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Human-environment process: Replication and refinement of a study of Rogers' principle of integrality

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Title Human-Environment Process: Replication and Refinement of a Study of Rogers' Principle of Integrality

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USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

Abstract

The purpose of this study was to test Rogers' principle of integrality by asking: Does a varied harmonic auditory environment increase the perceived restfulness of patients, who are hospitalised in order to heal following surgery? This study modified a previous study (Smith, 1986) which showed that varied harmonic sound had a more positive effect on the perceived restfulness of healthy subjects than did quiet ambience.

This experimental study tested 22 post-operative inpatients, using a non-equivalent control group design with pretest and posttest. Varied harmonic sound was provided by audiotaped sequences of music and narrative; quiet ambience was achieved by maintaining quiet within a non-soundproof hospital room. Smith's Restedness Tiredness Scale was used to measure perceived restfulness.

The hypothesis was supported at 0.05 level of significance using Analysis of Covariance. The findings imply that nursing actions can manipulate environmental sound in order to promote restfulness in surgical inpatients.

Declaration by Candidate

I certify that this thesis does not incorporate, without acknowledgement, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text.

Signature of Candidate

30 · 1 · 90

Date

I wish to acknowledge the assistance of Patricia Sikes in her supervision of this thesis.

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Human-Environment Process: Replication and Refinement of a Study of Rogers' Principle of Integrality

Significance of Study

Theories from many other disciplines relate to the practice of nursing. Abraham Maslow's theory that the individual is motivated by human needs relates directly to the process of patient assessment, care planning and evaluation of care given. Eric Fromm's psychological theory identifies the deepest human need as being the need to overcome perceived separateness.

> This awareness of himself as a separate entity ... makes his separate, disunited existence an unbearable prison. He would become insane could he not ... unite himself in some form or other with men, and with the world outside (Fromm, 1975, pp. 14,15).

Fromm sees this need as being the most significant source of human motivation, producing both positive and negative practices, the latter occurring as restless cycles. A major premise of Martha Rogers' nursing theory is that the human is in fact united to the environment in a mutual, inseparable and continuous process (Rogers 1986, p. 6). The interplay of these ideas suggests that in addressing the need to overcome the restless cycles associated with perceived separateness, attention could be given to Rogers' proposition that human-environment unity is unbroken.

For nursing to assist individuals to meet their needs, knowledge upon which practice is based must be generated by members of the profession. Mary Jane Smith (1986) investigated Rogers' concept of human-environment integrality by studying the

relationship between noise and perceived restfulness in a laboratory study. Smith's study demonstrated that healthy subjects who were confined to bed in an environment with planned organised sound, perceived themselves as more rested than those who were confined to bed in quietened, but not silent, surroundings. This finding gives rise to the question: "Does a varied harmonic auditory environment increase the perceived restfulness of patients who are hospitalised in order to heal following intra-operative procedures?" This study investigated that question with a view toward identifying nursing actions to promote auditory enhancement of restfulness for healing. It was also the intention of this study to contribute to the growing body of empirical evidence which supports Rogers' theorum of integrality.

Theoretical Framework

Martha Rogers' Science of Unitary Human Beings

The theoretical framework for this study was taken from Martha Rogers' Science of Unitary Human Beings - a paradigm for nursing. Within this framework Rogers (1986, p. 3) conceptualises;

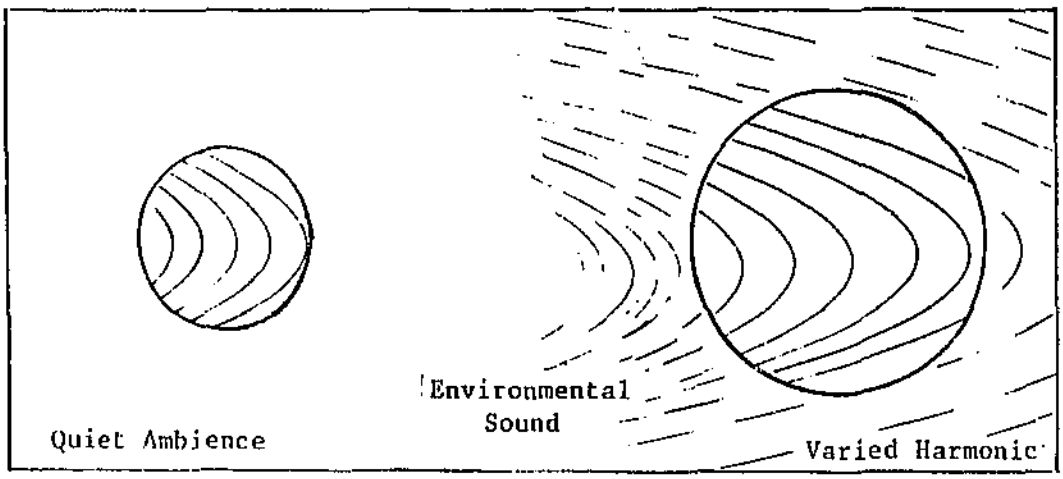
> The irreducible nature of individuals as energy fields different from the sum of their parts and *integral* with their respective environmental fields, differentiates nursing from other sciences and defines its focus. [italics added]

