THE EFFECTS OF THE TOMATIS METHOD ON FIRST-TIME PREGNANT WOMEN

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The effects of the Tomatis Method on first time pregnant women

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ABSTRACT

The current study evaluated the Tomatis Method (TM) of sensori-neural integration training, on first-time pregnant, married women. A two-group, pre-post treatment design was used. A non-randomized sample of low risk married women in trimester three were recruited and allocated to an experimental (n=12) and a non-intervention control group (n=8) based on their willingness to participate in the TM or not. The experimental group completed 60 half-hour sessions of listening to Mozart music and Gregorian chants through the Electronic Ear (EE), complemented by consultations. Three unanticipated non-completers, one resulting from mid-program birth and two from post-program births preceding post-assessment, reduced the experimental group to nine. Pre-program group equivalence was confirmed in both groups. Post-program results showed practically significant reductions of anxiety, neuroticism and tension, and practically significantly increased satisfaction with life, motherliness and agreeableness in the experimental group. Tension and fatigue increased in the control group. Findings replicated and extended Klopfenstein's (1994) study, by demonstrating significant symptom reduction and enhanced psychological well-being in pregnant women undergoing the TM.

INTRODUCTION

Recent research confirms that initial pregnancy implies a life transition, often constituting a state of crisis and disequilibrium (Bernazzani, Saucier, David & Boregeat, 1997; Parrott & Condit, 1996). Concomitant physiological and psychological factors include mood changes, loss of self-esteem, identification with the maternal role, variable spouse support, and the need to cope with stress, bodily and hormonal changes as well as changing family dynamics (Cameron, Grabill, Hobfoll, Crowther, Ritter & Lavin, 1996; Sugawara, Toda, Shima, Mukai, Sakakura & Kitamura, 1997; Hakulinen, Paunonen, White & Wilson, 1997).

Significantly, anxiety during pregnancy may not only be a function of interpersonal and support contexts, but also of the pregnant women's state of psychological well-being. In this regard it has been found that higher levels of optimism and constructive thinking, a coping capacity separate from formal schooling and intelligence, has been associated with more positive mood states and less anxiety in pregnant women (Epstein & Meier, 1989; Park, Moore, Turner & Adler, 1997). Many studies have attested to increased anxiety, fatigue and depression throughout pregnancy and significant elevations of anxiety in the third trimester (Bernazzani et al., 1997; Cameron et al., 1996; Gotlib, Whiffen, Mount, Milne & Cordy, 1989; Hakulinen et al., 1997; Parrott & Condit, 1996; Rofé, Blittner & Lewin., 1993; Striegel-Moore, Goldman, Garyin & Rodin, 1996; Sugawara et al., 1997). Anxiety and fatigue may be attributed to many factors, including mood changes due to hormonal fluctuations, identification with new maternal roles such as, an increasingly affectionate relationship with the fetus, preparations for the future child, and the

developing image of the child, first at a cognitive fantasy level and then at a concrete level of reality at birth. Prospective mothers may also experience ambivalence around their ability to cope with their infants. At this stage spousal support is very important. Several studies confirmed that the degree of emotional support provided by husbands, and to a certain degree grandmothers to be, significantly impact on the extent to which pregnancy is experienced as a crisis (Collins, Dunkel-Schetter, Lobel & Scrimshaw, 1993; Dimitrovsky, Lev & Itskowitz, 1998; Griffith, 1999; Leifer, 1977; Robinson & Stewart, 1989; Rofé et al., 1993; Zachariah, 1996).

In addition, some investigators have concluded that a pregnant woman's psychological state significantly affects the fetus in utero and possibly even the postnatal maternal-infant relationship. Females experiencing higher levels of tension/anxiety during pregnancy and concomitant higher levels of maternal dependency also reported more difficulties with their infants (Park et al., 1997; Parrott & Condit, 1996; Ronca & Alberts, 1995). Significant escalations of anxiety and ambivalence during pregnancy were also associated with suppressed motherliness, pre-term babies and low birth weights (Brockington, 1996; Bustan & Cocker, 1994; Du Plooy, 1977; Lederman, 1984; Uken, 1976). Commitment, defined as "an internal psychological state in which a person feels tied or connected to someone or something", and especially commitment to pregnancy was also found to be positively correlated with increased motherliness and decreased anxiety (Lydon, Dunkel-Schetter, Cohan & Pierce, 1996, p. 142).

Predictably, researchers are in agreement regarding the importance of assisting pregnant women throughout their pregnancies by providing prenatal care while the fetus is developing, physically and cognitively (Azar, 1997; Shetler, 1989). Existing support

programs range from enrichment of marital relationships, to nutrition, relaxation programs, and physical preparation for the birth experience. According to recent literature, it appears that prenatal programs for prospective mothers are focused on: (i) facilitating the physiological well-being through nutritional inputs, breathing exercises and relaxation, which to some extent also impact on the psychological well-being of prospective mothers (Brockington, 1996; Parrott & Condit, 1996); (ii) enhancing the well-being of unborn babies through nutritional inputs to pregnant women (Azar, 1997; Parrott & Condit, 1996; Shetler, 1989); (iii) fostering the well-being of prospective parents' relationships by marital therapy with pregnant spouses (Collins et al., 1993); and (iv) stimulating cognitive development in the unborn child (Lafuente, 1997; Shetler, 1989; Woodward, 1997).

While these interventions are undoubtedly a valuable means of reducing the risk of both maladaptive development of babies and maternal unpreparedness for labor, it appears that the psychological well-being of pregnant women remains underestimated. In the current global and South African context of hectic living, it appears as if even pregnant women, especially among the white community who mostly hold full-time occupations, allow themselves relatively little time for relaxation and mental preparation for birth, both as individuals and as couples. Furthermore, research has indicated that post-partum depression significantly associated with marital discord is an increasing problem (Misri, Kostaras, Fox & Kostaras, 2000). Women with active eating disorders during pregnancy also appear to be at higher risk for post-partum depression (Franco, Blais, Becker, Delinsky, Greenwood, Andrea, Ekeblad, Eddy & Herzog, 2001). Additionally, the high global incidence of perinatal complications (Niven, 1992) seems suggestive of a need for more focused interventions aimed at enhancing the psychological well-being of

prospective mothers in the hope of at least reducing marital discord during pregnancy, as well as the risk of post-natal infant morbidity and post-partum depression.

In this regard the research of Dr A Alfred Tomatis, a French otolaryngologist, resulted in a "psychology of the ear" (Van Jaarsveld, 1982), including a ground breaking insight in fetal life and a method of enhancing the maternal-fetal bond. Its impact on pregnant women will be evaluated in the current study. However, meaningful elaboration necessitates a brief outline of Tomatis's work.

By researching hearing difficulties in factory workers, Tomatis established that the larynx can only reproduce what the ear can hear (Tomatis, 1963/1996). Further research enabled him to discern a motivational element in auditory perception, i.e. the desire to listen, the basis of communication, which he believed to be crucial in establishing an upright posture, acquiring language and right auditory laterality. By observing and audiometrically assessing stutterers, dyslexic children, psychiatric patients, singers and musicians, he became aware of the highly negative impact of listening deficiencies/resistances to language. From the above he conceptualized a new field of study, called Audio-Psycho-Phonology, based on an interdependence and interaction between a person's hearing and listening potential, control over speech and language and psychological attitude (Tomatis, 1977/1991; 1963/1996).

Concomitant experimentation with electronic filters to correct listening deficiencies ultimately resulted in a method of sensori neural integration training called the Tomatis Method (TM). It involves a process of sound stimulation via headphones and an apparatus called the Electronic Ear, which serves to effect an osteo-muscular conditioning of the

middle ear muscles which reactivates the desire to listen (Tomatis, 1977/1991; 1963/1996). Sound, mostly Mozart music, but also recordings of mothers' voices are used in the process of enabling a client to attain proper listening over and above hearing. The Electronic Ear consists of two channels and an electronic gate, allowing the sound stimuli to pass from a low-pass to a high-pass channel so that lower frequencies are attenuated and higher frequencies amplified and vice versa. The impact of this "miocrogymnastic" is progressive relaxation and enhancement of communication. As the impact of sound on the right ear is gradually increased, the speech area in the left cerebral hemisphere is stimulated to obtain the most efficient processing of speech (Gilmor, 1989; Gilmor et al, 1989; Thompson & Andrews, 1999; Tomatis, 1977/1991). The process is monitored by regular consultations to explain the process and enable the client to take advantage of the change brought about by the stimulation (Neysmith-Roy, 2001).

