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Effects of a Single Music Therapy Intervention on Anxiety, Discomfort, Satisfaction, and Compliance With Screening Guidelines in Outpatients Undergoing Flexible Sigmoidoscopy

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Screening flexible sigmoidoscopy (FS) is an effective tool for the detection of colon cancer. Nonetheless, persons are reluctant to undergo FS for a variety of reasons such as anxiety, discomfort, and the possibility of abnormal findings. Nurses caring for FS patients can implement interventions to allay anxiety and promote comfort in an effort to enhance satisfaction and future compliance. Music therapy is one nonpharmacologic intervention that has been shown to be effective in allaying anxiety, reducing discomfort, and promoting satisfaction in other patient populations. A two-group pretest, posttest experimental design with repeated measures study recruited 64 subjects undergoing FS from one Midwestern tertiary care center. Subjects were randomly assigned to a control condition of usual procedural care or to an experimental condition of music therapy during the examination. State and trait anxieties were measured at pretest. State anxiety, discomfort, satisfaction, and perceived compliance with future screening were measured after the procedure. Subjects in the music group reported less anxiety and discomfort than subjects in the control group. There were no differences on satisfaction ratings or perceived compliance with screening guidelines. Nurses caring for patients undergoing screening FS can offer music therapy as one nonpharmacologic intervention to ameliorate anxiety and reduce discomfort.

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Although colon cancer is the second leading cause of cancer deaths in the United States, it can successfully be treated if detected in the early stages (Boring, Squires, & Tong, 1993). To detect colon cancer, screening procedures that visualize the colon and allow for biopsy of abnormal tissues are performed. Both the American Cancer Society and the National Cancer Institute recommend colon cancer screening for adults older than 50 years by flexible sigmoidoscopy (FS) every 3 to 5 years.

Despite the prevalence of colon cancer and the need for screening to detect this cancer, persons are hesitant to undergo the FS procedure, for numerous reasons, such as an erroneous perception that the examination is not necessary (Bejes & Marvel, 1992). Pain and discomfort associated with sigmoidoscopy are other reasons persons do not have the procedure (Lewis & Jensen, 1996; McCarthy & Moskowitz, 1993). Most patients (n = 70) who participated in a no-fee sigmoidoscopy screening day at one center reported some amount of discomfort during the procedure: 43% reported mild pain, 37% moderate pain, and 8% extreme pain (Center for Digestive Diseases, 1997). Only 9% of participants reported no discomfort during the procedure. Although sedatives or pain medications are not routinely administered before or during FS, participants in the screening day indicated that they would have liked "something" to help them cope with the procedure and make them more comfortable (Center for Digestive Diseases). Discomfort and prior poor experiences with sigmoidoscopy may deter repeated screening or necessary follow-up examinations.

Anxiety also is an impediment to undergoing screening sigmoidoscopy. Anxiety is associated with the medical environment, the procedure itself, previous poor experiences with the examination, and the possibility of abnormal findings or unknown outcomes (Palakanis, DeNobile, Sweeney, & Blankenship, 1994). The FS procedure itself can be embarrassing and uncomfortable. Anxiety can intensify any discomforts associated with sigmoidoscopy as well as interfere with examination completion.

Nurses working with FS patients are in a prime position to implement research-based, nonpharmacologic interventions for purposes of allaying anxiety and promoting comfort. However, research studies testing various nursing interventions to promote comfort and allay anxiety with FS patients are lacking. One nursing intervention that has been shown to be effective in divergent patient populations for decreasing anxiety (Augustin & Hains, 1996; Bonny & McCarron, 1984; Chlan, 1998a; Davis, 1992; Eisenman, & Cohen, 1995; Evans & Rubio, 1994; Frandsen, 1990; Kaempf & Amodei, 1989; Lueders-Bolwerk, 1990; Moss, 1988; Pfaff, Smith, & Gowan, 1989; Steelman, 1990; White, 1992; Winter, Paskin, & Baker, 1994;), promoting comfort (Aldridge, 1993; Beck, 1991; Cook, 1986; Dubois, Bartter, & Pratter, 1995; Heitz, Symreng, & Scamman, 1992; Long & Johnson, 1978; Magill-Levreault, 1993; Memory & Bellamy, 1993; Stevens, 1990), and enhancing patient satisfaction (Bampton & Draper, 1997; Cruise, Chung, Yogendran, & Little, 1996;) is music therapy. Although it is believed that patient satisfaction with the sigmoidoscopy procedure may enhance compliance (McCarthy & Moskowitz, 1993), it was not known whether music therapy could promote a positive experience for patients undergoing sigmoidoscopy. Thus, the purpose of this study was to test the effects of a single music therapy intervention on anxiety, discomfort, satisfaction, and perceived compliance with colon cancer screening guidelines in outpatients undergoing FS.