Integrality is defined as the mutual interactive unity of humans with their respective environments. A major premise of Rogers (1986, p. 11) is that the life process evolves with continuous, reciprocal, diversifying change through universal open systems. Rogers' model operates beyond temporal and spatial dimensions and excludes causal concepts such as homeostasis and adaptation. Assumptions of the Science of Unitary Human Beings are that all reality is integral and infinite, and that energy fields are the fundamental units of the living and the non-living (Rogers, 1988). The human energy field is identified by its wave pattern which is continually changing in response to environmental wave patterns. The individual continually interacts with his/her environment, engaging in a mutual response with that environment. Therefore, a changed response can be seen as an outcome of the integral human-environment process.

Human Perception, Sound and Restfulness

In this study, human perceptions of restfulness in response to specific auditory environments were examined. Environmental sound is a wave phenomenon characterised by frequency (pitch) and amplitude (loudness). Patterned sound such as music and stories consist of a range of structured frequencies picked up by the individual's hearing sense. From the hearing apparatus, it is transmitted to the cortex of the brain where it is processed (Van de Graaff & Fox, 1986, pp. 566,567). The person then assigns meaning to it by calling up an image according to personal world view and life experience. Smith (1986, p. 23) cited Bateson as suggesting that "image formation is an economical way of passing information across some sort of interface and is related to interaction and energy exchange." Human perception is awareness through the mind or senses. When sound is planned and organised to create a mental image, it is possible that less energy is consumed by the listener in this environment than if meaning must be assigned to unstructured short sequences of sound - such as hospital noises - that are heard. Based on Rogers' premise of integrality, the pattern of peaceful, meaningful sound will engage the individual in a mutual response of perceived restfulness, (see fig. 1). Rest can be defined as spiritual or mental peace and tranquility (Oxford Dictionary 1968, p. 1718). In the context of this study, perceived rest was defined as Smith (1986, p. 23) defined it, "the person's experience of easing with the flow of rhythmic change in the environment."

Figure 1
Theoretical Framework




Perceived
Restfulness

Literature Review.

Nursing has long been concerned with the patient's need to rest. Florence Nightingale (1859, p. 2) stated that for the sick person, nursing should occur "at the least expense of vital power to the patient." Fromm (1975, pp 14,15) associated the occurrence of restless cycles with perceived separateness. Gerald Jampolski (1989, p. 65) supports this association, and describes perceived separateness as a feeling of being disconnected from the environment including the people in it. Rogers' premise of integrality claims that human beings are never separate from their environment. How then can nursing derive from Rogers' framework, actions which will assist patients to experience harmonious interaction with their environment?

For the patient who is confined to hospital for healing, the experience of restfulness cannot be presumed, since reduced physical activity may heighten the patient's focus on an already strange environment with unfamiliar people as part of it. Nightingale (1859, p. 34) was concerned about environmental noise, observing that "noise which excites expectation" could be tiring for the sick. The experience of time 'dragging' is often reported from the sickbed. In one of Smith's studies (1975) she found significant differences in judgements of duration between healthy subjects in quiet surroundings, and those in an environment of continuous sound. The latter group perceived time as passing more quickly. Another study of time experience by Smith (1983), demonstrated a positive relationship between the

perceptions of time passing quickly, and of restfulness.

In her most recent study, Smith (1986) investigated the relationship between perceived restfulness and planned harmonic sound. She proposed that if time were experienced as passing more quickly in a planned auditory environment, and perceived restfulness equated with time passing quickly, persons should perceive themselves to be more rested in a planned harmonic auditory environment.

The study described in this paper modified Smith's 1986 study. In that study, Smith hypothesized that confined subjects who experienced a varied harmonic environment would experience themselves as more rested than those who experienced quietened surroundings. This hypothesis was supported at 0.05 level of significance. A two group pre-test post-test design was used with 120 healthy persons randomly assigned to one of the two groups experiencing auditory input. Although there were equal numbers of men and women subjects, it was not reported whether gender was evenly distributed between groups. Perceived restfulness was measured with a modified version of Borg's perceived exertion tool (Smith, 1986, p. 24), and was demonstrated as reliable for measuring perceived restfulness in healthy individuals aged 18 to 35 years.