The Tomatis Method has virtually spread all over the world and stimulated research with diverse client populations. Canadian studies evaluated the TM with learning disabled, dyslexic and autistic children. Results revealed significantly increased: IQ scores, reading skills, specific auditory processing skills, general adjustment and improved communication skills in learning disabled children (Gilmor, 1982). In a study of 5 dyslexic boys Roy and Roy found significant gains in perceptual processing and academic skills (Stutt, 1983). Subsequently a meta-analysis of the findings of these and other studies, resulted in positive effect sizes for the 5 behavioral domains analysed: linguistic (d=0.41), psychomotor (d=0.32), personal and social adjustment (d=0.31), cognitive (d=0.30) and auditory (d=0.04). Though limited by small sample sizes and non-random assignment, it was concluded that "effect sizes favouring children who had participated in the program were consistent with clinicians' reports of beneficial effects (Gilmor, 1999, p. 1). Neysmith-

Roy (2001) also found the TM useful with 6 autistic boys, three of whom improved from a more severe to a less severe category on the Childhood Autism Rating Scale (CARS). The changes brought about were primarily in the prelinguistic areas which could be seen as stepping stones towards human interaction and language development.

Likewise initial South African evaluations of the TM were primarily undertaken in the pathogenic paradigm and centered primarily on reduction of symptomatic behavior involving stuttering (Van Jaarsveld, 1974); anxiety and depression (Peché, 1975; Du Plessis, 1982; Du Plessis & Van Jaarsveld, 1988; Botes, 1979; Coetzee, 2001). More recently studies shifted towards enhancement of psychological well-being, i.e. with musicians (Du Plessis, Burger, Munro, Wissing & Nel, 2001) and combinations of the two paradigms (Coetzee, 2001). Despite favorable outcomes reflected by all these studies, the need for further investigations involving more rigorous study designs and larger samples remains.

The research overview illustrated the applicability of the TM to a spectrum of psychopathological conditions, in tandem with other approaches, as well as its potential to enhance psychological well-being. In the latter category it's application to pregnant women (Tomatis, 1994) is based on two assumptions: (i) a relationship between sound and prenatal life; and (ii) an association between maternal anxiety and prenatal life. Since the early fifties Tomatis has been emphasizing the significance of the maternal-fetal relationship. He asserted that the fetus was able to perceive its mother's voice during pregnancy, as the development and myelinization of the fetal ears is completed 4.5 months before birth, therefore enabling the fetus to perceive the maternal voice from the second trimester onwards (Tomatis, 1977/1991; 1963/1996; 1994). He posited that the maternal-fetal bond evolved from the moment the fetus was able to perceive her voice, and that the

perception of the maternal voice coincided with a desire to communicate, i.e. to listen to her voice (Tomatis, 1972/1978). Although ridiculed when articulating these views (Tomatis, 1977/1991) many researchers have subsequently verified the link between sound and the prenatal perception thereof, including the maternal voice. DeCasper & Fifer's findings (1980) validated Tomatis's assumption that infants have the ability to identify their mothers' voices and showed a preference for stories their mothers read to them before birth. Furthermore DeCasper & Spence (1986, 1991) suggested that prenatal auditory experiences influence the earliest voice preferences as well as postnatal auditory perception. Recently Mastropieri & Turkewitz (1999) found that newborns detected distinctive features characterizing different expressions of emotion by showing an increased arousal to mothers' joyful speech. These findings amplified the significant influence of prenatal auditory experiences on postnatal auditory responsiveness. Hepper (1991) also supported the idea that fetal learning influenced future behavioral and neural development, based on his study in which fetuses responded behaviorally to presentations of familiar stimuli. Postnatally the familiar stimuli elicited attention seeking responses optimal for learning.

An association between anxiety, especially maternal anxiety, and prenatal life emerged as a logical extension of Tomatis's conviction of maternal-fetal communication. When the prospective mother accepted her pregnancy and enjoyed good health, Tomatis argued that her voice would be warm and harmonious and therefore emotionally nourishing. However, should she reject her pregnancy and suffer lesser well-being, possibly even depression, the dominantly low frequency voice might irritate the fetus. Should the unwelcome pregnancy evoke a hysterical state, her voice, likely to be harsh, would also irritate the fetus. In both cases anxiety might be aroused in the fetus, possibly even

impacting postnatally (Tomatis, 1972/1978).

Generally this assertion has been supported by findings indicating that anxiety and even postnatal communication problems have been aroused in cases where prospective mothers experienced extreme apprehension and anxiety during pregnancy (Brockington, 1996; Bustan & Cocker, 1994; Gilmor, 1989; Gilmor, Madaule & Thompson, 1989; Lederman, 1984; Leitch, 1999; Uken, 1976).

Convinced that maternal well-being/anxiety influences the fetus, a rationale for applying the TM with pregnant women emerged in terms of three considerations: (i) escalation of maternal anxiety especially in the course of an initial pregnancy, confirmed independently of Tomatis by numerous researchers, mentioned before; (ii) the likelihood of a relaxation response in pregnant women too, since numerous clients with diverse problems have experienced relaxation during the TM and (iii) the belief that maternal relaxation during pregnancy would also benefit the fetus, because of the close maternal-fetal bond and the fetal capacity to perceive the maternal voice before the third trimester. The ability to perceive high frequency sounds and respond behaviorally to them from the 29th week onwards, has been confirmed by DeCasper & Fifer (1980); Lafuente et al., (1997); Woodward, (1997) and Woodward, Guidozzi, Hofmeyr, De Jong & Woods, (1993). At this stage the ear has reached an advanced state of development and according to DeCasper & Spence (1991) sound can be detected, discriminated and stored from week 32-36 onwards.

Once the TM had been applied to pregnant women, Tomatis indicated advantages for both mother and unborn baby. Maternal relaxation set in, her awareness expanded, heart rate

and breathing slowed down and she became more able to consciously enjoy the growing relationship with her baby. Apparently the fetus also enjoyed more space as the amniotic sac expanded in response to progressive maternal relaxation (Tomatis, 1994). From experimentation a specific application of the TM is currently used to prepare pregnant women for birth. The specific format of the sound stimulation comprises a combination of non-filtered music and Gregorian chants to promote relaxation, some filtered Mozart music to generate energy and eventually the repetition of Gregorian chants, to stimulate the developing fetal nervous system with a well modulated voice.

Despite the popularity of these programs, to date only one evaluation of the impact of the TM with pregnant women could be located, i.e. (Klopfenstein, 1994). Conducted in two French hospitals the study demonstrated the benefits of the TM with pregnant women and their babies. A significant relaxation response occurred among the pregnant women, together with more positive attitudes towards birth. In comparison to infants of the same gestation age, the duration of labor was reduced by about forty-five minutes, a superior birth weight was noted and "Tomatis babies" also seemed to recuperate faster and better than others. The rate of instrumental interventions (forceps, suction-cup) was also reduced.

However, the scientific rigor of the methodology is criticized by the researcher himself (Klopfenstein, 1994). Although the reduction of anxiety and fatigue observed among the participants in the study has been assessed psychometrically, it was not conducted in a research design involving an experimental and a structured control group. Also, variables of vital importance during pregnancy, including maternal psychological well-being, mood state fluctuations, motherliness status and levels of openness and agreeableness (deemed essential for mother-fetus communication) which could possibly be influenced by the TM

have not been adequately assessed either. It was also unclear whether, apart from their equal pregnancy status, the two groups were equal in other respects at pre-program assessment.

Given the limitations of the Klopfenstein (1994) study, the need for a further evaluation of the TM on a group of pregnant women outside of a hospital environment emerged. In addition to possibly replicating the earlier results obtained with pregnant women, the current study assesses the possibility of extending these by possibly indicating an impact on psychological well-being, since the latter is a key concept in a growing body of research, alternatively referred to as positive psychology (Seligman & Csikzentmihalyi, 2000), psychological well-being (Ryff & Keyes, 1995) or psychofortology, the source of identifying and developing strengths (Wissing & Van Eeden, 1994, 1999).