Theoretical Basis of Music Therapy for Anxiety and Discomfort Reduction

Music therapy is defined as the use of music to help achieve a specific change in behavior or feeling (McCloskey & Bulechek, 1996). For brief procedural pain, such as that experienced during FS, highly structured distraction techniques are effective (McCaffery, 1990). Music therapy is one of the most effective sensory techniques for distraction, one that has a high level of patient acceptability (McCaffery, 1990). Music therapy has been shown to be an effective adjunct for anxiety and pain reduction, resulting in improved patient comfort. Auditory stimulation through music occupies a number of neurotransmitters, resulting in fewer available transmitters to relay pain messages (Lane, 1992). Music also influences pain through emotions evoked by music listening that affect the autonomic nervous system, which in turn trigger the release of hormones and endorphins, the body's natural opiate pain killers (Lane).

Music's chief contribution to pain management, however, appears to be its ability to promote relaxation, which in turn can diminish pain and discomfort (Magill-Levreault, 1993; McCaffery, 1990). Music can alleviate cycles of anxiety and fear that exacerbate pain experiences while refocusing attention onto pleasing sensations (Bailey, 1986). Music can divert one's attention from anxiety, pain-evoking experiences, or unpleasant thoughts by using the potential of the pleasant musical stimulus to block out these unpleasant sensations, resulting in a positive perceptual experience (Thaut, 1990).

Music facilitates physical and mental relaxation by providing reinforcing cues with slow tempos and constant rhythmic patterns (Brown, Chen, & Dworkin, 1989). Feelings of anxiety, helplessness, and a lack of control can exacerbate a painful experience; distraction or elicitation of pleasurable emotional states can be induced by the rhythm and melodies of the music (Brown et al., 1989).

Although certain components of music such as constant rhythms and slow tempos are thought to be effective for anxiety and pain reduction, no one type of music or tape can be prescribed for this purpose. Personal preference has a strong impact on one's responses to music (Bonny, 1986); an imposed choice of a musical selection can be annoying to the listener. Thus, it is imperative to provide a variety of musical choices from which the listener can choose for music therapy.

Methods

Purpose of the Study

The purpose of this study was to test the effectiveness of music therapy on 1) anxiety during FS, 2) discomfort during FS, 3) satisfaction with the FS procedure itself, and 4) perceived compliance with colon cancer screening guidelines based on the current FS experience.

Setting

Subjects were recruited from one 750-bed tertiary care referral center located in the Midwest. Institutional approval for the use of human subjects in research was obtained before initiating data collection.

Any adult outpatient scheduled to undergo a nurse-endoscopist–performed screening FS who met the following criteria was invited to participate in the study: English as the primary language, adequate hearing or corrected hearing, and mental competence. Potential subjects who were mentally incompetent (i.e., Alzheimer's disease), had an uncorrected hearing impairment, for whom English was not the primary language, or who were not having a nurse-endoscopist performed sigmoidoscopy were not invited to participate in the study. Potential subjects were initially approached by the nurse-endoscopist to ascertain their interest in a study being conducted to examine methods of making the FS procedure less stressful for patients. If interest was indicated, the investigator then met with the potential subject in the procedure room, where written information was provided detailing the study specifics.

Design and Sample

A two-group pretest, posttest experimental design with repeated measures was used. Based on power analysis calculations for sample size (power = 0.80; effect size = 0.40; alpha = 0.05), 64 subjects were recruited. Mean age of subjects was 54.6 years (SD, 11.5). Most subjects were female (n = 44; 69%) as compared with male (n = 20; 31%). Likewise, most subjects were white (n = 62; 96.8%), followed by African-American and Hispanic (n = 1 each; 1.6%).