Auditory input for the 'harmonic sound' group was an organised mixture of music, narrations and silent intervals. Smith (1986, p.25) reported the existance of a strong relationship "between a musical selection and the mood associated with it." The choices for music in her study were therefore based on musician ratings according to Hevner's mood classifying

adjectives: leisurely, satisfying, serene, tranquil, quiet and soothing. The narrations were chosen by ratings of "most clear" and "most interesting" (Smith, 1986,p. 25). It was not reported whether attention was given to the overt capacity of the narratives to stimulate tension. It may be assumed that it was, since Smith's (1975) earlier related study attended to scripts by judging, pilot-study and subsequent revision. Auditory input for the 'quiet' group was a non-speaking, hushed environment.

Subjects were confined to bed in a laboratory setting for a total of 190 minutes. Smith maintained environmental consistency by controlling influencing variables such as bedding, lighting, temperature and stimulating factors related to the period prior to bedrest. Visual input may have differed for the individual subjects since they were tested simultaneously in the same room, but separated by wooden screens. The testing times also differed, but were equally post-meal times. Internal validity was further enhanced by consistent delivery of research protocol to subjects. Demographic variables such as previous interest/education in music, or in relaxation techniques was not reported. Analysis of Covariance (ANCOVA) using the pretest scores as the covariate, was used to test her hypothesis. According to Burns & Grove (1987, p. 543) ANCOVA removes the differences between groups that are due to confounding variables.

Hypothesis, Definitions, Objectives and Assumptions

Hypothesis

The hypothesis tested in this study is that reported perception of restfulness will be lower (subjects will be more rested) for hospitalised patients who experience a varied harmonic auditory environment than for those who experience quiet ambience.

Definition of terms

Concepts included in this study were operationally defined as follows:

Confined to hospital for healing - hospitalised for at least 48 hours following plastic surgery.

Varied harmonic sound - different sequences of music, quietness and narration extending over a period of 60 minutes.

Quiet ambience - the hushed still setting of a non-soundproof room where quietness is maintained for 60 minutes.

Perceived rest - the subjects numerical rating on the perceived restfulness scale.

The latter three operational definitions were devised by Smith (1986, pp. 23,24) for her study.

Research Objectives.

The specific objectives of this study were to;

1. Examine the relationship of varied harmonic sound to the perceived rest of patients who are confined to hospital for

healing.

2. Examine the relationship of quiet surroundings to the perceived rest of patients who are confined to hospital for healing.

3. Determine the significance of the difference between the perceived rest of patients (who are confined to hospital for healing) in quiet surroundings, and those in an environment of varied harmonic sound.

Assumptions.

The assumptions upon which this study was based included the following:

1. Plastic surgery invokes a need for healing.

2. Rest facilitates healing.

3. The hospital environment can be manipulated to promote rest.

4. Perceptual experiences require the assignment of meaning and result in the formation of mental images.

5. Barring physiological impairment, an individual can perceive auditory vibrations as meaningful sound.

Methods and Procedures.

> Selecting a research design for a study derived from the Rogerian system is problematic because the design field is focused around the concept of causal relationships....an example of using experimental or quasi-experimental designs within a Rogerian context would be the monitoring of indices of human field patterning in relation to introduced environmental change (Cowling, 1986, p 73).

The index of human field patterning measured in this study was perceived rest, with sound as the introduced environmental change.

Study design.

The study design was experimental using a non-equivalent control group design with pretest and posttest.

Figure 2
Study Design

	Measurement of dependent variable	Manipulation of independent variable	Measurement of dependent variable
Sample 1 Experimental Group	Pre-test ——→	Positive effect (Varied harmonic sound) —→	Post-test treatment
Sample 2 Control Group	Pre-test ——→	Alternative positive effect (Quiet ambience) —→	Post-test treatment

(Adapted from Burns & Grove, 1987, Fig.10:20, p. 263)

Perceived rest was the dependent variable pretested and postested. The independent variable was sound, with two nominal categories: varied harmonic and quiet ambience.

Measurement Instrument

Borg's perceived exertion scale was modified by Smith (1985) to measure perceived restfulness. This modified instrument, Smith's Restedness-Tiredness Scale, (RTS) was used for the pretesting and posttesting of perceived restfulness in this study.

> Borg's rating scale was designed to be used with subjects who were exercising or engaged in physical activity.....The Borg tool is a 15-item scale ranging from 6 to 20 .... to provide a linear relationship between subjective ratings of exertion and workload (Smith, 1986, p. 24).

