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What is This?
Exploring the Effects of Walking the Labyrinth

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Purpose: This pilot study examines the effects of walking a labyrinth. Method: A convenience sample of 25 community members participated in a four-group, repeated measures study to gather information about vital signs and affect before and after labyrinth walks. Because of the small sample size, results were inspected for effect size (ES) differences in pre- to postcomparisons. Mean postwalk scores were also compared to control group scores. Findings: Systolic and diastolic blood pressures showed essentially no ES differences pre to postwalk. The remaining ES comparisons showed .14 ES for pulse differences, .37 ES for respirations, and .22 and .56 ES differences for positive and negative affect measures, respectively. Conclusions: Comparisons of postwalk scores for walkers to nonwalkers showed mixed results in significance of differences. Implications: This pilot study shows the feasibility of the procedures for assessing the effects of labyrinth walking on basic parameters of health.

Keywords: walking meditation; labyrinth

Walking the labyrinth combines actions of the body, mind, and spirit in an ancient, yet currently used, activity—a walking meditation. The labyrinth has reemerged as a result of attention from Reverend Dr. Lauren Artress, President and Founder of Veriditas, The Voice of the Labyrinth Movement in San Francisco (Artress, 1995; Curry, 2000; West, 2000). Largely because of her efforts, labyrinths are now appearing in churches, schools, parks, and medical centers across the country. There are currently more than 1,000 labyrinths in the United States, with more than 50 labyrinths in Texas and more than 25 in California (World-Wide Labyrinth Locator, 2004). The labyrinths in medical centers are used by staff, patients, and families to reduce stress, to relax and cope, and to manage grief and loss (Sandor, 2002, 2003, 2004). Unfortunately, no studies testing the effects of the labyrinth walk appear in the literature, though many have speculated about the affects of the labyrinth walk and how those affects occur. The goal of the current research was to begin a systematic study of the affective and physiological effects of labyrinth walking.

Background

Of the few, very old labyrinths that exist today, perhaps the most famous is the one at Chartres Cathedral in Chartres, France. The Chartres Labyrinth is thought to have been built about 800 years ago. At that time, cathedrals throughout Europe were sites where the faithful completed a pilgrimage by walking the labyrinth because it was too dangerous to walk to the Holy Land during the Crusades (Artress, 1995; Cannato, 2002). Regardless of the actual impetus for building the Chartres Labyrinth, its documented age and maintenance are testimony to the longevity of interest in labyrinth walks. The Chartres Labyrinth is an 11-circuit labyrinth consisting of 11 concentric circles with the center being the 12th (see Figure 1). The path winds back and forth, clockwise and counterclockwise, taking the walker from the perimeter toward the center and out toward the perimeter again until the walker reaches the center. The labyrinth has several distinguishing features, including the center. The center, or

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rosette, is a circular shape with six petals. Another distinguishing feature is the perimeter of the labyrinth with semicircular shapes, *lunations*, forming 28 points in each quadrant. Lunations may represent a lunar counting tool for calculating when Easter occurs (Artress, 1995).

The use of the labyrinth to produce a meditative response is formal and ritualistic. Walkers progress through three phases during the labyrinth walk—releasing, receiving, and returning (*Walking the Labyrinths at Grace Cathedral*, n.d.). The first phase, *releasing*, occurs during the walk to the center at a normal walking speed. Walkers are encouraged to empty their minds; repeat a chant, word, or prayer; pose a problem to be solved; or recall a dream to reflect on. When in the center, walkers engage in *receiving* and may sit or stand while inviting an opening to personal healing, solace, connection, renewal, and wholeness. The third phase of the walk, *returning*, involves retracing one’s steps in the opposite direction. Walkers return to the day-to-day world with each step, and while doing this often experience a change of energy in mind, body, and spirit. The intent of the labyrinth walk is to evoke physiological, affective, and spiritual outcomes similar to a sitting meditation. On average, the labyrinth walk takes 20 minutes to complete.

**Complementary Health Practices**

Health practices that integrate the body, mind, and spirit focus on the intrinsic self-healing capacities within an individual. Several approaches to stress management that are complementary to traditional medicine exist. For the purposes of the current study and the proposed intervention, we reviewed the literature related to physical activity and meditation, two complementary health practices that decrease blood pressure, the physiological variable of interest.