AIMS

The study was aimed at determining whether participation of first-time pregnant married women in the TM would:

(i) reduce neuroticism including anxiety, negative mood states (tension/fatigue); and

(ii) enhance psychological well-being in terms of satisfaction with life, sense of coherence, motherliness, and personality dimensions of openness and agreeableness.

It was hypothesized that participation of first-time pregnant married women in the TM would lead to reduced neuroticism, including anxiety, negative mood states (tension/fatigue) and enhance psychological well-being in terms of satisfaction with life,

sense of coherence, motherliness, openness and agreeableness, while non-participation by a control group of first time pregnant married women would reflect no change in pre-assessment scores.

METHOD

Research design

A two-group, pre-post assessment design was used. This enabled a more rigorous study involving an experimental and control group of first time pregnant women, allocated non-randomly to the experimental group upon expressing a desire to participate in the TM, or to the control group when they were willing to participate in the research without having to attend the TM. Pre-post assessment ensured that groups could be compared at pre-treatment to assess whether the groups were comparable at the outset.

Participants

Participants were recruited through advertisements in the local press, on billboards and by liaising with local gynecologists. Recruitment was based on the following criteria: (i) first time pregnancies among (ii) married women. A non-randomized sample of women were allocated to an experimental group (n=12) and control group (n=8) in terms of their willingness to participate in the TM or not. Three unanticipated non-completers, one resulting from mid-program birth and two from post-program births preceding post-assessment, reduced the experimental group to nine.

Measuring instruments

The following measuring instruments were used:

Profile of Mood States (POMS)

The POMS, a 65-item five-point adjective rating scale was developed as a quick, economical instrument in the assessment of fluctuating affective states (McNair, Lorr & Droppleman, 1992). Six clearly defined POMS factors include Tension-Anxiety (Factor T), Depression-Dejection (Factor D), Anger-Hostility (Factor A), Vigor-Activity (Factor V), Fatigue-Inertia (Factor F) and Confusion-Bewilderment (Factor C). Answers are marked on a 1 to 4 scale, as applicable. A 0 equals "not at all" and a 4 equals "extremely". Answers should indicate how respondents have been feeling during the past week as well as during the day of assessment. Only sub-scale scores are totaled. The ideal profile obtained is known as an Iceberg profile, with factor V (vigor-activity) at the peak and the other factors below. The lower the other factors the better the profile. Reliability indices of 0.90, for all the indices of the extent to which the individual items within the six mood scales measure the same factor are near 0.90 or above (McNair et al., 1992). Reliability indices obtained in the current study are: 0.81 for factor T; 0.89 for factor D; 0.86 for factor A; 0.71 for factor V; 0.91 for factor F; and 0.75 for factor C. These results are consistent with other South African studies on all factors with factor C being slightly higher in comparison (Burger, 1999; Coetzee, 2001; Du Plessis, Burger, Munro, Wissing & Nel, 2001).

The Motherliness Test (MOTH)

A self-evaluating, 72 item questionnaire, measuring motherliness in pregnant women and mothers, comprising ten aspects pertaining to motherliness, including Fulfillment, Self-extension, Ability to give oneself, Agape, Growth, Identity, Attitude towards baby, Protectiveness, Fostering attitude towards others and Ability to give love (Uken, 1976). Each item consists of an introductory statement with two alternative ways of completion. One of the alternatives indicates a high level of motherliness and the other a lower level of motherliness. The test is available in English and Afrikaans and is preceded by clear written instructions. A score of 52 or higher is indicative of high, well-developed motherliness. A score of 40 to 51 is regarded as an average motherliness score and a score of 39 or lower is regarded as low motherliness. Although not psychometrically standardized, Uken (1976) tested its reliability by conducting an item analysis of all 84 items on the initial draft, to determine internal consistency. A Kuder Richardson value of 0,861 was found. After excluding twelve items because of poor correlation with the other ten primary aspects, another item analysis was done. The final form indicated a reliability index of 0,850 (Uken, 1976). In the current study a reliability index of 0.81 was obtained.

NEO Personality inventory revised (NEO PI-R)

The NEO PI-R, a 240-item, self-report scale, developed to measure five dimensions of personality namely: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness, was based on the personality trait theory of Costa & McCrae (1992). The dimensions Neuroticism (N), Openness (O) and Agreeableness (A) were used in the current study. Neuroticism comprises the following sub-scales: anxiety, angry

hostility, depression, self-consciousness, impulsiveness and vulnerability. Agreeableness includes warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions. Openness includes fantasy, aesthetics, feelings, actions, ideas, and value.

Raw scores are obtained for each of the six sub-scales of the five dimensions. Facets are totaled to obtain scores for relevant dimensions. Each sub-scale and dimension can be transferred to normalized t values to obtain normative profiles. Raw scores were used, as the test has not been standardized in South Africa. The NEO PI-R was found to be valid and reliable on a number of different populations (Costa & McCrae, 1992). Reliability indices of the dimensions' range from 0.86 to 0.92 while the reliability of the sub-scales range from 0.56 to 0.81 (Costa & McCrae, 1992). In the current study the reliability indices of the dimensions obtained are: Neuroticism 0.88, Openness 0.65 and Agreeableness 0.79.

Sense of Coherence Scale (SOC)

The SOC, a self-report measure, consisting of 29 items measuring the individual's way of experiencing the world and his/her life in it, is positively correlated with psychological and physiological well-being and negatively with stress symptomatology (Antonovsky, 1987, 1993; Wissing, De Waal & De Beer, 1992; Wissing & Du Toit, 1994).

The SOC encompasses three dimensions, namely: Comprehensibility, a cognitive component, referring to the extent to which individuals perceive the internal and external stimuli that confront them in their lives; Manageability, the instrumental component, defined as the extent to which people perceive resources to be at their disposal and

adequate enough to meet the demands posed by the stimuli; and Meaningfulness, a motivational component, providing the sense that certain areas of life matter and that they are challenges worthy of time and effort. Within the areas about which one cares deeply, the problems and demands posed by living are perceived as challenges rather than burdens. Good validity on the SOC, as well as high levels of reliability, with Cronbach alpha indices ranging from 0.82 to 0.95 (Antonovsky, 1993; Frenz, Carey & Jorgensen, 1993), are consistent with findings by Wissing and Van Eeden (1994) and Wissing and Du Toit (1994) within a South African context, indicating Cronbach alpha indices ranging from 0.85 to 0.91. In the current study a reliability index of 0.93 was obtained.

Satisfaction with Life Scale (SWL)

The SWL, a 5-item self-report scale measuring global life satisfaction, a cognitive judgmental process (Diener, Emmons, Larson & Griffen, 1985), enables subjects to make a global assessment of their quality of life according to their own criteria (Diener et al., 1985). A high score is indicative of high SWL and a low score of low SWL. Its validity and reliability have been confirmed by several studies, that is, reliability indices ranging from 0.79 to 0.89 (Diener et al., 1985; Pavot & Diener, 1993). In the South African study of Wissing and Du Toit (1994) a reliability index of 0.85 was found, and a reliability index of 0.83 was obtained in the current study.

Procedure

Once participants were identified, informed consent was obtained and pre-assessment was conducted. The experimental group then attended the special application of the TM,

designed for pregnant women. It consisted of 60 half hours of listening and consisted of the following: a passive phase, initially comprising unfiltered Mozart concertos, alternated by Gregorian chants, to stimulate relaxation; followed by the phase of "reverse music birth", to prepare their ears for listening to filtered sound. The latter was alternated by unfiltered and densified music, to generate energy. Finally they repeated Gregorian chants via the Electronic Ear, interchanged with unfiltered music, to stimulate the developing fetal nervous system with warm harmonious voices and also energize themselves.

The listening sessions were complemented by regular informal consultations to build rapport, share participant concerns and feelings, as well as informing them about the various program stages. Encouraged to attend, some prospective fathers occasionally accompanied their wives. A workshop offered to the non-intervention control group was declined. Post-assessment followed program completion with an approximate four-week lapse.

RESULTS

Statistical analysis

The SAS/STAT System for Windows release 6,12 (1996) computer software package was used for the statistical analyses. Descriptive statistics (means, standard deviations and range of scores) and Cronbach alpha reliability indices were computed. The significance of differences within groups was computed by means of the Wilcoxon sign rank test, and between groups by means of the Wilcoxon Rank sum test (Cohen, 1977; Steyn, 1999). P-values were not used in this study, because of non-randomization. P-values were,

however, noted together with Cohen's d-values to determine the degree of practical significance between and within groups (Cohen, 1977).