Intervention Conditions

Subjects who consented to participate in the study were randomized by a coin-flip to either an experimental condition or control condition.

Experimental music group. The experimental condition consisted of music listening through headphones during the sigmoidoscopy procedure. Subjects randomized to the music group (n = 30) were instructed to select a cassette tape from the investigator's collection that they preferred to listen to during the FS. The tape collection was assembled by a music therapist (J.W.) for purposes of discomfort and anxiety reduction, and consisted of 5 to 10 selections *each* of classical, country-western, new-age, easy listening, pop, rock, religious, era-specific, motion-picture soundtracks, and jazz. Subjects were assisted with the operation of the portable cassette tape player and headphones as needed. Subjects were then instructed to concentrate on the music during the FS and that the investigator would meet with subjects on examination completion to discuss their experiences. The investigator then exited from the procedure room.

Control group. Subjects randomized to the control condition (n = 34) received routine nursing care during the sigmoidoscopy procedure by the nurse-endoscopist. This routine care consisted of the nurse-endoscopist speaking to the patient at various times throughout the procedure. The investigator informed subjects that she would meet with them after the examination was completed to discuss their experiences. The investigator then exited from the procedure room.

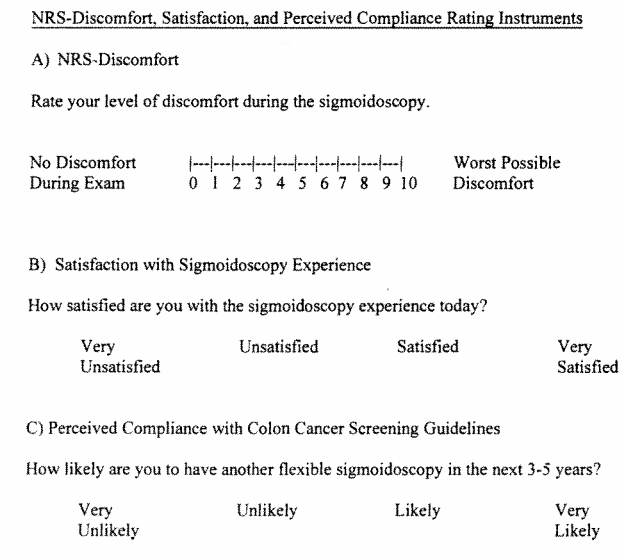
Measures

Anxiety. Anxiety, defined as subjective feelings of tension, apprehension, nervousness, and worry, is a two-dimensional state and trait concept (Spielberger, 1983). State anxiety is a transitory emotional state or condition; trait anxiety is a relatively stable individual difference in anxiety proneness (Spielberger). The State-Trait Anxiety Inventory (STAI) is one of the most extensively used instruments to measure this two-dimensional concept. Each scale of the STAI consists of 20 statements to which subjects respond as to how they feel generally (trait) and how they feel at the present time (state). Subjects respond to each item on a 4-point scale, from not at all (1) to very much (4). Test–retest reliability coefficients range from 0.86 to 0.92 for the trait scale, and 0.16 to 0.54 for the state scale (Spielberger). Internal consistency alpha coefficients range from 0.83 to 0.92 for the state scale, and 0.86 to 0.92 for the trait scale (Spielberger). For this sample, coefficient alpha was 0.93 for the state scale and 0.90 for the trait scale.

The state and trait portions of the STAI were administered to all subjects before the sigmoidoscopy procedure; the state portion was again administered after completion of the examination, when subjects were asked to recall how they felt during the examination.

Discomfort. Discomfort was operationally defined for this study as the physical sensation of experiencing pain or of being uncomfortable during the FS procedure. Intensity of discomfort experienced while undergoing FS was measured by a numeric rating scale (NRS) developed specifically for this study. Numeric rating scales are useful measures of pain intensity, are easier to administer, easier to score, are easier for elderly subjects to complete than other pain measures, yield a higher rate of correct responses, and have been found to correlate with Likert-type measures of pain intensity from 0.65 to 0.88 (McGuire, 1998).

All subjects were asked to rate the intensity of discomfort experienced during the FS on a horizontal scale from no discomfort felt (0) to worst possible discomfort felt (10) on


NRS-Discomfort, Satisfaction, and Perceived Compliance Rating Instruments

A) NRS-Discomfort

Rate your level of discomfort during the sigmoidoscopy.