Smith substituted the terms 'tired' and 'rested' for the terms 'heavy' and 'light' respectively. Validity for the tool in Smith's study was derived from Putt's study (Smith, 1986, p. 25) which concluded that individuals can identify and express their own energy levels. Lower scores on the RTS indicate perceived restedness while higher scores indicate perceived tiredness.

Reliability of instrument. Reliability of the RTS for this study was determined in the following manner: correlation coefficients of 7 hospitalised patients' ratings of their perceived restfulness upon awakening in the morning and before retiring in the evening on two consecutive days after the 48hr post-operative period had elapsed. These patients had not taken or been given any mind altering medications during the 24 hour period prior to rating or during the rating period. Instructions for completing the RTS were read to the patients who were given a written copy. These instructions are shown with the RTS in Fig. 3. Reliability on the instrument obtained a correlation coefficient of 0.83 from test retest scores indicating that the tool is reliable as a measure of perceived restfulness for the

subjects in this study.

Figure 3
Smith's Restedness-Tiredness Scale

Using the table below, please circle the number which best describes how rested or tired you are now feeling.
You may circle an unlabelled number if it's position best describes how you are feeling.

6	
7	Very, very rested
8	
9	Very rested
10	
11	Fairly rested
12	
13	Somewhat rested
14	
15	Tired
16	
17	Very tired
18	
19	Very, very tired
20	

Selected Setting

The study was conducted in a predominantly surgical 55 bed private hospital. The environment of study subjects included identical single rooms with identical window shades (drawn during testing) and soft furnishings. All study subjects rested in

hospital beds with innerspring mattresses, and with hypoallergenic bedclothing and pillows. The room temperature was thermostatically controlled between 18 C and 21 C. Subjects were not asked to remove personal belongings from their bedside tables.

Manipulation of Independent Variables

Varied harmonic sound. For the experimental group this sound sequence was provided as follows; 15 minutes of Brandenburg's Concerto No. 6 by Bach; 5 minutes of silence; 25 minutes of the story "Pigs is Pigs" by Ellis Parker Butler; 5 minutes of silence; 15 minutes of Appalachian Spring by Copland. The music choices were the same as those chosen by Smith, and the narrative was chosen to limit reading duration to 25 minutes, and to minimise tension producing content. The story "Pigs is Pigs" was rated as 'most interesting' by a sound technician, a sound librarian, and a Blind Institute short story reader who was subsequently engaged to record the narrative. In retrospect it is evident that the short story did not hold the interest of all subjects who heard it, but this factor had interesting outcomes which will be discussed later in this paper. A sound technician was hired to put the taped sequences together using one side of a 120 minute audiotape. Four audiotapes were prepared to provide for testing when the required post-operative period of subjects in the experimental group occurred simultaneously.

Quiet ambience. For the control group, quiet ambience was provided by maintaining quiet in a non-soundproof hospital room with the door closed and a nurse's call-bell within the subject's

reach. Routine ward activities producing sound external to the subject's room were not inhibited.

Population Identification

The subjects were selected from among patients admitted to the hospital for plastic surgery during a four week period. Selection criteria were as follows:- age 16-85, no hearing disability, post-operative period 48 - 72 hours prior to which no mind altering medications had been administered for at least 12 hours, and operative procedure: plastic surgery. The researcher chose to study the effects of auditory input on perceptions of restfulness in patients who were hospitalised in order to heal following surgery. Plastic surgery invokes a particular need for uncomplicated healing, as it is often associated with concern about body image. Using a table of random numbers, subjects were assigned to the experimental and control groups. A sample of 22 was chosen for the study so as to give manageability to the procedure.

Research Procedures

Liaison with hospital staff. Cooperation from the nurses staffing the wards of the hospital was gained by collaborating with them regarding the most suitable hour for conduct of this research, and by consultation with them regarding required nursing interventions for subjects on a day to day basis. A printed information sheet was displayed in the handover areas on days of testing to inform staff of the research activities and the subjects being tested for that day. (See Appendix A). This

information sheet served to facilitate planning of patient care for that day, and assisted the maintenance of internal consistency for the study. Staff at the hospital reception and switchboard areas were requested on a day to day basis to page the investigator if visitors or telephone calls came in for subjects during testing times.

Consent. 25 potential subjects were approached by the researcher who explained that she was conducting nursing research and that the surgeon concerned had given permission for his patients to be invited to participate in the study. The consent form was read to the patient as an explanation of the research procedures. (Appendix B. Consent form). Signed consent was obtained from 22 subjects, and in the case of one 16 year old, from the parents. Subjects were told that if they wished to withdraw from the study, they had an unconditional option to do so at any time.