The biographical profiles of the participants are displayed in Table 1.

Table 1 here

From Table 1 a high degree of biographical similarities emerged. Both groups tended to be in the 25-29 year age bracket and were relatively well-educated although more of the experimental group were professionally registered; pregnancies were primarily planned and most had been married for two to three years.

Pre-treatment group equivalence

Since time constraints necessitated a non-randomized availability sample of pregnant women in the experimental and control group, it was important to establish whether the groups were comparable at commencement of the program. Pre-assessment psychometric differences between the experimental and the control group are presented in Table 2.

Table 2 here

The results in Table 2 indicated that there were no practically significant differences between the experimental and control group in the pre-assessment psychometric data. Since both groups were similar on biographical and psychometric data, it could be concluded that the groups were similar and hence comparable at pre-assessment. The study group could be further contextualized in terms of representing a "low-risk" group (Schoon, 2001) since none of the women reported significant physical illnesses, like

diabetes mellitus, hypertension, heart disease or AIDS-related conditions, which would have rendered them "high-risk" pregnancies. Thus they represented the privileged section of the population, most of whom were looked after by gynecologists. The majority of pregnant women, especially African women in the under-served deep rural areas only have access to primary health care and in many cases are only cared for by nursing professionals some of whom are under-trained and hence morbidity and mortality among mothers and their babies are often high.

Statistics

The means, standard deviations, range of scores as well as the Cronbach alpha reliability indices for the experimental and control group at pre-assessment are presented in Table 3.

Table 3 here

Generally speaking, Table 3 indicated acceptable reliability on all scales and/or sub-scales. According to the available literature on the measuring instruments used in this study, these results were comparable. In addition, the reliability indices, means and standard deviations of the scales measuring psychological well-being (SOC, SWLS and POMS) were comparable to other South African groups (Burger, 1999; Coetzee, 2001; Wissing & Du Toit, 1994; Wissing & Van Eeden, 1994).

Pre-post differences within the experimental group on sense of coherence, satisfaction with life, motherliness, and mood states (POMS), neuroticism, openness and agreeableness are presented in Table 4.

Table 4 here

From Table 4 large practical increases in satisfaction with life, motherliness and agreeableness as well as a tendency towards increased vigor were noted in the experimental group, as well as large practical reductions of tension, fatigue and neuroticism.

In Graph 1 the pre-post mean scores of the experimental group on the POMS are presented.

Graph 1 here

Graph 1 indicated the formation of an Iceberg profile obtained as a result of large practical reductions in tension and fatigue and a tendency towards increased vigor.

Pre-post differences within the control group on sense of coherence, satisfaction with life, motherliness, and mood states (POMS), neuroticism, openness and agreeableness are presented in Table 5.

Table 5 here

From Table 5 it emerged that the control group manifested practically significant escalations in tension and fatigue. Tendencies towards increased depression, anger and confusion also occurred, possibly associated with the tendency towards reduced sense of coherence.

In Graph 2 the pre-post mean scores on the POMS of the control group are presented.

Graph 2 here

Graph 2 indicated large practical increases in tension and fatigue and a tendency towards

increased depression, anger and confusion.

Table 6 presents the significant differences between the experimental and control group at post-assessment.

Table 6 here

Table 6 illustrated a tendency towards increased sense of coherence, motherliness levels and vigor in the experimental group, whereas a tendency towards increased tension, depression, anxiety and neuroticism occurred in the control group. These findings confirmed the significant differences within the experimental group reported above.

DISCUSSION

The hypotheses that the participation of first-time pregnant married women in the TM would lead to reduced neuroticism (anxiety) and negative mood states (tension, fatigue) as well as enhanced psychological well-being in terms of satisfaction with life, sense of coherence and increased levels of motherliness, openness and agreeableness, while non-intervention in the control group showed no change, were generally supported. The findings are discussed below.

Reduced neuroticism and negative mood states

In contrast to several findings indicative of elevations in tension and fatigue throughout pregnancy, including a noteworthy rise during the third trimester (Bernazzani et al., 1997; Cameron et al., 1996; Gotlib et al., 1989; Hakulinen et al., 1997; Parrott & Condit, 1996; Rofé et al., 1993; Striegel-Moore et al., 1996; Sugawara et al., 1997), the experimental group achieved large practical reductions in levels of tension, anger and fatigue. The significance of these findings is amplified by the large practical reductions in the neuroticism dimension of the NEO-PI-R, indicative of significantly reduced anxiety, angry hostility, depression, self-consciousness, impulsiveness and vulnerability (Costa & McCrae, 1992). Thus the findings constitute a replication of Tomatis's initial clinical observations and the comparative French study, since anxiety reduction is highlighted by both (Klopfenstein, 1994). Significantly, the control group contrasted themselves by a large practical increase in tension and fatigue, while depression, anger and confusion tended to be higher. Thus their profile was more representative of the "normal" patterns observed during the third trimester, especially regarding elevated depression. Collins et

al., (1993) maintain that depression and especially post-partum depression is correlated with the amount and quality of support women experienced during the prenatal period. Perceived support would thus determine to what extent pregnancy was construed as a crisis. Given the association between post-partum depression and depression during pregnancy (Franco, et al., 2001), the TM could clearly be seen as a significant extension of participants' existing support networks. In view of the significant reductions of tension and anxiety it could also be seen as a stress buffer which would, in all likelihood, reduce the risk of post-partum depression in these highly engaged, ambitious young women. Nonetheless biochemical factors like hormonal changes and premenstrual irritability also associated with pre- and post-partum depression (Cameron et al., 1996; Gotlib et al., 1989; Striegel-Moore et al., 1996; Sugwara et al., 1997) cannot be overlooked.

Finally participants' behavior confirmed their enhanced relaxation, improved sleeping at night and resultant energy increases emerging in creative activities like gardening and painting never engaged in before.

Enhancement of psychological well-being

Unexpectedly, the reduction of neuroticism, including anxiety and negative mood states was complemented by evidence of enhanced psychological well-being in the experimental group of pregnant women. In the course of the listening sessions it was clear that the pregnant participants not only experienced a bodily awareness of anxiety reduction, but a sense of enhanced well-being observable from their animated faces, joyous socializing between sessions and sense of surprise at engaging in all sorts of "new" creative activities. Nevertheless it was still surprising to find that the above samples of "psychological well-being" were in fact confirmed by large practical differences on satisfaction with life;

motherliness; agreeableness and a tendency towards increased vigor.

The significance of these findings clearly surpasses those obtained in the comparative French study since psychological well-being was not specifically assessed.

Although the results cannot be generalized beyond the participants, in view of the small sample, it nonetheless points to the unique impact of the TM on pregnant women and thus confirms assumptions concerning the growth potential inherent in pregnant women espoused by some therapists, including Park et al., (1997) and Striegel-Moore et al., (1996).

Enhanced satisfaction with life was surprising too, since the journey towards birth caused more physical discomfort and attendant difficulties needing to be coped with (Parrot & Condit, 1996). However, it was clear that these women were experiencing a higher level of contentment.

Large practical increases in motherliness included a broad spectrum of aspects, ranging from enhanced fulfillment, self-extension, ability to give oneself, agape love, growth, identity, attitude towards baby, protectiveness, fostering attitude towards others and ability to give love (Uken, 1976). These findings corroborated the findings of other studies which proved that motherliness increases in the first trimester (Robinson & Stewart, 1989), decreases during the second and increases again in the third (Rofé et al., 1993).

Associated responses with enhanced motherliness observed during the TM were: feeling excitement about the unborn infants' responses to different music stimuli used in the TM; daring to read aloud to the baby during daytime breaks as if it was a natural thing to do; detecting excitement in spouses concerning the approaching birth and experiencing positive statements about perceived competence to take care of the new baby.

Significantly, no indications of increased motherliness were noted in the control group. Whether an artifact of their status as members of a non-intervention control group or not,

this finding was remarkable, as it contrasted with the generally accepted notion of motherliness increases during the first and third trimester.

Since levels of motherliness are also associated with commitment (Lydon et al., 1996), and since pre-treatment group equivalence was established for both the experimental and control groups, the results may in all likelihood indicate that the TM provided a growth context benefiting both motherliness and commitment.