No Discomfort During Exam |---|---|---|---|---|---|---|---|---|---|---| Worst Possible Discomfort

0 1 2 3 4 5 6 7 8 9 10

B) Satisfaction with Sigmoidoscopy Experience

How satisfied are you with the sigmoidoscopy experience today?

Very Unsatisfied | Unsatisfied | Satisfied | Very Satisfied

C) Perceived Compliance with Colon Cancer Screening Guidelines

How likely are you to have another flexible sigmoidoscopy in the next 3-5 years?

Very Unlikely | Unlikely | Likely | Very Likely

FIGURE 1 • NRS-discomfort, satisfaction, and perceived compliance rating instruments.

TABLE 1
Equivalence of Baseline Measures

Measure	Control Group (n = 34)	Music Group (n = 30)	Chi-square (df = 1)	p-value
Previous FS	n = 8	n = 10	.76	.38
Previous GI Exam(s)	n = 10	n = 10	.11	.74
Use of Pain Medication(s)	n = 6	n = 4	.23	.64
Use of Anti-anxiety meds	n = 2	n = 6	2.9	.09

Note: FS = flexible sigmoidoscopy, meds. = medications

completion of the examination by the nurse-endoscopist (Figure 1).

Patient satisfaction. Patient satisfaction was operationally defined as the degree to which subjects were pleased or satisfied with the sigmoidoscopy procedure itself. A patient satisfaction measure was developed specifically for this study, based on a patient satisfaction survey used previously at the research site. Subjects were asked to rate their satisfaction with the overall FS experience, from very unsatisfied to very satisfied, on completion of the examination (Figure 1).

Perception of future compliance. Colon cancer screening guidelines suggest FS every 3 to 5 years; thus, it is imperative that experiences be as favorable as possible to enhance future compliance. Perception of future compliance was operationally defined for this study as how likely a subject who had just completed a FS would have another procedure, per cancer screening guidelines. An instrument to measure perceived future compliance with colon cancer screening guidelines was developed specifically for this study. Subjects were asked postprocedure to rate their planned compliance with future sigmoidoscopy screening from very unlikely to very likely (Figure 1).

Data Collection Procedure

All data were collected by an investigator (L.C.) or research assistant. Before the FS, descriptive data were obtained from all subjects who consented to participate in the study to establish comparability between the experimental and control groups. Data included age, sex, race, previous experience with FS or other invasive gastroenterology procedures, and current use of pain medications or anti-anxiety medications. Subjects then completed the STAI. Subjects were then randomized to either the experimental or control group. After completion of the nurse-endoscopist–performed FS, all subjects completed the NRS-discomfort instrument, followed by the state anxiety scale. Subjects in the experimental group were asked after the procedure whether the music was helpful, whether they would use it again under similar situations, and how likely they were to undergo another sigmoidoscopy. Subjects in the control group were asked after the procedure whether they would have liked to have had the opportunity to listen to music during the procedure, and how likely they were to undergo another sigmoidoscopy in the future.

Findings

Level of significance was set a priori at $\alpha = .05$ for all statistical tests.

Demographic Data

Subjects who participated in this study were predominantly middle-aged white women who had not undergone a screening FS previously, had not had other GI procedures, and did not report current use of pain medications or anti-anxiety medications.

Equivalence of Baseline Measures

Chi-square was used to determine whether the two groups were equivalent on the following variables: previous sigmoidoscopy or other invasive GI procedures, and current use of pain medication(s) or anti-anxiety medication(s). No significant differences were found between groups on these measures (Table 1). Thus, the two groups were equivalent on these measures.

Anxiety

Analysis of variance (ANOVA) detected no statistical baseline differences for mean state anxiety and trait anxiety scores between the two groups (Table 2). Thus, the two groups were equivalent on these measures at baseline before the screening FS (Figure 2).

Analysis of covariance (ANCOVA) was used to detect any difference between groups on mean procedural state anxiety, with baseline state anxiety and trait anxiety used as covariates to control for the influence of these two variables on the outcome measure. A significant difference was found for procedural state anxiety (Table 2). Subjects in the music group reported less anxiety during FS (34.5; SD, 10) than those subjects in the control group (41.8; SD, 13.5) who did not listen to music (Figure 2). State anxiety actually increased slightly from baseline levels for those subjects in the control group from 40.2 to 41.8, whereas state anxiety was slightly less during the FS for those subjects in the experimental music group (from 36.9; SD, 12.5 to 34.5; SD, 10).