**Physical activity.** The exact physiological means by which physical activity decreases blood pressure is unknown (Petrella, 1998). The benefits of physical activity in reducing blood pressure, however, have been well documented—so much so that some recommend prescribing exercise as an adjunctive therapy for those who require pharmacologic therapy for their hypertension, especially those who are not on beta blockers (Cleroux, Feldman, & Petrella, 1999; Deblinger, 2001). A meta-analysis (Whelton, Chin, Xin, & He, 2002) of 54 studies where intervention and control groups differed only in aerobic exercise revealed that aerobic activity reduces blood pressure in persons with normal and high blood pressure. Aerobic activity can reduce systolic and diastolic blood pressure, and mild to moderate physical activity may be more effective in reducing hypertension than high intensity workouts (Hagberg, Park, & Brown, 2000; Petrella, 1998).

Rehabilitation programs following a variety of cardiac events include emphasis on physical activity (Burns, Camione, Froman, & Clark, 1998; Rejeski et al., 2002). Consistent, routine engagement in exercise has been shown to be so valuable to cardiac rehabilitation that many treat it as important as medication in the management of cardiovascular disease in general, and hypertension in particular (Hickey, Owen, & Froman, 1992).

**Meditation.** Building on the work of Cannon (1942), Selye (1976), and others, Benson’s (1975) early work was central in defining the physiologic changes to the stress response. Benson’s term, *the relaxation response*, refers to the bodily responses that counteract stress and decrease the heart rate, lower metabolism, decrease respirations, and lower blood pressure. The induction of the relaxation response in the human body represents a form of meditation prac-
Practiced for ages in many cultures and religions. Benson’s work began with participants who practiced a sitting meditation; however, he found that the relaxation response could also be elicited when walking by paying attention to the cadence of one’s steps; keeping the mind focused; saying a word, phrase, or prayer; and relaxing the muscles. Researchers have also recognized that the positive affects of meditation and relaxation are not limited to the immediate period but persist over time (Cooper & Aygen, 1979). As Benson continued his medical practice and research, he recognized that religious or spiritual beliefs were important to his patients’ lives and ultimately to their health. He found that approximately 80% of those using the relaxation response chose to say a prayer to focus their attention as they meditated. He called the combination of meditation and one’s beliefs the faith factor (Benson, 1984).

The intent of the current pilot study was to begin objective documentation of the effects of walking the labyrinth. Specifically, the goals were to measure physiological (blood pressure, heart rate, and respirations) and affective (positive and negative affect) responses to labyrinth walking.

Method

Design

A four-group, repeated measures design was used. Vital sign measures and the Positive Affect Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) were completed at baseline for all groups. This initial study was conducted to evaluate the feasibility and outcomes of a labyrinth walk as an intervention for adults living in the community. The aims were to assess physiological and affective responses to a labyrinth walk. In addition to those outcome variables, the current study assessed procedures for enrolling community participants, measuring outcomes in a systematic manner, and estimating the time needed for labyrinth walks with small groups of participants.

The Labyrinth and Meditation Garden at the William Temple Episcopal Center in Galveston, Texas, provided one of the settings for labyrinth walks. The indoor labyrinth at Grace Cathedral in San Francisco provided a second setting for the study, thereby expanding geographical representation. Both labyrinths are replicas of the 11-circuit labyrinth in the Chartres Cathedral (see Figure 2).

Participants

A convenience sample of 25 community members participated in the current study. All participants were deemed generally healthy volunteers, and no preexisting disease data were gathered. The labyrinth walk was conducted in two separate settings (Galveston, Texas \( n = 15 \), and San Francisco \( n = 10 \)) to provide variation in site. Biographic information about participants was collected to assess equivalence of participants across sites. There were five male and 20 female participants who ranged in age from 18 to 62 years. The majority of the participants were White (23), and two were Hispanic.

Instruments

Physiological indicators. Physiological indicators of interest (vital signs) included measurement of blood pressure, pulse, and respiration. Registered nurses collected vital signs from all participants at rest in a sitting position.

Affective indicators. The Positive Affect Negative Affect Schedule (PANAS; Watson et al., 1988) was used as the affective outcome measure. The PANAS is a 20-item self-report scale of pleasant and bad feelings (10 positive and 10 negative). These items have been shown repeatedly through factor analysis to measure two distinct and independent dimensions—positive and negative affect. The PANAS yields two scores, one for positive affect (PA) and one for negative affect (NA). Each item on the PANAS is rated for the frequency a feeling occurs during a specified period. By altering the interval assessed, the scales have been used to evaluate affect over brief or long periods. Reliability estimates of internal consistency for the positive and negative scales range from .84 to .90; retest stability estimates range from .39 to .71 depending on the directions for completing the scale (short or long intervals assessed) and the interval between administrations (Watson et al.).