The tendency towards increased vigor, a positive mood state confirmed that, despite bodily enlargement and concomitant discomfort, the program had in fact begun to impact on participants' sense of vigor positively, a finding that was generally endorsed as feeling energetic and able to carry out daily chores. Theoretically the results confirmed the findings of earlier studies where, in addition to reduction of negative affect, psychological well-being also became enhanced (Coetzee, 2001; Du Plessis et al., 2001; Rolf, 1998).

Large practical increases in the Agreeableness dimension of the NEO-PIR personality scale further confirmed the enhancement of psychological well-being as it implied significantly higher trust and compliance with others. It might be attributed to increased communication skills attained by attending the program. The TM aims at establishing right ear dominance, for the effective feedback to the speech center in the left-brain. It also prepares the ear to receive incoming sound information (Thompson & Andrews, 1999; Tomatis, 1977/1991). Enhanced agreeableness obviously also clears the ground for marital therapy, should it be required, and again pointed to the efficacy of the TM as a means of facilitating growth during a transitional state.

One of the participants reported a need to contact her mother whom she had not spoken to in years. It resulted in many conversations about the baby and consequently increasing

support from her. The participants generally reported thinking more clearly, arriving at solutions faster, taking more responsibility and being more accepting of people. This might be the result of stimulating the left, more logical, rational brain illustrating the small increase in openness.

Clearly, despite being healthy, enjoying interesting careers, excellent medical and marital support, the TM still benefited the participants, by providing a flexible therapeutic context in which they could relax, reflect on the changes brought about by their pregnancies, deal with significant relationships, vent fears and concerns, and consciously enjoy the tangible responses of their babies, especially to certain sections of the musical stimuli.

Despite the sense of excitement experienced throughout the research and conveyed by the special atmosphere surrounding the pregnant women, future researchers should be alerted to the possibility of unprecedented setbacks, despite precautions in the course of research with pregnant women. For instance, one participant, aged 26, apparently progressing very well, relaxing and steadily confronting her fears of her baby, in view of having always been a high school teacher, suddenly experienced a membrane rupture and, despite being hospitalized immediately, gave birth to her baby at age 6.5 months. It was a small consolation that, in spite of the upheaval, she insisted on playing Mozart to the baby, both before and after birth. Another consolation was that the participant's cousin, a nursing professional, spontaneously informed the researchers about how "strong " the baby's back appeared to be, as it sat up in a very good posture quite early. When her gynecologist was asked whether it could have resulted from traveling 100 km daily, his response was that the sudden birth (one of three occurring in his practice during that particular week) sometimes occured without a clear-cut etiology. In two other cases, medical opinions regarding estimated birth dates were proved inaccurate, resulting in loss of two other participants,

who had just completed the TM but gave birth before post-assessment one week after program completion could be done. The correct explanation for the sudden birth in all three cases will remain elusive, but especially in the last two cases the assumption was made that the onset of birth could have been accelerated since both women reported feeling very relaxed.

CONCLUSIONS

Tomatis's original premises were proved accurate and the hypotheses were supported based on the positive outcomes of the experimental group. This in addition, confirmed the psychological findings of the comparative French study as they pertained to pregnant women. Additionally the results surpassed those of the previous study by confirming enhanced psychological well-being in participants. Given the characteristics of the study group and especially the predominance of professional careers among the experimental group, the results were even more significant as they proved that even in such a competent, highly-engaged group the TM provided a unique stimulation and a context of containment in which psychological preparation for birth could be augmented. Besides the favorable outcome the research design nevertheless manifested several limitations, namely: the results cannot be generalized to all pregnant South African women, because of the modest sample of "low risk" women; and the impact of social support could not be controlled because of non-consistent spousal involvement .

Future researchers might consider to replicate the findings by including larger, culturally diverse samples and especially "high-risk" pregnancies due to maternal disease, for example hypertension, diabetes mellitus, or heart disease. Perceived social support should be controlled by involving spouses systematically. Follow-up investigations should be considered to determine retention effects. Finally the systematic study of development in "Tomatis babies" would add significantly to the value of future research.

REFERENCES

Antonovsky, A. (1987). The structure and properties of the Sense of Coherence Scale. *Social Science and Medicine, 36* (6), 725-733.

Antonovsky, A. (1993). The structure and properties of the Sense of Coherence Scale. *Social Science and Medicine, 42* (3), 634-663.

Azar, B. (1997, Dec). Learning begins even before babies are born, scientists show. *APA Monitor,* p 16-17.

Bernazzani, O., Saucier, J.P., David, H., & Boregeat, F. (1997). Psychosocial factors related to emotional disturbances during pregnancy. *Journal of Psychosomatic research, 42* (4), 391-402.

Botes, C. (1979). *Die gebruik van oudiopsigofonologiese opleiding by drie neuroties depressiewe kliente – 'n dieptestudie.* Ongepubliseerde meestersgraadskripsie, PU vir CHO, Potchefstroom.

Brockington, I. (1996). *Motherhood and mental health.* Great Britain: Somerset.

Burger, S. (1999). *Die effek van 'n gestruktureerde oudiopsigofonologiese program met musikale jong volwassenes.* Ongepubliseerde meestersgraadskripsie, PU vir CHO, Potchefstroom.

Bustan, M.N., & Cocker, A.L. (1994). Maternal attitude toward pregnancy and the risk

of neonatal death. *American Journal of Public Health, 84* (3), 411-414, March.

Cameron, R.P., Grabill, C.M., Hobfoll, S.E., Crowther, J.H., Ritter, C., & Lavin, J. (1996). Weight, self-esteem, ethnicity, and depressive symptomatology during pregnancy among inner-city women. *Health Psychology, 15* (4), 293-297.

Coetzee, O.J. (2001). *The impact of the Tomatis method on depressed young adults.* Unpublished masters thesis (article format), PU for CHE, Potchefstroom.

Cohen, J. (1977*). Statistical power analysis for the behavioural sciences.* (Revised edition). Orlando: Academic Press Incorporated.

Collins, N.L., Dunkel-Schetter, C., Lobel, M., & Scrimshaw, C.M. (1993). Social support in pregnancy: Psychosocial correlates of birth outcomes and postpartum depression. *Journal of Personality and Social Psychology, 65* (6), 1243-1258, Dec.

Costa, P.T., & Mc Crae, R.R (1992). *Revised NEO personality inventory (NEO-PI-R-R) and NEO five factor inventory (NEO FFI) professional manual.* Odessa: Psychological Assessment Resources Inc.

De Casper, A.J., & Fifer, W.P. (1980). Of human bondong: Newborns prefer their mothers' voices. *Science, 208,* 1174-1176.

De Casper, A.J., & Spence, M.J. (1986). Prenatal maternal speech influences newborns' perception of speech sounds. *Infant behaviour and development, 9,* 133-150.

De Casper, A.J., & Spence, M.J. (1991). Auditorily meditated behaviour during the perinatal period: A cognitive view. In M.J. Weiss and P.R. Zelazo, *Newborn attention: biological constraints and the influence of experience.* (pp. 142-176). Norwood, N.J. : Ablex Pub Corp.

Diener, E., Emmons, R.A., Larson, R.J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49* (1), 71-75.

Dimitrovsky, L., Lev, S., & Itskowitz, R. (1998). Relationship of maternal and general self-acceptance to pre- and post partum affective experience. *The Journal of Psychology, 132* (5), 507-516.

Du Plessis, W.F. (1982). *Beangste en nie-beangste eerstejaar dames studente: 'n kliniese-psigologiese verkenning.* Ongepubliseerde doktersgraad, PU vir CHO, Potchefstroom.

Du Plessis, W.F., & Van Jaarsveld, P.E. (1988). Audio-psycho-phonology: A comparative outcome study on anxious primary school pupils. *South African Journal of Psychology, 18* (4), 144-151.

Du Plessis, W.F., Burger, S., Munro, M., Wissing, D.P., & Nel, W. (2001). Multimodal enhancement of culturally diverse, young adult musicians: A pilot study involving the Tomatis Method. *South African Journal of Psychology, 31* (3), 35-42.

Du Plooy, H.A. (1997). *Moederlikheid en angs by borsvoedende en nie-borsvoedende moeders.* Ongepubliseerde meestersgraadskripsie. PU vir CHO. Potchefstroom.