Procedural Discomfort

ANOVA was used to detect any differences between groups on discomfort ratings during FS. There was a significant difference in mean NRS-discomfort ratings between groups (Table 2). Subjects in the music group reported less discom-

TABLE 2
Mean State-Trait Anxiety and NRS-Discomfort Ratings

Variable	Control Group Mean (*SD*)	Music Group Mean (*SD*)	F-statistic	df	*p*-value
Baseline State Anxiety	40.2 (11.9)	36.9 (12.5)	1.17	1,62	.28
Trait Anxiety	35.2 (9.0)	38.2 (9.6)	1.8	1,62	.219
Procedural State Anxiety	41.8 (13.5)	34.5 (10.0)	10.4	1,59	.002*
NRS-Discomfort	5.2 (1.7)	4.3 (2.1)	5.22	1,62	.026*

fort during the FS (4.3; SD, 2.1) than those in the control group (5.2; SD, 1.7), who received routine procedural care from the nurse-endoscopist (Figure 3).

Satisfaction With the FS Experience

Chi-square was used to ascertain any differences between groups on satisfaction ratings. There were no differences detected on this measure (Table 3). Thus, the music therapy treatment was not found to influence FS satisfaction.

Perceived Compliance With Colon Cancer Screening Guidelines

Chi-square was used to ascertain any differences between groups on perceived compliance with colon cancer screening guidelines. There were no differences detected on this measure (Table 4). Thus, the music therapy treatment was not found to influence future compliance ratings.

Helpfulness of Music Ratings

Eighty-three percent (n = 25; 83%) of subjects in the experimental music listening group rated the single music therapy session as helpful or very helpful during FS. A small percentage found the music intervention only somewhat helpful (n = 5; 16.7%). No subjects thought the music intervention was not helpful. An overwhelming majority of subjects indicated that they would like to have music available to them again during another FS (n = 27; 90%).

Surprisingly, 19 of 34 subjects in the control group would not have wanted to have music during the examination (56%). Comments from subjects to the investigator about not wanting music during FS were attributed to the fact that the procedure did not last that long and they did not believe music listening was necessary, even though they enjoyed music at home. Certain subjects also reported that they were interested in being able to hear the nurse-endoscopist during the examination. Others stated that they simply do not enjoy music and do not listen to it at home.

Discussion

Music therapy was favorably received by those subjects who participated in this study. Subject-selected music listening was effective in reducing anxiety associated with the examination, as well as in reducing reported levels of discomfort during the FS in this outpatient sample.

No statistical differences were found between groups for the FS experience satisfaction ratings or the perceived future compliance with colon cancer screening guidelines. A single music therapy intervention was not found to influence satisfaction ratings nor compliance with future FS screening. These findings are attributed in part to the expertise of the nurse-endoscopist (D.E.) who performed all of the screening FSs for those subjects who participated in the study. Subjects in both groups commented to the investigator how "won-

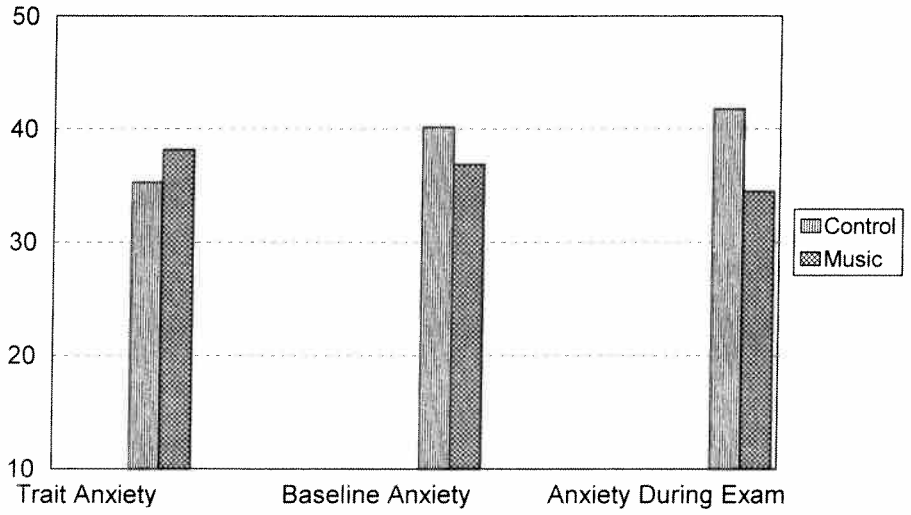


FIGURE 2 • Trait anxiety, state anxiety before and during sigmoidoscopy.