Testing procedures. Testing was not simultaneous for all subjects due to the differing admission dates. For consistency and to reduce disruption to hospital routines, the testing time was always between 1330 and 1430 hours. Staff handover and afternoon teas took place at this time. Immediately prior to testing, each subject was asked by the investigator to empty his/her bladder, and to refrain from eating, drinking and smoking during the testing time. Subjects were also instructed to rest in bed with their eyes closed for 10 minutes prior to pretesting to minimise the effect of environmental stimuli brought to their pretest response. Following pretesting, subjects were confined to bed for 60 minutes with their door closed and a call bell

within reach. During this time, the control group rested in quiet ambience, and the experimental group rested in an environment of varied harmonic sound. Then both groups were postested for perceived restfulness. Subjects were not able to be observed during the 60 minute confinement time but all stated that they had complied with the instructions given to them.

It was decided that a total time of 60 minutes duration for testing best accommodated the hospitalised patient's needs, and allowed the whole taped sequence to play without the environmental interruption of turning the tape over. The sound was delivered from a National Panasonic (Model RQ421DS) cassette player through an amplifier situated on a bedtable at the foot of the bed. When testing was simultaneous for more than one subject in the experimental group, identical equipment was used for sound delivery. It was intended to set amplitude at the same level for all subjects, but as the first subject stated a preference for less volume, it was subsequently set according to each subject's stated preference, which was within a range of 50 - 70 decibels. An assistant was trained to help set up the equipment prior to testing, and to ensure that there was no unauthorised entry to the subjects' rooms during testing, as subjects being tested simultaneously were sometimes located on different floors of the hospital. One aspect of the procedure which was an unanticipated difficulty was how to determine exactly when the audiotape had finished inside the experimental subjects' rooms. Noise occurring in the hospital corridoor made this difficult. The problem was resolved by the use of a stethescope applied to the door, from which sounds inside the room could be heard.

Data collection and data storage procedures.

The investigator administered the pretest and posttest RTS scale by reading previously written instructions for its use. Subjects were also given these written instructions with the tool. Demographic data which included the subject's age, address, and nature of operative procedure was collected from hospital records by the investigator.

Table 1.
Demographic data.

Sex	Age Range	Plastic Surgery
Male 4 Female 18	16 - 84	Face (10 subjects) Breast (5 subjects) Eye (3 subjects) Nose (4 subjects)

Confidentiality of all information obtained from subjects within the context of the study was assured and maintained as follows: The researcher was the only individual who had access to the name-identifying data, and completed a signed declaration binding her to respect the confidentiality of the information. (See Appendix B). All paper records were created in such a manner as to avoid juxtaposition of confidential information with identifying data. Master lists were stored separately from the paper files to which they referred. Details of coding systems were stored separately from records containing information in coded form. Name identifying data was stored in a locked metal box whilst not in use. Name-identified records were not stored on micro-computer. At the conclusion of the study, paper records containing named data were incinerated on the research site under the supervision of the researcher.

No significant risks to subjects were observed and no

interruption to health care occurred as a result of confinement during testing times. The nursing staff and attending doctor caring for these subjects were informed that the research procedure would be terminated immediately should an unforseen intervention be required during the testing time.

Data Analysis and Results

Variables

Variables were;

Dependent variable. Perceived restfulness.

Independent variable. Sound. (2 nominal categories; 'varied harmonic' and 'quiet'.)

Influencing variables. Anxiety levels of subjects; age of subjects; subjects' education levels; building construction noise; kind of surgery; anaesthetic agent used.

The first three influencing variables were statistically controlled within the technique of Analysis of Covariance (ANCOVA), which is discussed below. Building construction noise (part of the hospital was undergoing structural redevelopment) was excluded by locating subjects in rooms where this noise could not be heard. Differences occurring because of the kind of surgery were addressed to some extent by limiting subjects to the patients of only one plastic surgeon only. Anaesthetic differences were controlled as an influencing variable by testing subjects after the 48 hour post anaesthetic period had elapsed. None of the subjects had been given analgesia in the 12 hour period prior to testing.

Data Analysis

A frequency analysis was used to determine the mean scores of perceived restfulness for the two groups. The results are shown in Table 2.

