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EFFECTS OF MELLOW AND FRENETIC MUSIC AND STIMULATING AND RELAXING SCENTS ON WALKING BY SENIORS [1]

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Summary.—Previous research has yielded an inconclusive picture of the effects of music and scent on walking. Few laboratory studies have detected a beneficial effect of music; olfactory research has shown performance is positively affected for repetitive tasks but not yet on walking. The influence of these two types of stimuli in efficiency of exercise among seniors was assessed by measuring distance walked on an indoor course. Using a 3 × 3 factorial design [mellow music in 4:4 time, frenetic music in 2:8 time, and white noise by stimulating, relaxing, and control scent conditions], each of 20 volunteers from a senior center received nine randomized, 90-sec. exercise trials. Walking distance was reduced by mellow music but unaffected by stimulating music; there was no effect of scent.

The importance of maintaining physical fitness of elderly persons has been increasingly emphasized. While in the past, a decline in physical functioning was assumed an inevitable consequence of aging, recent studies (Aldridge, 1993) suggested that decreased physical activity may contribute substantially to deterioration of performance in elderly persons. This has spurred interest in a variety of techniques designed to promote their greater physical activity. This study examined the effects of both auditory (music) and olfactory (scent) stimulation on walking by elderly subjects.

Research involving music and exercise has yielded an inconsistent array of findings. Schwartz, Fernhall, and Plowman (1990) found that listening to fast-tempo, frenetic music had no objective effect on stationary bicycle performance. Also, there was no perception of an effect by subjects. Copeland and Franks (1991) who measured physiological (heart rate) and psychological effects of different types of music on treadmill endurance found that fast or loud music did not increase physiological or psychological arousal. Their study showed that soft, slow music had a relaxing effect, as reported by the subjects and as evidenced physiologically, since time to exhaustion was significantly longer during this treatment. In one of the few studies to show an effect of music on athletic performance, Ferguson, Carbonneau, and Chambliss (1994) reported that both positive and negative antecedent music enhanced performance of a karate drill over that following exposure to white

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noise. These results were attributed to focused attention and reduced distraction. A study examining stationary bicycle performance of active and inactive children and adults replicated Becker, Brett, Chambliss, Crowers, Haring, Marsh, and Montemayor's (1994) findings but indicated significant effect of antecedent music among seniors. The authors suggested that effects of music might be mediated by listening preferences which varied widely across age groups. Use of age-appropriate musical selections might increase the likelihood of observing facilitation among elderly persons.

In the past few years, popularity of nontraditional methods of medical treatment has increased. Among these "alternative" practices is the art of aromatherapy. Widely practiced in Europe and Asia, new aromatherapies are being developed for use of particular fragrances at home or in the workplace to achieve specific results such as increased energy, creativity, or relaxation (Ward, 1994). As these practices are only beginning to receive serious scientific attention, there is limited American research available. Research conducted in Japan, however, validated many of the claims that certain fragrances alter mood and change performance. For example, keypunch operators made far fewer errors when exposed to the scents of lavender, jasmine, or lemon. Lemon fragrance also seemed to slow their production significantly (Ward, 1994).

Proponents of aromatherapy maintain that fragrance is a way of healing that influences physically, emotionally, mentally, and spiritually. Essential oils which produce the odors supposedly can be germicidal, antiviral, antidepressants, aphrodisiacs, detoxificants, stimulants, fever-reducers, etc. (Stein, 1992). However, conclusions about the effects of olfactory stimulation are not based on controlled, double-blind experimental assessments. The few well-controlled experimental studies on aroma have focused primarily on the neurological underpinnings of olfactory processing. Previous research has distinguished preferences for aromas as a function of prior experience by rats (Carmi & Leon, 1991) and the role of aroma as a factor in context-dependent learning in humans (Smith, Standing, and de Man, 1992). One of the few authors to investigate the functional effects of aroma has indicated a variety of fragrance effects, including improved task performance, memory retrieval, stress reduction, mood elevation, improved self-concept, and sexual enhancement (Schiffman, 1992, pp. 51-62). This author has accounted for these extensive aroma effects neurologically by discussing the common limbic system substrate involved in the processing of motivational, emotional, and olfactory information. The present investigation assessed the effects of two types of concurrent music (mellow and frenetic) and two different fragrances (chamomile for relaxation and peppermint for stimulation) on the distance walked by elderly subjects during nine 90-sec. exercise trials. Mean distances walked in the music and scent conditions were compared with

those in white noise and no fragrance control conditions through use of a repeated-measures design. In this study, frenetic music and peppermint aroma were expected to be associated with greater distance walked.

