cell count in medical patients [Electronic version]. *Applied Psychophysiology and Biofeedback*, *25*, 117-128.

Eller, L. S. (1999a). Effects of cognitive-behavioral interventions on quality of life in persons with HIV [Electronic version]. *International Journal of Nursing Studies*, *36*, 223-233.

Eller, L. S. (1999b). Guided imagery intervention for symptom management. *Annual Review of Nursing Research*, *17*, 57-84.

Fernandez, E., & Turk, D. C. (1989). The utility of cognitive coping strategies for altering pain perception: a meta-analysis. *Pain*, *38*¸ 123-135.

Fors, E. A., Sexton, H., & Götestam, K. G. (2002). The effect of guided imagery and amitriptyline on daily fibromyalgia pain: A prospective, randomized controlled trial [Electronic version]. *Journal of Psychiatric Research*, *36*, 179-187.

Gruzelier, J., Smith, F., Nagy, A., & Henderson, D. (2001). Cellular and humoral immunity, mood and exam stress: The influences of self-hypnosis and personality predictors [Electronic version]. *International Journal of Psychophysiology*, *42*, 55-71.

Halpin, L. S., Speir, A. M., CapoBianco, P., & Barnett, S. D. (2002). Guided imagery in cardiac surgery. *Outcomes Management*, *6*(3), 132-137.

Horrigan, B. (2002). Marty Rossman, MD, Imagery: The body's natural language for healing. *Alternative Therapies in Health and Medicine*, *8*(1), 80-89.

Kiecolt-Glaser, J., Marucha, P., Atkinson, C., & Glaser, R. (2001). Hypnosis as a modulator of cellular immune dysregulation during acute stress [Electronic version]. *Journal of Consulting and Clinical Psychology*, *69*, 674-682.

Klaus, L., Beniaminovitz, A., Choi, L., Greenfield, F., Whitworth, G., Oz, M., et al. (2000). Pilot study of guided imagery use in patients with severe heart failure [Electronic version]. *American Journal of Cardiology*, *86*, 101-104.

Kolcaba, K., & Fox, C. (1999). The effects of guided imagery on comfort of women with early stage breast cancer undergoing radiation therapy. *Oncology Nursing Forum*, *26*(1), 67-72.

Kosslyn, S. M., Ganis, G., & Thompson, W. L. (2001). Neural foundations of imagery. *Nature Reviews Neuroscience*, *2*(9), 635-642.

Kwekkeboom, K. (2001). Outcome expectancy and success with cognitive-behavioral interventions: The case of guided imagery. *Oncology Nursing Forum*, *28*, 1125-1131.

Kwekkeboom, K., Huseby-Moore, K., & Ward, S. (1998). Imaging ability and effective use of guided imagery [Electronic version]. *Research in Nursing and Health*, *21*, 189-198.

Lang, E., Benotsch, E., Lutgendorf, S., Berbaum, M., Berbaum, K., Logan, H., et al. (2000). Adjunctive non-pharmacological analgesia for invasive medical procedures: A randomized trial. *Lancet*, *355*, 1486-1490.

Maguire, B. L. (1996). The effects of imagery on attitudes and moods in multiple sclerosis patients. *Alternative Therapies in Health and Medicine*, *2*(5), 75-79.

Moody, L. (1990). *Advancing nursing science through research* (Vol. 2). Newbury Park, CA: Sage.

Page, S., Levine, P., Sisto, S., & Johnston, M. (2001). A randomized efficacy and feasibility study of imagery in acute stroke. *Clinical Rehabilitation*, *15*, 233-240.

Polit, D. F., & Hungler, G. P. (1999). *Nursing research: Principles and methods* (6th ed.). Philadelphia: J. B. Lippincott.

Richardson, M. A., Post-White, J., Grimm, E. A., Moye, L. A., Singletary, S. E., & Justice, B. (1997). Coping, life attitudes, and immune responses to imagery and group support after breast cancer treatment [Electronic version]. *Alternative Therapies in Health and Medicine*, *3*(5), 62-70.

Robinson, F. P., Mathews, H. L., & Witek-Janusek, L. (2002). Issues in the design and implementation of psychoneuroimmunology research [Electronic version]. *Biological Research for Nursing*, *3*(4), 165-175.

Syrjala, K. L., & Abrams, J. R. (2002). Hypnosis and imagery in the treatment of pain. In D. C. Turk & R. J. Gatchel (Eds.), *Psychological approaches to pain management* (2nd ed., pp. 187-209). New York: Guilford.

Tusek, D., Church, J., & Fazio, V. (1997). Guided imagery as a coping strategy for perioperative patients. *AORN Journal*, *66*(4), 644-649.

Walker, L. G., Walker, M. B., Ogston, K., Heys, S. D., Ah-See, A. K., Miller, I. D., et al. (1999). Psychological, clinical and pathological effects of relaxation training and guided imagery during primary chemotherapy. *British Journal of Cancer*, *80*(1/2), 262-268.

Wallace, K. G. (1997). Analysis of recent literature concerning relaxation and imagery interventions for cancer pain. *Cancer Nursing*, *20*(2), 79-87.

Yoo, E., Park, E., & Chung, B. (2001). Mental practice effect on line-tracing accuracy in persons with hemiparetic stroke: A preliminary study. *Archives of Physical and Medical Rehabilitation*, *82*, 1213-1218.

Zeller, J., McCain, N., & Swanson, B. (1996). Psychoneuroimmunology: An emerging framework for nursing research. *Journal of Advance Nursing*, *23*, 657-664.

*Debra Van Kuiken, R.N., B.S., B.S.N., is a doctoral student and research assistant at the University of Cincinnati. She has worked in critical care, school nursing, and hospice. Her interests are in the connection of the mind, conscious and unconscious, and physical health. This meta-analysis was done as part of her doctoral studies and was presented as a student poster at the Midwest Nursing Research Society in 2004.*