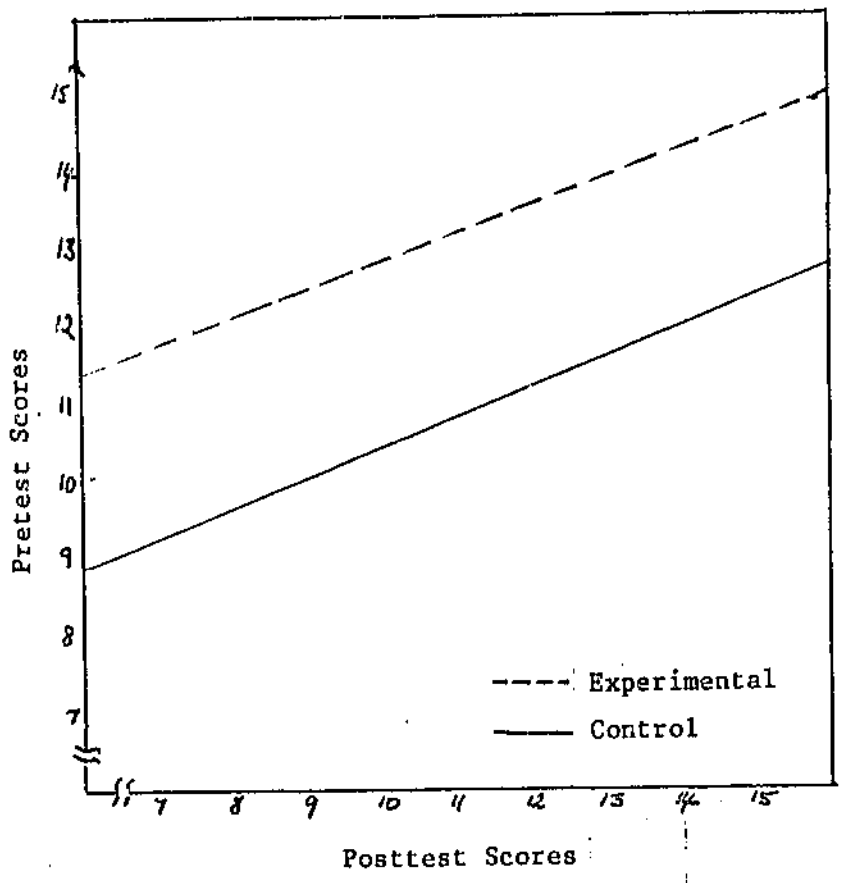
Table 2.
Mean Posttest Scores of Perceived Restfulness for Two Groups of Auditory Information for Subjects Confined to Hospital for Healing

	Perceived restfulness		
Groups	Mean	SD	N
Auditory information			
Quiet	11.45	2.06	11
Varied	9.63	2.91	11

For the subjects who were confined in quiet ambience, the posttest mean for perceived restfulness was 11.45; for those exposed to varied harmonic sound it was 9.36. These mean scores reflect the responses to different auditory stimuli, but to establish statistical significance between the group means, the differences in pretest scores had to be accounted for or 'removed'. The procedure of Analysis of Covariance (ANCOVA) statistically equates the groups by the process of regression analysis. Burns & Grove (1986;543) explain that the effects of confounding variables such as anxiety level, education, or age (which are reflected in the differences in pretest scores) can be removed using ANCOVA in pretest posttest designs. By using the pretest as the covariate in ANCOVA the differences in pretest scores were removed, providing a more accurate estimate of the difference between the control and experimental groups' responses to the independent variables. Munro et al (1988) state that the validity of regression analysis in ANCOVA is dependent upon the covariate being measured at the interval level. The covariate in this study - the pretest RTS - utilised interval measures. Further requirements for validity of regression analysis are that the covariate and the dependent variable demonstrate a linear

relationship, and that this relationship be of similar direction and strength. The data in this study met this criterion as shown in Fig 4.

Figure 4
Linear Relationship Between Covariate (Pretest) and Dependent Variable (Posttest) in Experimental and Control Groups



Assumptions which ensure a valid analysis of variance within the procedure of ANCOVA are that the groups be mutually exclusive with equivalent variances, and that the dependent variable be normally distributed continuous data. Experimental and control groups were by their nature mutually exclusive and had equivalent variances. The dependent variable - the posttest RTS - was normally distributed continuous data.

Results Appendix 3 shows the computer program and data

output for the ANCOVA procedure. The ANCOVA summary is shown below.

Table 3
Analysis of Covariance Summary

Source of Variation	df	Sum of squares	Mean squares	F	P
Groups;					
Between	1	38.32	38.32	8.20	.0099
Within	1	88.77	4.06		

Two sources of variation are shown in this summary. The first is the variation due to the manipulation of environmental sound (between variance), and the second is the variation within the groups (error variance). The probability reached by the F value of 8.20 for main effects gives a p value of .0099, supporting at .05 level of significance, the hypothesis tested in this study.