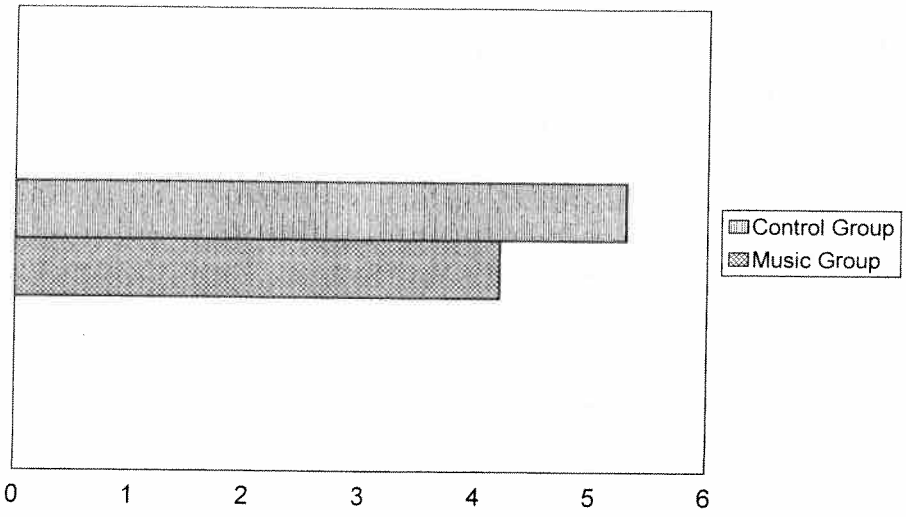


FIGURE 3 • Numeric rating scale—discomfort.

derful" E. was and how she made the experience much more tolerable.

Interesting data trends can be culled from the subjects' satisfaction and perceived compliance responses (Tables 3 and 4). Data trends do indicate that two subjects in the control group were very unsatisfied with the experience, whereas only one subject in the music group was unsatisfied. More subjects in the music group were very satisfied with the FS experience as compared with the control group responses.

Data trends indicate that only one subject in the control group thought it very unlikely that she/he would undergo another FS in the future, and three control subjects indicated they were unlikely to have another FS. No subjects, however, in the music group believed they were very unlikely to have another FS, with only one subject feeling unlikely to have another FS. Overall, most subjects in both groups thought they were likely or very likely to have another FS in 3 to 5 years as suggested by colon cancer screening guidelines based on their current experiences with the procedure.

Limitations

There are several limitations associated with this study. First, most subjects who participated in this study were white and were recruited from one center in the Midwest because of a restriction of resources. Likewise, subjects who participated had the screening FS performed by one nurse-endoscopist only. These issues limit generalizability of the study findings to more diverse patient samples or to other dissimilar clinical settings with a variety of endoscopists performing the FS.

Other limitations include that subjects were asked to rate their anxiety, discomfort, satisfaction, and perceived compliance with screening guidelines based on current experiences *after* the examination was completed and they were dressed in their street clothes. This led to a short delay in obtaining subjects' responses when they were asked to recall how they felt during the examination, rather than obtaining their responses immediately in the procedure room. The delay may have altered subjects' responses in some manner, which also may limit the applicability of these findings. Future work in this area should pay close attention to the timing of instrument administration to minimize subjects' burden yet ensure that data are collected consistently and accurately from all subjects.

Lastly, instruments to measure satisfaction and perceived future compliance with screening guidelines were developed specifically for use in this study; thus, they did not have established psychometric properties as does the STAI. Likewise, the instruments had not been tested previously in a similar patient sample. Thus, the reliability and validity of the findings from these measurers may be questionable.