Epstein, S., & Meier, P. (1989). Constructive thinking: A broad coping variable with specific components. *Journal of personality and Social Psychology, 57* (2), 332-349.

Franco, D.L., Blais, M.A., Becker, A.E., Delinsky, S.S., Greenwood, D.N., Andrea, T.F., Ekeblad, E.R., Eddy, K.T., & Herzog, D.B. (2001). Pregnancy complications and neonatal outcomes in women with eating disorders. *The American Journal of Psychiatry, 158* (9), 1461-1460.

Frenz, A.W., Carey, M.P., & Jorgensen, B. (1993). Psychometric evaluation of Antonovsky's Sense of Coherence Scale. *Psychological Assessment, 5* (2), 145-153.

Gilmor, T.M. (1982). *Results of a survey of children's performance on a variety of psychological tests before and after completing the Tomatis program.* Rexdale, Ontario: MDS Health Group Ltd.

Gilmor, T.M., Madaule, P., & Thompson, B. (1989). *About the Tomatis method.* Toronto: The Listening Center Press.

Gilmor, T.M. (1989). The Tomatis Method and the Genesis of Listening. *Pre-and Peri-natal Psychology Journal, 4* (1), 9-26, Fall.

Gilmor, T.M. (1999). The efficiency of the Tomatis Method for children with learning and communication disorders: A meta-analysis. *International Journal of Listening, 13*, 12-23.

Gotlib, I.H., Whiffen, V.E., Mount, J.H., Milne, K., & Cordy, N.I. (1989). Prevalence rates and demographic characteristics associated with depression in pregnancy and the postpartum. *Journal of Consulting and Clinical Psychology, 57* (2), 269-274.

Griffith, W.C. (1999). *Verwagtende egpare se subjektiewe belewenis van die eerste swangerskap.* Ongepubliseerde meestergraadskripsie. PU vir CHO, Potchefstroom.

Hakulinen, T., Paunonen, M., White, M.A., & Wilson, M.E. (1997). Dynamics of families during the third trimester of pregnancy in Southwest Finland. *International Journal of Nursing Studies, 34* (4), 270-277.

Hepper, P.G. (1991). An examination of fetal learning before and after birth. *The Irish journal of Psychology, 12* (2), 95-107.

Klopfenstein, A. (1994). Die Tomatis babys. In A.A. Tomatis, *Klang-welt-mutter-leib* (pp.132-156). Germany: Kosel

Lafuente, M.J., Grifol, R., Segarra, J., Soriano, J., Gorba, M.A., & Montesinos, A. (1997). Effects of the Firstart method of prenatal stimulation on psychomotor development:

The first six months. *Pre- and Perinatal Psychology Journal, 11* (3), 151-162, Spring.

Lederman, R.P. (1984). *Psychosocial adaptation in pregnancy: Assessment of seven dimensions of maternal development.* Englewood Cliffs: New Jersey. 226p.

Leifer, M. (1977). Psychological changes accompanying pregnancy and motherhood. *Genetic Psychology Monographs, 95*, 55-96.

Leitch, D.B. (1999). Mother-infant interaction: achieving synchrony. *Nursing Research, 48* (1), 55-58, Jan-Feb.

Lydon, J., Dunkel-Schetter, C., Cohan, C.L., & Pierce, T. (1996). Pregnancy decision making as a significant life event: A commitment approach. *Journal of Personality and Social Psychology, 71* (1), 141-151.

Mastropieri, D., & Turkewitz, G. (1999) Prenatal experience and neonatal responsiveness to vocal expressions of emotion. *Developmental Psychobiology, 35* (3), 204-214.

McNair, D.M., Lorr, M., & Droppleman, L.F. (1992). *Profile of mood states (POMS) Manual.* California : EdITS.

Misri, S., Kostaras, X., Fox, D., Kostaras, D. (2000). The impact of partner support in the treatment of postpartum depression. *Canadian Journal of Psychiatry, 45* (6), 554-558.

Neysmith-Roy, J. (2001). The Tomatis Method with severely autistic boys: Individual case studies of behavioral changes. *South African Journal of Psychology, 31(1), 19-28.*

Niven, C.A. (1992). *Psychological care for families.* Great Britain: Butterworth Heienmann.

Online Writing Lab. (2002). Using American Psychological Association (APA) format (Updated to 5th edition) Retrieved February 25 2002.

Park, C.L., Moore, P.J., Turner, R.A., & Adler, N.E. (1997). The roles of constructive thinking and optimism in psychological and behavioural adjustment during pregnancy. *Journal of Personality and Social Psychology, 73* (3), 384-592, Sep.

Parrott, R.L., & Condit, C.M. (1996). *Evaluating women's health messages : A resource Book.* U.S.A.: SAGE Publications.

Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological assessment, 5* (2), 164-172.

Pechè, A. (1975). *Die effek van Oudiopsigofonologie op angs. (The effect of Audio-psycho-phonology on anxiety).* Unpublished article, PU vir CHO, Potchefstroom.

Robinson, G.E., & Stewart, D.E. (1989). Motivation for motherhood and the experience

of pregnancy. *Canadian Journal of Psychiatry, 34* (9), 861-865.

Rofé, Y., Blittner, M., & Lewin, I. (1993). Emotional experiences during the three trimesters of pregnancy. *Journal of Clinical Psychology, 49* (1), 3-12.

Rolf, A.S. (1998). *Die evaluering van 'n oudiopsigfonologiese verrykingsprogram vir psigologiese studente.* Ongepubliseerde MA, PU vir CHO, Potchefstroom.

Ronca, A.E., & Alberts, J.F. (1995). Maternal contributions to fetal experience and the transition from prenatal to postnatal life. In J.P. Lecanuet, W.P. Fifer, N.A. Krasnegor and W.P. Smotherman (red.), *Fetal development: A psychobiological perspective* (pp. 331-350). U.S.A.: Lawrence Erlbaum Associates, Inc., Publishers.

Ryff, C.D., & Keyes, C.L.M. (1995). The structure of psychological well-being. *Journal of Personality and Social Psychology, 69*, 719-727.

Schoon, M.G. (2001). Risikogradering in swangerskap. *Geneeskunde/ The Medicine Journal, 43* (8), 44-46, Sep.

Seligman, M.E.P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*, 5-14.

Shetler, D.J. (1989). The inquiry into Prenatal musical experience: A report of the Eastman project 1980 –1987. *Pre-and Peri-natal Psychology Journal, 3* (3), 171-

189, Spring.

Steyn, H.S. (jr.). (1999). Praktiese beduidendheid: Die gebruik van Effekgroottes. Wetenskaplike Bydraes, Reeks B: Natuurwetenskappe nr. 117. Publikasiebeheerkomitee, PU vir CHO, Potchefstroom.

Striegel-Moore, R.H., Goldman, S.L., Garyin, V., & Rodin, J. (1996). A prospective study of somatic and emotional symptoms of pregnancy. *Psychology of Women Quarterly, 20*, 393-408, Sep.

Stutt, H.A. (1983). *The Tomatis method: a review of current research.* Montreal: Mc Gill University.

Sugawara, M., Toda, M.A., Shima, S., Mukai, T., Sakakura, K., & Kitamura, T. (1997). Premenstrual mood changes and maternal mental health in pregnancy and the post partum period. *Journal of Clinical Psychology, 53* (3), 225-232, Apr.

Tomatis, A.A. (1978). *Education and dyslexia.* Fribourg: AIAPP. (Original work published 1972)

Tomatis, A.A. (1991). *The conscious ear.* New York: Station Hill Press. (Original work published 1977)

Tomatis,A.A. (1994) *Klang-welt-mutter-leib.* Germany: Kosel

Tomatis, A.A. (1996). *The ear and language*. Canada: Moulin Publishing (Original work published 1963).

Thompson, B.M., & Andrews, S.R. (1999). The emerging field of sound training: Technologies and methods for impacting human development through sound stimulation. *IEEE Engineering in Medicine and Biology, 18* (2), 86-96, March/ April.

Uken, J.M. (1976). *The psychological changes during pregnancy with special reference to motherliness.* Unpublished master's thesis. UNISA, Pretoria.

Van Jaarsveld, P.E. (1974). *Hakkel en 'n waardering van die tegniek van Tomatis by die remediëring daarvan. (Stuttering and an evaluation of the technique of Tomatis with the remedy thereof).* Unpublished Dphil, PU vir CHO, Potchefstroom.