Discussion and Conclusions

The purpose of this study was to test Rogers' principle of human-environment integrality by asking the question; Does a varied harmonic auditory environment increase the perceived restfulness of patients who are hospitalised in order to heal following intraoperative procedures? A further question implicit in this study was: Does support for Rogers' premise that humans are integral with their environments have nursing research implications with reference to Fromm's identification of the restless cycles associated with perceived separateness? Generalisations made from the findings of this study are limited due to the sample size drawn from a single hospital in one geographic location. This discussion will therefore consider the research questions with reference to the findings of this study as they concur with the findings of Smith's (1986) study.

Environmental Sound and its Relationship to Perceived Restfulness

It was demonstrated in this study that environmental sound can directly influence a hospitalised person's perception of his or her own restfulness. This study also draws attention to the potential of hospital environments to produce coded sound - that is, sounds to which a variety of meanings may be attributed by the listener. Subjects in the 'quiet' group spontaneously identified "footsteps", "voices", "screens being pulled in the next room", "trolleys" and "the mop and bucket" as sounds heard from inside their hospital rooms during the testing time. Coded

sound requires the listener to assign significance to that sound. When the listener perceives him/herself to be in a position of vulnerability and dependence such as may occur during hospitalisation, the apportioning of possible meanings to coded sound (particularly sounds which arise from hospital activities) is work which requires energy. Such energy could be better conserved for the purpose of healing.

Of the 11 subjects in the 'quiet' group, 4 had to be awakened for the posttest, and 3 expressed a desire to continue to sleep uninterrupted after the posttest. 7 of the 11 subjects in the 'sound' group reported that thay had dozed during the short story, and of these, 5 stated that they found the story "boring". All subjects in the experimental group were awake at the end of the final music sequence. The different sleep-associated behaviours of subjects in these groups lends support to Rogers' proposition that human-environment interaction is unbroken, even during sleep. It also appears that, for some subjects, boring decoded sound was experienced as more restful than coded sound, a factor which highlights the undesirability of coded sound in an environment which may be manipulated to promote restfulness.

The findings of this study indicate that a hospital environment with varied harmonic decoded sound is significantly more conducive to the perceived restfulness of surgical inpatients than one of coded sound heard in quiet ambience. Therefore, it is suggested that certain nursing strategies can promote auditory enhancement of restfulness for healing by minimising coded environmental sound. These strategies include:-

explaining to the patient predictable ward activities and procedures prior to their occurrence; discussing the patient's care plan with him/her at it's inception and as it is modified; instructing hospital staff who routinely enter the ward areas to wear soft shoes; striving to provide an environment where hospital staff conduct conversations either clearly within the patient's hearing or totally out of their hearing; and, allowing patients the option of listening to varied harmonic sound with a headset at the bedside when this is not contraindicated for other reasons.

The Usefulness of Rogers' Nursing Conceptual Framework

In her scientific approach to nursing practice, Martha Rogers proposes that nursing actions need to be based on concepts that are primarily abstract. Therefore, application of the concepts in both research and practice require a perceptual shift to replace familiar ideas such as space and time, with more abstract ideas that transcend linear thinking. Concerning Rogers' conceptual system, Malinski (1986, pp. 25,26) writes, "If we accept the integral connectedness of person and environment, then the idea that the healing milieu is as important as the treatment modality does not seem strange" (Malinski, 1966, p. 25,26.). Nursing science requires theory testing in order to identify the healing milieu which can be derived from abstract conceptual systems such as the Science of Unitary Human Beings. Furthermore, for theory testing to be useful, implications for practice must be established. Through this study it can be seen that Roger's premise of integrality can

be therapeutically applied in the hospital setting.

Further research investigating auditory enhancement of restfulness for healing should test a larger number of hospitalised subjects distributed over different geographical areas to increase generalizability. The inclusion of deaf subjects would intensify the testing of human-environment integrality. Smith (1986, p. 27) recommended that in further studies, subjects be allowed to choose their own sound sequences, a recommendation supported by some subject responses to the narrative in this study. Persons who are required to rest as a prescription for chronic stress-related illness could also be tested in a longitudinal study.

Qualitative research seeking to define the phenomena of 'perceived separateness' could precede a study of the relationship between this phenomena and restlessness. Such a study may generate practice which addresses the need to overcome restless cycles associated with perceived separateness.

Appendix A.

Nursing Research: Information for Hospital Staff

Nursing research will be undertaken between [date] and [date]
1989. The research is to be conducted by Sue Meggitt and will involve the patients of [Doctor's name]. This research will be examining the effects of environmental sound on the restfulness of hospitalised patients.

The following guidelines have been drawn up to ensure that the needs of the patients are met, and the requirement for consistency within the research procedures be met.