Directions for Future Research

Although this study showed the beneficial effects of music therapy for reduction of anxiety and discomfort during

TABLE 3
Satisfaction With Sigmoidoscopy Examination (n = 64)

	Very Unsatisfied	Unsatisfied	Satisfied	Very Satisfied
Control Group	2	0	16	16
Music Group	0	1	8	21

Chi-square (df 1) = 6.1, p = .11

TABLE 4
Perceived Future Compliance With Screening Guidelines (n = 63)

	Very Unlikely	Unlikely	Likely	Very Likely
Control Group	1	3	10	19
Music Group	0	1	11	18

Chi-square (df 1) = 1.94; p = .57

screening FS, this study was limited to a single center, with a homogenous sample from the Midwest examinations being performed by one nurse endoscopist. Suggestions for areas of additional research are as follows. First and foremost is that this study needs to be replicated in a more heterogeneous sample, geographically, ethnically, and with numerous endoscopists.

Several subjects in the experimental condition of music listening during FS commented that they would have liked to listen to the music longer, as the examination itself was completed in an average of 15 minutes. It is not known what impact the intervention may have on this patient population if it is begun earlier, such as shortly after the patient arrives at the center and is waiting to undergo the examination.

Even though research testing the effects of nonpharmacologic nursing interventions with this patient population are increasing, additional work is necessary to test interventions other than music therapy. Most FS patients indicated in one survey that the examination itself indeed was distressful and they would like *something* to help them cope with the experience. That "something" is not always music therapy for all patients. Interventions such as guided imagery or other relaxation techniques may be effective in assisting patients to cope with the FS experience as well as with other invasive gastrointestinal procedures, but these require sound, scientific investigations before implementation in practice.

Implications for Nursing Practice

As indicated by the results of this investigation, self-selected music listening through headphones during FS is one intervention nurses can implement to allay anxiety and decrease discomfort associated with the procedure. Music is a familiar, comforting stimulus that can assist patients in coping with a distressful experience. Patients must be allowed a choice of music to which they will listen, because personal preference greatly affects the relative success or failure of the intervention.

Although music therapy was well received by most subjects who participated in this study, music is not a universally enjoyed stimulus, as indicated in responses given by some of the control group subjects. Other research-based, nonpharmacologic nursing interventions may be effective in assisting patients to cope with the FS experience.

Careful assessment of patients before implementing music therapy is critical, including whether patients even welcome music therapy and what their musical preferences may be. Guidelines and suggestions are available elsewhere to assist nurses interested in implementing music therapy in their clinical practice (Chlan, 1998b; Chlan & Tracy, 1999). A music therapist also can be consulted for guidance in establishing a music intervention program.

In summary, music therapy is one nonpharmacologic intervention nurses caring for patients undergoing FS can implement to allay anxiety and reduce discomfort associated with the procedure. Careful assessment of patient preferences before implementing any nonpharmacologic nursing intervention, however, is essential.

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Research Highlights

Understanding statistical tests: Chi-square

The *Chi-square test* is used to determine if there is a difference between two groups on categorical data used to describe the groups.

In this study these categories include: 1) previous sigmoidoscopy or other invasive GI procedure, 2) current use of pain medicine, and 3) use of anti-anxiety medication.

The two groups compared in this study are the music or "treatment" group and the group that had the sigmoidoscopy without the use of music, called the "control" group.

Chi-square is also used in this study to determine if there were differences between groups on satisfaction with the FS experience and compliance with screening guidelines.

Understanding statistical tests: ANOVA

Analysis of variance *(ANOVA)* tests for a difference or variance between groups on some measurement, usually taken before and after a treatment. In this study, the treatment for one group is listening to music while the control group receives routine care during sigmoidoscopy.

Anxiety and discomfort are the two variables measured to determine if there is a difference between the two groups as a result of the music treatment.

Understanding statistical tests: ANCOVA

Analysis of co-variance *(ANCOVA)* is used in this study to determine if there is a difference in anxiety between the two groups during sigmoidoscopy.

Based on the theoretical framework the researcher believes the study participants have a "baseline" level of anxiety or "state" anxiety and an anxiety level that indicates the individual's anxiety tendency known as "trait" anxiety.

ANCOVA removes the effects of these two anxiety levels to detect any difference in anxiety resulting from the music treatment during the sigmoidoscopy.

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