Van Jaarsveld, P.E. (1982). *The new psychological theory of Tomatis.* Unpublished article, PU for CHE, Potchefstroom.

Van Jaarsveld, P.E., & Du Plessis, W.F. (1988). Audio-Psycho-Phonology at Potchefstroom : a review. *South African Journal of Psychology, 18* (4), 136-143, Dec.

Wissing, M.P., De Waal, M., & De Beer, I. (1992, July, 19-24). *Sense of coherence (SOC) and stress symptomology (SS).* Paper presented at the 25th International Congress of Psychology, Brussels, Belgium.

Wissing, M.P., & Du Toit, M.M. (1994, July, 17-22). *Relations of the NEO-PI-R dimensions (NEO-FFI) to Sense of Coherence (SOC) and other measures of psychological well-being.* Paper presented at the 23rd International Congress of Applied Psychology, Madrid, Spain.

Wissing, M.P., & Van Eeden, C. (1994, July, 17-22). *Psychological well-being: Measurement and construct clarification.* Paper presented at the 23rd International Congress of Applied Psychology, Madrid, Spain.

Wissing,M.P., & Van Eeden, C. (1999). Facing the challenge to explicate mental health salutogenically: Sense of coherence and psychological well-being. In R. Roth (Eds.), *Psychologists facing the challenge of a global culture with human rights and mental health.* Lengerich: Pabst Science Publishers.

Woodward, S.C., Guidozzi, F., Hofmeyr, J., De Jong, J.A., & Woods, D. (1993). Indications for the therapeutic use of music in the pre-peri and postnatal periods. *South African Journal of music therapy, 10* (3), 14-22.

Woodward, S. (1997). Practical pre- and postnatal therapeutic stimulation: a brief guide for parents and caregivers. *South African Journal of Music Therapy, 15* (2), 8-11. Sep.

Zachariah, R. (1996). Predictors of psychological well-being of women during pregnancy: replication and extension. *Journal of Social Behaviour and*

Personality, 42 (4), 127-140.

Table 1 Biographical profile of participants

	EG 9	CG 8	EG %	CG %	Total %
AGE					
20–24	0	3	0	37.5	18.75
25–29	7	3	77.78	37.5	57.64
30–34	1	2	11.11	25	18.06
35–39	1	0	11.11	0	5.55
LEVEL OF EDUCATIONAL ATTAINMENT					
Std 10	2	4	22.22	50	36.11
Diploma	1	3	11.11	37.5	24.30
Degree	6	1	66.66	12.5	39.58
PROFESSIONAL REGISTRATION					
	7	1	77.77	12.5	45.14
YEARS MARRIED					
0–1	0	1	0	12.5	6.25
1–2	0	3	0	37.5	18.75
2–3	7	2	77.77	25	51.38
3–4	1	1	11.11	12.5	11.81
4–5	0	0	0	0	0
Over 5	1	1	11.11	12.5	11.81

PREGNANCY					
Planned	7	6	77.77	75	76.39
Unplanned	2	2	22.22	25	23.61

Note: EG – Experimental Group; CG- Control Group

Table 2 Significant differences between experimental group (EG) and control group (CG) at pre-assessment

(a) Variable	EG N=9	CG N=8		
	M	**M**	**P**	**d**
SOC	148.7	134.4	0.1479	0.341 ♦
SWLS	26.4	26.0	0.8461	0.045
MOTH	53.2	46.4	0.0662	0.433 ♦
POMS T	12.7	12.25	0.9615	0.010
POMS D	9.0	10.4	0.9616	0.012
POMS A	9.1	7.1	0.3096	0.240 ♦
POMS V	14.8	15.5	0.9231	0.023
POMS F	8.1	8.0	0.6292	0.114
POMS C	9.1	10.3	0.7336	0.080
NEO PI-R N	82.0	96.1	0.1627	0.329 ♦
NEO PI-R O	117.4	117.5	0.8852	0.034
NEO PI-R A	123.9	112.5	0.1489	0.340 ♦

Note: M – Mean, P – Statistical Significance: Wilcoxon Signed Rank Test, d – Practical Significance: Wilcoxon Test, SOC – Sense of Coherence Scale, SWLS – Satisfaction with Life Scale, MOTH – Motherliness Test Total, POMS T – Profile of Mood States Scale: Tension Component, POMS D – Profile of Mood States Scale: Depression Component, POMS A – Profile of Mood States Scale: Anger Component, POMS V – Profile of Mood States Scale: Vigor Component, POMS F – Profile of Mood States Scale: Fatigue Component, POMS C – Profile of Mood States Scale: Confusion Component, NEO PI-R N – Neo Personality Inventory: Neuroticism Dimension, NEO PI-R O – Neo Personality Inventory: Openness Dimension & NEO PI-R A – Neo Personality Inventory: Agreeableness Dimension

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

◆ d = 0.2–Small practical significance

◆◆ d = 0.5–Medium practical significance

◆◆◆ d = 0.8–Large practical significance

Table 3 Comparison of means, standard deviations, range of scores and Cronbach alpha reliability indices between experimental group (EG) and control group (CG) at pre-assessment

	EG (N=9)				CG (N=8)			
Variable	**M**	**SD**	**Range Min – Max**	**(α)**	**M**	**SD**	**Range Min-Max**	**(α)**
SOC	148.7	18.3	115.00-173.00	0.93	134.4	27.0	91.00-186.00	0.93
SWLS	26.4	5.4	17.00-35.00	0.83	26.0	5.4	18.00-35.00	0.83
MOTH	53.2	2.7	49.00-58.00	0.81	46.4	7.1	38.00-55.00	0.81
POMS T	12.7	3.4	7.00-18.00	0.81	12.3	9.3	2.00-27.00	0.81
POMS D	9.0	7.9	2.00-26.00	0.89	10.4	10.8	0.00-33.00	0.89
POMS A	9.1	4.6	2.00-15.00	0.86	7.1	7.9	0.00-19.00	0.86
POMS V	14.8	4.7	5.00-21.00	0.71	15.5	5.0	9.00-24.00	0.71
POMS F	8.1	3.3	5.00-14.00	0.91	8.0	8.9	0.00-23.00	0.91
POMS C	9.1	2.8	6.00-14.00	0.75	10.3	6.5	5.00-22.00	0.75
NEO PI-R N	82.0	12.1	67.00-97.00	0.88	96.1	29.8	49.0-144.00	0.88
NEO PI-R O	117.4	12.3	95.00-134.00	0.65	117.5	19.2	94.00-142.00	0.65
NEO PI-R A	123.9	11.7	107.00-144.00	0.79	112.5	23.0	92.00-154.00	0.79

Note: M – Mean, SD – Standard Deviation, α - Cronbach Alpha, SOC – Sense of Coherence Scale, SWLS – Satisfaction with Life Scale, MOTH – Motherliness Test Total, POMS T – Profile of Mood States Scale: Tension Component, POMS D – Profile of Mood States Scale: Depression Component, POMS A – Profile of Mood States Scale: Anger Component, POMS V – Profile of Mood States Scale: Vigor Component, POMS F – Profile of Mood States Scale: Fatigue Component, POMS C – Profile of Mood States Scale: Confusion Component, NEO PI-R N – Neo Personality Inventory: Neuroticism Dimension, NEO PI-R O – Neo

Personality Inventory: Openness Dimension & NEO PI-R A – Neo Personality Inventory: Agreeableness Dimension

Table 4 Significant pre- post differences within the experimental group

Variable (N=9)	M	SD	Median	p	d
SOC	5.67	14.26	1.00	0.2500	0.397 ♦
SWLS	3.22	3.27	2.0	0.0156 ***	0.99 ♦♦♦
MOTH	2.77	2.48	2.0	0.0156 ***	1.116 ♦♦♦
POMS T	-3.11	3.68	-1.0	0.0313 ***	-0.842 ♦♦♦
POMS D	-3.66	7.90	-1.0	0.2344	-0.464 ♦
POMS A	-2.66	5.39	-4.0	0.1875	-0.495 ♦
POMS V	4.78	7.69	4.0	0.0938	0.621 ♦♦
POMS F	-2.56	2.56	-2.0	0.0156 ***	-1.0 ♦♦♦
POMS C	-1.67	3.80	-1.0	0.2656	-0.439 ♦
NEO PI-R N	-10.33	11.80	-9.0	0.0234 ***	-0.875 ♦♦♦
NEO PI-R O	1.89	5.75	4.0	0.4141	0.328 ♦
NEO PI-R A	5.67	6.76	6.0	0.0469 ***	0.838 ♦♦♦