On the days of patient testing and data collection, the researcher will;

1. Inform hospital staff of participating patient's names and their room numbers, by posting a notice in the handover and switchboard areas. Testing times will always be between 1330 and 1430 hours.
2. Respond cooperatively to any decision made health professionals concerning the patient's need for immediate nursing or medical intervention, by terminating that patient's participation in the study.
3. Be responsible for the conduct and supervision of the research procedures, and communicate with patients and their visitors with respect to research procedures.

Hospital staff are requested to;

1. Refrain from entering the patient's room during testing time as this would invalidate results.
2. Refer any visitors or phone calls coming in for the concerned patients during testing times, to the researcher.
3. Refer any questions concerning the research procedure to the researcher.
4. Withold any information you have acquired concerning the research procedures, until all subjects have been tested. This will help to exclude influences which may affect the validity of the findings.

The findings of the study will be made available to all staff when the report is completed.

[Participants for the specific day concerned were added to this notice.]

Appendix B.

Consent Form

STUDY TITLE: Effects of Environmental Sound on the Hospitalised Patient's Experience of Rest.

INVESTIGATOR: Sue Meggitt

Sue Meggitt is a nurse studying the effects of environmental sound of the patient's experience of rest. She believes that this study will enable nurses to better assist patients in hospital to rest. I understand that it will take approximately 70 minutes of my time and will involve resting in bed and either;

a) Listening to music and a short story, or
b) Resting quietly without disturbance.

If I have any questions about the study, or about participating in the study, I may reach Sue Meggitt at 2441826 (home), or at [number and name of hospital where study was performed].

I agree to participate in the study and give Sue Meggitt access to my hospital records. I have been assured that my identity will not be revealed while the study is being conducted or when the study is published. I have been given a copy of this consent form.

Subject's signature	Signature of Witness
Researcher's signature	Date

Declaration Binding Researcher to Confidentiality

I, Susan Meggitt, do hereby promise to protect the confidentiality of the name-identifying information gained by me in the conduct of nursing research undertaken at [name of hospital] during 1989

Signature of researcher	Date
Witness to signature	

Appendix C

SAS Procedure and printout for ANCOVA

```
DATA REST;
INPUT GROUP $ PRE POST;
DIFF = PRE - POST;
CARDS;
1 11 07
1 11 07
1 15 10
1 15 13
1 13 09
1 13 12
1 11 11
1 13 11
1 13 09
1 13 07
1 11 10
2 11 13
2 11 07
2 07 07
2 14 12
2 11 13
2 11 09
2 13 15
2 11 10
2 15 14
2 09 11
2 11 15
RUN;
PROC GLM;
     CLASS GROUP;
     MODEL POST = GROUP PRE;
     MEANS GROUP;
     LSMEANS GROUP/STDERR PDIFF;
     TITLE 1 EXAMPLE OF PROC GLM FOR ANCOVA;
     TITLE 2 POST IS CONTINUOUS DEPENDENT VARIABLE;
     TITLE 3 GROUP PRE IS CONTINUOUS COVARIATE;
     TITLE 4 GROUP IS CATEGORICAL INDEPENDENT VARIABLE;
RUN;
```

General Linear Models Procedure
Class Level Information

Class	Levels	Values
GROUP	2	1 2

Number of observations in data set = 22

General Linear Models Procedure

Dependent Variable: POST

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	56.68100023	28.34050012	6.07	0.0092
Error	19	88.77354522	4.67229185		
Corrected Total	21	145.45454545			

R-Square	C.V.	Root MSE	POST Mean
0.389682	20.49744	2.161548	10.5454545

General Linear Models Procedure

Dependent Variable: POST

Source	DF	Type I SS	Mean Square	F Value	Pr > F
GROUP	1	18.18181818	18.18181818	3.89	0.0633
PRE	1	38.49918205	38.49918205	8.24	0.0098

Source	DF	Type III SS	Mean Square	F Value	Pr > F
GROUP	1	38.32808308	38.32808308	8.20	0.0099
PRE	1	38.49918205	38.49918205	8.24	0.0098

General Linear Models Procedure

Level of GROUP	N	POST Mean	POST SD	PRE Mean	PRE SD
1	11	9.6363636	2.06265495	12.6363636	1.50151439
2	11	11.4545455	2.91079496	11.2727273	2.19503572

General Linear Models Procedure
Least Squares Means

GROUP	POST LSMEAN	Std Err LSMEAN	Pr > |T| H0:LSMEAN=0	Pr > |T| H0: LSMEAN1=LSMEAN2
1	9.1333255	0.6748806	0.0001	0.0099
2	11.9575835	0.6748806	0.0001	

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