Method

The sample of 20 older adult volunteers, aged 60 to 101 years, included 10 men and 10 women who were members of a community-wide senior service facility. Subjects were invited to participate in the study during their regular hours of attendance. They were tested individually on-site.

Participants walked a 61-meter indoor course within the senior facility. Three audiotapes with randomized music sequences and instructions were used to deliver the music stimuli. One vial each of the two test scents, peppermint extract and extract of chamomile, supplied the olfactory stimuli.

Prior to conducting trials all subjects were questioned about any preexisting conditions which might preclude participation. All nine trials consisted of 90-sec. randomized presentations of music and scent during which subjects were encouraged to walk as far as they comfortably could on a premeasured indoor course. The subjects received standard instructions prior to the trials. "You will be asked to listen to a variety of tapes while walking. During these trials, the tape will periodically instruct you to stop walking and place your hands at your sides." Distance was recorded after each of nine trials.

To develop the music samples, experienced staff were surveyed individually for their recommendations about familiar mellow and frenetic vocal music selections with broad-based appeal for this age group. Two unanimously supported selections were "Goodnight Sweetheart" (mellow) and "Beer Barrel Polka" (frenetic) which, along with a white noise control (rolling blank tape), served in random order as the three music conditions. The music was played through headphones, after subjects listened to instructions asking them to adjust the volume to a comfortable level. The various taped music sequences were marked with color-coded dots to prevent experimenters from being aware of the music conditions during the actual trials.

Three sets of scented headphones were randomly used to manipulate the scents; one strongly scented with peppermint concentrate (expected on the basis of previous research to act as a stimulant), one strongly scented with chamomile concentrate (expected to elicit a relaxation response), and one unscented but comparably saturated with water, serving as a control. These headphones were stored in sealed Ziploc bags in which moistened cotton balls were saturated with the appropriate commercially available concentrated scent (available through The Body Shop, Wake Forest, North Carolina, USA). The experimenters wore nose plugs and used color-coded dots to identify the different bags to remain blind to the scent conditions.

Results and Discussion

Multivariate analysis of variance with two repeated factors of music (frenetic, mellow, blank) and scent (peppermint, chamomile, neutral) was performed on distance walked during the nine 90-sec. trials. A significant main effect of music was found ($F_{2,35}=3.18$, $p<.05$), but no significant effect for scent. Informal postexperimental interviews showed that few subjects were aware of scent treatments. Planned *post hoc* tests showed that mean performance during the mellow music conditions was significantly lower than that during white noise and frenetic music conditions, as shown in Table 1.

TABLE 1
Means and Standard Deviations For Distance (Feet) Walked During 90-sec. Trials in Three Music and Three Scent Conditions by 20 Senior Subjects

Music	Scent					
	Peppermint		Chamomile		Neutral	
	M	*SD*	*M*	*SD*	*M*	*SD*
Frenetic (2:8 time)	310.9	100.8	321.0	90.3	320.2	86.8
Mellow (4:4 time)	309.7	99.7	304.0	77.4	313.1	83.3
Control	317.9	87.1	320.9	93.2	320.3	91.0

These data indicated that music significantly influenced distance walked. Compared with the white noise and frenetic music conditions, the mellow music had a negative effect. These results differ from Becker, *et al.*'s (1994) lack of effect for a senior sample. A possible explanation for this discrepancy is that use of generationally appropriate music increased its salience. Spontaneous comments by subjects during and after the trials validated the appropriateness of the musical selections. The negative effect of the mellow music could be due to pacing, i.e., as mellow music was in 4:4 time vs 2:8 time of the frenetic music. However, a lack of positive effect for the frenetic conditions makes this questionable (McElrea & Standing, 1992). The presence or content of the lyrics may have distracted subjects from walking. An explanation for the lack of scent effect is a reduced olfactory function expected with aging or lack of effective presentation. These findings differ from those obtained by Schiffman (1992) who reported significant scent effects among elderly people, so methodological differences may be important here. Schiffman may have used more potent olfactory stimuli than those of the current investigation; however, comments of uninvolved passersby in our experimental area supported the notion that the stimuli were quite strong.

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