Biographic information and rating scales. Each participant completed a Biographic Data Sheet and Rating Scale at the beginning of the current study. The information collected included age, gender, ethnic origin, attendance at religious services, and self-ratings of health status, religiosity, and spirituality.
Procedure

The research protocol was reviewed and approved for protection of human subjects’ rights by the Institutional Review Board at the University of Texas Medical Branch in Galveston. All participants completed informed consent procedures before the study began. Three groups of participants, Groups 1, 2, and 3, the treatment groups, listened to an introductory talk about labyrinths. Group 4, the control group, did not hear the labyrinth introductory talk at that time and was separated from the other three groups. All members of the groups (1–4) had their vital signs assessed and completed the PANAS on the same schedule. After baseline assessment for all four groups, and the introductory talk for Groups 1 to 3, Group 1 walked the labyrinth. Groups 2, 3, and 4 remained on their own, unsupervised in a common area waiting for their labyrinth walk. When Group 1 returned from the labyrinth walk, all four groups had vital signs measured and completed the PANAS again. Then Group 2 walked and outcome measures for all four groups were assessed. This procedure was repeated after Group 3 walked. Finally, Group 4 (the control group) walked the labyrinth. All four groups then had their vital signs recorded and completed the PANAS one last time. Group 4 then listened to a talk about the labyrinth, thus separating the labyrinth narrative introduction and expectation from the physical activity of the labyrinth walk. In sum, all respondents had vital signs recorded and completed PANAS 5 times. Table 1 summarizes the design and procedures. In the table, Observations (Obs) indicates collection of the vital sign and PANAS data; talk and walk are the introduction talk, and the labyrinth walk intervention, respectively. The repeated measures with use of a control group allowed for testing of the effects of the talk and walk separately. The same design, with random assignment of the participants to the comparison groups, was used at each site.

Figure 2
Grace Cathedral Labyrinth, San Francisco, Photo by Cindy Pavlinac (left), and William Temple Labyrinth, Galveston, Photo by Gary Delzer (right)

Data Analysis

Initial analysis of group equivalence (Galveston \( n = 15 \) to San Francisco \( n = 10 \)) on the biographical information (age, gender, etc.) showed no site differences, so the data were combined to create a single sample of \( N = 25 \) for the statistical analysis to evaluate outcomes of walking the labyrinth. In addition, all groups (treatment and control) were found equivalent on the affective and physiological outcome variables at pretest. Average prewalk and postwalk scores were calculated on the repeated scores for the physiological measures and the two PANAS scales to create the most psychometrically sound (stable) prewalk and postwalk estimates for participants on those variables. The use of means collapsed across the repeated observations created one prewalk and one postwalk outcome measure for blood pressure (systolic and diastolic separately), pulse, respirations, and positive and negative affect. Prewalk and postwalk mean scores on the variables for all participants were then analyzed with correlated \( t \) tests for within-participant comparisons.

Because of the small sample size and limited statistical power, results were inspected for effect size (ES) differences (Cohen’s \( d \) statistic) rather than tested for statistical significance. Cohen (1988) described the meaning of this \( d \) estimate as “small, \( d = .2 \),” “medium, \( d = .5 \),” and “large, \( d = .8 \)” ESs. Effect sizes can be interpreted as having small, medium, or large practical meaning independent of statistical significance of the finding. Use of ES testing is recommended over probability testing in the case of small sample size because achieving statistical significance is, in part, a function of sample size (Cohen, 1988).

Between-group (treatment and control) analyses were also conducted. Postwalk mean scores on the variables for participants in treatment Groups 1, 2, and 3 \( (n = 18) \) were compared to the mean scores of participants in the control group \( (n = 7) \) before they walked the labyrinth using \( t \) tests for independent samples.

Again, acknowledging the small sample size, statistical significance was not expected at the conventional \( p < .05 \) or \( p < .01 \) levels given the lack of power in the analyses. In these analyses, trends in the data rather than statistical significance were of interest.

Results

When asked about attendance at religious services, 8 participants reported they never attended, 2 attended on holidays, 7 attended once a month, 5 reported attending weekly, and 1 attended a religious service 2 or more times a week. Participants also rated their health, spirituality, and religiosity. Using a 1 (poor) to 5 (excellent) rating scale for health, 6 participants rated their health as 3, 10 rated their health as 4, and 9 rated their health as 5. The spirituality rating scale ranged from 1 (not spiritual) to 5 (very spiritual). Four participants rated their spirituality as 3, 5 rated their spirituality as 4, and 16 rated themselves as 5 (very spiritual). Finally, when asked to rate their religiosity using a similar rating scale, 1 (not religious) to 5 (very religious), 9 participants rated themselves as 1 (not religious), 7 participants rated their religiosity as 2, 4 rated their religiosity as 3, 2 rated their religiosity as 4, and 3 rated themselves as 5 (very religious). The ratings across the two sites on each of these characteristics were similar.