Note: M – Mean, SD – Standard Deviation, P – Statistical Significance: Wilcoxon Signed Rank Test, d – Practical Significance: Wilcoxon Test, SOC – Sense of Coherence Scale, SWLS – Satisfaction with Life Scale, MOTH – Motherliness Test Total, POMS T – Profile of Mood States Scale: Tension Component, POMS D – Profile of Mood States Scale: Depression Component, POMS A – Profile of Mood States Scale: Anger Component, POMS V – Profile of Mood States Scale: Vigor Component, POMS F – Profile of Mood States Scale: Fatigue Component, POMS C – Profile of Mood States Scale: Confusion Component, NEO PI-R N – Neo Personality Inventory: Neuroticism Dimension, NEO PI-R O – Neo Personality Inventory: Openness Dimension & NEO PI-R A – Neo Personality Inventory: Agreeableness Dimension

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

- ♦ d =0.2–Small practical significance
- ♦♦ d =0.5–Medium practical significance
- ♦♦♦ d =0.8–Large practical significance

Table 5 Significant pre-post differences within the control group

Variable (N=8)	M	SD	Median	p	(b) d
SOC	-9.75	14.12	-10.00	0.1094	-0.690 ◆◆
SWLS	-0.875	5.19	-1.0	0.5469	-0.169
MOTH	-0.25	2.76	-0.5	0.7813	-0.090
POMS T	4.87	4.42	5.5	0.0313 *	1.104 ◆◆◆
POMS D	7.25	9.77	5.5	0.0781	0.741 ◆◆
POMS A	5.37	8.10	2.0	0.1563	0.663 ◆◆
POMS V	-2.75	6.04	-3.5	0.2656	-0.455 ◆
POMS F	3.63	4.34	3.5	0.0625	0.836 ◆◆◆
POMS C	1.5	2.27	1.0	0.1875	0.66 ◆◆
NEO PI-R N	1.63	8.95	4.0	0.7188	0.181
NEO PI-R O	-2.75	14.37	-7.0	1.0000	-0.191
NEO PI-R A	-1.653	9.29	-0.5	0.7031	-0.175

Note: M – Mean, SD – Standard Deviation, P – Statistical Significance: Wilcoxon Signed Rank Test, d – Practical Significance: Wilcoxon Test, SOC – Sense of Coherence Scale, SWLS – Satisfaction with Life Scale, MOTH – Motherliness Test Total, POMS T – Profile of Mood States Scale: Tension Component, POMS D – Profile of Mood States Scale: Depression Component, POMS A – Profile of Mood States Scale: Anger Component, POMS V – Profile of Mood States Scale: Vigor Component, POMS F – Profile of Mood States Scale: Fatigue Component, POMS C – Profile of Mood States Scale: Confusion Component, NEO PI-R N – Neo Personality Inventory: Neuroticism Dimension, NEO PI-R O – Neo Personality Inventory: Openness Dimension & NEO PI-R A – Neo Personality Inventory: Agreeableness Dimension

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

- ♦ d = 0.2–Small practical significance
- ♦♦ d = 0.5–Medium practical significance
- ♦♦♦ d = 0.8–Large practical significance

Table 6 Significant differences between experimental group (EG) and control group (CG) at post-assessment

Variable	EG N=9	CG N=8		
	M	**M**	**P**	**d**
SOC	154.33	124.63	0.0232 *	0.536 ◆◆
SWLS	29.77	25.13	0.0377 *	0.489 ◆
MOTH	56.0	46.13	0.0173 *	0.562 ◆◆
POMS T	9.6	17.13	0.0027 **	-0.70 ◆◆
POMS D	5.3	17.63	0.0299 *	-0.512 ◆◆
POMS A	6.4	12.5	0.0336 *	-0.501 ◆◆
POMS V	19.6	12.8	0.0338 *	0.500 ◆◆
POMS F	5.6	11.6	0.0067 **	-0.639 ◆◆
POMS C	7.4	11.8	0.0516	-0.459 ◆
NEO PI-R N	71.7	97.75	0.0298 *	-0.513 ◆◆
NEO PI-R O	119.3	114.8	0.4403	0.182
NEO PI-R A	129.6	110.9	0.1115	0.375 ◆

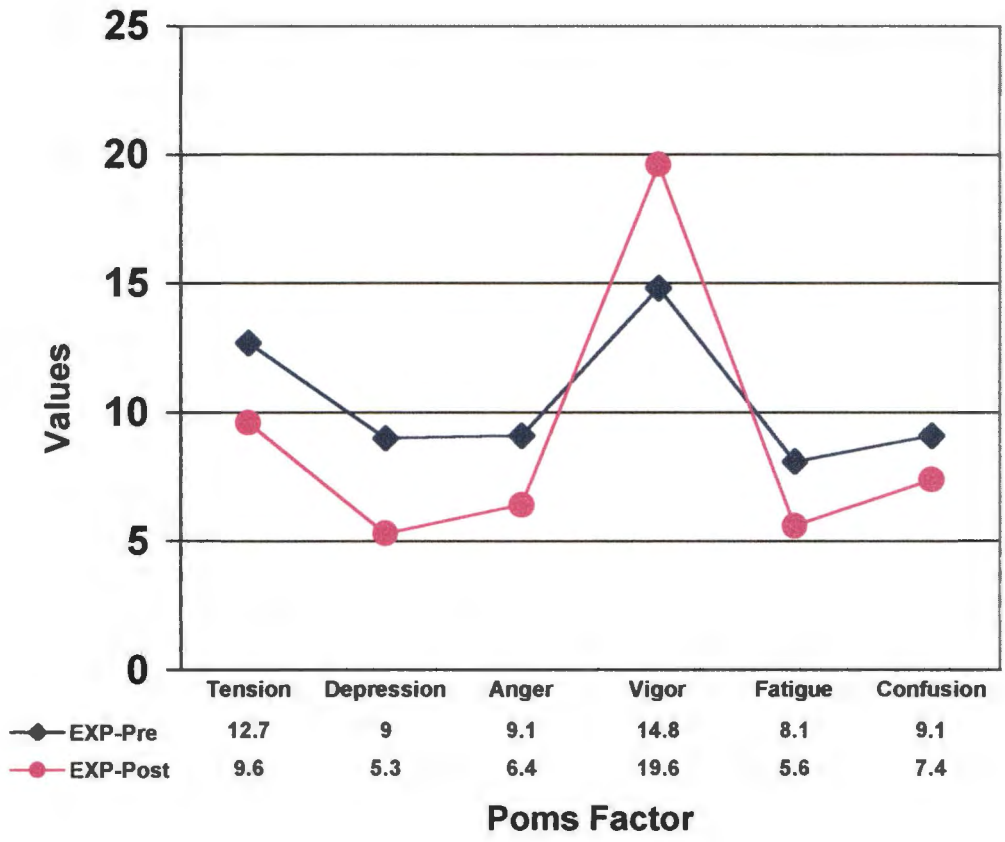
Note: M – Mean, P – Statistical Significance: Wilcoxon Signed Rank Test, d – Practical Significance: Wilcoxon Test, SOC – Sense of Coherence Scale, SWLS – Satisfaction with Life Scale, MOMTH – Motherliness Test Total, POMS T – Profile of Mood States Scale: Tension Component, POMS D – Profile of Mood States Scale: Depression Component, POMS A – Profile of Mood States Scale: Anger Component, POMS V – Profile of Mood States Scale: Vigor Component, POMS F – Profile of Mood States Scale: Fatigue Component, POMS C – Profile of Mood States Scale: Confusion Component, NEO PI-R N – Neo Personality Inventory: Neuroticism Dimension, NEO PI-R O – Neo Personality Inventory: Openness

Dimension & NEO PI-R A – Neo Personality Inventory: Agreeableness Dimension

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

- ◆ d = 0.2–Small practical significance
- ◆◆ d = 0.5–Medium practical significance
- ◆◆◆ d=0.8–Large practical significance

Graph 1 : POMS: Pre-post-program mean scores within the experimental group(n=9)



Graph 2: POMS: Pre-post-program mean scores within the control group(n=8)