Feasibility of Enrollment and Design

The current study showed recruitment from community volunteers to be easily accomplished. The Galveston site had the most participants with a total of 15; the San Francisco site had 10 participants. Each of the participants completed the PANAS in fewer than 3 minutes. Two registered nurses at each site accomplished measurement of all vital signs quickly and efficiently. No participants indicated a desire to leave the study before completion of all instruments and mea-
sures. The time to complete the labyrinth walk ranged from 15 to 30 minutes, with an average time of 22.5 minutes. The entire time of volunteer participation to complete all measures and the walk ranged from 2 to 3 hours.

**ES Findings**

In this initial study of labyrinth effects, two of the comparisons, on the systolic and diastolic blood pressures, showed essentially no ES differences prewalk to postwalk (see observation regarding smoking below). The remaining comparisons showed *d* estimates of .14 ES for pulse differences, .37 ES for respirations, and .22 and .56 ES differences for positive and negative affect (PANAS), respectively, with positive affect increasing postwalk and negative affect decreasing postwalk. Small to medium ES differences were thus found for respirations and the affective (PANAS) outcomes. The lack of significant results on the within-participants’ blood pressure comparisons suggest the need for other physiological indicators, such as saliva cortisol, and better control of extraneous variables (see discussion of smoking below) if these outcomes are of interest for documentation. Additional quantitative (spirituality and anxiety) and qualitative measures (descriptions of the experience and the meaning of the walk) may further explain the effects of this unique walking meditation.

The results of the independent *t* tests comparing postwalk treatment group mean scores to prewalk control group mean scores are presented in Table 2. The *t* values and corresponding significance levels are provided as well. Three of the six *t* tests show significant differences when the significance level is set at a liberal *p* < .10 value, with all outcomes favoring the labyrinth treatment group.

**Independent Labyrinth Walking**

An unplanned follow-up telephone contact was made with 7 of the 25 participants. Those seven had provided telephone numbers for contact. They were called 3 months after the initial labyrinth walk and queried as to whether they had walked the labyrinth, independently, since the initial walk. Six of the seven, or 86%, had walked the labyrinth on their own. Of those who walked, they reported walking an average of between 2 and 3 times since their initial participation.

### Table 2

**Independent *t* Tests for Treatment and Control Groups’ Affective and Physiological Outcomes**

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SD)</th>
<th><em>t</em> Value</th>
<th><em>p</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive affect</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (<em>n</em> = 18)</td>
<td>3.68* (1.08)</td>
<td>2.73</td>
<td>.012</td>
</tr>
<tr>
<td>Control (<em>n</em> = 7)</td>
<td>2.49 (0.68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Negative affect</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (<em>n</em> = 18)</td>
<td>1.12* (0.27)</td>
<td>0.24</td>
<td>.810</td>
</tr>
<tr>
<td>Control (<em>n</em> = 7)</td>
<td>1.14 (0.14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Systolic blood pressure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (<em>n</em> = 18)</td>
<td>117.14 (8.86)</td>
<td>1.92</td>
<td>.068</td>
</tr>
<tr>
<td>Control (<em>n</em> = 7)</td>
<td>128.66 (21.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diastolic blood pressure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (<em>n</em> = 18)</td>
<td>76.56 (9.04)</td>
<td>0.01</td>
<td>.997</td>
</tr>
<tr>
<td>Control (<em>n</em> = 7)</td>
<td>76.57 (6.50)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Pulse</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Treatment (<em>n</em> = 18)</td>
<td>75.33 (8.81)</td>
<td>1.03</td>
<td>.315</td>
</tr>
<tr>
<td>Control (<em>n</em> = 7)</td>
<td>79.71 (11.46)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Respirations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (<em>n</em> = 18)</td>
<td>16.22 (3.93)</td>
<td>1.75</td>
<td>.093</td>
</tr>
<tr>
<td>Control (<em>n</em> = 7)</td>
<td>19.42 (4.58)</td>
<td></td>
<td></td>
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</tbody>
</table>

* Higher numbers are more positive affect.
* Higher numbers are more negative affect.

**Discussion**

There was evidence of corruption of the blood pressure variable as an outcome measure suggesting the ES for systolic and diastolic was problematic. The corruption occurred during the unsupervised waiting time when some of the participants smoked cigarettes. The participants who smoked did so either before or after the walk, depending on their group. The action of the cigarettes briefly elevates blood pressure (Deblinger, 2001), thus confounding the vital sign measure of blood pressure. If blood pressure outcomes are to be used in subsequent research, we recommend that researcher control be exercised and smoking during the data collection period not be allowed or current smokers be excluded from participation. Blood pressure is a sensitive outcome measure for complementary modalities, particularly with another type of meditation (Transcendental Meditation) as a stress reduction intervention (Schneider et al., 1995; Schneider et al., 2005).

The initial study also identified outcome variables participants are willing to have measured and the concern noted above about corruption of data. All are
important for implementing the design on a larger scale. For instance, the physiological outcomes were all quickly and easily measured by nurses. With greater researcher control they might prove to be economical, nonintrusive measures of change. The self-report responses on the PANAS were analyzed for psychometric soundness and showed internal consistency estimates consistent with published estimates. The participants understood why they were completing the scales repeatedly and did not object to the task. The PANAS scales, introduced with the directions to complete the items for how the participants “are feeling now,” were sensitive to state changes in affect. We are not sure about the impact of the talk before the walk; however, the script for the talk was the same text for all groups tested and was delivered by the same presenter for each talk. It was also incidentally found that many of the participants chose to walk the labyrinth again, on their own, suggesting the potential of the labyrinth walk as a lifestyle practice. The long-term effects of the walk were not measured; however, this may be an area for future research as many complementary modalities show increased effects with repeated use over time. Finally, this initial study demonstrated that participants are willing to stay at the study site for more than 1 hour before or after walks to allow data collection for documentation of outcomes of a labyrinth walk.

Limitations

This initial study assessed the physiological and affective responses to a single labyrinth walk. Whereas the pretest-posttest design was useful for showing immediate effects for the affective outcome measure (PANAS) as supported in the literature (Salmon et al., 2004), the design with a single walk was not useful to show the effects on the physiological measures. More sensitive physiological outcome measures and greater research control over extraneous variables such as smoking would improve the ability to document outcomes attributable to the labyrinth walk.

Another limitation was the supervision of participants during the study. Aside from smoking, a factor known to influence blood pressure, other extraneous variables could have altered outcomes. The participants at both sites were asked to wait in designated areas between the walks and data collection sessions. The lack of monitoring of participants during this time allowed the cigarette smoking, and in one instance, one participant began to share her religious experiences with the other participants in her small group.

Implications for Future Plans

Low-cost and low-demand interventions for health promotion and treatment of chronic health conditions are sought by all health care providers. Empirical documentation of results in addition to speculation about expected or desired outcomes is needed. This was an initial, small-scale study showing such documentation is feasible with the use of community volunteers as participants. Given the promising preliminary results of this exploration of both procedures and outcomes, an additional, more rigorous study is now indicated. Clearly, a study enrolling a sample of sufficient size to allow meaningful statistical testing of results is recommended. Other designs comparing labyrinth walking to other exercise or meditation interventions would be illuminating. For example, a study comparing regular labyrinth walking with other walking programs or sitting meditation would provide instructive data for evaluation of outcomes of interventions commonly self-selected. In addition, qualitative data about the experience of the walk and the meaning of the experience would be useful to help understand the mechanisms of how the labyrinth works to effect outcomes.

The ultimate aim of this research was to explore the unknown health benefits related to the labyrinth walk and to provide preliminary findings related to its use as a complementary health practice. Labyrinths are available throughout the community. Their low-demand, low-cost nature holds promise for intervention with individuals experiencing a variety of existing chronic conditions such as hypertension, multiple sclerosis, Parkinson’s disease, attention-deficit/hyperactivity disorder (ADHD), and stroke rehabilitation. If walking the labyrinth is shown to have desirable outcomes, this activity might be a valuable complementary health practice for health promotion and disease prevention.

References


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Robin D. Froman, PhD, RN, FAAN, is dean and Patty L. Hawkens Professor at the University of Texas Health Science Center at San Antonio. She is a quantitatively oriented nurse researcher interested in healthy lifestyle choices, advanced directives, self-efficacy and self-agency, and measurement issues in healthcare research. Her publications appeared in *Research in Nursing and Health* (2004) and *American Journal of Maternal Child Nursing* (with C. T. Beck & H. Bernal, in press).